ISO 9001, 14001 & OHSAS 18001
CERTIFIED COMPANY

Technical Plant : E-442, Riico Industrial Area
Chopanki (Bhiwadi) 301707 (Raj.)
Telefax : 01493 - 298189 - 91

insecticides (INDIA) LIMITED

January 06, 2020 **BY HAND DELIVERY/RPAD**

To,
The Member Secretary (Industry-II)
Ministry of Environment, Forest & Climate Change,
Government of India,
Indira Paryavarn Bhavan,
Aliganj, Jor Bagh Road,
New Delhi – 110 003

SUB: **ADDITIONAL INFORMATION FOR ENVIRONMENT CLEARANCE FOR PROPOSED EXPANSION OF PESTICIDES TECHNICAL PRODUCTS (FROM 1800 MT/ANNUM TO 9350 MT/ANNUM) IN EXISTING UNIT AT PLOT NO. E-442, 443 & 444, RIICO INDUSTRIAL AREA, CHOPANKI, BHIWADI, DIST: ALWAR – 301 707, RAJASTHAN, INDIA, OF M/s. INSECTICIDES INDIA LIMITED**

CATEGORY: **A-5(b) UNIT LOCATED WITHIN NOTIFIED INDUSTRIAL AREA**

REF: **MINUTES OF THE 14th MEETING OF THE EXPERT APPRAISAL COMMITTEE FOR ENVIRONMENTAL APPRAISAL OF INDUSTRY-2 SECTOR PROJECTS CONSTITUTED UNDER EIA NOTIFICATION, 2006, HELD DURING NOVEMBER 20-22, 2019**

KIND ATTN.: DR. R. B. LAL

Dear Sir,

This has reference to the above mentioned subject matter. We are submitting herewith additional information as required by you for Proposed Expansion of Pesticides Technical Products (From 1800 MT/Annum To 9350 MT/Annum) in Existing Unit at Plot No. E-442, 443 & 444, RIICO Industrial Area, Chopanki, Bhiwadi, Dist: Alwar – 301 707, Rajasthan, India, of M/S. Insecticides India Limited [Industrial Sector Project-Category: A- 5 (b)].

Due to technical reasons on Parivesh portal, we have not been able to upload our Additional Details Sought by yourself on website; and therefore we are mailing you the Additional Details Sought in the 14th meeting of the Expert Appraisal Committee for Environmental Clearance of our unit held on 22nd November, 2019

We hope you would find the same in order and oblige us by granting EC.

Thanking you.
Yours faithfully,

For INSECTICIDES INDIA LIMITED

AUTHORIZED SIGNATORY

Sr. No.	Query Raised	Query Reply Given	Page No.
1.	EIA report to be revised as per the terms of reference granted for the project, and shall conform to Appendix III of the EIA Notification, 2006.	EIA Report is revised and prepared as per the terms of reference granted for the project, and conforms to the Appendix III of the EIA Notification, 2006. Revised EIA Report with Form-2 is attached with Additional Information file.	--
2.	EAC noted that PP has not submitted adequately TOR compliance and PP needs to be resubmit the TOR compliance adequately.	EIA Report is revised and TOR compliance is adequately prepared. Revised EIA Report with adequate TOR Compliance with Form-2 is attached with Additional Information file.	--
3.	Action plan in view of the project site being in Critically Polluted Area.	Action plan in view of the project site being in Critically Polluted Area is attached as **Annexure-1**.	4-6
4.	PP needs to prepare the species specific conservation plan for schedule-I species along with budgetary allocation and PP to take approval for the Wildlife conservation and management plan from CWLW State Government.	Species specific conservation plan for schedule-I species along with budgetary allocation is attached as **Annexure-2**.	7-12
5.	Details of courts/NGT cases, if any, on the project area or against the project proponent.	There was 1 NGT Case (Manveer vs CPCB & Ors. dated 05/12/2018) in the project area and is attached as **Annexure-3.**	13-14
6.	Details of existing production with supporting documents.	Details of existing production with supporting documents is attached as **Annexure-4.**	15-18
7.	Considering complaint against the project proponent regarding production without prior permission, pollution etc, report from SPCB and CPCB on the factual status.	Report from SPCB and CPCB against the project proponent regarding production without prior permission, pollution etc, on the factual status is attached as **Annexure-5.**	19-20
8.	Revised water balance with details of total water and fresh water requirement, and permission from concerned regulatory authority.	Revised water balance with details of total water and fresh water requirement, and permission from concerned regulatory authority is attached as **Annexure-6.**	21-23

9.	Effluent treatment mechanism with plan for Zero Liquid Discharge.	Total raw water requirement will be is 188.0 KL/day. Total waste water generation will be 136 KL/Day. Total effluent will be treated in Stripper, MEE and ETP and 126 KL/Day final treated effluent will be recycled for industrial operations. Hence our Unit is Zero Liquid Discharge Unit. Effluent treatment mechanism with plan for Zero Liquid Discharge is attached as **Annexure-7.**	24-29
10.	Onsite emergency plan as per MSIHC Rules.	Onsite emergency plan as per MSIHC Rules is attached as **Annexure-8.**	30-43

Annexure-1

Action plan in view of the project site being in Critically Polluted Area

Sr. No.	Environment	Mitigation Measures	Measures to be taken
1.	Air	(i) Stack emission levels should be stringent than the existing standards in terms of the identified critical pollutants	Adequate stack height of 30 m is provided with Boiler and stack emission levels will be stringent than the existing standards as prescribed by CPCB.
		(ii) CEMS may be installed in all large/ medium red category industries (air polluting) and connected to SPCB and CPCB server.	We have already installed CEMS for Boiler and connected to SPCB and CPCB server. In expansion scenario also we will install CEMS for Boiler and will be connected to SPCB and CPCB server.
		(iii) Effective fugitive emission control measures should be imposed in the process, transportation, packing, etc.	Measures to control fugitive emissions. (i) Airborne dust at all transfers operations/ points will be controlled either by spraying water or providing enclosures. (ii) Adequate ventilation will be provided. (iii) Regular maintenance of valves, pumps, flanges, joints and other equipment will be done to prevent leakages and thus minimizing the fugitive emissions of VOCs. (iv) Entire process will be carried out in the closed reactors with proper maintenance of pressure and temperature. (v) Periodic monitoring of work area will be carried out to check the fugitive emission. (vi) To eliminate chances of leakages from glands of pumps, mechanical seal will be provided at all solvent pumps. (vii) For dust emissions bag filter will be provided. (viii) Dedicated scrubber will be provided are used for fugitive emissions to control. (ix) Regular inspection of floating roof seals and proper preventive maintenance of roofs and seals for tanks. (x) Close feeding system will be provided for centrifuges. Centrifuge and filtrate tank vents will be connected to vent chillers.
		(iv) Transportation of material by rail/ conveyor belt, wherever feasible.	Not Applicable, all the local raw material will be transported by road and imported materials will be transported by sea and then the material shall reach the site by road.
		(v) Encourage use of cleaner	(i) We have proposed for using Briquettes as fuel

		fuels (pet coke/ furnace oil/ LSHS may be avoided).	because of non-availability of Natural Gas in Chopanki area and will provide Multi-Cyclone Separator with Bag Filter and Scrubber as APCM for the Boiler using Briquettes as fuel. (ii) Provision of Adequate Scrubbers to control process gas emissions.
		(vi) Best available technology may be used. For example, usage of EAF/ SAF/ IF in place of Cupola furnace. Usage of Supercritical technology in place of sub-critical technology.	Not Applicable as we are not using any furnace.
		(vii) Increase of green belt cover by 40% of the total land area beyond the permissible requirement of 33%, wherever feasible.	Increase in green belt to 4784 m^2 (40%) from 4000 m^2 (33%) of the total area of 11958 m^2.
		(viii) Stipulation of green belt outside the project premises such as avenue plantation, plantation in vacant areas, social forestry, etc.	We have planted green belt outside the premises within the periphery of the project site.
		(ix) Assessment of carrying capacity of transportation load on roads inside the industrial premises. If the roads required to be widened, shall be prescribed as a condition.	We have well developed 8-9 m width roads for carrying transportation load and there is no requirement of road widening and moreover the site is located within notified industrial area of RIICO having well developed road infrastructure.
2.	Water	(i) Reuse/ recycle of treated wastewater, wherever feasible.	Total raw water requirement will be is 188.0 KL/day. Total waste water generation will be 136 KL/Day. Total effluent will be treated in Stripper, MEE and ETP and 126 KL/Day final treated effluent will be recycled for industrial operations. Hence our Unit is Zero Liquid Discharge Unit.
		(ii) Continuous monitoring of effluent quality/ quantity in large and medium Red Category Industries (water polluting).	We have installed TOC analyzer, pH meter & flow meter for Continuous monitoring of effluent quality/ quantity in our plant and is connected to SPCB and CPCB server.
		(iii) A detailed water harvesting plan may be submitted by the project proponent.	Rain water harvesting is not possible in pesticide industries. Company has made the storm water drainage to collect rain water and also made guard pond for rain water then company shall check the pH and COD value of rain water. If result of rain water will find within norms, then company will utilize the

			rain water in plant premise otherwise it will be sent to ETP for further treatment.
		(iv) Zero Liquid discharge wherever techno-economically feasible.	Total waste water generation will be 136 KL/Day. Total effluent will be treated in Stripper, MEE and ETP and 126 KL/Day final treated effluent will be recycled for industrial operations. Hence our Unit is Zero Liquid Discharge Unit.
		(v) In case, domestic waste water generation is more than 10 KLD, the industry may install STP.	Domestic wastewater (7 KL/Day) will be sent to septic tank and then mixed with industrial effluent in ETP for further treatment and then will be re-used within premises.
3.	Land	(i) Increase of green belt cover by 40% of the total land area beyond the permissible requirement of 33%, wherever feasible.	Increase in green belt to 4784 m^2 (40%) from 4000 m^2 (33%) of the total area of 11958 m^2.
		(ii) Stipulation of green belt outside the project premises such as avenue plantation, plantation in vacant areas, social forestry, etc.	We have planted green belt outside the premises within the periphery of the project site.
		(iii) Dumping of waste (fly ash, slag, red mud, etc.) may be permitted only at designated locations approved by SPCBs/ PCCs.	We will send the generated hazardous waste to RSPCB approved TSDF/ CHWIF site of M/s. UCCI, Udaipur.
		(iv) More stringent norms for management of hazardous waste. The waste generated should be preferably utilized in co-processing.	We will explore the possibility for disposal of waste generated to be preferably utilized in co-processing.
4.	Other Conditions (Additional)	(i) Monitoring of compliance of EC conditions may be submitted with third party audit every year.	Monitoring of compliance of EC conditions will be submitted with third party audit every year.
		(ii) The % of CER may be at least 1.5 times the slabs given in the OM dated 01.05.2018 for SPA and 2 times for CPA in case of Environment Clearance	We will contribute 2 % of the proposed project cost (2 times % of CER as per OM dated 01.05.2018) for socio economic development activities for 2 year.

Annexure-2

Species specific conservation plan for schedule-I species along with budgetary allocation

ISO 9001, 14001 & OHSAS 18001
CERTIFIED COMPANY

Technical Plant : E-442, Riico Industrial Area
Chopanki (Bhiwadi) 301707 (Raj.)
Telefax : 01493 - 298189 - 91

insecticides (INDIA) LIMITED

January 02, 2020

BY HAND DELIVERY/RPAD

To,
The District Forest Officer
District Alwar
Rajasthan

SUB: Our proposal for Species specific conservation plan for schedule I species along with budgetary allocation for our project site located at plot no. E-442,443,444, RIICO Industrial Area, Chopanki, Bhiwadi, dist: Alwar (Rajasthan) – 301 707 of M/s Insecticides India Limited

Respected Sir,

Our meeting for proposed expansion of Pesticides Technical Products from 1800 MT/Annum to 9350 MT/Annum was held in 14th Meeting of the Expert Appraisal Committee for Environmental Appraisal of Industry-2 Sector Projects constituted under EIA Notification, 2006, held on November 22, 2019 at MoEF&CC, New Delhi.

As per the Minutes of Meeting for the same, we want to submit our proposal for Species specific conservation plan for schedule-I species along with budgetary allocation for our project site located at plot no. E-442,443,444, RIICO Industrial Area, Chopanki, Bhiwadi, dist: Alwar (Rajasthan) – 301 707 of M/s Insecticides India Limited (Point number 4 of minutes of meeting).

We request you kindly to approve our proposal for our project.

Thanking you.
Yours faithfully,

For INSECTICIDES INDIA LIMITED

02/01/2020

AUTHORIZED SIGNATORY

03-01-2020

Details of Presence of Schedule-I species

Study Area: M/s. Insecticide India Limited, RIICO Ind. Area, Chaupanki, Dist: Alwar, Rajasthan

a) Whether there is presence of schedule-I species?

The Schedule- I species as per Wildlife Protection Act -1972 are:

Mammals					
Sr No	**Common Name**	**Scientific Name**	**Local Name**	**IUCN Status**	**WPA Schedule**
1	Leopard	Pantherapardus	Baghera, Tendua	VU	I
2	Black Buck	Antilopecervicapra	Kala Hiran	LC	I
3	Indian gazelle OR Chinkara	Gazellabennettii	Chinkara	LC	I
4	Four horned antelope	Tetracerusquadricornis	Bhedal	VU	I
Birds					
1	Raj Giddh	Red – Headed Vulture	Sarcogypscalvus	CR	I
2	Giddh, BangaliGiddh	White backed vulture	Gyps bengalensis	CR	I
3	Mor, Mayur	Indian Peafowl	Pavocristatus	LC	I
4	SarpBhakshiGarud	Short-toed snake eagle	Circaetusgallicus	LC	I
5	Kapasi	Black-shouldered kite	Elanusaxillaris	LC	I
6	MadhuBaaj	Oriental honey buzzard	Pernisptilorhynchus	LC	I
Reptiles					
1	KachhuvaTalabka	Indian mud turtle	Lissemyspunctata	LC	I
2	Ajgar	Indian python	Python molurus	LC	I

Conservation Plan for Schedule – I species documented from project site

Introduction

A detailed field survey was carried out for complete documentation of floral as well as faunal biodiversity for the core zone which is at Project site and the buffer zone which is 10 km aerial circular area from the project site. White Backed Vulture and Indian Peafowl were recorded from the study area belongs to Schedule – I of the Wildlife Protection Act – 1972. Following are species wise conservation plans and also generalized measures for their conservation.

- **White Rumped Vulture (Gyps bengalensis)**

Scientific classification

Kingdom: Animalia
Phylum: Chordata
Class: Aves
Order: Accipitriformes
Family: Accipitridae
Genus: *Gyps*
Species: ***G. bengalensis***

Binomial name

Gyps bengalensis

Conservation Measures

Direct and indirect approach is required to provide effective conservation, which is recommended as under:

1. Increasing the tree cover in the study area which will provide habitat and roosting and nesting the vulture and it require big trees so the conservation of such big trees is also equally essential.
2. This can be achieved by planting of trees (a group of trees that grow close together, generally without many bushes or other plants) in buffer area. By encouraging people for plantation of some local species such as Neem, Shirish, Khakhro, Haldu, Amli, Banyan, Peepal and Peeper or other *Ficus sp.* Vacant places such as edges of agricultural fields, village Gauchar, Panchayat's common land, neighbourhood of people inhibiting, road side avenue tree plantation, open scrubs, ravines, school compounds can be selected for practicing the plantation activity.
3. Awareness programmes (community and school level) for conservation of Vulture in the study area and also through organizing Presentations, competitions during "Wildlife Week" and "Van Mahotsav" celebrations by active involvement of local community. People should make aware of benefits of vulture as it act as natural cleaner as it feed on dead Caracas. People also should make aware of negative effects of uses of Diclofenac as veterinary treatments and It has been suggested that Meloxicam (another NSAID) as a veterinary substitute that is harmless to vultures would help in the recovery.
4. Some provision of rewards to informers for the control of poaching and illegal trade in wildlife.
5. Carrying out census and research projects to know the potential threats and population status of the species in collaboration of local schools, colleges, panchayats and forest department.

6. Provision of veterinary care and Rescue for the species when it comes with direct encounter to community inhibiting nearby especially during the Uttarayan festival during which many birds get injured by sharp thread of kites.
7. Another way to help preserve the endangered species is to create society dedicated to ecological ethics. All the conservation measures will be implemented with the help of and in the consultation of the district forest department.
8. With the objective of effectively protecting the wild life and to control poaching, smuggling and illegal trade in wildlife and its derivatives, the Government of India enacted Wild Life (Protection) Act 1972. The Act was amended in January 2003 and punishment and penalty for offences under the Act have been made more stringent.

The proponent has proposed a sum of Rs. 282500/-for the "Vulture" conservation plan under the following heads:

S. No	**Work or Activity**	**Approximate Cost. Rs.**
1	Plantation-350 tree plants (5 feet heightas per the plant species-Cost of sapling will be changed per year)	52,500/-(@ 150/-per plant)
2	Small water tank or tanka –20 in number @ 5000/- per tank	1,00,000/-
3	Five awareness programme for "Vulture" conservation	20,000/ Program =1,00,000/-
4	3 cash prizes @ 10000 in a year will be awarded to the informer of poachers.	30,000/-
	TOTAL	**282500/-**

- **Indian Peafowl (*Pavocristatus*)**

Classification

Kingdom	: Animalia
Phylum	: Chordata
Class	: Aves
Order	: Galliformes
Family	:Phasianidae
Genus	: Pavo
Species	: Pavocristatus
Common Name	: Indian Peafowl
Vernacular Name	: Mor

Conservation Measures

Direct and indirect approach is required to provide effective conservation, which is recommended as under:

1. Increasing the tree cover in the study area which will provide shelter and roosting to the peacocks. This can be achieved by planting of trees (a group of trees that grow close together, generally without many bushes or other plants) in buffer area. By encouraging people for plantation of some local species such as Neem, Shirish, Khakhro, Haldu, Amli, Banyan, Peepal and Peeper or other *Ficus sp.* Vacant places such as edges of agricultural fields, village Gauchar, Panchayat's common land, neighbourhood of people inhibiting, road side avenue tree plantation, open scrubs, ravines, school compounds can be selected for practicing the plantation activity.
2. Awareness programmes (community and school level) for conservation of peacocks in the study area and also through organizing competitions during "Wildlife Week" and "Van Mahotsav" celebrations by active involvement of local community.
3. Some provision of rewards to informers for the control of poaching and illegal trade in wildlife.
4. Carrying out census and research projects to know the potential threats and population status of the species in collaboration of local schools, colleges, panchayats and forest department.
5. Provision of veterinary care and cages for injured or sick deformed birds especially during 'Uttarayan' – A Kite flying festival where the birds are prone to thread injuries.
6. Suggest strategies to minimize negative impacts of changing environment in nearby area of peacock populations and to promote conservation of peacock habitats.
7. Another way to help preserve the endangered species is to create society dedicated to ecological ethics. All the conservation measures will be implemented with the help of and in the consultation of the district forest department.
8. With the objective of effectively protecting the wild life and to control poaching, smuggling and illegal trade in wildlife and its derivatives, the Government of India

enacted Wild Life (Protection) Act 1972. The Act was amended in January 2003 and punishment and penalty for offences under the Act have been made more stringent.

The proponent has proposed a sum of Rs. 202500/-for the "Peacock" conservation plan under the following heads:

S. No	Work or Activity	Approximate Cost. Rs.
1	Plantation-350 tree plants (5 feet heightas per the plant species-Cost of sapling will be changed per year)	52,500/-(@ 150/- per plant)
2	Small water tank or tanka –20 in number @ 5000/-per tank	1,00,000/-
3	One awareness programme for "Peacock" conservation	20,000/-
4	3 cash prizes @ 10000 in a year will be awarded to the informer of poachers.	30,000/-
	TOTAL	**202500/-**

Total Budgetary Allocation

1.	"Vulture" Conservation Plan	Rs. 2,82,500 /-
2.	"Peacock" Conservation Plan	Rs. 2,02,500 /-
	Total Budget	**Rs. 4,85, 000/-**

Annexure-3

Details of NGT case (Manveer vs CPCB & Ors. dated 05/12/2018) on the project area

Item No. 05 Court No. 1

BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI

Original Application No. 645/2015

Manveer Applicant(s)

Versus

Central Pollution Control Board & Ors. Respondent(s)

Date of hearing: 05.12.2018

CORAM: **HON'BLE MR. JUSTICE ADARSH KUMAR GOEL, CHAIRPERSON**
HON'BLE MR. JUSTICE S.P. WANGDI, JUDICIAL MEMBER
HON'BLE MR. JUSTICE K. RAMAKRISHNAN, JUDICIAL MEMBER
HON'BLE DR. NAGIN NANDA, EXPERT MEMBER

For Applicant(s): Mr. Anurag Kasana and Ms. Rubina Arora, Advocates

For Respondents (s):

ORDER

1. In pursuance of order dated 13.09.2018, a report has been furnished by the Central Pollution Control Board and Rajasthan State Pollution Control Board (RSPCB) on the issue of alleged water pollution from discharge of effluents by Insecticides India Limited. The recommendations and the conclusion in the report are as follows:

> ***"2.2 Recommendations***
> 1. *The industry needs to submit reply to the quarries raised by the RSPCB and get the consent to operate (CTO) under the Air (Prevention and Control of Pollution) Act, 1981 and Water (Prevention and Control of Pollution) Act, 1974 renewed from RSPCB at the earliest.*
> 2. *The industry needs to install disinfection system (Chlorination) after the activated carbon filtration unit to reduce the microbial contamination in treated effluent.*
> 3. *The industry needs to install night vision PTZ camera for covering, ETP outlet, solid and liquid hazardous waste feeding point. Alkaline scrubber, and filter press and provide connectivity to RSPCB server.*
> 4. *The RSPCB needs to keep a continuous vigil on the operation of the ETP including maintaining ZLD.*

2.3 Conclusion

- *The industry has provided the ETP for treatment of liquid waste generating from the industry and found in operation and not discharging any effluent outside the premises from the ETP. The quality of the treated effluent is within the prescribed limit.*
- *The industry has provided multi-cyclone followed by alkali scrubber for HW incinerator and multi-cyclone and bag filters for steam generating boiler for controlling of air pollution which are adequate.*
- *As per the HW authorization, the industry is sending the incinerator ash to TSDF Udaipur and maintaining the HW manifest."*

2. In view of above, no further direction is required except that the industry must comply with the recommendations to the satisfaction of the RSPCB. The compliance report may accordingly be secured by the RSPCB.

3. A copy of the report of the joint inspection may be furnished to the applicant by e-mail.

The application is disposed of.

Adarsh Kumar Goel, CP

S.P. Wangdi, JM

K. Ramakrishnan, JM

Dr. Nagin Nanda, EM

December 05, 2018
R

Annexure-4

Details of existing production with supporting documents

Year	Production (MT/ Annum)	EC Granted Capacity (MT/ Annum)	Excess Production (MT/ Annum)
2005-06	Nil	400	Nil
2006-07	Nil	400	Nil
2007-08	191.065	400	Nil
2008-09	272	400	Nil
2009-10	1141.725	1800	Nil
2010-11	1371.890	1800	Nil
2011-12	1256.962	1800	Nil
2012-13	979.237	1800	Nil
2013-14	749.915	1800	Nil
2014-15	590.429	1800	Nil
2015-16	575.902	1800	Nil
2016-17	841.667	1800	Nil
2017-18	799.060	1800	Nil
2018-19	1090.925	1800	Nil
April 2019 - Nov 2019	492.382	1800	Nil

Form GSTR-3B

[See rule 61(5)]

Year	2019-20
Month	November

1. GSTIN	08AAACI3076P1Z5
2. Legal name of the registered person	INSECTICIDES (INDIA) LIMITED

3.1 Tax on outward and reverse charge inward supplies

Nature of Supplies	Total Taxable value	Integrated Tax	Central Tax	State/UT Tax	Cess
(a) Outward taxable supplies (other than zero rated, nil rated and exempted)	271014098.00	40986722.00	3838193.00	3838193.00	0.00
(b) Outward taxable supplies (zero rated)	1577600.00	0.00	-	-	0.00
(c) Other outward supplies (Nil rated, exempted)	0.00	-	-	-	-
(d) Inward supplies (liable to reverse charge)	6942777.00	308227.00	19456.00	19456.00	0.00
(e) Non-GST outward supplies	0.00	-	-	-	-

3.2 Inter-state supplies

Nature of Supplies	Total Taxable value	Integrated Tax
Supplies made to Unregistered Persons	0.00	0.00
Supplies made to Composition Taxable Persons	0.00	0.00
Supplies made to UIN holders	0.00	0.00

4. Eligible ITC

Details	Integrated Tax	Central Tax	State/UT Tax	Cess
(A) ITC Available	24792361.00	552217.00	552217.00	0.00
(B) ITC Reversed	0.00	0.00	0.00	0.00
(C) Net ITC Available (A) – (B)	24792361.00	552217.00	552217.00	0.00
(D) Ineligible ITC	0.00	6806.00	6806.00	0.00

5. Exempt, nil and Non GST inward supplies

Nature of Supplies	Inter-state supplies	Intra-state supplies
From a supplier under composition scheme, Exempt and Nil rated supply	374768.00	1746506.00
Non-GST supply	103680.00	0.00

5.1 Interest and Late fee

Details	Integrated Tax	Central Tax	State/UT Tax	Cess
Interest	0.00	0.00	0.00	0.00
Late fee	-	0.00	0.00	-

FINAL

6.1 Payment of tax

Description	Total tax payable	Tax paid through ITC				Tax/Cess paid in cash	Interest paid in cash	Late fee paid in cash
		Integrated Tax	Central Tax	State/UT Tax	Cess			
(A) Other than reverse charge								
Integrated Tax	0.00	29669550.00	0.00	0.00	-	11317172.00	0.00	-
Central Tax	0	0.00	2522254.00	-	-	1315939.00	0.00	0.00
State/UT Tax	0.00	0.00	-	2522254.00	-	1315939.00	0.00	0.00
Cess	0.00	-	-	-	0.00	0.00	0.00	-
(B) Reverse charge								
Integrated Tax	0.00	-	-	-	-	308227.00	-	-
Central Tax	0.00	-	-	-	-	19456.00	-	-
State/UT Tax	0.00	-	-	-	-	19456.00	-	-
Cess	0.00	-	-	-	-	0.00	-	-

6.2. TDS/TCS Credit

Details	Integrated Tax	Central Tax	State/UT Tax
TDS	0	0	0
TCS	0	0	0

FINAL

For October 2019-20

Form GSTR-3B

[See rule 61(5)]

Year	2019-20
Month	October

1. GSTIN	08AAACI3076P1Z5
2. Legal name of the registered person	INSECTICIDES (INDIA) LIMITED

3.1 Tax on outward and reverse charge inward supplies

Nature of Supplies	Total Taxable value	Integrated Tax	Central Tax	State/UT Tax	Cess
(a) Outward taxable supplies (other than zero rated, nil rated and exempted)	293886554.00	48049217.00	2362648.00	2362648.00	0.00
(b) Outward taxable supplies (zero rated)	738750.00	0.00	-	-	0.00
(c) Other outward supplies (Nil rated, exempted)	0.00	-	-	-	-
(d) Inward supplies (liable to reverse charge)	13745291.00	669895.00	18435.00	18435.00	0.00
(e) Non-GST outward supplies	0.00	-	-	-	-

3.2 Inter-state supplies

Nature of Supplies	Total Taxable value	Integrated Tax
Supplies made to Unregistered Persons	0.00	0.00
Supplies made to Composition Taxable Persons	0.00	0.00
Supplies made to UIN holders	0.00	0.00

FINAL

4. Eligible ITC

Details	Integrated Tax	Central Tax	State/UT Tax	Cess
(A) ITC Available	43023016.00	1384145.00	1384145.00	0.00
(B) ITC Reversed	0.00	0.00	0.00	0.00
(C) Net ITC Available (A) – (B)	43023016.00	1384145.00	1384145.00	0.00
(D) Ineligible ITC	41482.00	8794.00	8794.00	0.00

5. Exempt, nil and Non GST inward supplies

Nature of Supplies	Inter-state supplies	Intra-state supplies
From a supplier under composition scheme, Exempt and Nil rated supply	1990869.00	562830.00
Non-GST supply	314336.00	0.00

5.1 Interest and Late fee

Details	Integrated Tax	Central Tax	State/UT Tax	Cess
Interest	0.00	0.00	0.00	0.00
Late fee	-	0.00	0.00	-

FINAL

6.1 Payment of tax

Description	Total tax payable	Tax paid through ITC				Tax/Cess paid in cash	Interest paid in cash	Late fee paid in cash
		Integrated Tax	Central Tax	State/UT Tax	Cess			
(A) Other than reverse charge								
Integrated Tax	0.00	48049217.00	0.00	0.00	-	0.00	0.00	-
Central Tax	0	2362648.00	0.00	-	-	0.00	0.00	0.00
State/UT Tax	0.00	2362648.00	-	0.00	-	0.00	0.00	0.00
Cess	0.00	-	-	-	0.00	0.00	0.00	-
(B) Reverse charge								
Integrated Tax	0.00	-	-	-	-	669895.00	-	-
Central Tax	0.00	-	-	-	-	18435.00	-	-
State/UT Tax	0.00	-	-	-	-	18435.00	-	-
Cess	0.00	-	-	-	-	0.00	-	-

FINAL

6.2. TDS/TCS Credit

Details	Integrated Tax	Central Tax	State/UT Tax
TDS	0	0	0
TCS	0	0	0

Annexure-5

Report from SPCB and CPCB against the project proponent regarding production without prior permission, pollution etc, on the factual status

The visit has been conducted by the Central Pollution Control Board, Bhopal on 2nd December 2019 and the report is awaited. During the visit, the following points were checked.

(i) CTO under Air (Prevention and Control of Pollution) Act, 1981 and Water (Prevention and Control of Pollution) Act, 1974 renewed vide Order No. 2018-2019/PDF/3865 from RSPCB and is valid till 31/05/2023 and the plant is running as per CTO norms.

(ii) Installation of disinfection system (Chlorination) after the activated carbon filtration unit to reduce the microbial contamination in treated effluent.

(iii) installation of night vision PTZ camera for covering, ETP outlet, solid and liquid hazardous waste feeding point. Alkaline scrubber and filter press and provide connectivity to RSPCB server.

(iv) Provision of ETP for treatment of liquid waste generating from the industry and found in operation and not discharging any effluent outside the premises from the ETP. The quality of treated effluent is within the prescribed limit.

(v) Provision of multi-cyclone followed by alkali scrubber for HW incinerator and multi-cyclone and bag filter for steam generating boiler for controlling of air pollution which are adequate.

(vi) As per the HW authorization, the industry is sending the incinerator ash to TSDF Udaipur and maintaining the HW manifest.

During the visit, the production and EC granted capacity was checked. The production and the EC granted capacity is as below:

Year	Production (MT/ Annum)	EC Granted Capacity (MT/ Annum)	Excess Production (MT/ Annum)
2016-17	841.667	1800	Nil
2017-18	799.060	1800	Nil
2018-19	1090.925	1800	Nil

क्षेत्रीय निदेशालय (मध्य), भोपाल
Regional Directorate (Central), Bhopal
केन्द्रीय प्रदूषण नियंत्रण बोर्ड
Central Pollution Control Board
(पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय, भारत सरकार)
(Ministry of Environment, Forests & Climate Change, Government of India)

RD/BPL/ EC/ 2019-20/ 23९

Date: January 03, 2020

To,

Dr. Mukesh Kumar
M/s Insecticides (India) Ltd.
442., RIICO Industrial Area,
Chopanki, Bhiwadi,
Rajasthan-301707

Sub: Inspection of your industry for submission of report to MoEF&CC for obtaining EC-reg.
Ref: Your letter No. Nil dated. 07.12.2019

Sir,

As you are aware that the visit of of your industrial premises was conducted on 02.12.2019 by the official of CPCB, Regional Directorate with reference to Hon'ble NGT Order dated 13.11.2019 in Execution Application No. 42/2019 in the matter of "Sumitra Devi Vs CPCB & Ors." to verify the discharge of overall industrial effluent in the drains of Bhiwadi and the report has been submitted to Hon'ble NGT .

During visit of your premises no discharge of effluent in to the RIICO drain was observed, it was also noticed that PTZ camera and OCEMS were in operation. Since inspection is not done to check the performance of pollution control equipment, ETP, incinerator, boiler and not verified the manufacturing process also, So this above mentioned report may not be considered for clearance of EC.

For Environmental Clearance detailed inspection, including above mentioned points required to be verified. Therefore, the detailed report will be provided to you for submitting to MOEF & CC only after thorough inspection and monitoring by CPCB officials. As desired by MoEF&CC and requested by you, inspection & monitoring will be done and the report will be made available to you for EC purpose at the earliest.

Yours faithfully,

(Dr. P.K. Behera)
Regional Director

Copy to: Shri Dinabandhu Gouda,
Head IPC-I Division, CPCB, Delhi – for information, please

Regional Director

तृतीय तल, सहकार भवन, नॉर्थ टी.टी. नगर, भोपाल-462003 (म.प्र.)
फैक्स : 0755-2775587, ईपीएबीएक्स : 2775385, 2775386, Website : www.cpcb.nic.in, E-mail : cpcb.bhopal@gmail.com
Head Office : Parivesh Bhawan, East Arjun Nagar, Delhi - 110 032
Tel.: (011) 43102030, Fax : 011-22304948, 22307078, 22307079, Website : www.cpcb.nic.in

Annexure-6

Revised water balance with details of total water and fresh water requirement, and permission from concerned regulatory authority.

Total raw water requirement will be 188.0 KL/day (Industrial: 170 KL/Day + Domestic: 8 KL/Day + Gardening: 10 KL/Day) which will be met through RIICO water supply and recycling. Total waste water generation will be 136 KL/Day (Industrial: 129 KL/Day + Domestic: 7 KL/Day). Out of 129 KL/Day industrial effluent, effluent from processes, scrubber and lab (49 KL/Day) will be sent to MEE and MEE condensate (40 KLD) will be sent to ETP for further treatment. Total effluent (127 KL/Day) from septic tank, utilities, washing and MEE Condensate will be sent to ETP and 126 KL/Day final treated effluent will be recycled for industrial operations. Domestic wastewater (7 KL/Day) will be sent to septic tank and then mixed with industrial effluent in ETP for further treatment.

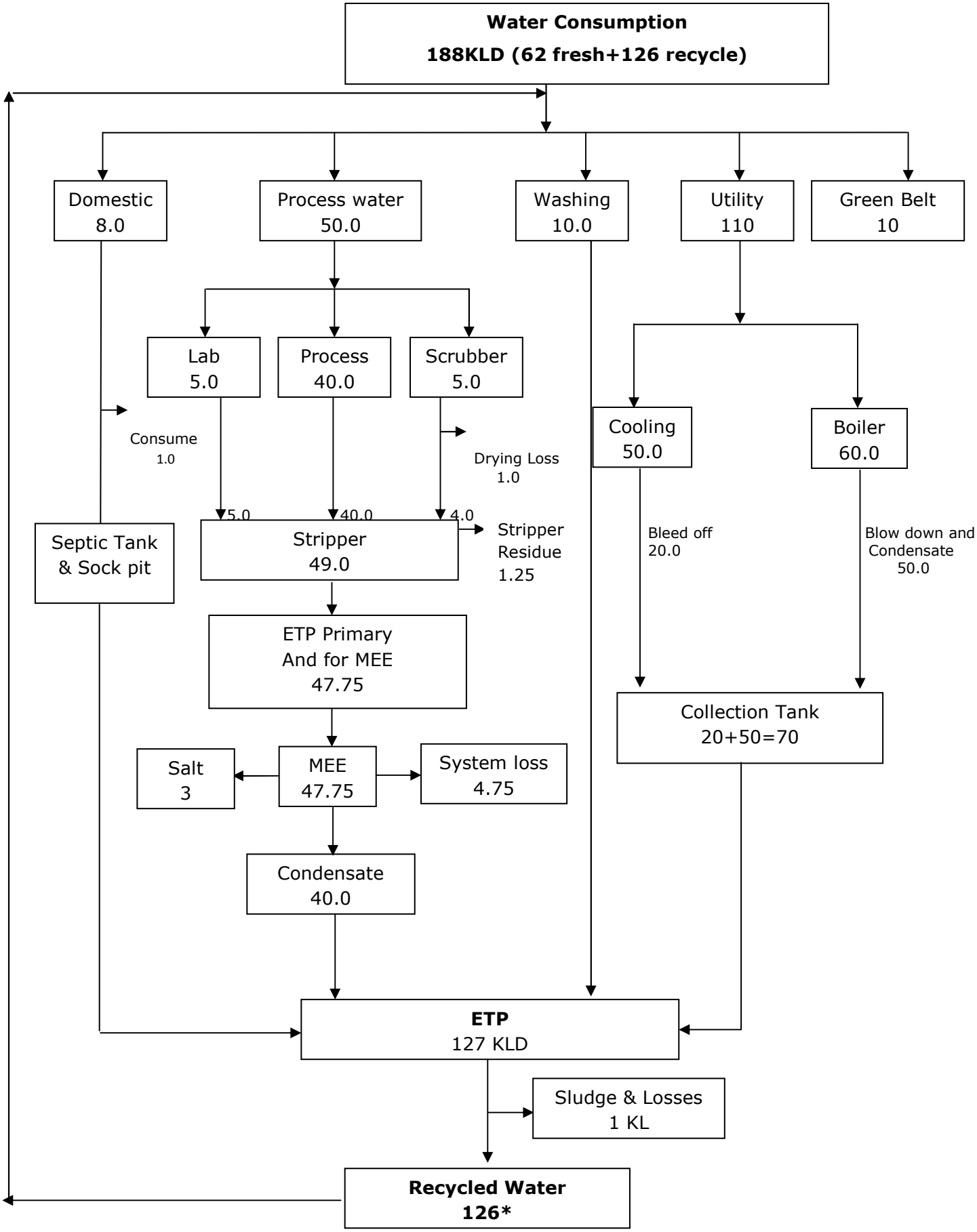
EXISTING:-

WATER CONSUMPTION AND WASTEWATER GENERATION			
SR. NO.	**SECTION**	**(KL/day)**	
		WATER CONSUMPTION	**WASTE WATER GENERATION**
1.	Domestic	6	5.4
2.	Industrial		
	Process & Washing	5.4	5
	Boiler	10	2
	Cooling & Chilling	3	0.4
3.	Gardening	5	--
	Total Industrial	**18.4**	**7.4**
	Grand Total	**29.4**	**12.8**

PROPOSED:-

WATER CONSUMPTION AND WASTEWATER GENERATION			
SR. NO.	**SECTION**	**(KL/day)**	
		WATER CONSUMPTION	**WASTE WATER GENERATION**
1.	**Domestic**	8	7
2.	**Green Belt**	10	0
3.	**Industrial**		
A.	Process	40	40
B.	Lab	5	5
C.	Scrubber	5	4
D.	Cooling	50	20
E.	Boiler	60	50
F.	Washing	10	10
Total Industrial		**170**	**129**
Total (1+2+3)		**188**	**136**
Recycle Water		**126**	**--**
Fresh Water Requirement		**62**	**--**

WATER BALANCE DIAGRAM:



RIICO WATER SUPPLY LETTER

RIICO
GROW WITH RAJASTHAN

Rajasthan State Industrial Development
& Investment Corporation Ltd.
(A Rajasthan Government Undertaking)
CIN : U13100RJ1969SGC001263
GSTIN: 08AABCR4695JIZW
UNIT-II, Rest House Road, RIICO Chowk,
Bhiwadi, Distt. Alwar Rajasthan (INDIA)
PIN : 301019.
Telephone : 01493-220811 Fax-220728
Email : bhiwadi2@riico.co.in
No. : 3585
Date : 31.12.19

By Regd. A.D. Post

M/s Insecticides (India) Ltd.
Plot No. E-442, RIICO Industrial Area
Chopanki, Teshsil- Tijara, Distt- Alwar
Rajasthan

Subject: Application for Supply of 70 KLD Water from RIICO Water Supply scheme to M/s Insecticides (India) Ltd. Plot No. E-442, Industrial Area Chopanki, Tehsil- Tijara, Distt- Alwar, Raj.

Sir,

Kindly refer your application dated 26.12.2019 for supply of 70 KLD Water. In this regard you are hereby informed that the Corporation will supply water as per availability of water under complete water supply scheme of Industrial area as per norms of the corporation.

Thanking you,
Yours Faithfully,

Unit Head
RIICO Ltd., Bhiwadi-II

Annexure-7

Effluent treatment mechanism with plan for Zero Liquid Discharge

1. ETP physio-chemical treatment is being operated in batch mode whereas biological treatment is being done continuously.
2. ETP operation is being done 24 hours a day, 365 days a year. Aeration system is being operated continuously whereas physio-chemical treatment is done in batches of 20 kl each (10 kl+10 kl).
3. Cycle time of each batch preparation is 4.5 hours out of which 45 minutes is pumping time and 3.75 hours is reaction time.
4. Flow rate of ETP biological treatment is being maintained between4-5 kl/hr which gives a capacity to treat between 96 to 120 kl of effluent per day.
5. The collection tanks are divided into two parts of 35 kl and 31 kl respectively. The 35 kl part acts as Collection Tank-1 for high COD effluent and 31 kl part as Collection Tank-2 for Low COD effluent.
6. The effluent after collecting in collection tanks (through Oil Skimmer), is transferred to two Reaction Tanks RT-1 and RT-2 in parallel for mixing of H2O2 in presence of Ferrous sulphate in acidic medium
7. The effluent is then pumped to Reaction Tank RT-3 for precipitation and coagulation of sludge containing iron.
8. The effluent next moves to Flocculation Tank FT-1 for flocculation of sludge.
9. Effluent moves on to Tube Settler TS for settling of sludge.
10. Effluent flows to Reaction Tank RT-4 for precipitation and coagulation process.
11. The effluent next moves to Flocculation Tank FT-2 for flocculation of sludge.
12. Effluent moves on to Primary Tube Settler PTS for settling of sludge.
13. The effluent overflows to a Pre-aeration tank of capacity 20 kl and Pre-Aeration Tower.
14. The effluent after treatment in Pre-Aeration Tower reaches Aeration Tank AT-1 for aeration with help of free floating media.
15. Effluent is then settled in Aeration Settler STS-1 for recirculation and wasting.
16. The effluent after treatment in AT-1 and STS-1 will pass on to Aeration Tank AT-2 for aeration with help of free floating media.
17. Effluent is then settled in Aeration Settler STS-2 for recirculation and wasting.

18. The effluent after treatment in AT-2 and STS-2 will pass onto the Aeration Tank AT-3 for aeration with help of free floating media.
19. Effluent is then settled in Aeration Settler STS-3 for recirculation and wasting.
20. The effluent from STS-3 will pass onto the Underground Holdingtank of capacity 13.5 KL.
21. The effluent is next transferred to Media Filter and Activated Carbon filter for polishing of effluent.

DETAILS OF UNITS OF ETP

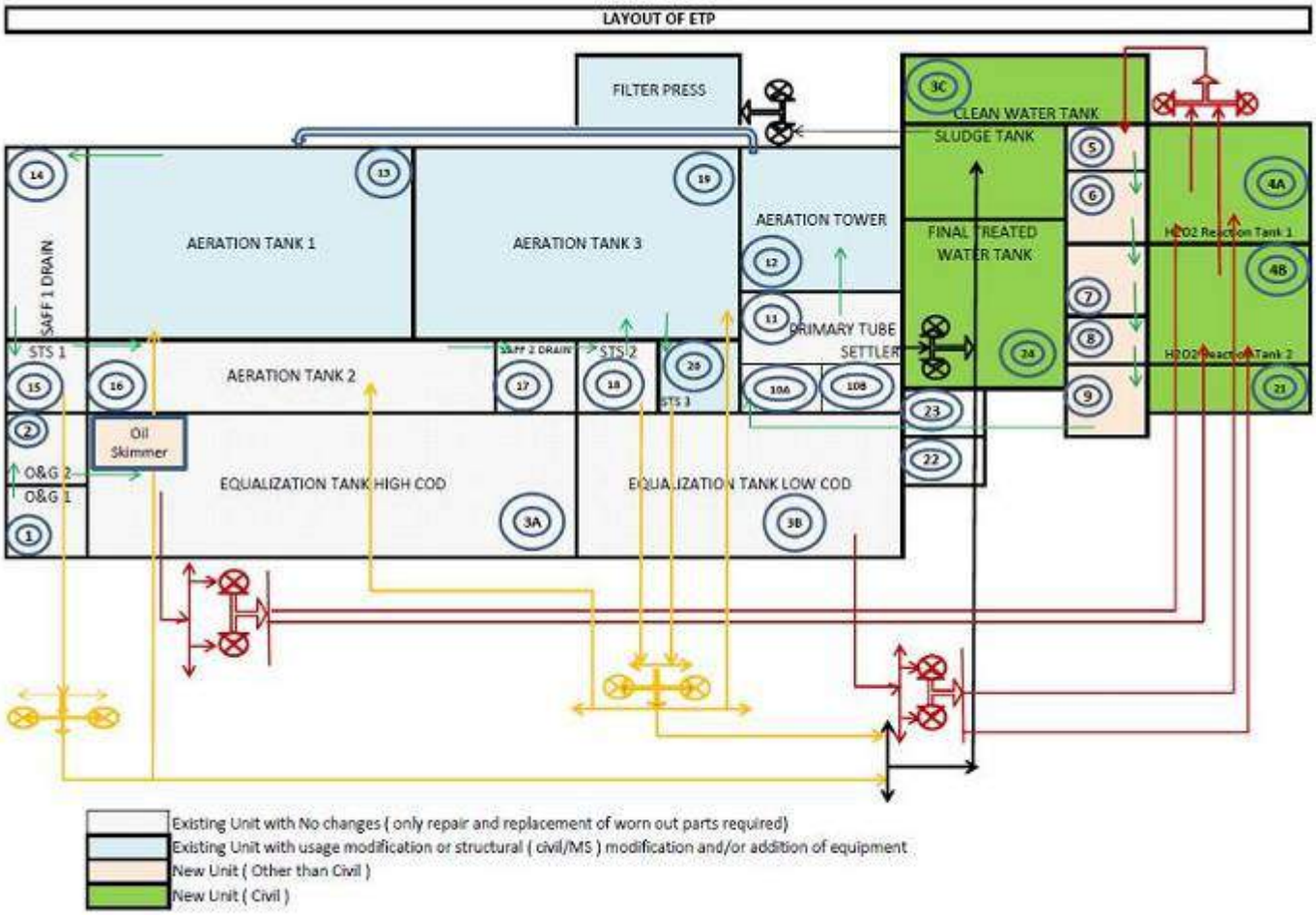
		Dimensions (meters)			
	Description	**Length**	**Width**	**Height/Depth**	**Volume (KL)**
1	Oil & Grease Chamber 1	1.000	0.800	1.900	1.520
2	Oil & Grease Chamber 2	1.000	0.800	1.900	1.520
3	Effluent Collection Tank	5.050	1.900	3.700	35.502
4	Neutralization Tank	4.450	1.900	3.700	31.284
5	Flash Mixer A	0.825	0.595	1.805	0.886
6	Flash Mixer B	0.825	0.595	1.805	0.886
7	Primary Tube Settler	1.980	1.720	2.820	9.604
8	SAFF 1	10.500	6.000	4.550	286.650
9	SAFF 1 Drain	6.000	0.800	4.550	21.840
10	Secondary Tube Settler 1	1.770	1.090	2.300	4.437
11	SAFF 2	5.850	1.770	4.550	47.113
12	SAFF 2 Drain	0.580	1.770	4.550	4.671
13	Secondary Tube Settler 2	1.770	1.200	3.210	6.818
14	CC Tank	1.770	1.770	4.550	14.255
15	Treated Water Storage Tank/Aeration Tower	5.000	1.720	2.430	20.898

	Aeration Tank 1	6	4.875	4.550	133.088
	Aeration Tank 2	5.850	1.770	4.550	47.113
	Aeration Tank 3	6	4.875	4.550	133.088

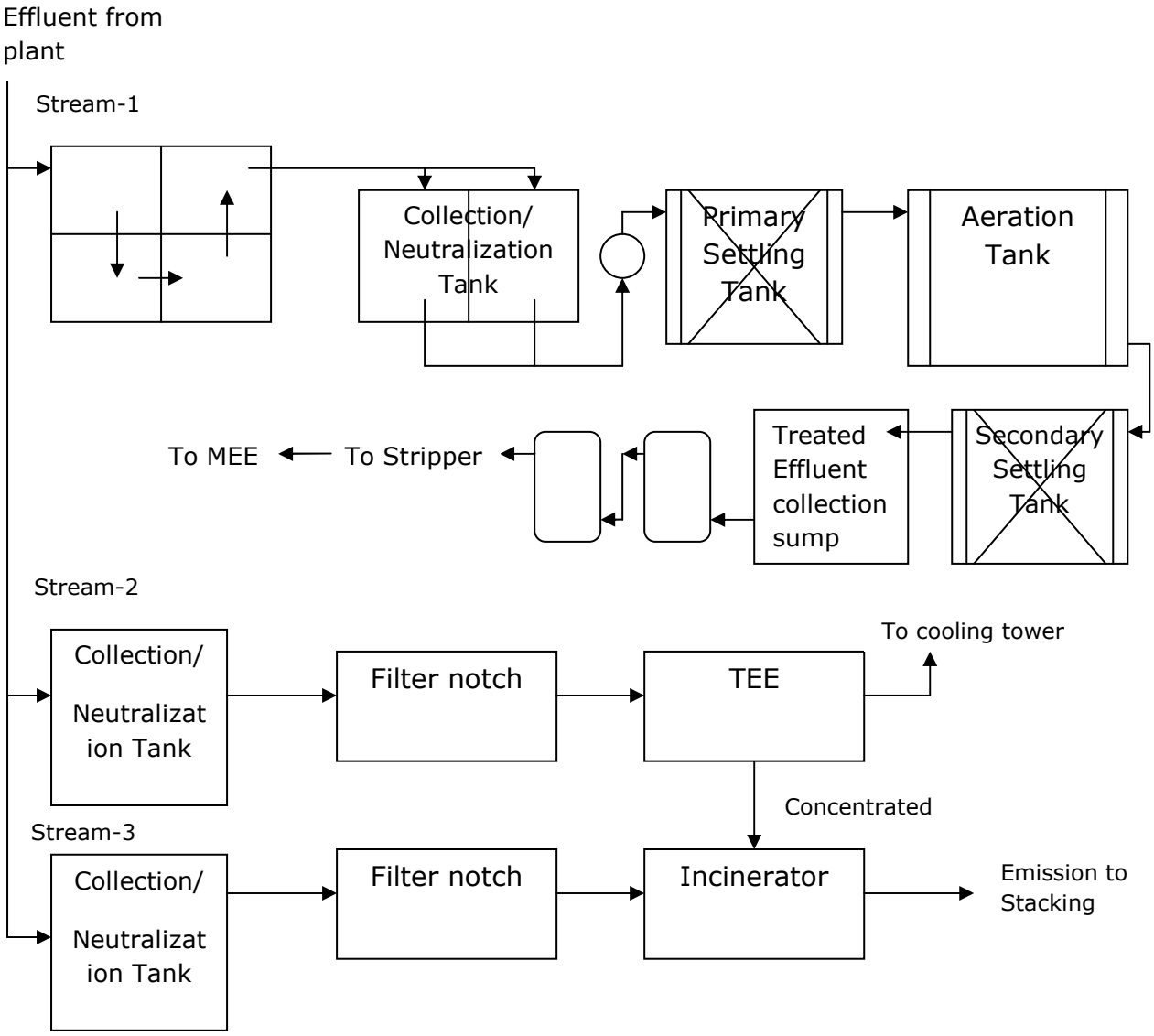
Characteristics of Waste Water

Sr. No.	Parameters	Unit	Results	
			Before treatment	After treatment
1	pH	--	2-11	6.5-8.5
2	BOD_3	mg/l	100-1200	20-30
3	TSS	mg/l	600-900	50-100
4	O&G	mg/l	10-15	2-10
5	COD	mg/l	3000-3500	100-250
6	TDS	mg/l	15000-40000	300-400
7	Phenolic Compound	mg/l	5-6	0.5-1.0
8	Ammonical Nitrogen	mg/l	70-80	25-30

ETP DIAGRAM



PROCESS FLOW DIAGRAM



BASIS FOR DESIGN OF STRIPPER

Type of System	:	Packed Bed type stripping system
CAPACITY		
Organics	:	(187.5 kg/hr Organics +187.5 kg/hr Water)
Feed Rate	:	6250 Kg/hr
Capacity Evaporation	:	5875 Kg/Hr
FEED PROPERTIES		
Organics	:	375 Kg/hr Solvents
Water	:	375 Kg/hr Water
Specific Gravity	:	1.1 app.
COD	:	3 % W/W
Temperature	:	60°C
PRODUCT FROM Stripper		
Organics	:	(187.5 kg/hr Organics +187.5 kg/hr Water)
Temperature	:	65-75°C
OPERATING CONDITIONS		
Steam	:	393 kg/hr @ 3 bar pressure
Cooling Water at 30°C	:	38 m3/hr
Stripper Power	:	7 KW (Installed) / 5.6 KW (Absorbed)
Inlet electricity	:	415 V, 50 Hz
MATERIAL OF CONST.		
All contact parts	:	SS 316L
Vapor / Condensate	:	SS 304

BASIS OF DESIGN FOR EVOPARATOR

Type of System	:	**Four effect Force circulation evaporator**
CAPACITY (Evaporation Plant)		
Evaporation Rate	:	4781 kg/hr
Feed Rate	:	5875 Kg/hr (TDS :7.45 %w/w)
Concentrate Material from MEE	:	1094 kg./hr (40 %w/w solids)
FEED PROPERTIES		
Solid Content Range (w/w)	:	7.45 % w/w
Form	:	Clear Solution with totally dissolved solids
Solvent	:	Water
Specific Gravity & PH	:	1.1 & Min. 6.5 and Max. 7.5
Viscosity		4-6 cp (assumed)
Temperature	:	60°C
OPERATING CONDITIONS		
Mode of Heating	:	Dry Saturated Steam at 3 kg/cm2 (g)
MATERIAL OF CONST.	:	
Feed/ Product	:	SS 316L
Vapor Liquid Separators	:	SS 316L
Non contact parts	:	SS 304

BASIS OF DESIGN FOR AGITATED THIN FILM DRYER

Type of System	:	**ATFD.**
Evaporation Rate	:	608 Kg/hr
Feed Rate	:	1094 Kg/hr @ 40 %
Product	:	486 kg/hr
FEED PROPERTIES		
Solid Content Range	:	40 % w/w
Solvent	:	Water
OPERATING CONDITIONS		
Mode of Heating	:	Steam
MATERIAL OF ONSTRUCTION	:	
Feed/ Product	:	SS 316 L
Vapor / Condensate	:	MS
Vapor Liquid Separators	:	SS 316 L

Annexure-6

Onsite emergency plan as per MSIHC Rules

1.0 **Name & address of the Responsible person**

Responsible Person

Name		:	Mr M Koteswar Rao
Designation		:	DGM (Works)
Address		:	Insecticides India Ltd. E-442, RIICO Industrial Area, Chopanki, Bhiwadi, Alwar (Rajasthan).
Telephone	(Works)	:	01493-516602 to 05
	(Resi)	:	8619320755
	(Mobile)	:	9116101175
Residence		:	House no 4-S-35 Ghandhi Kuti Bhiwadi, Rajasthan

1.1 LIST OF IMPORTANT STAFF

S. No.	Name	Designation	Residential Address	Tel No.
1	Mr. Rajesh Aggarwal	Managing Director	FD- 42, West Enclave, Pitampura, N. Delhi	27318181 27318171 27318151
2	Dr. Mukesh Kumar	GM (R&D)	A-034, Ashiana Greens Bhiwadi	1493-528510 9667231558
3	Mr. Koteswar Rao	DGM (Works)	House no 4-S-35 Ghandhi Kuti Bhiwadi, Rajasthan	9116101175
4	Mr. Ramayan Singh	Sr. Manager (Production)	3/247, UIT, Sector 3 Bhiwadi Dist. Alwar, Raj.	7733918124
5	Mr. Amar Pathak	Manager Maintenance	5/95, UIT, sector 5 Bhiwadi Dist. Alwar, Raj.	7737212078

1.2 EMERGENCY SERVICE TELEPHONE NUMBERS

OFFICE/ CONTACT PERSON	PHONE NO.
Collector Alwar	0144- 2337565, 2336101
SP Alwar	0144- 2337453, 2337838
SDM, Tijara	01460- 242008,
Addl. SP	223797, 223710, 9414406002
Deputy SP	220700, 277265
SHO	100, 220600, 277505
Police Chowki UIT	512007
Hospital Civil	221311, 225766, 9414013512
ESI Hospital	220790
Nursing Homes	
1. Rahtat Hospital	220395, 222242, 9414366495
2. City Nursing Home	221700, 510095, 230500
3. Gopinath Memorial Hospital	221843, 223543
4. Dr. P. M. Gupta	220377 (O), 220077 ®
5. Shakuntla Nursing Home	220417
Fire Brigade	
Bhiwadi	222700, 101, 512101
Rewari	01274- 225111
Gurgaon	0124/ 917- 320101
Alwar	0144- 222444
Parasrampuria	220974, 220975
Ambulance service	
Orient Syntax	220733, 220812
Rahat Hospital	220395, 222242
City nursing Home	221700, 221000
Delhi Orthopedics	221843, 223543

2.0 DESCRIPTION OF INDUSTRIAL ACTIVITY

2.1 SITE

The Plant is situated at Chopanki, District Alwar (Rajasthan). It is 10 Km from National Highway and situated in a specious area, having vast open spaces. This is situated in well-developed industrial Area, Chopanki. The main gate and inside factory premises have well laid, good wide passages, walk way and roads. It is 7 Km away from Bhiwadi Hospital

2.2 INTRODUCTION

The Industry is a Limited company; well managed by professionally qualified and experienced personnel in chemicals lines. The main products of the company are insecticides and pesticides. It has plants and equipments like Reactor, Generators, cooling tower, water storage tank, chemicals storage tanks, exhaust ducts, scrubbers and bag filters.

2.3 MANUFACTURING PROCESS

Manufacturing process involves manufacturing of technical of pesticides with using of utilities like heating, chilling, cooling and this is done by addition of various Raw-materials, solvents, additives and carriers in a given portion.

3.0 HAZARDOUS CHEMICAL & PROCESS

3.1 HAZARDOUS CHEMICALS

There are no hazardous chemical expect technical pesticides approximate 290 MT (Solid) & 70 KL Liquid. The list of hazardous chemicals is attached (Annexure 1)

3.2 HAZARDOUS PROCESS

There is no hazardous process except chemical reaction..

3.3 TYPE OF ACCIDENTS DURING MANUFACTURING PROCESS

1.	Solvent	Spill on body and fire
2.	Pulverizer	Particulate matter inhalation
3.	Technical	Spill on body and fire

3.4 IDENTIFICATION OF HAZARDS

The hazards in the plant have been identified with long experience in these types of plants. There are two types of major hazards that are spillage and fire.

3.5 ASSESSMENT OF ACCIDENT CONSEQUENCES

Only fire hazard has been identified in the plant and process area, which may be due to electric short-circuiting and, wrong use of matches. List of contact telephone numbers is available at main gate, administration office and plant in emergency.

3.6 ACCIDENT HISTORY

Since commissioning no explosion or fire has occurred in the plant.

3.7 REMEDIAL ACTION TAKEN IN DANGEROUS AREA

The operators and staff working in the area are given protective equipments. Also in heating and grinding area operators and staff does not work more than 5-10 minutes at a time. The machines operation in dangerous area is automatic in nature. No operator and staff have to work in these areas. This makes the area safe. The dust generated in the grinding areas is collected with cyclone arrangements and the dust is not allowed to escape in the atmosphere. Thus, the hazard is minimized.

3.8 ADDITIONAL REQUIREMENTS IN NORMAL & EMERGENCY SITUATIONS.

a) All staff and workers are being trained about use of PPE.

b) The PPE use on shop floor is made compulsory.

c) Concerned staff has been trained to use the fire extinguishers during fire hazards in any place of factory

d) The first aid kits and its use have been provided for easy use.

4.0 DESCRIPTION OF INFORMATION ON ORGANISATIONAL SET UP FOR SAFETY.

4.1 SAFETY ORGANISATION

Company is well equipped with day-to-day development in safety in India and abroad. All the rules enforced by the government of India and Rajasthan are studies and implemented.

4.2 SAFETY POLICY

The safety policy of Company is to protect employees and environment from accident and pollution.

The management gives top priority to safety. Each and every accident be thoroughly investigated to find out the root cause and to stop reoccurrence of the same type of mis-happening.

4.3 SAFETY TRAINING

Company imparts general training to all workmen and staff. Hygiene, housekeeping and safety activity are the main thrust areas.

4.4 AVAILABILITY OF SAFETY EQUIPMENTS

1. Hand gloves Rubber
2. Hand gloves cloth
3. Hand gloves Canvas
4. Gum Boots
5. Apron rubber
6. Safety Goggles
7. Head covers & Helmets
8. Cloth and Asbestos aprons
9. Masks
10. Self contained breathing apparatus.

4.5 DELEGATION OF RESPONSIBILITIES FOR PLANT SAFETY

The departmental head is responsible for all kind of safety activities and incidents in the department. In the absence of departmental head, the responsibilities have been delegated to the plant shift in-charge.

4.6 SAFETY RELATED ACTIVITIES IN PLANT

1. Mechanical ventilation system and scrubbers are always in use.
2. Safety valves provided where ever needed
3. Emergency hooter/ Bell.
4. Periodical preventive maintenance
5. Routine medical check –up
6. Development of green belt
7. Routine maintenance check –up of fire extinguishers.
8. First aid training.

5.0 DESCRIPTION OF EMERGENCY CONTROL PLANING

5.1 INTRODUCTION

An onsite emergency may arise which threatens to man, machines, building and environment and may convert into a major accident if not controlled on site properly.

5.2 EMERGENCY PLAN ORGANISATION

Following are the key personnel designated

Main Work controller (MWC)

Team A	**Team B**
Site Controller	Site Controller
Incident Controller	Incident Controller
Emergency Team	Emergency Team

5.3 EMERGENCY OPERATION

5.3.1 KEY PERSONNELS

Following are the key personnel designated:

S. No. Designation	Name & Home address
1. Factory DGM	Mr Koteswar Rao House no 4-S-35 Ghandhi Kuti Bhiwadi, Rajasthan
2. Manager Maintenance	Mr. Amar Pathak 5/95, UIT, Sector 5 Bhiwadi Dist. Alwar, Raj.
3. Sr. Manager Production	Mr Ramayan Singh 3/247, UIT, Sector 3 Bhiwadi Dist. Alwar, Raj.

The factory manager will act as main works controller and overall charge of emergency will be on the MWC 2 and MWC 3 will act as MWC in the absence of MWC 2 in serial.

5.3.2 SITE CONTROLLER

Section in- charge and supervisor will act as site controller and co-ordinate all activities. In the absence of section in- charge, shift deputy in-charge will co-ordinate the activities.

5.3.3 INCIDENT CONTROLLER

All the departmental heads will act as incident controllers and co-ordinate all activities and assist MWC.

5.3.4 COMMUNICATION OFFICER

Commercial officer will act as communication officer. He will co-ordinate all activities and communicates all information to higher management. He will assist to MWC.

5.3.5 LIAISON OFFICER

The Security supervisor will act as liaison officer. He will co-ordinate MWC and will handle security, Police, Press and public.

5.4 RESPONSIBILITIES OF KEY PERSONNELS

5.4.1 MAIN WORKS CONTROLLERS

a. Overall in charge of Emergency.

b. To access magnitude of situation.

c. Maintain continuous review of the situation with site and incident controller.

d. Evaluation of people if needed.

e. To stop panic in the minds of employees.

f. To be in touch with govt. officials.

g. To remain in factory till emergency is restored.

5.4.2 SITE CONTROLLER

a. Will direct all operation in the affected area.

b. Will maintain harmony among with persons in the plant involved in operations.

c. Security of affected area.

d. Shutting of the process to prevent disaster.

e. Co-ordinate incident controller to preserve the evidences of the accident to facilitate inquiry into the cause and circumstances which escalated the emergency.

5.4.3 INCIDENT CONTROLLER

a. Will coordinate emergency teams and persons on duty to over power the situation.

b. All electrical, chemical and fire sources to be cut off

c. Evacuations of persons from the affective area.

d. Correct use of safety appliances.

e. Stopping the process so that no further complication arises.

5.4.4 COMMUNICATION OFFICERS

a. To maintain communication link between MWC and incident controller.

b. To arrange for messenger in case of failure of telephones.

c. To maintain proper inventory of control centers property.

d. To inform and persons needed for emergency operations

e. To arrange first aid teams.

5.4.5 LIAISION OFFICER

a. Will co-ordinate MWC.

b. Will handle police, press and public.

c. To arrange additional help from outside agencies.

d. To transport injured to hospital

e. To arrange for the relief of the persons engaged in the emergency by arranging drinking water, medicines, refreshments and other amenities needed.

f. Any spontaneous work assigned by MWC.

ANNEXURE 1

LIST OF CHEMICAL & STORAGE CAPACITY

1.	Iso Propyl Alcohol	25.0 KL
2.	Hexane	40.0 KL
3.	Toluene	40.0 KL
4.	Ethylene dichloride	20.0 KL
5.	Bifenthrin Alcohol	15 MT
6.	Hydrogen per oxide	20 MT
7.	Lambda cyhalothric acid	50 MT
8.	Thionyl chloride	20 MT
9.	MPBD	20 MT
10.	2-Chloro 5-chloromethyle thiazole	40 MT
11.	MNIO	40 MT

ANNEXURE 2

LOCATION OF FIRE EXTINGUISERS

S. No.	Location	Type	Capacity	Nos
1.	Meter Room Ground floor	B.C.	10 Kg	01
2.	Boiler House	B.C.+ A	10 Kg	03
3.	Process Plant-GF	BC	6 Kg	02
4.	Process Plant-GF	BC	4.5 Kg	01
5.	Process Plant-GF	ABC	06 Kg	02
6.	Process Plant-GF	ABC	05 Kg	05
7.	Process Plant-GF	ABC	70 Kg	01
8.	Process Plant-GF	BC	4.5 Kg	01
9.	Process Plant-I-Floor	ABC	05 Kg	05
10.	Process Plant-I-Floor	BC	4.5 Kg	02
11.	Process Plant-II-Floor	ABC	05 Kg	03
12.	Process Plant -II-Floor	BC	05 Kg	01
13.	Utility-GF	BC	4.5 Kg	01
14.	Utility-GF	ABC	05 Kg	02
15.	Utility-GF	BC	10 Kg	01
16.	Utility-GF	BC	4.5 Kg	01
17.	LT Room-GF	BC	4.5 Kg	01
18.	LT Room-GF	ABC	05 Kg	01
19.	Tech.Godwn-GF	ABC	05 Kg	06
20.	Tech.Godwn-GF	BC	10 Kg	01
21.	Tech.Godwn-GF	A	09 Kg	01
22.	Solvent Tank-GF	BC	70 Kg	01
23.	Chemical Lab.	BC	02 Kg	02
24.	R&D Lab. Gate	ABC	04 Kg	01
25.	R&D Lab. Gate	BC	02 Kg	03
26.	Security Gate	ABC	04 Kg	01

Annexure – 3

LIST OF ANTIDOTES

Symptomatic treatment is given for the pesticides poisoning. Antidotes should be used as prophylactic or preventive. Antidotes should be administered only under guidance of a doctor. The following will be kept in the factory.

Atropine is the usual antidote for organophosphate or carbamate poisoning. It can be administered orally and in severe cases injections are given. Repeated injections may be required.

Pralidoxime (2-PAM) is injected intravenously as an antidote in organophosphate poisoning. It must be given in conjunction with atropine therapy. It must not be used in cases of carbamate poisoning.

Barbiturates injected intravenously may help in controlling convulsions. Diazepam may also be used for this purpose. Epinephrine must not be used for this purpose.

Vitamin K (Phytonadione) is the preferred antidote for anticoagulant poisoning such as warfarin. Vitamin C is sometimes used as adjunct for this purpose.

Calcium gluconate given intravenously is effective against some organochlorine insecticides.

Dimercaprol (BAL) is recommended for arsenic poisoning. It is normally given intramuscularly. In case of methyl bromide and ethylene dibromide poisoning this drug may be given before the appearance of symptoms.

Amyl nitrite inhalation is effective against poisoning of hydrogen cyanide and calcium cyanide. Sodium nitrite and sodium thiosulphate may be given intravenously.

Sodium methylthiouracil can be used as an antidote to reduce the basal metabolic rate of the body in case of a dinitrophenol pesticide such as DNOC or dinoseb.

ANNEXURE - 4

NEUTRALIZATION ARRANGEMENT IN CASE OF TOTAL

Chemical leakage

In case of total chemical leakage the material is collected in the dike. Wear protective equipment to prevent skin and eye contamination. Use absorbent (soil, sand or other inert material like soap stone). Wash the affected area with detergent and water.

The neutralization of the area is also done with soda ash. The sufficient quantity of absorbent material and soda ash is always available in the store.

The protective equipment like hand gloves, gum boots, apron, safety goggles, head covers, masks and self contained breathing apparatus are all wish available in the working area and store.

ANNEXURE 5

SAFETY COMMITTEE

Sr. No.	Name	Designation	Remarks
1.	Dr. Mukesh Kumar	GM (R&D)	Chairman
2.	Mr. M Kokeswar Rao	DGM	Records
3.	Mr. S.K. Pathak	Sr. Manager QC	Records
4.	Mr. Jaipal Singh	Manager Production	Records
5.	Amar Pathak	Manager Maint.	Records
6.	Mr. Yunus Khan	Store Officer	Records
7.	Mr. Jagdish Prasad	Sr. Executive Production	Rotation
8.	Mr. Kailash	Production Officer	Rotation
9.	Mr. V.K. Sharma	Health Officer	Rotation
10.	Mr. Yashpal Singh	ETP operator	Rotation
11.	Mr. Vidhya Sagar	Operator	Rotation
12.	Mr. Kuldeep Sharma	Safety Officer	Rotation
13.	Mr. Dalip Singh	Store Supervisor	Rotation
14.	Mr.Lal Chand	Plant Operator	Rotation
15.	Ram Chand	Labour	Rotation
16.	Puran Singh	Labour	Rotation
17.	Radhey	Labour	Rotation
18.	Laloo Singh	Labour	Rotation

Form-2

APPLICATION FOR PRIOR ENVIRONMENTAL CLEARANCE

1	**Details of Project**			
	a.	Name of the Project (s)	:	Proposed Expansion of Pesticides Technical Products (From 1800 MT/Annum To 9350 MT/Annum) In Existing Unit
	b.	Name of the Company / Organisation	:	M/s. Insecticides India Limited
	c.	Registered Address	:	E-442, 443 & 444, RIICO Industrial Area, Chopanki, Bhiwadi, Dist: Alwar - 301707, Rajasthan
	d.	Legal Status of the Company	:	Others
	e.	Joint Venture (Yes/No)	:	No
		If Yes,		
		(i) No. of JV Partners(***Multiple Entries Allowed***)	:	

Name of the JV Partner	Share of the JV Partner	Address of the JV Partner	Email Id of JV Partner	Mobile No. of JV Partner

2	**Address for the correspondence**			
	a	Name of the applicant	:	Dr. Mukesh Kumar
	b	Designation (Owner / Partner / CEO)	:	General Manager
	c.	Address		E-442, 443 & 444, RIICO Industrial Area, Chopanki, Bhiwadi, Dist: Alwar - 301707, Rajasthan
	d	Pin code		301707
	e	e-mail		mukeshiilindia@gmail.com
	f.	Telephone No.		01493 298189
	g.	Fax No.		
3	**Category of the Project/Activity as per Schedule of EIA Notification,2006**			
	a.	Project / Activity [1(a)(i) / 1(a)(ii) / 1(b) / 1(c) / 1(d) / 1 (e) / 2(a) / 2(b) / 3(a) / 3(b) / 4(a) / 4(b)(i)/ 4(b) (ii) / 4(c) / 4(d) / 4(e) / 4(f) / 5(a) / 5(b) / 5(c) / 5(d) / 5(e) / 5(f) / 5(g) / 5(h) / 5(i) / 5(j) / 6(a) / 6(b) / 7(a) / 7(b)/ 7 (c) / 7 (d) / 7 (da) / 7 (e) / 7 (f) / 7 (g) / 7 (h) / 7 (i) / 8 (a) / 8 (b)		5 (b) Pesticides Industry and pesticide specific intermediates (Excluding formulations)
	b.	Category ($A/B_1/B_2$)	:	A
		If B_1 or B_2		--
		Reason for application at Central Level / State level (in case of B_2 projects)	:	--
		If Others		
	i.	Proposal Number	:	IA/RJ/IND2/116690/2019
	ii.	Master Proposal Number	:	SW/116684/2019

	c.	Please Specify	:	--
	d.	EAC concerned (for category A Projects only) (Coal Mining / Non-coal Mining / Thermal / River Valley & Hydro / Industry-I / Industry-II / Infrastructure-I / Infrastructure-II / Nuclear &Defence / CRZ	:	Industrial Projects – 2
	e.	New / Expansion /Modernization / One Time Capacity expansion (only for Coal Mining) / Expansion under Para 7(ii) / Modernization under Para 7(ii) / Change of Product Mix under Para 7(ii))	:	Expansion
4	**Location of the Project**			
	a.	Plot / Survey / Khasra No.	:	Plot No. E-442, 443 & 444
	b.	Village	:	Chopanki
	c.	Tehsil	:	Tijara
	d.	District	:	Alwar
	e.	State	:	Rajasthan
	f.	Pin Code	:	301 707
	g.	Bounded Latitudes (North)		
		From	:	28.152
		To	:	28.153
	h.	Bounded Longitudes(East)		
		From	:	76.878
		To	:	76.879
	i.	Survey of India Topo Sheet No.	:	53 D/12, 53 D/15 & 53 D/16
	j.	Upload Topo Sheet File (*Upload pdf only*)	:	Attached as **Figure 2.3, Section 2.4.1, Chapter-2 in EIA Report (Page No. 2-11)**
	k.	Maximum Elevation Above Means Sea Level(AMSL)	:	283
	l.	Upload (kml) File (*Upload kml only*)	:	Attached as **Annexure-1**
	m.	Distance of Nearest HFL from the project boundary within the study area	:	30
	n.	Seismic Zone (Zone: 1 / 2 / 3 / 4 / 5)	:	2
5	**Whether project is executed in multiple States (Yes / No)?**			No
	If Yes			
	a.	Number of States in which Project will be Executed (e.g. *1,2,3,4,5,6*)		1
	b.	Main State of the Project		Rajasthan
	c.	Other State (*Multiple Entries Allowed*) (If the project to be executed, does not belong to any state, then state category could be selected as 'Other')		

State	District	Tehsil	Village

6	**Details of Terms of Reference (ToR)**			
	a.	Whether ToR is mandatory for submitting application (Yes / No)?		Yes
		If Yes		
	b.	Date of issue of ToR / Standard ToR		18th February 2019
	c.	MoEF&CC / SEIAA File No.		J-11011/63/2009-IA-11(1)
	d.	Upload ToR letter (PDF only)		Attached as **Annexure-11 in EIA Report (Page No. A-150)**
7	**Details of Public Consultation**			
	a.	Whether the Project Exempted from Public Hearing (Yes/No)?		Yes
		If yes,		
		Reason		Unit is located in Notified Industrial area of RIICO, Chopanki
	b.	Supporting Document (*upload pdf only*)		Attached as **Annexure-2**
	c.	Whether details of Public Hearing available (Yes/No)?	:	--
		If No,		--
	d.	Reason thereof		--
		Supporting Document (*upload pdf only*)		--
		If Yes,		--
	e.	Date of Advertisement of Public Hearing		--
	f.	Copy of advertisement in English (Upload PDF only)	:	--
	g.	Whether Public hearing was presided over by an officer of the rank of Additional District Magistrate or above (Yes/No)?	:	--
		If yes		--
	h.	Designation of Presiding Officer (District Magistrate / District Collector / Deputy Commissioner / others - please specify)		--
	i.	Copy of duly signed Proceedings of Public Hearing in English (*Upload pdf only*)	:	--
	j.	Date of Public Hearing	:	--
	k.	Venue of Public Hearing:	:	--
		Village		--
		Tehsil		--
		District		--
		State		--
	l.	Distance of Public Hearing Venue from the Proposed Project (km)	:	--

	m.	No. of people attended		:	--
	n.	If the multiple public hearings conducted			--
		PI give the details of each PH as per (e) to (o) above			--
8	**Details of Project Configuration / Product (*Multiple Entries Allowed*)**				
	a.	Whether the project is New (Yes/No?)			No
		If yes,			--
	b.	Project Configuration			--

Plant / Equipment / Facility	Configuration	Remarks if any

	c.	Product		:	

Product / Activity (Capacity / Area)	Quantity	Unit	Mode of Transport / Transmission of Product

- Unit:- (Tons per Annum(TPA), Mega Watt(MW), Hectares(ha), Kilo Litre per Day(KLD), Tons Crushed per Day(TCD), Cubic Meter per Day, Kilometers(Km), Million Liters per Day(MLD), Others)
- Mode of Transport/Transmission of Product (Road, Rail, Conveyor Belt, Pipe Conveyor, Arial Ropeway, combination of two or three modes, Others)

9	**If Expansion / Modernisation / One Time Capacity expansion (only for Coal Mining) / Expansion under Clause 7(ii) / Modernisation under Clause 7(ii) / Change of Product Mix under Clause 7(ii)))**				
	a.	Details of environmental clearance granted earlier			
		(i)	Date of issue of environmental clearance	:	29th April 2009
		(ii)	MoEFCC / SEIAA File Number		J-11011/63/2009-IA II (I)
		(iii)	Upload EC Letter		Attached as **Annexure-13 in EIA Report (Page No. A-160)**
	b.	Details of certified report on compliance of earlier environmental clearance conditions			
		(i)	Details of Regional Officeof MoEFCC / Zonal Office of CPCB / SPCB / UTPCC from which certified reporton compliance of earlier environmental clearance conditions obtained	:	Regional Office, Lucknow
		(ii)	Letter No	:	IV/ ENV/ R/Ind-107/740/2005/322
		(iii)	Status of Compliance	:	Complied
		(iv)	Certified report on compliance of earlier environmental clearance conditions (Including	:	Attached as **Annexure-13 in EIA Report (Page No. A-160)**

			Monitoring Report) (*Upload pdf only*)		
		(v)	Date of site visit	:	29/05/2019
	c.	**Details of Consent to Operate**			
		(i)	Whether Consent to operate obtained (Yes/No)?		Yes
			If yes,		
		(ii)	Upload Copies of all Consent to operate obtained since inception (*Upload pdf only*)		Attached as **Annexure-10 in EIA Report (Page No. A-125)**
		(iii)	Date of issue		22/01/2019
		(iv)	Valid up to		31/05/2023
		(v)	File No.		F(PLG)/Alwar(Alwar)/36(1)/2015-2016/ 6090-6092
		(vi)	Application No.		2018-2019/PDF/3865
		(vii)	Upload Copy of Consent to operate valid as on date (*Upload pdf only*)		Attached as **Annexure-10 in EIA Report (Page No. A-125)**
	d.	Details of Capacity Expansion (*Multiple Entries Allowed*)			

Sr. No.	Product Name	Quantity from	Quantity to	Total	Unit	Mode of Transport/ Transmission of Product
A. PESTICIDE TECHNICAL						
1.	**Phenoxy Herbicides**	20	280	300		
	Quizalofop				MT/Annum	Road
	2,4-D Ethyl Ester				MT/Annum	Road
	2,4-D sodium salt				MT/Annum	Road
	Clodinafop propargyl				MT/Annum	Road
2.	**Imidazolinone Herbicide**	50	0	50		
	Imazethapyr				MT/Annum	Road
3.	**Sulfonyl Urea Herbicides**	20	380	400	MT/Annum	Road
	Metsulfuron methyl				MT/Annum	Road
	Sulfosulfuron				MT/Annum	Road
	Tribenuron methyl				MT/Annum	Road
	Flazasulfuron				MT/Annum	Road
	Iodosulfuron				MT/Annum	Road
	Nicosulfuron				MT/Annum	Road
	Rimsulfuron				MT/Annum	Road
4.	**Organochlorine Herbicides**	200	0	200		
	Butachlor				MT/Annum	Road

			Pretilachlor				MT/Annum	Road
		5.	**Other Herbicides**	600	200	800		
			Oxyfluorfen				MT/Annum	Road
			Paraquate				MT/Annum	Road
			Diclofop methyl				MT/Annum	Road
			Diflufenican				MT/Annum	Road
			Sulcotrione				MT/Annum	Road
			Benfuresate				MT/Annum	Road
			Glufosinate ammonium				MT/Annum	Road
			Penoxsulam				MT/Annum	Road
			Pinoxaden				MT/Annum	Road
			Propanil				MT/Annum	Road
			Tembotrione				MT/Annum	Road
		6.	**Carbamate Insecticide**	10	90	100		
			Thiodicarb				MT/Annum	Road
		7.	**Neo Nicotinoid Insecticides**	100	2900	3000		
			Acetamiprid				MT/Annum	Road
			Imidacloprid				MT/Annum	Road
			Thiacloprid				MT/Annum	Road
			Thiamethoxam				MT/Annum	Road
			Dinotefuran				MT/Annum	Road
			Clothianidin				MT/Annum	Road
			Imidaclothiz				MT/Annum	Road
		8.	**Organophosphorus Insecticides**	300	0	300		
			Chlorpyriphos				MT/Annum	Road
		9.	**Pyrethroid Insecticides**	150	2850	3000		
			Allethrin				MT/Annum	Road
			Alpha cypermethrin				MT/Annum	Road
			Cyfluthrin				MT/Annum	Road
			Cypermethrin				MT/Annum	Road
			Delta cypermethrin				MT/Annum	Road
			d-transallethrin				MT/Annum	Road
			Lambda cyhalothrin				MT/Annum	Road
			Permethrin				MT/Annum	Road
			Prallethrin				MT/Annum	Road
			Transfluthrin				MT/Annum	Road
			Bifenthrin				MT/Annum	Road
			Metofluthrin				MT/Annum	Road
		10.	**Other Insecticides**	100	200	300		
			Fipronil				MT/Annum	Road
			Buprofezin				MT/Annum	Road

		Cartap hydrochloride				MT/Annum	Road
		Metalaxyl				MT/Annum	Road
		Novaluron				MT/Annum	Road
		Ethiprole				MT/Annum	Road
		Thiocyclam hydrogen oxalate				MT/Annum	Road
		Pymetrozine				MT/Annum	Road
		Fenpyroximate				MT/Annum	Road
		Spirotetramat				MT/Annum	Road
		Flonicamid				MT/Annum	Road
		Flubendiamide				MT/Annum	Road
		Indoxacarb				MT/Annum	Road
	11.	**Conazole Fungicides**	75	225	300		
		Difenoconazole				MT/Annum	Road
		Hexaconazole				MT/Annum	Road
		Ipconazole				MT/Annum	Road
		Paclobutrazol				MT/Annum	Road
		Propiconazole				MT/Annum	Road
		Tebuconazole				MT/Annum	Road
		Tricyclazole				MT/Annum	Road
		Probenazole				MT/Annum	Road
		Prothioconazole				MT/Annum	Road
		Epoxiconazole				MT/Annum	Road
	12.	**Other Fungicides**	75	225	300		
		Thiophanate methyl				MT/Annum	Road
		Pyraclostrobin				MT/Annum	Road
		Cyzofamid				MT/Annum	Road
	13.	**Fermentation Technology**	100	200	300	MT/Annum	Road
		Abamectin				MT/Annum	Road
		Azoxystrobin				MT/Annum	Road
		Picoxystrobin				MT/Annum	Road
		Emamectin benzoate				MT/Annum	Road
	Total		**1800**	**7550**	**9350**		
	1.	Pesticide formulation Bulk	1500	0	1500	MT/Annum	Road
	2..	Emulsifier formulation	500	0	500	MT/Annum	Road
	3.	Granule formulations	7500	0	7500	MT/Annum	Road
	4.	Liquid formulations	6000	0	6000	MT/Annum	Road
	5.	Powder formulations	4500	0	4500	MT/Annum	Road
	6.	R&D Unit	1 (Service)	0	1 (Service)	MT/Annum	
	Total		**20,000**	**0**	**20,000**		

- Unit:- (Tons per Annum(TPA), Mega Watt(MW), Hectares(ha), Kilo Litre per Day(KLD), Tons Crushed per Day(TCD), Cubic Meter per Day, Kilometers(Km), Million Liters per Day(MLD), Others)

- Mode of Transport/Transmission of Product (Road, Rail, Conveyor Belt, Pipe Conveyor, Arial Ropeway,combination of two or three modes, Others)

e. Details of Configuration (*Multiple Entries Allowed*)

Plant / Equipment / Facility	Existing Configuration	Proposed Configuration	Final configuration after expansion	Remarks if any
S.S Reactor	8	9	17	10 KL
S.S Reactor	13	13	26	6.0 KL
S.S Reactor	6	6	12	5.0 KL
Glass line reactor	5	9	14	6.3 KL
Glass line reactor	3	5	8	5.0 KL
MS Reactor	1	1	2	5.0 KL
Agitated nutsche filter Drier	4	6	10	5.0 KL
RVD	3	6	9	1 to 5 KL
Centrifuge SS basket	2	2	4	48″ Dia.
Nutsche filter	2	2	4	5 KL
SS tanks	42	30	72	2- 5 KL
Glass lined tanks	15	20	35	2- 5 KL
Pulverizer	1	0	1	100 Kg/hr
Ejectors	11	10	21	NA
Sparkler filter	3	5	8	NA

10	**Project Cost**			
	a.	Total Cost of the Project at current price level (in Lakhs)	:	4567.08
	b.	Funds Allocated for Environment Management (Capital) (in Lakhs)	:	943.37
	c.	Funds Allocated Towards ESC (Entrepreneur Social Responsibility) (in Lakhs)	:	33.50
	d.	Funds Allocated for Environment Management Plan (EMP) (Recurring per Annum) (in Lakhs)	:	600.00
11	**Whether project attracts the General Condition specified in the Schedule of EIA Notification (Yes/No)? [provide name of WL/CPA/ESA/Inter-state boundary / International boundary and distance from the project**		:	Yes
		If Yes		
	a.	Protected Area Notified Under the Wild Life(Protection) Act,1972	:	
	b.	Critically Polluted Areas as identified	:	Unit is located within 10kms. of Critically

		by the Central Pollution Control Board from Time to Time		Polluted Area of Bhiwadi.
	c.	Notified Eco-Sensitive Areas	:	
	d.	Inter-State Boundaries and International Boundaries	:	
12	**Whether projects attract the Specific Condition specified in the Schedule of EIA Notification (Yes/No)?**		:	No
		If Yes		
	a.	If any Industrial Estate/Complex / Export processing Zones /Special Economic Zones/Biotech Parks / Leather Complex with homogeneous type of industries such as Items 4(d), 4(f), 5(e), 5(f), or those Industrial estates with pre-defined set of activities (not necessarily homogeneous, obtains prior environmental clearance, individual industries including proposed industrial housing within such estates /complexes will not be required to take prior environmental clearance, so long as the Terms and Conditions for the industrial estate/complex are complied with (Such estates/complexes must have a clearly identified management with the legal responsibility of ensuring adherence to the Terms and Conditions of prior environmental clearance, who may be held responsible for violation of the same throughout the life of the complex/estate		
13	**Raw Material / Fuel Requirement (*Multiple Entries Allowed*)**			
	a.	Details of Raw Material / Fuel Requirement		

Sr. No.	Product Name	Quantity (MT/ MT)	Source	Transportation	Distance from Project Site	Type of Linkage
1.	**2-4-D Ethyl Ester**					
	2,4-D acid	0.95	Swati Chemical Industries, Vadodara	By Road	760	Open Market
	Ethyl alcohol	0.21	KLJ Resources Ltd, Kandla	By Road	880	Open Market
2.	**2-4-D Sodium Salt**					

	2,4 –Dichloro phenol	0.725	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Mono Chloro Acetic Acid	0.520	Terratech Chemicals (India) Pvt. Ltd, Ankleshwar	By Road	752	Open Market
3.	**Abamectin**					
	Streptomycessa vermitis	0.550	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Anthelminic	1.100	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Acaricidal	1.100	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
4.	**Acetamiprid**					
	N-Cyano methyl Acetamidate	0.500	Nanging Bangnong, China	By Sea	2700	Open Market
	2-Chloro 5-(methyl amino methyl) Pyridine	0.730	Nanging Bangnong, China	By Sea	2700	Open Market
	Methanol	0.200	KLJ Resources Ltd, Kandla	By Road	880	Open Market
5.	**Allethrin**					
	Cyclohexane	0.930	Akin Chemicals Pvt Ltd, Kandla	By Road	885	Open Market
	Allethrolone	0.540	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Pyridine	0.350	Etong, China	By Sea	2275	Open Market
	Chrysanthemic acid chloride	0.640	Etong, China	By Sea	2275	Open Market
6.	**Alpha Cypermethrin**					
	Meta phenoxy benzaldehyde	0.714	Agropack, Ankleshwar	By Road	820	Open Market
	Sodium cyanide	0.195	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
	n- Hexane	4.300	C.J Shah & Co, Kandla	By Road	882	Open Market
	Cyprmethric acid chloride	0.835	Herenba Industries Ltd., Mumbai	By Road	1075	Open Market
7.	**Azoxystrobin**					
	MMCP	0.900	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Dimethyl Formamide	0.100	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market

	2-cyano phenol	0.350	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Potassium Carbonate	0.250	Sudarshan Pharma Industries, Bhiwandi	By Road	1090	Open Market
	Methanol	0.280	KLJ Resources Ltd, Kandla	By Road	880	Open Market
8.	**Buprofezin**					
	p-nitrophenyl-N-chloromethyl carbamate	1.426	Sajjan India Ltd, Panoli	By Road	801	Open Market
	Toluene	0.425	Atlas Chemical Industries, Kandla	By Road	885	Open Market
	Thiourea	0.854	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Lime	0.282	Nishal Enterprises, Ankleshwar	By Road	760	Open Market
	Ethylene dichloride	0.610	Chemtrade Overseas Pvt Ltd, Hazira	By Road	880	Open Market
9.	**Butachlor**					
	2,6-Diethyl aniline	0.500	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Benzene	0.265	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Paraformaldehyde	0.170	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Triethyl amine	0.0035	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Chloroacetyle chloride	0.395	Srichaitanya Chlorides Pvt. Ltd., Hyderabad	By Road	1486	Open Market
	N-Butanol	1.050	Goel Industries, Bhiwandi	By Road	1090	Open Market
10.	**Cartap hydrochloride**					
	2-Dimethylamino-1, 3-dichloropropane	0.680	FJ Agro, China	By Sea	2880	Open Market
	Sodium thiosulphate	0.120	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Sodium cyanide	0.080	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
	Hydrochloric acid	0.150	Plastochem Industries, Bhiwadi	By Road	15	Open Market

11.	**Chlorpyrifos**					
	Sodium Salt of trichloro Pyridinol	0.658	CFAR industries, China	By Sea	2800	Open Market
	Diethyl Thio Phosphoryl Chloride	0.560	Excel Industries, Mumbai	By Road	1082	Open Market
	Ethylene dichloride	0.263	Chemtrade, Kandla	By Road	870	Open Market
12.	**Cyfluthrin**					
	FluroMeta Phenoxy Benzaldehyde	0.495	Herenba Industries Ltd., Dahej	By Road	830	Open Market
	Sodium cyanide	0.140	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
	Cypermethric Acid chloride	0.578	Herenba Industries Ltd., Mumbai	By Road	1092	Open Market
	Hexane	0.050	KLJ resources Ltd, Kandla	By Road	880	Open Market
13.	**Cypermethrin**					
	Cypermethric Acid chloride	0.590	Herenba Industries Ltd., Mumbai	By Road	1092	Open Market
	Meta Phenoxy Benzaldehyde	0.485	UPL Ltd, Ankleshwar	By Road	820	Open Market
	Sodium cyanide	0.145	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
	Phase Transfer Catalyst	0.006	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
	Hexane	0.045	KLJ Resources Ltd, Kandla	By Road	880	Open Market
	Hypochlorite	1.630	H.K Chemical Industries, Bhiwadi	By Road	12	Open Market
14.	**Delta cypermethrin**					
	Ester of Bi-cisthemic acid	0.515	Nanging Bangnong, China	By Sea	2700	Open Market
	Thionyl Chloride	0.150	Kutch Chemical Industries Ltd, Panoli	By Road	805	Open Market
	Meta phenoxybenzaldehyde	0.485	UPL Ltd, Ankleshwar	By Road	820	Open Market
	Sodium cyanide	0.150	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
15.	**Difenoconazole**					
	4-methyl-1, 3-dioxolane	0.281	FJ Agro, China	By Sea	2880	Open Market

	2-chloro-4-(4-chlorophenoxy) benzyl chloride	0.927	FJ Agro, China	By Sea	2880	Open Market
	Dimethyl Formamide	0.174	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	1,2,4-Trizole	0.236	Nanging Bangnong, China	By Sea	2700	Open Market
	Potassium hydroxide	0.562	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
16.	**D-Transallethrin**					
	Cyclohexane	0.260	Akin Chemicals Pvt Ltd, Kandla	By Road	885	Open Market
	Allethrelone	0.540	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Pyridine	0.015	Etong, China	By Sea	2275	Open Market
	Chrysanthemic acid chloride	0.637	Etong, China	By Sea	2275	Open Market
17.	**Emamectin**					
	Streptomycessa vermitis	0.455	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Anthelminic	0.910	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Acaricidal	0.910	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Methyl benzoate	0.225	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Methanol	0.310	KLJ Resources Ltd, Kandla	By Road	880	Open Market
18.	**Fipronil**					Open Market
	Fipronil Pyrazole	1.263	FJ Agro, China	By Sea	2880	Open Market
	Ammonium Thiocyanate	0.809	Hebai Chengsin, China	By Sea	3700	Open Market
	Oxone	3.906	FJ Agro, China	By Sea	2880	Open Market
	Triflouro methyl bromide	0.835	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Triflouro acetic acid	1.232	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
19.	**Hexaconazole**					

	2,4-Dichloro valero phenol	0.800	Nanging Bangnong, China	By Sea	2700	Open Market
	Dimethyl sulphide	1.160	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Potassium hydroxide	0.693	Krishna Solvechem Ltd, Ankleshwar	By Road	825	Open Market
	Oxarine	0.733	Nanging Bangnong, China	By Sea	2700	Open Market
	Dimethyl formamide	0.080	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	1,2,4-triazole	0.253	Nanging Bangnong, China	By Sea	2700	Open Market
20.	**Imazethapyr**					
	5-ethyl-3-pyridine carboxylic acid	0.818	Nanging Bangnong, China	By Sea	2700	Open Market
	5 Dihydro-4 methyl 4 (1 methyl ethyl)-5-oxo-1 H-imidazoline	0.682	Beliite Chemical, China	By Sea	2790	Open Market
	Dimethyl formamide	0.145	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Sodium carbonate	0.636	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
21.	**Imidacloprid**					
	2–Chloro, 5–chloro methyl Pyridine	0.855	Nanging Bangnong, China	By Sea	2700	Open Market
	N – Nitro iminoIdmidazolidine	0.715	Nanging Bangnong, China	By Sea	2700	Open Market
	Dimethyl formamide	0.108	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Sodium carbonate	0.671	PK Chlorochem, Ankleshwar	By Road	815	Open Market
	Methanol	0.020	KLJ Resources Ltd, Kandla	By Road	880	Open Market
22.	**Indoxacarb**					
	Monoglyme	0.015	Nanging Bangnong, China	By Sea	2700	Open Market
	Sodium hydride	0.160	PK Chlorochem, Ankleshwar	By Road	815	Open Market
	Chloro methyl formate	0.378	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market

	Oxadiazine carboxylate	0.626	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Dichloromethane	0.060	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
23.	**Ipconazole**					
	Cyclopentanol	0.357	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Dimethyl Sulphide	1.243	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	4-Chloro Benzyl Chloride	0.715	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Potassium hydroxide	0.715	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Dimethyl formamide	0.100	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	1,2,4-Trizole	0.300	Nanging Bangnong, China	By Sea	2700	Open Market
	Para formaldehyde	0.157	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
24.	**Lambda Cyhalothrin**					Open Market
	Meta Phenoxy Benzaldehyde	0.470	Herenba Industries Ltd., Ankleshwar	By Road	824	Open Market
	Sodium Cyanide	0.128	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
	TFP Acid Chloride	0.640	FJ Agro, China	By Sea	2880	Open Market
	N-Hexane	0.120	KLJ Resources Ltd, Kandla	By Road	880	Open Market
	Isopropyl alcohol	0.300	KLJ Resources Ltd, Kandla	By Road	880	Open Market
25.	**Met sulfuron methyl**					Open Market
	O-sulfoisocyante Methyl Benzoate	0.634	Nanging Bangnong, China	By Sea	2700	Open Market
	2-Amino 4-Methoxy 6-Methyl 1,3,5 Triazine	0.367	Nanging Bangnong, China	By Sea	2700	Open Market
	Toluene	0.100	Atlas Chemical Industries, Kandla	By Road	885	Open Market
26.	**Metalaxyl**					Open Market

		N-(2, 6 – Dimethyl Phenyl) Alanine – Methyl Ester	0.750	Nanging Bangnong, China	By Sea	2700	Open Market
		Methoxy Acetyl Chloride	0.400	Shiva chemicals, Panoli	By Road	802	Open Market
		Toluene	0.110	Atlas Chemical Industries, Kandla	By Road	885	Open Market
	27.	**Novaluron**					Open Market
		2,6-difluoro benzoyl isocyanate	0.321	FJ Agro, China	By Sea	2880	Open Market
		2-chloro-4-amino phenoxy ether	0.794	FJ Agro, China	By Sea	2880	Open Market
		Toluene	0.546	Atlas Chemical Industries, Kandla	By Road	885	Open Market
	28.	**Oxyfluorfen**					Open Market
		2-Chloro Trichloro p-Tolyl 3-Ethoxy phenyl Ether	0.877	Nanging Bangnong, China	By Sea	2700	Open Market
		Nitric Acid	0.252	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	29.	**Pacloburazol**					
		tert-pentan-3-ol	0.380	Sinochem china, China	By Sea	3400	Open Market
		4-Chloro Benzyl Chloride	0.690	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
		KOH	0.690	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
		DMF	0.075	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
		1,2,4 Triazol	0.290	Nanging Bangnong, China	By Sea	2700	Open Market
		K_2CO_3	0.070	PK Chlorochem, Ankleshwar	By Road	815	Open Market
	30.	**Paraquate**					
		4,4' bipyridine	0.945	FJ Agro, China	By Sea	2880	Open Market
		Methyl iodide	1.866	Sanjay chemical (India) Pvt Ltd,	By Road	1112	Open Market

			Bhiwandi			
	Silver Chloride	0.855	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
31.	**Permethrin**					
	Meta Phenoxy Benzyl Alcohol	0.524	Herenba Industries Ltd., Ankleshwar	By Road	824	Open Market
	Cypermethric Acid Chloride	0.615	Herenba Industries Ltd. , Ankleshwar	By Road	824	Open Market
	n-Hexane	0.180	KLJ Resources Ltd, Kandla	By Road	880	Open Market
32.	**Prallethrin**					
	Cyclopenten 1-hydroxy	0.535	Etong, China	By Sea	2275	Open Market
	Sodium cyanide	0.162	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
	Chrysanthemic acid chloride	0.658	Etong, China	By Sea	2275	Open Market
	Hexane	0.125	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
33.	**Pretilachlor**					
	2,6-diethyl-N-(propoxyethyl) analine	0.703	Etong, China	By Sea	2275	Open Market
	Chloro acetyl chloride	0.453	Deedy, Ankleshwar	By Road	795	Open Market
	Hexane	0.047	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Ammonia Gas	0.055	GACL, Dahej	By Road	841	Open Market
34.	**Propiconazole**					
	4-propyl-1, 3-dioxolane	0.405	Etong, China	By Sea	2275	Open Market
	Dimethyl Sulphide	1.175	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	2,4-dichloro Benzyl Chloride	0.845	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Potassium hydroxide	0.675	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	1,2,4 Triazol	0.284	Nanging Bangnong, China	By Sea	2700	Open Market
	Potassium carbonate	0.068	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market

	Isopropyl alcohol	0.236	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
35.	**Quizalofop**					
	R- (p hydroxyl phenoxy) propionic acid	0.405	Etong, China	By Sea	2275	Open Market
	Potassium carbonate	0.143	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	6-Chloroquinoxaline	0.733	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Dimethyl formamide	0.570	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Methanol	0.143	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
36.	**Tebuconazole**					
	1-(4-Chlorophenyl)-4, 4'-dimethyl-pent-3-one	0.755	FJ Agro, China	By Sea	2880	Open Market
	Dimethyl sulfate	0.502	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Potassium hydroxide	0.323	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Dimethyl formamide	0.025	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Sodium Sulfide	0.026	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	1,2,4 Triazol	0.255	Nanging Bangnong, China	By Sea	2700	Open Market
	Potassium carbonate	0.040	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
37.	**Thiacloprid**					
	2-Chloro, 5-Chloro methyl Pyridine	0.857	Nanging Bangnong, China	By Sea	2700	Open Market
	Thiazolidinylide neCyanamide	0.714	Sajjan India Ltd, Panoli	By Road	801	Open Market
	Dimethyl formamide	0.100	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Sodium carbonate	0.672	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
38.	**Thiodicarb**					

	Methomyl Tech – Powder	0.933	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Toluene	0.110	Atlas Chemical Industries, , Kandla	By Road		Open Market
	Sulphur dichloride	0.302	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
39.	**Thiophanate methyl**					
	Ethylene dichloride	0.080	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Sodium Thiocyanate	0.526	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Methyl chloroformate	0.600	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	O-Phenylene Diamine	0.350	Anhui, China	By Sea	3900	Open Market
40.	**Transfluthrin**					
	Tetra fluoro benzyl alcohol	0.521	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Chrysanthemic acid chloride	0.633	Etong, China	By Sea	2275	Open Market
	Hexane	0.186	Nanging Bangnong, China	By Sea	2700	Open Market
41.	**Tricyclazole**					
	3-methyl-(1,2)-benzothiazole Chloride	0.733	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Potassium hydroxide	0.667	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Dimethyl formamide	0.087	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	1,2,4 Triazol	0.280	Nanging Bangnong, China	By Sea	2700	Open Market
	Potassium carbonate	0.067	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
42.	**Sulfosulfuron**					
	2-ethyl sulfonyl imidazo [1,2a]pyridine-3-sulfonamide	0.628	Nanging Bangnong, China	By Sea	2700	Open Market
	4,6-dimethoxy-2-(Phenoxy carbonyl)amino	0.760	Nanging Bangnong, China	By Sea	2700	Open Market

	pyrimidine					
	Triethyl amine	0.340	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
43.	**Tribenuron methyl**					
	2-carbomethoxybenzene sulfonamide	0.735	Nanging Bangnong, China	By Sea	2700	Open Market
	4-Methoxy-6-dimethyl -1,3,5-triazin-2-amine	0.515	Nanging Bangnong, China	By Sea	2700	Open Market
	Butyl isocyanate	0.368	Nanging Bangnong, China	By Sea	2700	Open Market
	Phosgene	0.390	Nanging Bangnong, China	By Sea	2700	Open Market
	Xylene	0.220	Atlas Chemical Industries, Kandla	By Road	885	Open Market
44.	**Flazasulfuron**					
	3N-methoxycarbonyl 3-trifluoro methyl pyridine-2-sulfonamide	0.718	Nanging Bangnong, China	By Sea	2700	Open Market
	2-amino-4,6-dimethoxy pyrimidine	0.401	Nanging Bangnong, China	By Sea	2700	Open Market
	1,2-dichloro ethane	0.267	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
45.	**Iodosulfuron methyl**					Open Market
	methyl 2-{[(chloromethoxy) carbonyl] sulfamoyl}-4-iodobenzoate	0.885	FJ Agro, China	By Sea	2880	Open Market
	4-Methoxy-6-methyl 1,3,5-triazine-2-amine	0.280	FJ Agro, China	By Sea	2880	Open Market
	Dibutyl urea	0.018	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Dodacane	1.795	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
46.	**Nicosulfuron**					
	2-sulfoamido-3-(N,N-dimethyl)-	0.685	Nanging Bangnong, China	By Sea	2700	Open Market

	carbo amidopyridine					
	4,6-dimethoxy pyrimidine phenyl carbamate	0.790	Nanging Bangnong, China	By Sea	2700	Open Market
	Dibutyl urea	0.460	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Acetonitrile	4.700	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
47.	**Rimusulfuron**					
	3-ethane sulfonylpyridine -2-sulfonamide	0.935	Nanging Bangnong, China	By Sea	2700	Open Market
	4,6-dimethoxy pyrimidine phenyl carbamate	1.560	Nanging Bangnong, China	By Sea	2700	Open Market
	Dibutyl urea	0.790	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Acetonitrile	4.700	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
48.	**Diclofop-methyl (DCFM)**					
	4-(2,4-dichloro phenoxy) phenol	1.235	Etong, China	By Sea	2275	Open Market
	2-chloro-methyl propionate	0.575	Etong, China	By Sea	2275	Open Market
	Toluene	0.515	Atlas Chemical Industries, Kandla	By Road	885	Open Market
	Ethyl acetate	0.065	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
49.	**Diflufenican**					
	2-(3-trifluoromethyl Phenoxy) nicotinyl chloride	0.993	Nanging Bangnong, China	By Sea	2700	Open Market
	Dichloro ethane	0.357	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market

	2,4-difluoroaniline	0.360	Nanging Bangnong, China	By Sea	2700	Open Market
	Triethyl amine	0.422	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
50.	**Sulcotrione**					
	1,3-cyclohexanedione	0.485	Akin Chemicals Pvt Ltd, Hazira	By Road	882	Open Market
	Pyridine	0.375	Nanging Bangnong, China	By Sea	2700	Open Market
	2-chloro-4(methyl sulfonyl) benzoic acid chloride	1.100	Nanging Bangnong, China	By Sea	2700	Open Market
	Methylene chloride	0.383	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Acetonitrile	5.100	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Triethyl amine	0.425	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Potassium cyanide	0.064	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Ethylene dichloride	0.170	KLJ Resources Ltd, Bhiwandi	By Road	1108	Open Market
51.	**Clodinafop propargyl**					
	RHPPA	0.550	Nanging Bangnong, China	By Sea	2700	Open Market
	5-chloro-2,3-DFP	0.450	Nanging Bangnong, China	By Sea	2700	Open Market
	Toluene	0.025	Atlas Chemical Industries, Kandla	By Road	885	Open Market
	Sodium hydroxide	0.250	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Propargyl chloride	0.175	Nanging Bangnong, China	By Sea	2700	Open Market
52.	**Benfuresate**					
	Morpholine	0.370	Nanging Bangnong, China	By Sea	2700	Open Market
	Isobuteraldehyd	0.310	Nanging Bangnong,	By Sea	2700	Open

	e		China			Market
	4-benzoquinone	0.455	Nanging Bangnong, China	By Sea	2700	Open Market
	Ethane sulfonyl chloride	0.535	Nanging Bangnong, China	By Sea	2700	Open Market
	Toluene	0.460	Atlas Chemical Industries, Kandla	By Road	885	Open Market
53.	**Glufosinate ammonium**					
	Ethanol	0.100	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Acrolein	0.310	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
	Sodium cyanide	0.640	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
	Ammonium carbonate	0.270	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Barium hydroxide	0.330	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Sulfuric acid	0.870	Plastochem Industries, Bhiwadi	By Road	15	Open Market
	Ammonium hydroxide	0.800	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
54.	**Dinotefuran**					
	3-HMTHF	0.540	Etong, China	By Sea	2275	Open Market
	Thionyl chloride	0.635	Kutch Chemical Industries Ltd, Panoli	By Road	805	Open Market
	Ammonia	0.360	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	MMNCl	0.700	Etong, China	By Sea	2275	Open Market
	Toluene	0.075	Atlas Chemical Industries, Kandla	By Road	885	Open Market
55.	**Clothianidin**					
	1,5-Dimethyl-2-nitroiminohexahydro-1,3,5-triazine	0.740	Nanging Bangnong, China	By Sea	2700	Open Market
	Sodium hydroxide	0.170	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Dimethyl formamide	2.000	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	2-chloro-5-thiazolymethylc	0.715	Nanging Bangnong, China	By Sea	2700	Open Market

	hloride					
	Ethanol	0.350	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
56.	**Imidaclothiz**					
	Dimethyl formamide	0.080	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Sodium hydroxide	0.180	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	N – Nitro iminoIdmidazolidine	0.500	Beliite Chemical, China	By Sea	2790	Open Market
	2-chloro-5-chloromethyl thiazole	0.636	Nanging Bangnong, China	By Sea	2700	Open Market
57.	**Bifenthrin**					
	Lambda cyhalothric acid	0.625	Nanging Bangnong, China	By Sea	2700	Open Market
	Thionyl chloride	0.250	Kutch Chemical Industries Ltd, Panoli	By Road	805	Open Market
	Bifenthrin alcohol	0.488	Nanging Bangnong, China	By Sea	2700	Open Market
	Hexane	0.095	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
58.	**Ethiprole**					
	Compound A	1.000	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Ethylene dichloride	0.050	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Acetic acid	0.032	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Hydrogen per oxide	0.325	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Sodium sulfite	0.100	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
59.	**Thiocyclam hydrogen oxalate**					
	Toluene	3.000	Atlas Chemical Industries, Kandla	By Road	885	Open Market

			Allyl chloride	0.300	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
			Sodium hydroxide	0.325	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
			Dimethyl amine	0.450	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
			Sodium thiosulphate	1.200	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
			Sodium sulfide	0.500	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
		60.	**Pymetrozine**					
			Ethylene dichloride	4.000	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
			Methyl acetate	0.375	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
			Hydrazine hydrate	0.495	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
			Triphosgene	0.500	Triveni Chemicals, Ankleshwar	By Road	790	Open Market
			Potassium carbonate	0.325	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
			Chloroacetone	0.450	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
			Hydrochloric acid	0.100	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
			Nicotinaldehyde	0.400	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
		61.	**Fenpyroximate**					
			Dichloro ethane	3.000	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
			1.3-DMPPCO	0.590	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
			TBCMB	0.580	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
			Potassium carbonate	0.180	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
		62.	**Pyraclostrobin**					
			4-chlorophenyl hydrazine	0.425	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
			Methyl acrylate	0.260	Sanjay chemical (India) Pvt Ltd,	By Road	1112	Open Market

			Bhiwandi			
	1-BMNB	0.565	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Ammonium chloride	0.100	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Methyl chloroformate	0.265	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Potassium carbonate	0.040	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Dimethyl sulfate	0.150	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
63.	**Cyzofamid**					
	2,2-DCPTE	0.660	Nanging Bangnong, China	By Sea	2700	Open Market
	Glyoxal	0.420	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Hydroxylamine hydrochloride	0.700	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Thionyl chloride	0.390	Kutch Chemical Industries Ltd, Panoli	By Road	805	Open Market
	Potassium carbonate	0.225	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	N-NDMASC	0.470	Nanging Bangnong, China	By Sea	2700	Open Market
64.	**Thiamethoxam**					
	Dimethyl formamide	0.50	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	2-chloro-5-chloromethyl thiazole	0.600	Nanging Bangnong, China	By Sea	2700	Open Market
	3-Methyl-N-nitro iminoperhydro-1,3,5-oxadiazine	0.575	Beliite Chemical, China	By Sea	2790	Open Market
	Potassium carbonate	0.250	PK Chlorochem, Ankleshwar	By Road	815	Open Market
65.	**Penoxsulam**					
	2-FTMA	0.400	Etong, China	By Sea	2275	Open Market

	Sodium Methoxide	0.012	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	2,2 Difluro ethanol	0.185	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	HCl (30%)	0.310	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Sodium Nitrite	0.175	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Sodium Sulfite	0.315	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	5,8 DMTPA	0.420	Nanging Bangnong, China	By Sea	2700	Open Market
	Dichloroethane	2.500	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
66.	**Pinoxaden**					
	MDEMP Acetate	0.600	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Dimethyl Carbonate	0.250	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Sodium Hydroxide	0.011	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Dichloroethane	2.000	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	1,2,5-ODDHB	0.700	Etong, China	By Sea	2275	Open Market
	2,2 DMPC	0.325	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
67.	**Propanil**					
	3,4 dichloro aniline	0.810	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Soda Ash	0.160	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Propionic Acid	0.370	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
68.	**Tembotrione**					
	Chlorobenzene	3.000	Sanjay chemical	By Road	1112	Open

			(India) Pvt Ltd, Bhiwandi			Market
	MCMMSB	0.650	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Bromine	0.400	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	HCl (30%)	0.325	Plastochem Industries, Bhiwadi	By Road	15	Open Market
	Thionyl Chloride	0.275	Kutch Chemical Industries Ltd, Panoli	By Road	805	Open Market
	Cyclohexane-1,3 dione	0.275	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
69.	**Metofluthrin**					
	2,2-DMPCPC Acid	0.470	Nanging Bangnong, China	By Sea	2700	Open Market
	Thionyl Chloride	0.360	Kutch Chemical Industries Ltd, Panoli	By Road	805	Open Market
	Caustic solution	0.120	Nishal Enterprises, Bhiwadi	By Road	15	Open Market
	TFMM phenyl methanol	0.675	FJ Agro, China	By Sea	2880	Open Market
70.	**Spirotetramat**					
	2,5 DMBAA	0.475	Etong, China	By Sea	2275	Open Market
	Thionyl Chloride	0.350	Kutch Chemical Industries Ltd, Panoli	By Road	805	Open Market
	Methanol	0.100	KLJ Resources Ltd, Kandla	By Road	880	Open Market
	HCl (30%)	0.385	Plastochem Industries, Bhiwadi	By Road	15	Open Market
	Potassium Carbonate	0.400	PK Chlorochem, Ankleshwar	By Road	815	Open Market
	Ethoxy Formyl Chloride	0.310	Etong, China	By Sea	2275	Open Market
71.	**Flonicamid**					
	4- TFMNA	0.900	Nanging Bangnong, China	By Sea	2700	Open Market
	2-AAN HCl	0.450	Nanging Bangnong, China	By Sea	2700	Open Market
	Triphosgene	0.475	Triveni Chemicals, Ankleshwar	By Road	790	Open Market
72.	**Flubendiamide**					
	IMMTPMPFPPP	1.000	Nanging Bangnong, China	By Sea	2700	Open Market

	m-CPBA	0.550	Nanging Bangnong, China	By Sea	2700	Open Market
73.	**Probenazole**					
	Saccharine Amide	0.915	Blue Circle Organics Pvt Ltd, Mumbai	By Road	1050	Open Market
	Allyl Alcohol	0.290	Chemex Organochem Private Limited, Mumbai	By Road	1062	Open Market
	Soda Ash	0.160	RR Innovative Pvt Ltd, Bhiwandi	By Road	1104	Open Market
	Thionyl Chloride	0.620	Kutch Chemical Industries Ltd, Panoli	By Road	805	Open Market
	Toluene	2.500	Atlas Chemical Industries, Kandla	By Road	885	Open Market
	Dichloromethane	2.500	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
74.	**Picoxystrobin**					
	Methyl Ester	0.970	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Pyridinone	0.560	FJ Agro, China	By Sea	2880	Open Market
	Potassium Carbonate	0.400	PK Chlorochem, Ankleshwar	By Road	815	Open Market
	Toluene	0.950	Atlas Chemical Industries, Kandla	By Road	885	Open Market
	Methanol	0.400	KLJ Resources Ltd, Kandla	By Road	880	Open Market
75.	**Epoxiconazole**					
	1,2,4-triazole	0.245	Nanging Bangnong, China	By Sea	2700	Open Market
	Sodium Hydroxide	0.180	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Hydrochloric Acid	0.100	Plastochem Industries, Bhiwadi	By Road	15	Open Market
	Dimethyl Formamide	0.280	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
76.	**Prothioconazole**					
	1,2-Dichloro benzene	0.455	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Chloro cyclopropane	0.236	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	2-hydroxypropanyl chloride	0.295	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Xylene	2.0	Atlas Chemical	By Road	885	Open

			Industries, Kandla			Market
	1,2,4- Triazole-5-thione	0.315	Nanging Bangnong, China	By Sea	2700	Open Market

In case of expansion proposals, total requirement of raw material / fuel shall be given

- Unit:- (Tons per Annum(TPA), Mega Watt(MW), Hectares(ha), Kilo Litre per Day(KLD), Tons Crushed per Day(TCD), Cubic Meter per Day, Kilometers(Km), Million Liters per Day(MLD), Others)
- Mode of Transport/Transmission of Product (Road, Rail, Conveyor Belt, Pipe Conveyor, Arial Ropeway,combination of two or three modes, Others)

b.	Upload copy of Linkage / Fuel Supply Agreement / e-auction / Memorandum of Understanding / Letter of Allocation / Captive source / others.	:	Attached as **Section-2.8, Chapter-2 in EIA Report (Page No. 2-16)**

14	**Baseline Data (Air / Water / Noise / Soil / Ground water table/ Others)**			
	a.	Period of Base Line Data Collection		
		From (DD/MM/YYYY)	:	01st Dec 2018
		To (DD/MM/YYYY)	:	28th Feb 2019
	b.	Season (Summer / Pre-monsoon / Post-monsoon / Winter)	:	Winter
	c.	No. of Ambient Air Quality (AAQ) Monitoring Locations	:	9
	d.	Details of AAQ Monitoring (*Multiple Entries Allowed*)		

Criteria Pollutants	Unit	Maximum Value	Minimum Value	98 Percentile Value	Prescribed Standard
PM 10	Micro gram per Meter Cube	99.18	62.12	95.19	100
PM 2.5	Micro gram per Meter Cube	58.33	36.92	52.61	60
SO_2	Micro gram per Meter Cube	11.09	6.09	9.28	80
NOx	Micro gram per Meter Cube	15.59	6.81	13.92	80
Others O3	Micro gram per Meter Cube	21.95	12.34	18.42	100

- Criteria Pollutants: - (PM10, PM2.5, SO2, NOx, Others parameters specific to sector)
- Unit: - (Micro Gram per Meter Cube,Nano Gram per Meter Cube,Mili Gram per Meter Cube, NA)

e.	No. of Ground Water Monitoring Locations (*Multiple Entries Allowed*)	:	9
f.	Details of Ground Water Monitoring		

Criteria Pollutants	Unit	Maximum Value	Minimum Value	Desirable Limit	Maximum Permissible Limit
pH	NA	7.69	6.93	6.5	8.5
Total Suspended Solids	mg/L	25	<2	50	100
Total Hardness	mg/L	428	120	300	600
Fluoride	mg/L	BDL	BDL	1	1.5

Total Dissolved Solids	mg/L	946.0	480.0	500	2000
Chlorides	mg/L	234.0	18.0	250	1000
Others (Sulfates)	mg/L	30.39	5.78	200	400
Heavy Metals (Zinc)	mg/L	BDL	BDL	5	15

Criteria Pollutants: - (pH, TSS, TDS, Total Hardness, Chlorides, Fluoride, Heavy Metals, other parameters specific to the sector)

- Unit :- (mg/l, NA)

g.	No. of Surface Water Monitoring Locations	:	0

h. Details of Ground Water Monitoring (*Multiple Entries Allowed*)

Criteria Pollutants	Unit	Maximum Value	Minimum Value	Classification of inland water body
pH	NA	0	0	A
BOD	mg/L	0	0	A
DO	mg/L	0	0	A
COD	mg/L	0	0	A
Others (Chlorides)	mg/L	0	0	A

- Parameter :- (pH, DO, BOD, COD, Others parameters specific to the sector)
- Unit :- (mg/l, NA)

i.	No. of Ambient Noise Monitoring Locations	:	9

j. Details of Noise Monitoring (*Multiple Entries Allowed*)

Parameter	Unit	Maximum Value	Minimum Value	Prescribed Standard
Leq (Day)	A- weighted decibels (dB (A))	74.9	46.5	75
Leq (Night)	A- weighted decibels (dB (A))	64.8	31.1	65

- Parameter:- (Leq(Day),Leq(Night))
- Unit :- (A-weighted decibels(dB(A))

k.	No. of Soil Monitoring Locations (*Multiple Entries Allowed*)	:	9

Parameter	Unit	Maximum Value	Minimum Value
pH		8.66	7.32
N (Nitrogen)	gm/kg	0.023	0.0023
P (Phosphorus)	gm/kg	0.0019	0.00002
K (Potassium)	gm/kg	1.78	0.929
Electric Conductivity	mS/cm	0.470	0.112

- Parameter :- (pH, N(Nitrogen), P(Phosphorus), K(Potassium), Electric Conductivity)
- Unit :- (Millisiemens per Centimeter, Milligram per Litre, Percent, Centimeter per Second, Milliequivalents per 100 Gram, Milligram per Kilogram, Parts per Million, Kilogram per hectare, Others)

l	**Ground Water Table**			
i	Range of Water Table Pre-Monsoon Season (Meters Below Ground Level (m bgl)):			
	From	:	50	
	To	:	75	

	ii	Range of Water Table Post-Monsoon Season (Meters Below Ground Level (m bgl)):		
		From	:	60
		To	:	85
	iii	Whether Ground Water Intersection will be there (Yes / No)?	:	No
		If Yes,		
		(i) Upload Copy of Central Ground Water Authority Letter (*Upload pdf only*)	:	
		(ii) Letter No.	:	
		(iii) Date of issue	:	
15	**Details of Water Requirement (During Operation)**(*Multiple Entries Allowed*)			
	a.	Details		

Source	Quantity in KLD	Method of water withdrawal	Distance from Source	Mode of Transport
RIICO Water Supply & Reuse	188	Pipeline	8	Pipeline

- Source: Surface /Ground Water /Sea /Others
- Modeof Transportation: Pipeline /Canal /Others
- Method of water withdrawal: Barrage / Weir / Intake well / Jackwell / Tube well / Open well / Others

	b.	Upload Copy of Permission from Competent Authority (*Upload pdf only*) Attached as **Section-2.10.1, Chapter-2 in EIA Report (Page No. 2-202)**		
	c.	Letter No.	:	3585
	d.	Date of issue	:	31-12-2019
	e.	Permitted quantity	:	70 KLD
	f.	Whether Desalination is proposed (Yes/ No)	:	No
		If Yes,		
		(i) Desalination capacity (KLD)	:	
		(ii) Quality of Brine (KLD)	:	
		(iii) Mode of Disposal of brine	:	
16	**Waste Water Management (During Operation)**			

Type / Source	Quantity of Waste Water Generated (Kilo Litre per Day)	Treatment Capacity (Kilo Litre per Day)	Treatment Method	Mode of Disposal	Quantity of Treated Water Used in Recycling / Reuse (Kilo Litre per Day)	Quantity of Discharged Water (Kilo Litre per Day)
Industrial & Domestic	136	136	ETP, Solvent stripper & MEE	Reuse within plant & recycling	126	10 (Losses & Salt generated to TSDF site)

	a.	Total Waste Water Generation	:	136
	b.	Total Discharged Water	:	10 (Losses & Salt generated to TSDF site)
	c.	Total Reused Water	:	126

17 **Solid Waste Generation Management**(*Multiple Entries Allowed*)

Item	Quantity per Annum	Unit	Distance from Site	Mode of Transport	Mode of Disposal
ETP Sludge	307.5	Tons	500	Road	Treatment, Storage and Disposal Facility (TSDF)
Process Residue	399.3	Tons	0	--	In-house incineration or sent to CHWIF
MEE Salt	1080	Tons	500	Road	Treatment, Storage and Disposal Facility (TSDF)
Used Lubricating Oil	1.45	Tons	8	Road	Authorized Recyclers
Drums & Containers, Bags & Liners	21	Tons	15	Road	Authorized Recyclers
Incineration Ash	16	Tons	500	Road	Treatment, Storage and Disposal Facility (TSDF)
Stripper Sludge	412.5	Tons	0	--	In-house incineration or sent to CHWIF

- Item:- (Industrial waste,Municipal Solid waste,Fly ash, Bottom Ash, Hazardous Waste (as per Hazardous and Other Waste Management Rules 2016),E Waste,Bio-Medical waste,Construction& Demolition waste,PlasticWaste,Others)
- Unit:- (Tons,Kiloliter)
- Mode of Disposal:- (Treatment, Storage and Disposal Facility(TSDF),Authorized Re-cyclers,Landfills,SanitaryLandfills,Others)

18 **Air Quality Impact Prediction** (*Multiple Entries Allowed*)

Criteria Pollutants	Unit	Baseline Concentration	Incremental Concentration	Distance GLC	Total GLC	Prescribed Standard
PM10	Micro gram per Meter Cube	69.4	0.75	0.38	70.2	100
PM 2.5	Micro gram	38.77	0.4	0.38	39.17	60

		per Meter Cube					
	SO2	Micro gram per Meter Cube	8.35	0.009	0.38	8.359	80
	NOx	Micro gram per Meter Cube	13.76	0.0	0.38	13.76	80
	Others (HBr)	Micro gram per Meter Cube	BDL	0.007	0.38	BDL	--

- Parameter:- (PM10, PM, SO2, NOx, Others parameters specific to the sector)
- Unit :- (Microgram per Meter Cube, NA)

19	**Power Requirement**			
	a.	Quantity (Kilo Volt Amps (KVA))	:	860
	b.	Source	:	JVVNL
	c.	Upload Copy of Agreement (*Upload pdf only*)	:	Attached as **Annexure-3**
	d.	Standby Arrangement (Details of DG Sets)	:	DG Set * 3 Nos.
	e.	Stack Height (in m)	:	5.5, 6 & 7
20	**Land Ownership Pattern (Prior to the project proposal) in Ha**			
	a.	Forest land	:	0.0
	b.	Private Land	:	1.1958
	c.	Government Land	:	0.0
	d.	Revenue Land	:	0.0
	e.	Other Land	:	0.0
		Total land		1.1958
21	**Present Land Use breakup in Ha**			
	a.	Agriculture Area	:	18810.22
	b.	Waste/Barren Area	:	0
	c.	Grazing/ Community Area	:	0
	d.	Surface Water bodies	:	89.28
	e.	Settlements		6996.04
	f.	Industrial		0
	g.	Forest	:	5146.36
	h.	Mangroves		0
	i.	Marine area		0
	j.	Others (Scrubland)	:	373.6
		Total	:	31415.5
22	**Land requirement for various activities (Multiple entries allowed) in Ha**		:	

Description of Activity / Facility / Plant / Others	Land requirement	Remarks
Production Plants	0.26	
Security Building	0.003	
Effluent Treatment plant	0.08	
Utility	0.0498	
Raw Material and Finished Products Storage	0.135	
Tank farm area	0.023	
Green Belt	0.4784	
Hazardous waste storage area	0.005	
Road & Open Area	0.1616	
Total	**1.1958**	

- Activity / Facility / Plant / Others include: Main Plant, Township, Greenbelt, Ash pond, Quarry area, OB dump Area, Safety zone, Tailing pond, Landfill, Water reservoir, De-salination plant, Area for solid waste management, Built-up area, others

23 **Ecological and Environmental Sensitivity (Within 10 Km):-WLS-Wild Life Species; NPA-Notified Protected Area; ESAs-Eco Sensitive Areas;ESZs- Eco Sensitive Zones)**

a. Details of Ecological Sensitivity

Details of Ecological Sensitivity	Name	Distance from the Project (Km)	Remarks
Corridors	NA	0	NA
Critically Polluted Area	Bhiwadi	7	Within the block
ESAs	NA	0	NA
NPA	NA	0	NA
WLS	NA	0	NA
ESZs	NA	0	NA
Wildlife Corridors	NA	0	NA

- Details of Ecological Sensitivity: - (Critically Polluted Area, WLS, NPA, ESAs, ESZs, Corridors, Wildlife Corridors)

b.	Whether NBWL recommendation is required (Yes/No)?		No
	If yes		
	Upload NBWL recommendation in PDF		
c.	Details of Environmental Sensitivity		

Details of Environmental Sensitivity	Name	Distance from the Project (Km)	Remarks
Forest	NA	0	NA
Archaeological Sites	NA	0	NA
Others	NA	0	NA
Defence Installations	NA	0	NA

- Details of Environmental Sensitivity:- (Forest, Archaeological Sites,Defence Installations, Others)

d.	Whether NoC / Permission from the competent authority is required (Yes/No)?		No
	If yes		--

		Upload NoC / Permission from the competent authority in PDF		--
24	**Forest Land**			
	1	Whether any Forest Land involved(Yes/No)?		No
		If Yes		--
	a.	Forests Clearance Status (In-Principle(Stage-I) Approval Obtained / Final (Stage-II) Approval Obtained / Forest Clearance Under Process(Stage-I) / Forest Clearance Under Process(Stage-II) / Application for Forest Clearance yet to be Submitted)	:	--
		If In-Principle (Stage-I) Approval Obtained,		--
		(i) MoEFCC file number	:	--
		(ii) Date of InPrinciple (Stage-I) approval	:	--
		(iii) Area diverted	:	--
		(iv) Upload FC Letter (Upload pdf only and attach it as Annexure-FC letter)	:	--
		If Final (Stage-II) Approval Obtained,		--
		(i) MoEFCC file number	:	--
		(ii) Date of Final Approval	:	--
		(iii) Date of In-Principle Approval	:	--
		(iv) Area diverted	:	--
		(v) Upload FC Letter*(Upload pdf only and attach it as Annexure-FC letter)*		--
		If Forest Clearance under process (Stage-I),		--
		(i) MoEFCC file number	:	--
		(ii) Area applied	:	--
		If Forest Clearance under process (Stage-II),		--
		(i) MoEFCC file number	:	--
		(ii) Area applied	:	--
	b.	Legal Status of Forest Land (Reserved, Protected, Private, Village, Others)		--
		If Others,		--
		Please Specify Others	:	--
25	**Tree Cutting, if any**			
	a.	No. of Trees Cut for the Project (if Forestland not involved)	:	No

	b.	Details of Tree Cutting and Planting of Trees (*Upload pdf Only*)	:	--
26	**Land Acquisition Status**			
	a.	Acquired Land		1.1958
	b.	Land yet to be acquired		--
	c.	Status of Land acquisition if not acquired		--
27	**Rehabilitation and Resettlement (R&R)**			
	a.	No. of Villages		--
	b.	No. of Households		--
	c.	No. of PDFs (Project Displaced Families)		--
	d.	No. of PAFs (Project Affected Families)		--
	e.	Funds Allocated for R&R		--
	f.	Status of R&R (Completed / In-progress / Yet to start)		Yet to start
28	**Whether there is Presence of Schedule-I Species (Yes/No)?**		:	Yes
		If yes,		
	a.	Details of Schedule-I Species	:	12 Schedule-I species
	b.	Whether conservation plan for Schedule-I Species has been prepared (Yes/ No)?	:	Yes
		If Yes,		
		(i) Upload conservation plan (Upload only PDF)		Attached in **Section-3.11.2, Chapter-3 in EIA Report (Page No. 3-62)**
		(ii) Fund Provision made		4,85,000/-
		(iii) Period of Implementation		Within 5 years after getting EC
	c.	Whether conservation plan for Schedule-I Species has been approved by competent authority (Yes/ No)?		No
		(i) Upload copy of approval (Upload PDF Only)	:	--
		(ii) Letter No.	:	--
		(iii) Date of issue	:	--
		(iv) Recommendations if any	:	--
29	**Whether there is Presence of Water Bodies in Core Area(Yes/No)?**		:	No
		If yes,		--
	a.	Details of Water Bodies in Core Area	:	--
	b.	Whether there is Diversion required (Yes/No)?		--
		If yes,		--

	c.	Details of diversion required		--
	d.	Details of study conducted		--
	e.	Whether permission has been obtained from competent authority (Yes/No)?		--
		(i) Upload copy of permission (Upload PDF Only)		--
		(ii) Letter No.		--
		(iii) Date of issue		--
		(iv) Recommendations if any		--
30	**Whether there is Presence of Water Bodies in Buffer Area(Yes/No)?**		:	--
		If Yes		--
	a.	Details of Water Bodies in Buffer Area	:	--
	b.	Direction of Water Bodies in Buffer Area (North / South / East / West / North East / North West / South East / South West)	:	--
	c.	Distance of Water Bodies in Buffer Area (kilo meters)		--
31	**Manpower Requirement**			
	a.	Permanent employment during construction	:	0
	b.	Permanent employment during operation	:	160
	c.	Temporary employment during construction	:	0
	d.	Temporary employment during operation	:	0
	e.	No. of working days	:	330
	f.	Total manpower	:	160
32	**Green Belt in Ha**			
	a.	In case of new projects	:	NA
	i.	Total Area of Green Belt		--
	ii.	Percentage of Total Project Area	:	--
	iii.	No. of Plants to be Planted	:	--
	iv.	Funds Allocated for Plantation	:	--
	v	Upload Green Belt Plan (Upload PDF Only)		--
	b.	Incase of expansion / modernization / change in product mix etc.		--

i.

Description	Existing	Proposed	Total
Total Area of Green Belt	4000	784	4784
Percentage of Total	33.45	6.55	40.00

			Project Area				
			No. of Plants	210	100	310	
			Funds Allocated	6,30,000 /-	1,00,000/-	7,30,000/-	
	ii.	Upload Green Belt Plan (Upload PDF Only)			Attached as **Section-10.7, Chapter-10 in EIA Report (Page No. 10-17)**		
33	**Project Benefit (*Multiple entry allowed*)**						
	Type of Project Benefits			Details of Project Benefit			
	Social			Provision of employment to nearby people, CSR & CER activities			
	(Project benefits shall include environmental, social and others)						
34	**Whether the Project / Activity attracts the provisions of CRZ (Yes/No)?**					No	
	If yes,					--	
	1	**Project Details**				--	
		a.	CRZ Classification: (CRZ I (A), CRZ I(B), CRZ II, CRZ III, CRZ IV (A), CRZ IV(B))			--	
		b.	Location type: (Non-Eroding Coast, Low and Medium Eroding Coast, High Eroding Coast)			--	
		c.	Details of Mangroves Land Involved, if Any			--	
		d.	Area of Mangroves Land (hectare)			--	
		e.	EIA (Terrestrial) Studies: (Carried Out, Not Carried Out)			--	
			If Carried Out,			--	
			1)	Summary Details of EIA (Terrestrial) Studies		--	
			2)	Upload Recommendation made in EIAs (Upload pdf only)		--	
			3)	Period of Study from (EIA Terrestrial)		--	
			4)	Period of Study to (EIA Terrestrial)		--	
			If Not Carried out			--	
				Give Reason		--	
		f.	EIA (Marine) Studies: (Carried Out, Not Carried Out)			--	
			If carried out			--	
			1)	Summary Details of EIA (Marine) Studies		--	

			2)	Upload Recommendation made in EIAs		--
			3)	Period of Study from (EIA Marine)		--
			4)	Period of Study to (EIA Marine)		--
			If Not Carried out,			--
			Give Reason			--
		g.	Disaster Management Plan/National Oil Spill Disaster Contingency Plan (if Applicable)			--
	2.	**Description of the Project Under Consideration**				--
		a.	Type of Project: (Resort/Buildings/civic amenities, Coastal Roads/Roads on Stilt, Pipelines from Thermal power Blow Down, Marine Disposal of Treated Effluent, Facility for Storage of Goods/Chemicals, Offshore structures, Desalination Plant, Mining of Rare Earth/Atomic Minerals, Sewage Treatment Plants, Lighthouse, Wind Mills, Others)			--
			If Resort/Buildings/civic amenities,			--
			1)	Agency Name for Preparing CRZ Maps		--
			2)	Total Area/Built-up Area (hectare)		--
			3)	Height of Structure		--
			4)	FSI Ratio		--
			5)	The governing Town Planning Rules/Regulations		--
			6)	Details of Provision of Car Parking Area		--
			If Coastal Roads/Roads on stilt,			--
			1)	Agency Name for Preparing CRZ Maps		--
			2)	Area of Land Reclamation		--

			3)	Estimated Quantity of Muck/Earth for Reclamation		--
			4)	Carrying Capacity of Traffic		--
			If Pipelines from Thermal Power Blow Down,			--
			1)	Agency Name for Preparing CRZ Maps		--
			2)	Length of Pipeline		--
			3)	Length Traversing CRZ Area		--
			4)	Depth of Excavation		--
			5)	Width of Excavation		--
			6)	Length of Pipeline from Seashore to Deep Sea		--
			7)	Depth of Outfall Point from Surface of Sea Water		--
			8)	Temperature of effluent above Ambient at Disposal Point		--
			If Marine Disposal of Treated Effluent,			--
			1)	Agency Name for Preparing CRZ Maps		--
			2)	Location of Intake/Outfall		--
			3)	Depth of Outfall Point		--
			4)	Length of Pipeline		--
			5)	Length Traversing CRZ Area		--
			6)	Depth of Excavation		--
			7)	Width of Excavation		--
			8)	Length of Pipeline from Seashore to Deep Sea/Creek		--
			9)	Depth of Outfall Point from Surface of Sea Water		--
			10)	Depth of Water at Disposal Point		--
			11)	Type of Disposal		--
			If Facility for Storage of Goods/Chemicals,			--

			1)	Agency Name for Preparing CRZ Maps		--
			2)	Name and Type of Chemical		--
			3)	End use of the Chemical		--
			4)	No. of Tanks for Storage		--
			5)	Capacity of tanks		--
			If offshore structures,			--
			1)	Agency Name for Preparing CRZ Maps		--
			2)	Exploration or Development		--
			3)	Depth of Sea Bed		--
			4)	No. of Rigs/Platform		--
			5)	Details of Group Gathering Stations		--
			If Desalination Plant,			--
			1)	Agency Name for Preparing CRZ Maps		--
			2)	Capacity of Desalination		--
			3)	Total Brine Generation		--
			4)	Temperature of Effluent above Ambient at Disposal Point		--
			5)	Ambient Salinity		--
			6)	Disposal Point		--
			If Mining of Rare Earth/Atomic Minerals,			--
			1)	Agency Name for Preparing CRZ Maps		--
			2)	Capacity of Mining		--
			3)	Volume/Area to be mined		--
			4)	Type of Mineral to be Extracted		--
			5)	End use of the Mineral		--
			If Sewage Treatment Plants,			--
			1)	Agency Name for Preparing CRZ Maps		--
			2)	Capacity		--
			3)	Total Area of Construction		--
			4)	Compliance of effluent parameters as laid down by		--

				CPCB/SPCB/other authorized agency		
			5)	Whether discharge is in sea water/creek? If yes,		--
				Distance of Marine Outfall Point from Shore/from the tidal river bank		--
				Depth of Outfall Point from Sea Water Surface		--
				Depth of Sea at Outfall Point		--
			If Lighthouse,			--
			1)	Agency Name for Preparing CRZ Maps		--
			2)	Total Area of Construction		--
			3)	Height of the Structure		--
			If Wind Mills,			--
			1)	Agency Name for Preparing CRZ Maps		--
			2)	Capacity (MW)		--
			3)	Transmission Lines: (Overhead, Underground)		--
			4)	Diameter of Windmill		--
			5)	Length of Blade		--
			6)	Speed of Rotation		--
			7)	Height of the Structure		--
			If Others,			--
			1)	Agency Name for Preparing CRZ Maps		--
			2)	Please Specify with salient features		--
			3)	Upload relevant Document (*Upload pdf only*)		--
	3.	**Distance of Project (In Meters) from LTL/HTL to be Stated**				--
		a.	Clause of CRZ Notification Under which the Project is a Permissible/Regulated Activity			--
		b.	Whether CRZ Map Indicating HTL, LTL Demarcation in 1:4000 Scales Prepared? (Yes/No)			--

			If Yes,			--
			1)	Distance of Project (in meters) from HTL to be Stated		--
			2)	Upload Maps(*kml File*)		--
			3)	Distance of Project(in meters) from LTL to be Stated		--
			4)	Upload Maps (*kml File*)		--
		c.	Whether Project Layout Superimposed on CRZ Map 1:4000 Scales?: (Yes/No)			--
			If Yes,			--
			1)	Upload Maps (*kml File*)		--
		d.	Whether CRZ Map 1:25000 Covering 7 km Radius Around Project Site Prepared? (Yes/No)			--
			If Yes,			--
			1)	Upload Maps (*kml File*)		--
		e.	Whether CRZ Map Indicating CRZ-I,II,III and IV Including Other Notified ESAs Prepared?: (Yes/No)			--
			If Yes,			--
			1)	Upload Maps (*kml File*)		--
		f.	NOC from State Pollution Control Boards Obtained: (Yes/No)			--
			If Yes			--
			1)	Upload Copy of NOC (*Upload pdf only*)		--
		g.	Details of Rain Water Harvesting System			--
	4.	**Recommendation of State Coastal Zone Management Authority**				--
		a.	Upload Copy of CZMA (*Upload pdf Only*)			--
		b.	State the Conditions Imposed			--
		c.	Social and Environmental Issues and Mitigations Measures Suggested Including but not Limited to R&R, Water, Air, Hazardous Wastes, Ecological			--

			aspects, etc. (Brief Details to be Provided)		
35	**Sector Specific Details**				
I	**Whether the proposal is mining of minerals (coal / non-coal) project (Yes/No)?**				No
		If yes,			--
	1	No. of Mineral to be Mined (Multiple Entries Allowed)		:	--
		Minerals To be Mined	Major or Minor Mineral		
	2	Mine Capacity in ROM (Run of Mine)			--
	3	Upload 500 meters Cluster Certificate from State Mines and Geology in case of minor minerals (Upload pdf Only)			--
	4	**Mining Plan**			--
		a.	Approval Letter No.		--
		b.	Date of Approval		--
		c.	Upload Approved Letter (*Upload pdf only*)		--
		d.	Approved by State Mines & Geology Department / Indian Bureau of Mines / Ministry of Coal /Ministry of Mines /State Government /Atomic Mineral Directorate / Others)		--
		e.	If Others,		--
			Please specify		--
		f.	Approved Mining Lease Area		--
		g.	Approved Capacity		--
	5	**Technical Details**			--
		a.	Total Geological Reserves (Million Ton)		--
		b.	Mineable Reserves (Million Ton)		--
		c.	Extractable Reserves(Million Ton)		--
		d.	Percent of Extraction(%)		--
		e.	Grade of Coal /Ore /Mineral		--
		f.	Stripping Ratio		--
		g.	Category of Gaseousness (Only for Coal Mining, Others may write Not applicable)		--
		h.	Average Gradient(Degree)		--

		i.	Maximum Thickness of Seams(meters) (Only for Coal Mining, Others may write Not applicable)		--
		j.	Mining Method (Opencast / Underground /Mixed(Opencast + Underground) /Adit		--
		k.	Life of Mine (Years)		--
	6	**Details of beneficiation (including crushing / screening/others)**			--
		a.	Whether it is proposed to install crusher within the mining lease area (Yes/No)?		--
			If yes,		--
		b.	No. of crushers		--
		c.	Details of crusher (Multiple entries allowed)		--

Crusher ID	Capacity (in TPH)	Remarks

		d.	Whether it is proposed to install beneficiation plant / Coal washery within the mining lease area (Yes/No)?		--
			If yes,		--
		e.	Beneficiation / washing Technology		--
		f.	Capacity		--
	7	**Details of Seams if applicable**			--
		a.	No. of seams		--
		b.	Thickness of seams to be worked on		--
		c.	Maximum Thickness of Seams(meters) (if not Applicable,may Write NA)		--
	8	**Details of Mining Lease**			--
		a.	Details of Mining Lease		--
		b.	Upload Letter of Intent (Upload pdf only)		--
		c.	Date of Execution of Mining Lease with Reference Number		--
		d.	Validity of Mining Lease		--
		e.	Upload Copy of Executed Lease deed valid as on Date (Upload pdf only)		--

		f.	Earlier Renewals (Multiple Entries Allowed)		--
			Uploaded Copy of Earlier Lease	Date of Renewal	
	9	**OB (Over Burden) Management (Only if Mining Method: Opencast)**			--
		a.	**Details of External Dumps**		--
			i) No. of OB Dumps		--
			ii) Total Area (in Hectare)		--
			iii) Height (in meter)		--
			iv) Quantity (in Million Cubic meter)		--
			v) No. of year back fill up		--
		b.	**Details of Internal Dump**		--
			i) No. of Internal Dumps		--
			ii) Total Area (in Hectare)		--
			iii) Height (in meter)		--
			iv) Quantity (in Million Cubic meter)		--
	10	**Details of Topsoil Management**			--
		a.	Quantity of Topsoil excavated during the entire life of the mine (in Million Cubic meter)		--
		b.	Quantity of Topsoil proposed for utilization for reclamation during the entire life of the mine (in Million Cubic meter)		--
		c.	Quantity of Topsoil proposed for utilization for other activities during the entire life of the mine (in Million Cubic meter)		--
	11	**Detail of Final Mine Void(Only if Mining Method: Opencast)**			--
		a.	Area (in Hectare)		--
		b.	Depth (in meter)		--
		c.	Volume (in Million Cubic meter)		--
	12	**Details of Quarry(Only if Mining Method: Opencast)**			--
		a.	Final Void of (hectare)		--
		b.	At a Depth of (meter which is proposed to be converted into a Water Body.)		--

		c.	Total Quarry Area (ha)		--
	13	**Details of Transportation**			--
		a.	In Pit/Underground to Surface		--
		b.	Surface to Siding/Loading		--
		c.	Transportation / Conveyor Details		--
	14	**Details of Land Usage (Pre-Mining)**			--

Land Use	Within ML Area (Hectare)	Outside ML Area (Hectare)	Total
Agriculture Land			
Forest Land			
Waste Land			
Grazing Land			
Surface Water Bodies			
Settlements			
Others(Specify)			

	15	**Details of Transportation**			--
		a.	In Pit/Underground to Surface		--
		b.	Surface to Siding/Loading		--
		c.	Transportation / Conveyor Details		--
	16	**Details of Land Usage (Pre-Mining)**			--

Land Use	Within ML Area (Hectare)	Outside ML Area (Hectare)	Total
Agriculture Land			
Forest Land			
Waste Land			
Grazing Land			
Surface Water Bodies			
Settlements			
Others(Specify)			
Others			

	17	**Details of Land Usage (Post-Mining)**		

Land Use	Plantation	Water Body	Public Use	Others
Excavation / quarry				
Top Soil Storage				
External OB dumps				
Internal OB				

		dumps				
		Roads				
		Built Up Area (Colony/Office)				
		Green Belt				
		Virgin Area				
		Other				
		Total				

	18	**Details of Reclamation(Only if Mining Method: Opencast)Total Afforestation Plan shall be Implemented Covering of Mining. This will include:**			--
		a.	External OB Dump(in hectare)		--
		b.	Internal Dump(in hectare)		--
		c.	Quarry(in hectare)		--
		d.	Safety Zone(in hectare)	:	--
		e.	Final Void of (hectare)	:	--
		f.	At a Depth of (*meter which is proposed to be converted into a Water Body.*)	:	--
		g.	Density of Tree Plantation per ha (in no.)	:	--
		h.	Others in ha (such as Excavation Area along ML Boundary, along Roads and Infrastructure, Embankment Area and in Township Located outside the Lease etc.)		--
		i.	Total afforestation plant (in hectare)		--
	19	**Status of Progressive Mining Closure Plan (For Expansion Projects only)**			--
		a.	Implementation of Various Activities as per Approved Progressive Mine Closure Plan(in Bar Chart) (pdf) (*Upload pdf only*)		--
		b.	Any Deviation from the Approved Progressive Mine Closure Plan		--
		c.	Total Area Excavated(in hectare)		--
		d.	Total Area Backfilled after Excavation(in hectare)		--
		e.	Total Area Reclaimed (in hectare)		--

	20	**Actual Coal/Ore Production vis-a-vis sanctioned capacity Since inception (*Multiple Entries Allowed*)**		--

Financial Year	Sanctioned Capacity as per EC (MTPA)	Sanctioned capacity as per CTO	Sanctioned capacity as per approved Mining Plan	Actual Production	Excess Production Beyond the EC / CTO / Mining Plan Sanctioned Capacity (MTPA)

II	**Whether proposal is for Thermal Project (including captive power plant and Waste Heat Recovery Plant) (Yes/No)?**				No
		If yes,			--
	1	**Specifications of the Plant**			
		a.	Technology proposed (Supercritical, Sub-Critical, CFBC, AFBC, PFBC, IGCC, Incineration, Pyrolysis, Gasification, Bio-methanation, Others)	:	--
		b.	Plant Load Factor (%)	:	--
		c.	Station Heat Rate (Kcal/Kwh)	:	--
		d.	Steam Rate/Flow Rate	:	--
		e.	Boiler Temperature	:	--
		f.	Boiler Pressure	:	--
		g.	Type of Stack (Single flue / Bi-flue / Tri-Flue)	:	--
		h.	No. of Stacks		--

Stack ID	Stack height (m)	Stack Diameter at exit (m)	Exit velocity of stack gas (m/s)	Exit temperature of stack gas (°C)

	2	**Details of fuel linkage (please specify if multiple linkages are involved)**			--
		a.	Type of linkage (Linkage / Fuel Supply Agreement / e-auction / MoU / LOA / Captive / Open market / Others)		--
		b.	Quantity of linkage granted		--
		c.	Date of Linkage		--
		d.	Duration of linkage		--

	3.	**Details of Transportation of fuel**			--

Details / Mode	Distance (km)	Quantity (TPA)
Rail		
Road		
Pipeline		
Conveyor		
Other mode (Please specify)		

	4.	**Details of Fuel Characteristics**			--
		a.	Gross Calorific Value (Kcal/Kg)		--
		b.	Ash content (%)		--
		c.	Sulphur Content (%)		--
		d.	Moisture (%)		--
		e.	Mercury (mg/kg)		--
		f.	Fixed Carbon (%)		--
		g.	Volatile Matter (%)		--
	5.	**Details of Cooling system**			--
		a.	Type of cooling system: Air cooled/Water cooled		--
		b.	Type of draft: Natural draft/Forced draft		--
		c.	Type of air circulation: Parallel flow/ Counter flow		--
		d.	Cycles of Cooling (COC):		--
		e.	Water requirement for cooling (m^3/day):		--
		f.	Boiler blow down temperature:		--
III	**Whether proposal is for River Valley & Hydroelectric Project (Yes/No)?**				No
	If Yes,				--
	1.	**Sub Sector: (**Multipurpose Project / Hydroelectric Project / Irrigation project)			--
	2.	Name of the River		:	--
	3.	Whether Cumulative Impact Assessment and Carrying Capacity Study of River Basin Carried Out? (Yes/No)		:	--
		If Yes		:	--
		a.	Status of Cumulative Impact Assessment and Carrying Capacity Study of River Basin: (Recommended / Not Recommended,)	:	--
			If Recommended		--

		b.	Details of Cumulative Impact Assessment and Carrying Capacity Study of River Basin	:	--
		c.	Upload Relevant Document (*Upload pdf only*)	:	--
	4.	Type of Project: (Construction of Dam Barrage / Run of the River / Lift Irrigation Scheme)		:	--
	5.	Dam Height (meter) if applicable		:	--
	6.	Dam Length (meter) if applicable			--
	7.	Total Submergence Area (hectare)		:	--
	8.	Details of Gross Command Area (GCA) (hectare)		:	--
	9.	Details of Irrigable Command Area (ICA) (hectare)		:	--
	10.	Details of Culturable Command Area (CCA) (hectare)		:	--
	11.	Total Command Area (hectare)		:	--
	12.	Powerhouse Installed Capacity		:	--
		a.	Type of Powerhouse: (Underground / Surface)		--
		b.	Capacity (megawatts)		--
		c.	No. of Tunnels		--
		d.	No. of Units		--
		e.	Bank of River: (Left /Right / Both)		--
	13.	**Generation of Electricity Annually**			--
		a.	Quantity of Generation of Electricity Annually (in Giga Watt Hours(GWh))		--
		b.	Water availability at various percentages		--

Percentage	Water availability (Cusecs)	Dependable year	Remarks
At 50%			
At 75%			
At 90%			

		c.	Machine Availability (%)		--
		d.	Cost of Electricity Generation (in INR)	:	--
		e.	Internal Rate of Return (%)	:	--
		f.	Year of achievement of Internal Rate of Return	:	--

	14.	Catchment Area Treatment Plan (Upload PDF)			--
	15.	Muck Management Plan			--
		a.	Upload Muck Management Plan in PDF		--
		b.	Total Excavation Muck (Cubic Meter)		--
		c.	Utilized for Construction (Cubic Meter)		--
		d.	No. of Muck Disposal sites		--
		e.	Total Muck Disposal Area (Ha)		--
	16.	Fishery Development and Management Plan			--
		a.	Upload Fishery Development and Management Plan in PDF		--
		b.	No. of Fingerlings		--
		c.	No. of Fish Species		--
		d.	Name of the umbrella Fish Species (Scientific Name)		--
	17.	Status of Environmental Flow			--

Season	Average Inflow (in Million Cubic Meter)	Percent of Flow
Lean		
Non-Lean		
Monsoon		
Non-Monsoon		

	18.	Free Flow Stretch(km)			--
	19.	Approval of Central Water Commission			--
		a.	Approval Reference No.		--
		b.	Date of Approval		--
		c.	Upload Copy of Approval (*Upload pdf only*)		--
	20.	Approval of Central Electricity Authority			--
		a.	Approval Reference No.		--
		b.	Date of Approval		--
		c.	Upload Copy of Approval (*Upload pdf only*)		--
	21.	Details of Coffer Dam (upstream) if applicable			--
		a.	Quantity of the material (m^3)		--
		b.	Length of the dam (m)		--

		c.	Quantity of muck to be used (m^3)		--
		d.	Quantity of borrow material to be used (m^3)		--
		e.	Decommissioning plan (upload in PDF)		--
	2 2.	Details of Coffer Dam (downstream) if applicable			--
		a.	Quantity of the material (m^3)		--
		b.	Length of the dam (m)		--
		c.	Quantity of muck to be used (m^3)		--
		d.	Quantity of borrow material to be used (m^3)		--
		e.	Decommissioning plan (upload in PDF)		--
IV	**Whether the proposal is Infrastructure projects (Yes/No)**				No
	If yes?				--
	1	**Details of Building Construction**			--
		a.	Maximum Height of the Building (Meters)		--
		b.	Total No. of Flats to be Build		--
		c.	No. of Buildings		--
		d.	Total plot area (sqm)		--
		e.	Total built up area (sqm)		--
	2	**Foreshore Facilities And/or Marine Disposal**			--
		a.	Whether Project Involves Foreshore Activities and/or marine Disposal (Yes/No)?	:	--
			If Yes,		--
		b.	Upload Shoreline Study (Upload pdf only)		--
		c.	Type of Cargo		--
		d.	Quantity of Cargo		--
		e.	Control Measures of Cargo		--
		f.	Dust Control Measures		--
		g.	Quantum		--
		h.	Quantity of Dredging (Cubic meter per day)		--
		i.	Type of Dredging (Capital, Maintenance)		--
		j.	Disposal of Dredge Material		--
		k.	Details of Outfall Diffusers		--

		m.	No. of Dilution Expected		--
		n.	Distance at which the outlet will Reach Ambient Parameters		--
		o.	Details of Monitoring at outfall		--
		p.	Copy of NoC from PCB in case of Marine Disposal(Upload pdf only)		--
	3	**Rain Water Harvesting**			--
		a.	No. of Storage		--
		b.	Capacity		--
		c.	No. of Recharge Pits		--
		d.	Capacity		--
	4	**Parking**			--
		a.	Details of 4-Wheeler/ 2-Wheeler Parking		--
	5.	**Energy Saving Measures**			--
		a.	Source/Mode		--
		b.	Percentage		--
		c.	Quantity		--
	6.	**Other Details**			--
		a.	Details of impact on Water Bodies and Drainage patters of catchment area, if any		--
		b.	Details of Traffic Density Impact Assessment and Modelling Study(*Upload pdf Only*)		--
		c.	In case of Underground Tunnel projects below the Forest Land – Subsidence Impact Study report(*Upload pdf Only*)		--
	7.	**Type of Industries to be established with Industrial Estate as per their category A/B**			--

Sl. No	Type of Industry	No. of Units	Category A/B

	8.	**Length of the alignment in case of highway projects**			--
	9.	**Details Bridges/ROB/Interchanges, Flyovers, Vehicle Underpass and PedestrianUnderpass (in case of**			--

		Highway Projects)			
		a.	Total No. of Bridges		--
		b.	Total No. of ROB		--
		c.	Total No. of Interchanges		--
		d.	Total No. of Flyovers		--
		e.	Total No. of Vehicle Underpass		--
		f.	Total No of Pedestrian Underpass		--
		g.	Details of other utilities rail and road corridors		--
36	**Details of Court Cases if any**				
	a.	Whether there is any Court Cases pending against the project and/or land in which the project is proposed to be set up (Yes/No)?			No
		If Yes,			
	b.	Name of the Court (Districts *Court / High Court / NGT / Tribunals / Supreme Court of India*)			NA
		If name of Court: (Districts Court, High Court, NGT, Tribunals)			--
	c.	Name of the Sub-court			--
	d.	Case No.			--
	e.	Orders/Directions of the court,if any and its relevance with the proposed project			--
	f.	Case Details			--
	g.	Upload Court Order if any (*Upload pdf Only*)			--
37	**Details of direction issued under Environment (Protection) Act / Air (Prevention & Control of Pollution)) Act / Water (Prevention & Control of Pollution) Act**				
	a.	Whether any direction issued under Environment (Protection) Act/Air (Prevention & Control of Pollution)) Act/Water (Prevention & Control of Pollution) Act(Yes/No)?			No
		If yes,			--
	b.	Details of directions issued under Environment (Protection) Act/Air (Prevention & Control of Pollution)) Act/Water (Prevention & Control of Pollution) Act			--
	c.	Upload copy of directions issued under Environment (Protection) Act/Air (Prevention & Control of Pollution)) Act/Water (Prevention &			--

		Control of Pollution) Act		
	d.	Compliance status of the directions		
38	**Details of EIA Consultant**			
	a.	Have you hired Consultant for preparing document (Yes/No)?	:	Yes
		If No,		--
		(i) Reason for not engaging the Consultant	:	--
		If Yes,		
		(i) Accreditation No.	:	Stay Order Against QCI NABET
		(ii) Name of the EIA Consultant	:	Aqua Air Environmental Engineers Pvt. Ltd.
		(iii) Address		403, Centre Point, Nr. Kadiwala School, Ring Road, Surat – 395 002
		(iv) Mobile No.	:	9904433995
		(v) Landline No.	:	0261 – 2461241
		(vi) E-mail Id	:	aqua_eia@yahoo.com
		(vii) Category of Accreditation (Eligible for Category A / Eligible for Category B)	:	Eligible for Category A
		(viii) Sector of Accreditation	:	A
		(ix) Validity of Accreditation	:	07/04/2016
		(x) Upload Certificate of Accreditation certified by QCI/NABET (*Upload pdf Only*)	:	Attached as **Section-2.8, Chapter-2 in EIA Report (Page No. 2-16)**
39	**Documents to be attached**			
I	***If Project Type is New / Expansion / Modernization / one-time capacity expansion for coal mining:***			
	a.	Upload Copy of EIA/EMP Report		Copy of EIA/EMP
	b.	Upload Copy of Risk Assessment Report		Copy of Risk Assessment
	c.	Upload Copy of Feasibility Report/ Detailed Project Report(DPR) /Detailed Engineering Report /Detailed Conceptual Plan / Approved Mining Plan (in case of Mining proposals) (*Upload pdf only*)		Copy of Feasibility Report/ Detailed Project Report(DPR) /Detailed Engineering Report /Detailed Conceptual Plan / Approved Mining Plan
	d.	Upload Copy of Final Layout Plan (*Upload pdf only*)		Copy of Final Layout Plan
	e.	Upload Cover Letter*(Upload pdf only and attach it as Annexure-document of Cover letter)*		Copy of Cover Letter
	f.	Upload a copy of documents in support of the competence/authority of the person making this application to make application on behalf of the User *Agency (Upload pdf only and*		Copy of documents in support of the competence/authority of the person making this application to make application on behalf of the User *Agency*

		attach it as Annexure-authorization)		
	g.	Upload copy of District Survey Report (for mining of minor minerals only)		--
		Upload copy of Replenishment Study Report & Baseline Survey data (for river sand mining proposals only)		--
	g.	Upload Additional File, if any (*Upload pdf only*)		Copy of Additional File
II	***If Project Type is other than New / Expansion / Modernization / one-time capacity expansion for coal mining: -***			--
	a.	Upload Copy of Feasibility Report/ Detailed Project Report(DPR) /Detailed Engineering Report /Detailed Conceptual Plan (*Upload pdf only*)		--
	b.	Upload Copy of Final Layout Plan (*Upload pdf only*)		--
	c.	Upload Cover Letter*(Upload pdf only and attach it as Annexure-document of Cover letter)*		--
	d.	Upload a copy of documents in support of the competence/authority of the person making this application to make application on behalf of the User Agency*(Upload pdf only and attach it as Annexure-authorization)*		--
	e.	Upload Additional File, if any*(Upload pdf only)*		--
	f.	Upload Updated Form1*(Upload pdf only)*		--
40	**Undertaking**			
	a.	I hereby give undertaking that the data and information given in the application and enclosures are true to be best of my knowledge and belief and I am aware that if any part of the data and information found to be false or misleading at any stage,the project will be rejected and clearance given,if any to the project will be revoked at our risk and cost. In addition to above,I hereby give undertaking that no activity / construction / expansion has since been taken up		
	b.	Name	:	Dr. Mukesh Kumar
	c.	Designation	:	General Manager
	d.	Company	:	M/s. Insecticides India Limited
	e.	Address	:	E-442, 443 & 444, RIICO Industrial Area, Chopanki, Bhiwadi, Dist: Alwar - 301707, Rajasthan

*****

Annexure-1

KML file

Annexure-KML.kml

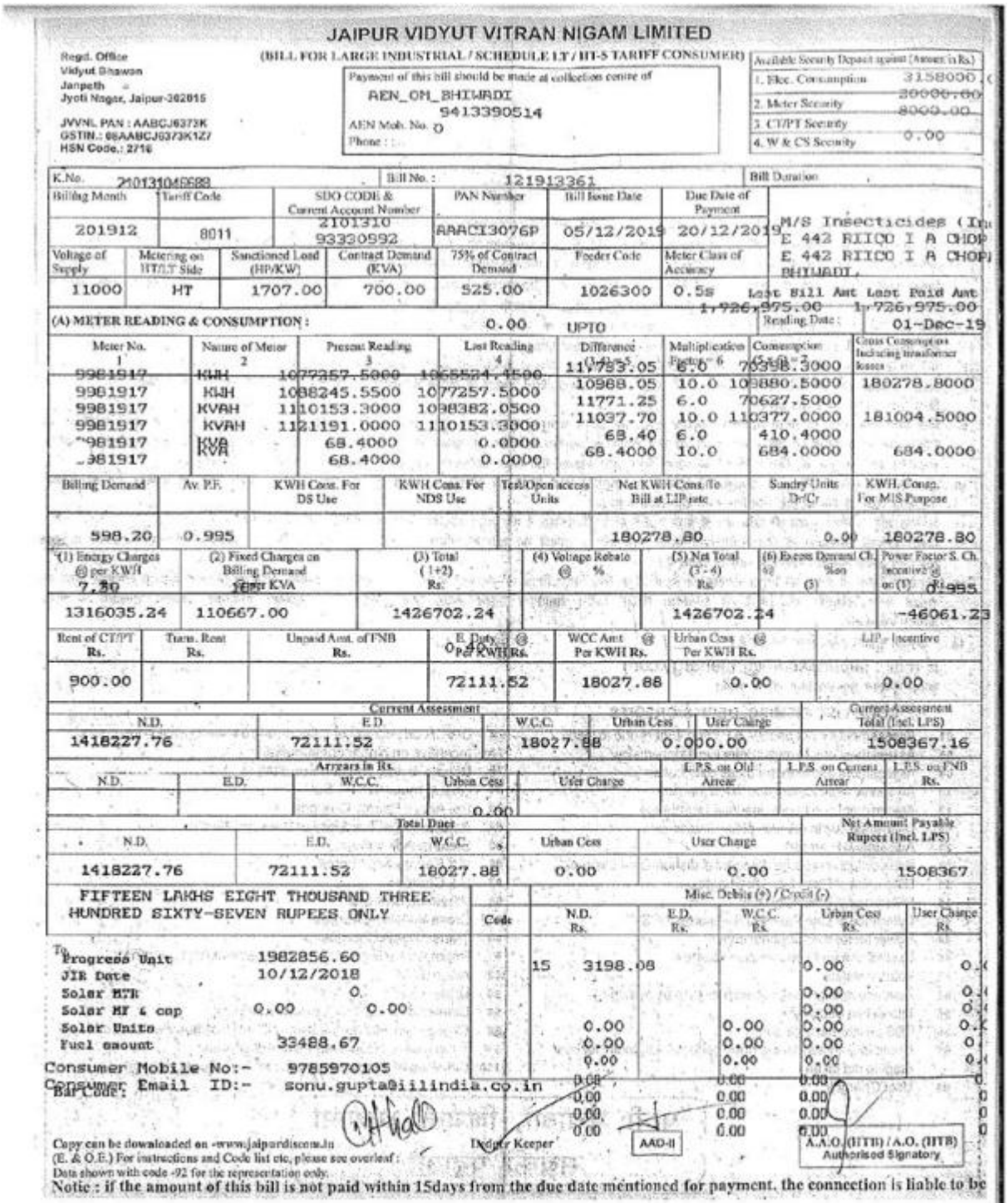
Annexure-2

Public Hearing Exemption

Company is located in notified industrial estate of RIICO Industrial Area, Chopanki. So, public hearing is Not Applicable.

Annexure-3

Electricity Bill



JAIPUR VIDYUT VITRAN NIGAM LIMITED

Regd. Office
Vidyut Bhawan
Janpath
Jyoti Nagar, Jaipur-302015

JVVNL PAN : AABCJ6373K
GSTIN.: 08AABCJ6373K1Z7
HSN Code.: 2716

(BILL FOR LARGE INDUSTRIAL / SCHEDULE LT / HT-5 TARIFF CONSUMER)

Payment of this bill should be made at collection centre of
REN_ON_BHIWADI
AEN Mob. No. 9413390514
Phone :

Available Security Deposit against (Amount in Rs.)	
1. Elec. Consumption	3158000
2. Meter Security	30000.00
3. CT/PT Security	8000.00
4. W & CS Security	0.00

K.No. 2101310456B3 | Bill No. : 121913361 | Bill Duration :

Billing Month	Tariff Code	SDO CODE & Current Account Number	PAN Number	Bill Issue Date	Due Date of Payment	
201912	8011	2101310 93330992	AABCI3076P	05/12/2019	20/12/2019	M/S Insecticides (I... E 442 RIICO I A CHOP... E 442 RIICO I A CHOP... BHIWADI,

Voltage of Supply	Metering on HT/LT Side	Sanctioned Load (HP/KW)	Contract Demand (KVA)	75% of Contract Demand	Feeder Code	Meter Class of Accuracy	Last Bill Amt	Last Paid Amt
11000	HT	1707.00	700.00	525.00	1026300	0.5s	1,726,975.00	1,726,975.00

(A) METER READING & CONSUMPTION : 0.00 UPTO Reading Date : 01-Dec-19

Meter No. 1	Nature of Meter 2	Present Reading 3	Last Reading 4	Difference (3-4)=5	Multiplication Factor = 6	Consumption (5 x 6) = 7	Gross Consumption including transformer losses
~~9981917~~	~~KWH~~	~~1077257.5000~~	~~1065524.4500~~	11733.05	6.0	70398.3000	
9981917	KWH	1088245.5500	1077257.5000	10988.05	10.0	109880.5000	180278.8000
9981917	KVAH	1110153.3000	1098382.0500	11771.25	6.0	70627.5000	
9981917	KVAH	1121191.0000	1110153.3000	11037.70	10.0	110377.0000	181004.5000
9981917	KVA	68.4000	0.0000	68.40	6.0	410.4000	
9981917	KVA	68.4000	0.0000	68.4000	10.0	684.0000	684.0000

Billing Demand	Av. P.F.	KWH Cons. For DS Use	KWH Cons. For NDS Use	Test/Open access Units	Net KWH Cons. To Bill at LIP rate	Sundry Units Dr/Cr	KWH Consp. For MIS Purpose
598.20	0.995				180278.80	0.00	180278.80

(1) Energy Charges @ per KWH	(2) Fixed Charges on Billing Demand @ per KVA	(3) Total (1+2) Rs.	(4) Voltage Rebate @ %	(5) Net Total (3-4) Rs.	(6) Excess Demand Ch. @ % on (3)	Power Factor S. Ch. Incentive @ on (1)
7.30	160					0.995
1316035.24	110667.00	1426702.24		1426702.24		-46061.23

Rent of CT/PT Rs.	Trans. Rent Rs.	Unpaid Amt. of FNB Rs.	E. Duty @ Per KWH Rs.	WCC Amt @ Per KWH Rs.	Urban Cess @ Per KWH Rs.	LIP Incentive
900.00			72111.52	18027.88	0.00	0.00

Current Assessment

N.D.	E.D.	W.C.C.	Urban Cess	User Charge	Current Assessment Total (Incl. LPS)
1418227.76	72111.52	18027.88	0.00	0.00	1508367.16

Arrears in Rs.

N.D.	E.D.	W.C.C.	Urban Cess	User Charge	L.P.S. on Old Arrear	L.P.S. on Current Arrear	L.P.S. on FNB Rs.
			0.00				

Total Dues

N.D.	E.D.	W.C.C.	Urban Cess	User Charge	Net Amount Payable Rupees (Incl. LPS)
1418227.76	72111.52	18027.88	0.00	0.00	1508367

FIFTEEN LAKHS EIGHT THOUSAND THREE HUNDRED SIXTY-SEVEN RUPEES ONLY

Misc. Debits (+) / Credit (-)

Code	N.D. Rs.	E.D. Rs.	W.C.C. Rs.	Urban Cess Rs.	User Charge Rs.
15	3198.08			0.00	0.00
				0.00	0.00
				0.00	0.00
	0.00		0.00	0.00	0.00
	0.00		0.00	0.00	0.00
	0.00		0.00	0.00	0.00
	0.00		0.00	0.00	0.00
	0.00		0.00	0.00	0.00
	0.00		0.00	0.00	0.00

To
Progress Unit 1982856.60
JIR Date 10/12/2018
Solar MTR 0
Solar MF & cap 0.00 0.00
Solar Units
Fuel amount 33488.67

Consumer Mobile No:- 9785970105
Consumer Email ID:- sonu.gupta@iilindia.co.in
Bar Code:

Copy can be downloaded on -www.jaipurdiscom.in
(E. & O.E.) For instructions and Code list etc, please see overleaf :
Data shown with code -92 for the representation only.

Dealing Keeper | AAO-II | A.A.O. (HTB) / A.O. (HTB) Authorised Signatory

Notic : if the amount of this bill is not paid within 15days from the due date mentioned for payment, the connection is liable to be

M/s. INSECTICIDES INDIA LIMITED
PLOT NO. E-442, 443 & 444, RIICO INDUSTRIAL AREA, CHOPANKI, BHIWADI, DIST: ALWAR – 301 707, RAJASTHAN

ENVIRONMENTAL IMPACT & RISK ASSESMENT REPORT FOR PROPOSED EXPANSION OF PESTICIDES TECHNICAL PRODUCTS (FROM 1800 MT/ANNUM TO 9350 MT/ANNUM) IN EXISTING UNIT

December, 2018 to February, 2019
Proposal No.: IA/RJ/IND2/91777/2019
File No.: J-11011/63/2009-IA-11(1)

Prepared By:

NABL Accredited Testing Laboratory
ISO 9001:2008 Certified Company

Aqua-Air Environmental Engineers P. Ltd.
403, Centre Point, Nr. Kadiwala School, Ring Road, Surat – 395002 (Guj.)

ENVIRONMENTAL IMPACT & RISK ASSESSMENT REPORT

CLIENT	:	**M/s. INSECTICIDES INDIA LIMITED** **E-442, 443 & 444, RIICO INDUSTRIAL AREA, CHOPANKI,** **BHIWADI, DIST:ALWAR - 301707, RAJASTHAN**
PROJECT TITLE	:	**ENVIRONMENTAL IMPACT & RISK ASSESMENT REPORT FOR PROPOSED EXPANSION OF PESTICIDES TECHNICAL PRODUCTS (FROM 1800 MT/ANNUM TO 9350 MT/ANNUM) IN EXISTING UNIT**
PROJECT NO.	:	**690000**

Prepared By:

NABL Accredited Testing Laboratory
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Aqua-Air Environmental Engineers P. Ltd.
403, Centre Point, Nr. Kadiwala School, Ring Road, Surat - 395002

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COPY OF TORs FROM MOEF&CC, NEW DELHI

No.J-11011/63/2009-IA-11(1)
Goverment of India
Minister of Enviroment,Forest and Climate Change
Impact Assessment Division
***

Indira Paryavaran Bhavan,
Vayu Wing,3rd Floor,Aliganj,
Jor Bagh Road,New Delhi-110003
18 Feb 2019

To,

M/s INSECTICIDES INDIA LIMITED
E-442,443,444, RIICO Industrial Area, Chopanki, Bhiwadi, Alwar, Rajasthan,
Alwar-301707
Rajasthan

Tel.No.01493-298189; Email:mukeshiilindia@gmail.com

Sir/Madam,

This has reference to the proposal submitted in the Ministry of Environment, Forest and Climate Change to prescribe the Terms of Reference (TOR) for undertaking detailed EIA study for the purpose of obtaining Environmental Clearance in accordance with the provisions of the EIA Notification, 2006. For this purpose, the proponent had submitted online information in the prescribed format (Form-1) along with a Pre-feasibility Report. The details of the proposal are given below:

1. Proposal No.:	IA/RJ/IND2/91777/2019
2. Name of the Proposal:	M/s. Insecticides India Limited
3. Category of the Proposal:	Industrial Projects - 2
4. Project/Activity applied for:	5(b) Pesticides industry and pesticide specific intermediates (excluding formulations)
5. Date of submission for TOR:	17 Jan 2019

In this regard, under the provisions of the EIA Notification 2006 as amended, the Standard TOR for the purpose of preparing environment impact assessment report and environment management plan for obtaining prior environment clearance is prescribed with public consultation as follows:

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

5(b): STANDARD TERMS OF REFERENCE FOR CONDUCTING ENVIRONMENT IMPACT ASSESSMENT STUDY FOR PESTICIDES INDUSTRY AND PESTICIDE SPECIFIC INTERMEDIATES (EXCLUDING FORMULATIONS)AND INFORMATION TO BE INCLUDED IN EIA/EMP REPORT

A. STANDARD TERMS OF REFERENCE

1) **Executive Summary**

2) **Introduction**

   i. Details of the EIA Consultant including NABET accreditation

   ii. Information about the project proponent

   iii. Importance and benefits of the project

3) **Project Description**

   i. Cost of project and time of completion.

   ii. Products with capacities for the proposed project.

   iii. If expansion project, details of existing products with capacities and whether adequate land is available for expansion, reference of earlier EC if any.

   iv. List of raw materials required and their source along with mode of transportation.

   v. Other chemicals and materials required with quantities and storage capacities

   vi. Details of Emission, effluents, hazardous waste generation and their management.

   vii. Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract)

   viii. Process description along with major equipments and machineries, process flow sheet (quantative) from raw material to products to be provided

   ix. Hazard identification and details of proposed safety systems.

   x. Expansion/modernization proposals:

      a. Copy of all the Environmental Clearance(s) including Amendments thereto obtained for the project from MOEF/SEIAA shall be attached as an Annexure. A certified copy of the latest Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 30th May, 2012 on the status of compliance of conditions stipulated in all the existing environmental clearances including Amendments shall be provided. In addition, status of compliance of Consent to Operate for the ongoing /existing operation of the project from SPCB shall be attached with the EIA-EMP report.

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

b. In case the existing project has not obtained environmental clearance, reasons for not taking EC under the provisions of the EIA Notification 1994 and/or EIA Notification 2006 shall be provided. Copies of Consent to Establish/No Objection Certificate and Consent to Operate (in case of units operating prior to EIA Notification 2006, CTE and CTO of FY 2005-2006) obtained from the SPCB shall be submitted. Further, compliance report to the conditions of consents from the SPCB shall be submitted.

4) Site Details

i. Location of the project site covering village, Taluka/Tehsil, District and State. Justification for selecting the site, whether other sites were considered.

ii. A toposheet of the study area of radius of 10km and site location on 1:50,000/1:25,000 scale on an A3/A2 sheet. (including all eco-sensitive areas and environmentally sensitive places)

iii. Details w.r.t. option analysis for selection of site

iv. Co-ordinates (lat-long) of all four corners of the site.

v. Google map-Earth downloaded of the project site.

vi. Layout maps indicating existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities etc. If located within an Industrial area/Estate/Complex, layout of Industrial Area indicating location of unit within the Industrial area/Estate.

vii. Photographs of the proposed and existing (if applicable) plant site. If existing, show photographs of plantation/greenbelt, in particular.

viii. Landuse break-up of total land of the project site (identified and acquired), government/ private - agricultural, forest, wasteland, water bodies, settlements, etc shall be included. (not required for industrial area)

ix. A list of major industries with name and type within study area (10km radius) shall be incorporated. Land use details of the study area

x. Geological features and Geo-hydrological status of the study area shall be included.

xi. Details of Drainage of the project upto 5km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be provided. (mega green field projects)

xii. Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land.

xiii. R&R details in respect of land in line with state Government policy

5) Forest and wildlife related issues (if applicable):

i. Permission and approval for the use of forest land (forestry clearance), if any, and recommendations of the State Forest Department. (if applicable)

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

ii. Landuse map based on High resolution satellite imagery (GPS) of the proposed site delineating the forestland *(in case of projects involving forest land more than 40 ha)*

iii. Status of Application submitted for obtaining the stage I forestry clearance along with latest status shall be submitted.

iv. The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-ā-vis the project location and the recommendations or comments of the Chief Wildlife Warden thereon

v. Wildlife Conservation Plan duly authenticated by the Chief Wildlife Warden of the State Government for conservation of Schedule I fauna, if any exists in the study area

vi. Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972, to the Standing Committee of the National Board for Wildlife.

6) Environmental Status

i. Determination of atmospheric inversion level at the project site and site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall.

ii. AAQ data (except monsoon) at 8 locations for PM10, PM2.5, SO2, NOX, CO and other parameters relevant to the project shall be collected. The monitoring stations shall be based CPCB guidelines and take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests.

iii. Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAQQM Notification of Nov. 2009 along with - min., max., average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an annexure to the EIA Report.

iv. Surface water quality of nearby River (100m upstream and downstream of discharge point) and other surface drains at eight locations as per CPCB/MoEF&CC guidelines.

v. Whether the site falls near to polluted stretch of river identified by the CPCB/MoEF&CC, if yes give details.

vi. Ground water monitoring at minimum at 8 locations shall be included.

vii. Noise levels monitoring at 8 locations within the study area.

viii. Soil Characteristic as per CPCB guidelines.

ix. Traffic study of the area, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project, parking arrangement etc.

x. Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic and endangered species. If Schedule-I fauna are found within the study area, a Wildlife Conservation Plan shall be prepared and furnished.

xi. Socio-economic status of the study area.

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

7) Impact and Environment Management Plan

i. Assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features. In case the project is located on a hilly terrain, the AQIP Modelling shall be done using inputs of the specific terrain characteristics for determining the potential impacts of the project on the AAQ. Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be assessed. Details of the model used and the input data used for modelling shall also be provided. The air quality contours shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any.

ii. Water Quality modelling - in case of discharge in water body

iii. Impact of the transport of the raw materials and end products on the surrounding environment shall be assessed and provided. In this regard, options for transport of raw materials and finished products and wastes (large quantities) by rail or rail-cum road transport or conveyor-cum-rail transport shall be examined.

iv. A note on treatment of wastewater from different plant operations, extent recycled and reused for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E(P) Rules.

v. Details of stack emission and action plan for control of emissions to meet standards.

vi. Measures for fugitive emission control

vii. Details of hazardous waste generation and their storage, utilization and management. Copies of MOU regarding utilization of solid and hazardous waste in cement plant shall also be included. EMP shall include the concept of waste-minimization, recycle/reuse/recover techniques, Energy conservation, and natural resource conservation.

viii. Proper utilization of fly ash shall be ensured as per Fly Ash Notification, 2009. A detailed plan of action shall be provided.

ix. Action plan for the green belt development plan in 33 % area i.e. land with not less than 1,500 trees per ha. Giving details of species, width of plantation, planning schedule etc. shall be included. The green belt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated.

x. Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to use for the various activities at the project site to conserve fresh water and reduce the water requirement from other sources.

xi. Total capital cost and recurring cost/annum for environmental pollution control measures shall be included.

xii. Action plan for post-project environmental monitoring shall be submitted.

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

xiii. Onsite and Offsite Disaster (natural and Man-made) Preparedness and Emergency Management Plan including Risk Assessment and damage control. Disaster management plan should be linked with District Disaster Management Plan.

8) Occupational health

i. Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers

ii. Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, colour vision and any other ocular defect) ECG, during pre placement and periodical examinations give the details of the same. Details regarding last month analyzed data of above mentioned parameters as per age, sex, duration of exposure and department wise.

iii. Details of existing Occupational & Safety Hazards. What are the exposure levels of hazards and whether they are within Permissible Exposure level (PEL). If these are not within PEL, what measures the company has adopted to keep them within PEL so that health of the workers can be preserved,

iv. Annual report of heath status of workers with special reference to Occupational Health and Safety.

9) Corporate Environment Policy

i. Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.

ii. Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA.

iii. What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.

iv. Does the company have system of reporting of non compliances / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report

10) Details regarding infrastructure facilities such as sanitation, fuel, restroom etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase.

11) Enterprise Social Commitment (ESC)

i. Adequate funds (at least 2.5 % of the project cost) shall be earmarked towards the Enterprise Social Commitment based on Public Hearing issues and item-wise details along with time

bound action plan shall be included. Socio-economic development activities need to be elaborated upon.

12) Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance/ATR to the notice(s) and present status of the case.

13) 'A tabular chart with index for point wise compliance of above TOR.

B. SPECIFIC TERMS OF REFERENCE FOR EIASTUDIES FOR PESTICIDES INDUSTRY AND PESTICIDE SPECIFIC INTERMEDIATES (EXCLUDING FORMULATIONS)

1. Commitment that no banned pesticides will be manufactured.
2. Detailsonsolvents to be used,measuresfor solventrecovery and for emissions control.
3. Details of process emissions from the proposed unit and its arrangement to control.
4. Ambient air quality data should include VOC, other process- specific pollutants* like NH3*, chlorine*, HCl*, HBr*, H2S*, HF*, CS2 etc., (*-as applicable)
5. Work zone monitoring arrangements for hazardous chemicals.
6. Detailed effluent treatment scheme including ssegregation for units adopting 'Zero' liquid discharge.
7. Action plan for odour control to be submitted.
8. A copy of the Memorandum of Understanding signed with cement manufacturers indicating clearly that they co-process organic solid/hazardous waste generated.
9. Authorizatiou/Membership for the disposal of liquid effluent in CETP and solid/hazardous waste in TSDF, if any.
10. Material Safety Data Sheet for all the Chemicals are being used/will be used.
11. Authorization/Membership for the disposal of solid/hazardous waste in TSDF.
12. Details of incinerator if to be installed.
13. Risk assessment for storage and handling of hazardous chemicals/solvents. Action plan for handling & safety system to be incorporated.
14. Arrangements for ensuring health and safety of workers engaged in handling of toxic materials.

***

COMPLIANCE OF TERMS OF REFERENCES (TORs) – MoEF&CC, NEW DELHI

Sr. No.	TERMS OF REFERENCES	COMPLIANCE
	SPECIFIC TOR	
1.	Commitment that no banned pesticides will be manufactured.	Undertaking stating that no banned pesticides will be manufactured is referred as Annexure-9.
2.	Details on solvents to be used, measures for solvent recovery and for emission control.	Solvent to be used, measures for solvent recovery and for emission control is referred as Section-7-12, Chapter-7 in EIA Report (Page No. 7-137 to 7-139).
3.	Details of process emissions from the proposed unit and its arrangement to control.	Process emission from proposed expansion unit and its arrangement to control is referred as Section-2.11.1, Chapter-2 in EIA Report (Page No. 2-215).
4.	Ambient air quality data should include VOC, other process- specific pollutants like* NH3*, chlorine*, HCl*, HBr*, H2S*, HF*, CS2 etc., (* - as applicable)	Ambient air quality data is referred as Table-3.9, Chapter-3 in EIA Report (Page No. 3-16 to 3-18)
5.	Work zone monitoring arrangements for hazardous chemicals.	Hazardous Chemicals will be within the TLV/ PEL as per ACGIH recommendation and will be monitored using gas monitor and work place ambient air monitoring will be provided.
6.	Detailed effluent treatment scheme including segregation for units adopting 'Zero' liquid discharge	Effluent treatment scheme is referred as Section-2.10.4, Chapter-2 in EIA Report (Page No. 2-207 to 2-212).
7.	Action plan for odour control to be submitted.	Plan for Odor control is referred as Section-10.4.2.2, Chapter-10 in EIA Report (Page No. 10-10 to 10-12).
8.	A copy of the Memorandum of Understanding signed with cement manufacturers indicating clearly that they co-process organic solid/hazardous waste generated.	Memorandum of Understanding signed with cement manufacturers indicating clearly that they co-process organic solid/hazardous waste generated will be taken after obtaining EC and CTE.
9.	Authorization/Membership for the disposal of liquid effluent in CETP and solid/hazardous waste in TSDF, if any.	Authorization/Membership for the disposal of liquid effluent in CETP and solid/hazardous waste in TSDF is referred as Section-2.12.4, Chapter-2 in EIA Report (Page No. 2-221 to 2-222).
10.	Material Safety Data Sheet for all the Chemicals are being used/will be used.	Material Safety Data Sheet for all the Chemicals is referred as Annexure-6.
11.	Authorization/Membership for the disposal of solid/hazardous waste in TSDF.	Authorization/Membership for the disposal of solid/hazardous waste in TSDF is referred as Section-2.12.4, Chapter-2 in EIA Report (Page No. 2-221 to 2-222).
12.	Details of incinerator if to be installed.	Details of incinerator are mentioned in Section-2.11.2, Chapter-2 in EIA Report (Page No. 2-215).
13.	Risk assessment for storage and handling of hazardous chemicals/solvents. Action plan for handling & safety system to be incorporated.	Risk assessment for storage and handling of hazardous chemicals/solvents is referred as Section-7.5.2.3, Chapter-7 in EIA Report (Page No. 7-41 to 7-62). Action plan for handling & safety system is referred as Section-7.2 and Section-7.3, Chapter-7 in EIA Report (Page No. 7-12 to 7-28)
14.	Arrangements for ensuring health and safety of workers engaged in handling of toxic materials.	Occupational Health and Safety is referred as Section-7.10, Chapter-7 in EIA Report (Page No. 7-100 to 7-134).

Sr. No.	TERMS OF REFERENCES	COMPLIANCE
1.	**Executive Summary**	Please refer Chapter-11 in EIA Report
2.	**Introduction**	
	i. Details of the EIA Consultant including NABET accreditation	EIA Consultant, M/s. Aqua-Air Environmental Engineers Pvt. Ltd. has stay order against NABET accreditation. Refer Annexure 8.
	ii. Information about the project proponent	Information about the project proponent is referred as Section-1.1.1, Chapter-1 in EIA Report (Page No. 1-1 to 1-3).
	iii. Importance and benefits of the project	Importance of the project is referred as Section 1.1.3, Chapter-1 in EIA Report (Page No. 1-4).
3.	**Project Description**	
	i. Cost of project and time of completion.	Total Cost of proposed expansion project= Rs. 1654 Lakhs Time of completion = 1 Year after getting EC and NOC
	ii. Products with capacities for the proposed project.	Products with capacities for the proposed expansion project are referred as Table-2.2, Section-2.7, Chapter-2 in EIA Report (Page No. 2-13 to 2-15).
	iii. If expansion project, details of existing products with capacities and whether adequate land is available for expansion, reference of earlier EC if any.	Products with capacities for the proposed expansion project are referred as Table-2.2, Section-2.7, Chapter-2 in EIA Report (Page No. 2-13 to 2-15).
	iv. List of raw materials required and their source along with mode of transportation.	List of raw materials required and their source along with mode of transportation is referred as Table-2.3, Section-2.8, Chapter-2 in EIA Report (Page No. 2-16 to 2-38).
	v. Other chemicals and materials required with quantities and storage capacities	List of raw materials required and their source along with mode of transportation is referred as Table-2.3, Section-2.8, Chapter-2 in EIA Report (Page No. 2-16 to 2-38).
	vi. Details of Emission, effluents, hazardous waste generation and their management.	Details of Air emission are referred as Section- 2.11.1 & 2.11.5 Chapter-2 in EIA Report (Page No. 2-215 & 2-217). Details of effluent are referred as Section- 2.10.4, Chapter-2 in EIA Report (Page No. 2-207 to 2-212). Details of Hazardous Waste is referred as Section-2.12.1, Chapter-2 in EIA Report (Page No. 2-220).
	vii. Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract)	Requirement of Water: 188.0 KL/Day and source: RIICO water supply & re-use. Requirement of Power: 860 KW from JVVNL. Water Balance Diagram is referred as Section- 2.10.3, Chapter-2 in EIA Report (Page No. 2-204).
	viii. Process description along with major equipments and machineries, process flow sheet (quantities) from raw material to products to be provided	Process description along with major equipments and machineries, process flow sheet (quantities) from raw material to products is referred as Section-2.9, Chapter-2 in EIA Report (Page No.2-39 to 2-201).
	ix. Hazard identification and details of proposed safety systems.	Hazard Identification is referred as Section- 7.1.4, Chapter-7 of EIA Assessment Report (Page No. 7-4) and safety precautions is referred as Section-7.2, Chapter-7 of EIA Assessment Report (Page No. 7-12).
	x. Expansion/modernization proposals: a. Copy of all the Environmental Clearance(s) including Amendments thereto obtained for the project from MOEF/SEIAA shall be attached as an Annexure. A certified copy of	Copy of Environmental Clearance obtained vide File no. J-11011/63/2009- IA II (I) dated 29th April 2009 is attached as Annexure-13 in EIA Report. EC Compliance Report is obtained from MoEF&CC, Lucknow vide File No. IV/ENV/R/

	the latest Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 30th May, 2012 on the status of compliance of conditions stipulated in all the existing environmental clearances including Amendments shall be provided. In addition, status of compliance of Consent to Operate for the ongoing /existing operation of the project from SPCB shall be attached with the EIA-EMP report.	Ind-107/740/2005/322 dated 05th July 2019 is attached as Annexure-13 in EIA Report.
	b. In case the existing project has not obtained environmental clearance, reasons for not taking EC under the provisions of the EIA Notification 1994 and/or EIA Notification 2006 shall be provided. Copies of Consent to Establish/No Objection Certificate and Consent to Operate (in case of units operating prior to EIA Notification 2006, CTE and CTO of FY 2005-2006) obtained from the SPCB shall be submitted. Further, compliance report to the conditions of consents from the SPCB shall be submitted.	Copy of Environmental Clearance obtained vide File no. J-11011/63/2009- IA II (I) dated 29th April 2009 is attached as Annexure-13 in EIA Report. EC Compliance Report is obtained from MoEF&CC, Lucknow vide File No. IV/ENV/R/ Ind-107/740/2005/322 dated 05th July 2019 is attached as Annexure-13 in EIA Report.
4.	**Site Details**	
	i. Location of the project site covering village, Taluka/Tehsil, District and State, Justification for selecting the site, whether other sites were considered.	Location of the Project is referred as Figure–2.2, Section-2.3.1, Chapter-2 in EIA Report (Page No. 2-6).
	ii. A toposheet of the study area of radius of 10km and site location on 1:50,000/1:25,000 scale on an A3/A2 sheet. (including all eco-sensitive areas and environmentally sensitive places)	A toposheet of the study area is referred as Figure-2.3, Section-2.4.1, Chapter-2 in EIA Report (Page No. 2-11).
	iii. Details w.r.t. option analysis for selection of site	Major factors involved in the selection of site are listed below: • Site situated in Notified Industrial Estate. • Site is well connected by road & Rail • Proximity to raw material suppliers • Availability of power and fuel. • Availability of water from RIICO water supply • Availability of common TSDF and common incineration sites in nearby area. • Availability of skilled workmen Proximity to cities like Chaupanki and Alwar, ensure access to already existing social and commercial infrastructure.
	iv. Co-ordinates (lat-long) of all four corners of the site.	Corner I : 28° 9'13.35"N 76°52'41.42"E Corner II : 28° 9'12.41"N 76°52'44.46"E Corner III : 28° 9'07.35"N 76°52'42.58"E Corner IV : 28° 9'8.31"N 76°52'39.52"E
	v. Google map-Earth downloaded of the project site	Google map-Earth downloaded of the project site is referred as Figure–2.2, Section-2.3.1, Chapter-2 in EIA Report (Page No. 2-7).

	vi. Layout maps indicating existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities etc. If located within an Industrial area/Estate/Complex, layout of Industrial Area indicating location of unit within the Industrial area/Estate.	Layout maps for the proposed unit is referred as Figure–2.1, Section-2.2, Chapter-2 in EIA Report (Page No. 2-2).
	vii. Photographs of the proposed and existing (if applicable) plant site. If existing, show photographs of plantation/greenbelt, in particular.	Photographs of the proposed and existing plant site is referred as Figure–2.2, Section-2.3.1, Chapter-2 in EIA Report (Page No. 2-8).
	viii. Land use break-up of total land of the project site (identified and acquired), government/private - agricultural, forest, wasteland, water bodies, settlements, etc shall be included. (not required for industrial area)	Land use break-up of total land of the project site is referred as Section-2.2, and Chapter-2 in EIA Report (Page No. 2-1).
	ix. A list of major industries with name and type within study area (10km radius) shall be incorporated. Land use details of the study area	A list of major industries with name and type within study area is referred as Table-2.1, Scetion-2.4.1, Chapter-2 in EIA Report (Page No. 2-10).
	x. Geological features and Geo-hydrological status of the study area shall be included.	Geological features are referred as Section 3.8, Chapter-3 in EIA Report (Page No.3-32) and Geo-hydrological status of the study area is referred as Section 3.8.4, Chapter-3 in EIA Report (Page No. 3-38).
	xi. Details of Drainage of the project upto 5km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be provided. (mega green field projects)	Drainage of the project upto 5 km radius of study area is referred as Section 3.8.5, Chapter-3 in EIA report. (Page No. 3-40)
	xii. Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land.	Land is already acquitted by the company.
	xiii. R&R details in respect of land in line with state Government policy	R & R is not applicable because company purchased the land from RIICO, Chopanki.
5.	**Forest and wildlife related issues (if applicable)**	
	i. Permission and approval for the use of forest land (forestry clearance), if any, and recommendations of the State Forest Department. (if applicable)	Not Applicable
	ii. Landuse map based on High resolution satellite imagery (GPS) of the proposed site delineating the forestland (*in case of projects involving forest land more than 40 ha)*	Not Applicable
	iii. Status of Application submitted for obtaining the stage I forestry clearance along with latest status shall be submitted.	Not Applicable
	iv. The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing	Not Applicable

	these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden there on.	
	v. Wildlife Conservation Plan duly authenticated by the Chief Wildlife Warden of the State Government for conservation of Schedule I fauna, if any exists in the study area	Not Applicable
	vi. Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972, to the Standing Committee of the National Board for Wildlife	Not Applicable
6.	**Environmental Status**	
	i. Determination of atmospheric inversion level at the project site and site-specific micrometeorological data using temperature, relative humidity, hourly wind speed and direction and rainfall.	Determination of atmospheric inversion level at the project site and site-specific micrometeorological data using temperature, relative humidity, hourly wind speed and direction and rainfall is referred as Section 3.3, Chapter-3 in EIA Report (Page No.3-5 to 3-11).
	ii. AAQ data (except monsoon) at 8 locations for PM10, PM2.5, SO2, NOX, CO and other parameters relevant to the project shall be collected. The monitoring stations shall be based CPCB guidelines and take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests.	AAQ data (except monsoon) at 8 locations for PM10, PM2.5, SO2, NOX, CO and other parameters relevant to the project is referred as Table No. 3.9, Section 3.4.2, Chapter-3 in EIA Report (Page No.3-16).
	iii. Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAQQM Notification of Nov. 2009 along with – min., max., average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an annexure to the EIA Report.	Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAQQM Notification of Nov. 2009 is referred as Table No. 3.9, Section 3.4.2, Chapter-3 in EIA Report (Page No.3-16).
	iv. Surface water quality of nearby River (100m upstream and downstream of discharge point) and other surface drains at eight locations as per CPCB/MoEF&CC guidelines.	Surface water quality of nearby River (100m upstream and downstream of discharge point) and other surface drains at two locations is referred as Table No. 3-12, Section-3.6.1, Chapter-3 in EIA Report (Page No.3-25 to 3-27).
	v. Whether the site falls near to polluted stretch of river identified by the CPCB/MoEF&CC, if yes give details.	No, the site does not falls near to polluted stretch of river identified by the CPCB/MoEF&CC.
	vi. Ground water monitoring at minimum at 8 locations shall be included.	Ground water monitoring at minimum at 8 locations is referred as Table No. 3-12, Section 3.6.1, Chapter - 3 in EIA Report (Page No. 3-25 to 3-27).
	vii. Noise levels monitoring at 8 locations within the study area.	Noise levels monitoring at 10 locations is referred as Table No. 3-10B, Section-3.5.1, Chapter-3 in EIA Report (Page No. 3-22).
	viii. Soil Characteristic as per CPCB guidelines.	Soil Characteristic is referred as Table No. 3.14, Section 3.7.1, Chapter-3 in EIA Report (Page No. 3-30).
	ix. Traffic study of the area, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project, parking arrangement etc.	Traffic study of the area: type of vehicles and frequency: 1) Containers – 8 Nos. 2) Truck – 18 Nos. 3) Tempo - 20 Nos. 4) Car – 10 Nos.

		5) Loaders - 1 Nos.
	x. Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic and endangered species. If Schedule-I fauna are found within the study area, a Wildlife Conservation Plan shall be prepared and furnished.	Flora existing in the study area is referred as Section 3.11.1, Chapter-3 in EIA Report (Page No. 3-46) and fauna (terrestrial and aquatic) existing in the study area is referred as Section 3.11.2, Chapter-3 in EIA Report (Page No. 3-53).
	xi. Socio-economic status of the study area.	Socio-economic status of the study area is referred as Section 3.12, Chapter-3 in EIA Report (Page No. 3-99).
7.	**Impact and Environment Management Plan**	
	i. Assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features. In case the project is located on a hilly terrain, the AQIP Modelling shall be done using inputs of the specific terrain characteristics for determining the potential impacts of the project on the AAQ. Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be assessed. Details of the model used and the input data used for modelling shall also be provided. The air quality contours shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any.	Assessment of ground level concentration of pollutants is referred as Table 4.2, Chapter-4 in EIA Report (Page No. 4-13). Details of the model used and the input data used for modeling: 1) Concentration of all pollutants 2) Meteorological Data 3) Ram file, Sam File, Met File, Mixing Height 4) Village Co-Ordinates Contours are referred as Figure 4.2, Section 4.2.3, Chapter-4 in EIA Report (Page No. 4-14 to 4-23).
	ii. Water Quality Modeling – in case of discharge in water body	Water Quality Modeling is referred as Table 3.12, Section 3.6.1, Chapter 3 in EIA Report (Page No. 3-25 to 3-27)
	iii. Impact of the transport of the raw materials and end products on the surrounding environment shall be assessed and provided. In this regard, options for transport of raw materials and finished products and wastes (large quantities) by rail or rail-cum road transport or conveyor-cum-rail transport shall be examined.	Impact of the transport of the raw materials and end products is referred as Section 10.11, Chapter-10 in EIA Report (Page No. 10-21).
	iv. A note on treatment of wastewater from different plant operations, extent recycled and reused for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E(P) Rules.	Effluent Treatment Scheme and characteristics of untreated and treated effluent are is referred as Section 2.10.4, Chapter-2 in EIA Report (Page No.2-207 to 2-212).
	v. Details of stack emission and action plan for control of emissions to meet standards.	Details of stack emission and action plan for control of emissions is referred as Section 10.4.2, Chapter-10 in EIA Report (Page No. 10-8).
	vi. Measures for fugitive emission control	Measures for fugitive emission control are referred as Section 10.4.2.1, Chapter-10 in EIA Report (Page No. 10-9).
	vii. Details of hazardous waste generation and their storage, utilization and management. Copies of MOU regarding utilization of solid and hazardous waste in cement plant shall also be included. EMP shall include the concept of waste-	Details of hazardous waste generation and their storage, utilization and management is referred as Table 2.5, Section 2.12, Chapter-2 in EIA Report (Page No.2-220).

	minimization, recycle/reuse/recover techniques, Energy conservation, and natural resource conservation.	
	viii. Proper utilization of fly ash shall be ensured as per Fly Ash Notification, 2009. A detailed plan of action shall be provided	Not Applicable.
	ix. Action plan for the green belt development plan in 33 % area i.e. land with not less than 1,500 trees per ha. Giving details of species, width of plantation, planning schedule etc. shall be included. The green belt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated.	Action plan for the green belt development plan is referred as Section 10.7, Chapter-10 in EIA Report (Page No. 10-17 to 10-19).
	x. Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to use for the various activities at the project site to conserve fresh water and reduce the water requirement from other sources.	Action plan for rainwater harvesting plan is referred in Section 10.4.1.2, Chapter-10 in EIA Report (Page No. 10-7).
	xi. Total capital cost and recurring cost/annum for environmental pollution control measures shall be included.	Total cost of the Project will be Rs. 4567.08 Lakhs. Capital cost of air & water pollution control system and environmental monitoring equipments will be Rs. 943.37 Lakhs.
	xii. Action plan for post-project environmental monitoring shall be submitted.	Post-project environmental monitoring is referred as Section 6.3, Chapter-6 in EIA Report (Page No. 6-3).
	xiii. Onsite and Offsite Disaster (natural and Man-made) Preparedness and Emergency Management Plan including Risk Assessment and damage control. Disaster management plan should be linked with District Disaster Management Plan.	Disaster Management Plan- On site Emergency and Offsite Management Plan is referred in Section 7.6 to Section 7.9, Chapter-7 in EIA Report (Page No. 7-70 to 7-99).
8.	**Occupational health**	
	i. Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers	Plan for Occupational Health and Safety is referred as Section 7.10, Chapter-7 in EIA Report (Page No. 7-100) and fund allocation for occupational health & safety of all contract and casual workers is Rs. 10 Lakhs/Annum,
	ii. Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, colour vision and any other ocular defect) ECG, during pre placement and periodical examinations give the details of the same. Details regarding last month analyzed data of above mentioned parameters as per age, sex, duration of exposure and department wise.	Health Evaluation of Workers is referred as Section 7.10.1.8 Chapter-7 in EIA Report (Page No. 7-102).
	iii. Details of existing Occupational & Safety Hazards. What are the exposure levels of hazards and whether they are within Permissible Exposure level (PEL). If these are not within PEL, what measures the	Existing Occupational & Safety Hazards is referred in Section 7.10.1.9 Chapter-7 in EIA Report (Page No. 7-103).

	company has adopted to keep them within PEL so that health of the workers can be preserved,	
	iv. Annual report of heath status of workers with special reference to Occupational Health and Safety	Annual report of heath status of workers is referred in Section 7.10.1.11, Chapter-7 in EIA Report (Page No. 7-111).
9.	**Corporate Environment Policy**	
	i. Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.	Environment Policy is referred as Section 6.4, Chapter-6 in EIA Report (Page No. 6-5).
	ii. Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA.	Environment Policy is referred as Section 6.4, Chapter-6 in EIA Report (Page No. 6-5).
	iii. What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.	Administrative order of the company is referred as Figure 6.1, Chapter-6 in EIA Report (Page No. 6-9)
	iv. Does the company have system of reporting of non compliances / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report	Yes, company has system of reporting of non compliances / violations of environmental norms to the Board of Directors of the company and is referred as Section 6.6, Chapter-6 in EIA Report (Page No. 6-9)
10.	Details regarding infrastructure facilities such as sanitation, fuel, restroom etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase.	There will be no provision of housing facilities in company, only sanitation facilities in company will be made available during operation phase.
11.	**Enterprise Social Commitment (ESC)**	
	i. Adequate funds (at least 2.5 % of the project cost) shall be earmarked towards the Enterprise Social Commitment based on Public Hearing issues and item-wise details along with time bound action plan shall be included. Socio-economic development activities need to be elaborated upon.	CSR activities are referred as Section 8.5, Chapter-8 in EIA Report (Page No. 8-3).
12.	Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance/ATR to the notice(s) and present status of the case.	No litigation pending against the project and/or any direction/order passed by any Court of Law against the project
13.	'A tabular chart with index for point wise compliance of above TORs.	Complied
14.	The TORs prescribed shall be valid for a period of three years for submission of the EIA-EMP reports.	Complied
The following general points shall be noted:		
	All documents shall be properly indexed, page numbered.	Complied

	Period/date of data collection shall be clearly indicated.	Complied
	Authenticated English translation of all material in Regional languages shall be provided.	Complied
	The letter/application for environmental clearance shall quote the MOEF file No. and also attach a copy of the letter.	Complied
	The copy of the letter received from the Ministry shall be also attached as an annexure to the final EIA-EMP Report.	Complied and referred as Annexure-11.
	The index of the final EIA-EMP report must indicate the specific chapter and page no. of the EIA-EMP Report	Complied
	While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MOEF vide O.M. No. J-11013/41/2006-IA.II (I) dated 4th August, 2009, which are available on the website of this Ministry shall also be followed.	Complied and referred as (Page No. I-25 – I-29).
	The consultants involved in the preparation of EIA-EMP report after accreditation with Quality Council of India (QCI) /National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA-EMP reports prepared by them and data provided by other organization/Laboratories including their status of approvals etc. Name of the Consultant and the Accreditation details shall be posted on the EIA-EMP Report as well as on the cover of the Hard Copy of the Presentation material for EC presentation.	Consultant has stay order against Quality Council of India (QCI) /National Accreditation Board of Education and Training (NABET) and is referred as Annexure -8.
	TORs' prescribed by the Expert Appraisal Committee (Industry) shall be considered for preparation of EIA-EMP report for the project in addition to all the relevant information as per the 'Generic Structure of EIA' given in Appendix III and IIIA in the EIA Notification, 2006. Where the documents provided are in a language other than English, an English translation shall be provided. The draft EIA-EMP report shall be submitted to the State Pollution Control Board of the concerned State for conduct of Public Hearing. The SPCB shall conduct the Public Hearing/public consultation, district-wise, as per the provisions of EIA notification, 2006. The Public Hearing shall be chaired by an Officer not below the rank of Additional District Magistrate. The issues raised in the Public Hearing and during the consultation process and the commitments made by the project proponent on the same shall be included separately	Agreed to the condition. Public Hearing is Not Applicable because Proposed Expansion Project is located within notified area of RIICO Industrial Estate.

	in EIA-EMP Report in a separate chapter and summarised in a tabular chart with financial budget (capital and revenue) along with time-schedule of implementation for complying with the commitments made. The final EIA report shall be submitted to the Ministry for obtaining environmental clearance.	

September 02, 2019

UNDERTAKING

We, **M/s. Insecticides India Limited**, own this EIA Report prepared by M/s. Aqua-Air Environmental Engrs. P. Ltd., Surat for PROPOSED EXPANSION OF PESTICIDES TECHNICAL IN EXISTING UNIT at PLOT NO. E-442, 443 & 444, RIICO INDUSTRIAL AREA, CHOPANKI, TAL: BHIWADI, DIST: ALWAR – 301707, RAJASTHAN

Thanking You.

Yours faithfully,

For INSECTICIDES INDIA LIMITED

AUTHORIZED SIGNATORY

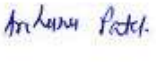
Declaration by Experts Contributing to the EIA Report of

Insecticides India Limited, Plot No. E-442, 443 & 444, RIICO Industrial Area, Chopanki, Tal: Bhiwadi, Dist: Alwar – 301 707 (Rajasthan).

EIA COORDINATOR

Name	Signature
Mr. Chetan R. Kabariya	

FUNCTIONAL AREA EXPERTS

Sr. No.	Name of the Exports	Qualification	Involvement (Task)	Signature
1	Mr. Jayeshkumar Somabhai Patel	B.E. (Civil), M.E. (Environmental), MIE, CE	Air Pollution Monitoring & Control (AP), Air Quality Modeling and Prediction (AQ), Water Pollution (WP) & Solid and Hazardous Waste Management (SHW)	
2	Mrs. Archana Jayeshkumar Patel	B.E. (Civil), AMIPHE	Water Pollution (WP), Noise and Vibration (NV), Hydrology, Water Conservation (HG) & Soil Conservation (SC)	
3	Mr. Chetan Ravjibhai Kabariya	B.E. (Chemical)	Air Pollution Monitoring & Control (AP), Air Quality Modeling and Prediction (AQ), Risk and Hazard (RH) & Solid and Hazardous Waste Management (SHW)	
4	Mr. Dhaval Vijay Jhaveri	B.E. (Chemical)	Air Pollution Monitoring & Control (AP), Air Quality Modeling and Prediction (AQ), Risk and Hazard (RH) & Solid and Hazardous Waste Management (SHW)	
5	Mr. Mehul Dekate	B.E. (Chemical)	Air Pollution Monitoring & Control (AP), Air Quality Modeling and Prediction (AQ), Risk and Hazard (RH) & Solid and Hazardous Waste Management (SHW)	
6	Mr. Chirag Harishchandra Lavana	B.Sc. (Chemistry)	Air Pollution Monitoring & Control (AP), Water Pollution (WP), Noise and Vibration (NV) & Soil Conservation (SC)	

7	Mr. Bhavin Dashrathal Shah	B.Sc.(Geology), M.Sc.(Geology), M.Sc. Tech. (Geotech) (Empanelled Expert)	Land Use (LU), Hydrology, Water Conservation (HG) & Geology (GEO) & Soil conservation (SC)	
8	Mr. Mitesh Arvindbhai Patel	B.E. (Environmental)	Land Use (LU), Air Pollution Monitoring & Control (AP), & Solid and Hazardous Waste Management (SHW)	
9	Ms. Sonal Rameshbhai Patel	B.E. (Environmental)	Air Quality Modeling and Prediction (AQ) , Water Pollution (WP) & Solid and Hazardous Waste Management (SHW)	
10	Mr. Siddharth Amar Butani	M.E. (Environmental) B.E. (Civil)	Soil conservation (SC), Air Quality Modeling and Prediction (AQ) and Hydrology, Water Conservation (HG)	
11	Mr. Yash Ketankumar Kapadia	M.E. (Environmental) B.E. (Environment Science & Technology)	Air Pollution Monitoring & Control (AP), Air Quality Modeling and Prediction (AQ) and Water Pollution (WP)	
12	Mr. Harsh Maheshchandra Shah	M.E. (Environmental) B.E. (Environmental)	Land Use (LU), Water Pollution (WP) & Solid and Hazardous Waste Management (SHW)	
13	Ms. Pooja Narenbhai Patel	M.E. (Environmental) B.E. (Environmental)	Noise and Vibration (NV), Air Quality Modeling and Prediction (AQ) and Ecology and Bio-diversity (EB)	
14	Mr. Bhavin Deveshkumar Bhagat	M.Sc. (Industrial Chemistry)	Risk Assessment and hazard management (RH), Air Quality Modeling and Prediction (AQ) and Air Pollution Monitoring & Control (AP)	B. D. Bhagat

15	Mr. Sunny Y. Jariwala	M.E. (Environmental) B.E. (Environmental)	Land Use (LU), Water Pollution (WP) & Solid and Hazardous Waste Management (SHW)	
16	Mr. Ankit Dilsukhbhai Rakholiya	B.E. (Civil)	Noise and Vibration (NV), Hydrology, Water Conservation (HG) & Soil Conservation (SC)	
17	Mr. Anand Dhirajbhai Patel	B.E. (Civil) P.D.I.S.	Hydrology, Water Conservation (HG), Water Pollution (WP) and Risk Assessment and hazard management (RH)	
18	Mr. Neel Narendrabhai Patel	B.E. (Mechanical)	Air Pollution Monitoring & Control (AP), Noise and Vibration (NV), Risk Assessment and hazard management (RH)	
19	Mr. Henil M. Lenkapati	M.Sc. (Chemistry)	Air Pollution Monitoring & Control (AP), Water Pollution (WP) and Soil Conservation (SC)	
20	Mr. Ankit Gobarbhai Talaviya	B.Sc. (Chemistry), M.Sc. (Organic Chemistry)	Soil Conservation (SC) and Risk Assessment and hazard management (RH) & Air Pollution Monitoring & Control (AP)	
21	Ms. Vikisha Sumanbhai Prajapati	B.E. (Environmental)	Air Pollution Monitoring & Control (AP), Air Quality Modeling and Prediction (AQ) & Water Pollution (WP)	
22	Mr. Karan Rajnikant Chaniyara	M.Sc. (Industrial Chemistry)	Risk Assessment and hazard management (RH), Air Quality Modeling and Prediction (AQ) and Air Pollution Monitoring & Control (AP)	

23	Mr. Romin Mukeshbhai Gandhi	B.E. (Environmental)	Air Quality Modeling and Prediction (AQ) , Water Pollution (WP) & Solid and Hazardous Waste Management (SHW)	
24	Mr. Mikin Mukeshbhai Patel	M.E. (Environment Process Design) B.E. (Environmental)	Air Pollution Monitoring & Control (AP), Water Pollution (WP), Noise and Vibration (NV)	
25	Ms. Drashti Rajeshkumar Patel	B.E. (Environmental)	Land Use (LU), Air Quality Modeling and Prediction (AQ) & Water Pollution (WP)	
26	Mrs. Priyanka Ritesh Mistry	M.Sc. (Microbiologist) B.Sc. (Microbiologist)	Water Pollution (WP) and Ecology and Bio-diversity (EB)	
27	Mrs. Miral Keyur Surti	B.E. (Environmental)	Solid and Hazardous Waste Management (SHW), Water Pollution (WP), Land Use (LU)	
28	Ms. Heena Devidas Dodiya	B.E. (Environmental)	Noise and Vibration (NV), Air Quality Modeling and Prediction (AQ) & Water Pollution (WP)	
29	Ms. Krishna Bhaveshbhai Vaghamshi	B.E. (Environmental)	Land Use (LU), Air Pollution Monitoring & Control (AP), & Solid and Hazardous Waste Management (SHW)	
30	Ms. Krupali Rameshbhai Goti	B.E. (Environmental)	Noise and Vibration (NV) and Water Pollution (WP)	
31	Ms. Rasita Babubhai Gajera	B.E. (Environmental)	Air Pollution Monitoring & Control (AP) and Air Quality Modeling and Prediction (AQ)	
32	Ms. Kajal Thakorbhai Patel	M.Sc. (Environment Science) B.Sc. (Chemistry)	Soil Conservation (SC), Water Pollution (WP) and Ecology and Bio-diversity (EB)	
33	Ms. Rupal Mansukhbhai Jethwa	M.Sc. (Organic Chemistry) B.Sc. (Chemistry)	Air Pollution Monitoring & Control (AP) and Water Pollution (WP)	
34	Mr. Zaverbhai Govardhanbhai Patel	M. Com.	Socio economics (SE)	
35	Mr. Nalin Jaysukhbhai Kabaria	M.Sc. (Environment Science)	Air Pollution Monitoring & Control (AP), Air Quality Modeling and Prediction (AQ), Water Pollution (WP) and Ecology and Bio-diversity (EB)	
36	Mr. Vishal Mansukhbhai Jasani	M.Sc. (Bio Informatics)	Water Pollution (WP)	

Declaration by Head of the Organization

I, Jayesh S. Patel, hereby confirm that the above mentioned team members were involved in preparation of EIA Report of M/s. Insecticides India Limited. I also confirm that I shall be fully accountable for any misleading information mentioned in this statement.

Name of Consultant	Aqua-Air Environmental Engineers Pvt. Ltd., Surat
Name of Concerned Person	Mr. Jayesh Patel
Designation	Managing Director
Signature	
Contact Infomartion	aquaair_surat@hotmail.com aqua_eia@yahoo.com

CHAPTER – 1:

INTRODUCTION

1.1 BACKGROUND

M/s. Insecticides India Limited Proposes Expansion of Pesticide Technical Products (From 1800 MT/Annum to 9350 MT/Annum) in Existing Unit located at Plot No. E-442, 443 & 444, RIICO Industrial Area, Chopanki, Bhiwadi, Dist. Alwar – 301 707, Rajasthan.

1.1.1 Promoters and their Back Ground

1. M/s Insecticides (India) Limited, a limited company is a leading Indian Brand company, holding a strong foothold in the India Agrochemical market, setting benchmarks in the manufacturing and marketing of pesticides and agrochemicals. With a strong countrywide network, commitment to growth and a mission to make the choicest of brands available to farmers at the most competitive prices, IIL is all set to touch the Rs. 1500 crore turnover mark by the year 2020. IIL's brands occupy leadership positions (No. 1 and 2) in almost all categories in pesticides and agrochemicals.
2. The company was incorporated in the year 1996. It was initially established as a private limited and subsequently converted into a limited company on 2.11.2001 to pursue the main objectives of pesticides and agrochemicals.
3. IIL stands for excellence in pesticide formulations. The name spells quality and trust all across the nation. The company is committed to provide the best products at the most competitive prices to the farmers.
4. M/s. Insecticides (India) limited have a product range of about 110 products. IIL took over the famous brands like Lethal, Milchlor, and Lethal Super to take them to soaring heights by widely making them available across the country. IIL entered into technical collaboration for manufacturing and marketing of Thimet in India and Nepal in the year 2006, which has poised a solid confidence on our overseas collaborators American Vanguard Corporation, USA by selling the record quantities in India. The wide acceptability of the company's Tractor brand product signifies IIL'S deep connection with the farming community.

5. To augment the manufacturing with constant innovation, IIL has established a dedicated R & D Center, which is recognized by Department of Scientific & Industrial research, Ministry of Science & Technology. It focuses on developing high value added, complex new molecules for introduction in the market.
6. Keeping in view the present demand and expected increase in demand for these Products in the years to come, the company is planning for Expansion in Production Capacity from 1800 Tons Per Annum to 9350 Tons Per Annum Pesticides Technical. After merger of technical and formulation plant, the total pesticide formulation capacity will be 20,000 MT/ KL per Annum in existing Insecticide Manufacturing plant at E-442, 443 & 444, RIICO Ind. Area, Chopanki, Bhiwadi Dist: Alwar (Raj.).
7. Ultra-modern automated manufacturing facility is backed by processes that are empowered by technology. This helps us to manufacture products with consistent quality with customer support.
8. This Manufacturing facility will be a non-polluting unit on the lines similar with the Company's existing Units.
9. The manufacturing facility is having ISO 9001, 14001 and 45001 for its commitment towards quality, environment, occupational health and safety ultimately leading to customer satisfaction.
10. The quality control laboratories are NABL accredited and having all the modern testing facilities and qualified chemists.

The names of Managing Director and directors of industry are as under.

Name	**Address**
Mr. Hari Chand Aggarwal	FD-42, Vishakha Enclave, Pitampura, Delhi-34
Mr. Rajesh Aggarwal	FD-42, Vishakha Enclave, Pitampura, Delhi-34
Mrs. Nikunj Aggarwal	FD-42, Vishakha Enclave, Pitampura, Delhi-34
Mr. Virjesh Kumar Gupta	C 1/66, Bhim Nagar, SDA, New Delhi-16
Mr. Navin Shah	26/53, Punjabi Bagh West, New Delhi-26
Mr. Vinod Kumar Mittal	G-2/703, Kingsbury Appartments, TDI city, Nangal Kalan (43), Sonipat, Haryana-131023

Mr. Jayaraman Swaminathan	501, Ganga Towers II, Atur Park, ST Road, Chembur, Mumbai, MH 400071
Mr. Deepak Gupta	F-98, Richmond Park, DLF Phase 4, Gurgaon

M/s Insecticides India Limited is a professionally managed company that has built for itself a stimulating work culture that empowers people, promotes team building and encourages new ideas. This has enabled IIL to grow its status as one of the few successful Indian pesticides and Agrochemicals companies. Accordingly the business of the unit is being managed by a professional unit General Manager, heading a professional team of Managers. He is assisted by Managerial, Supervisory and other staff including skilled and unskilled workers in the day to day functioning of the unit. The company already has technical knowledge of the products to be manufactured.

1.1.2 Regulatory Framework

For proposed project; following assumptions has been considered:

1) Proposed project falls in category A - 5(b) as per EIA Notification, 2006, So, we have applied for Environmental Clearance at MoEF & CC, New Delhi.
2) Consent to Establish/Consent to operate for proposed expansion project from RSPCB, Jaipur.
3) PESO License, Nagpur
4) Factory Act License for expansion
5) Public Liability Insurance
6) The Motor Vehicles Act
7) The Bureau of Indian Standards Act
8) Central Insecticides Board Registration
9) The Static and Mobile Pressure Vessels (Unfired) Rules
10) Capacity of Plant 9350 MT/Annum
11) Total working days in a year 335
12) Raw material storage facility for 15 days
13) Finished product storage for 7 days
14) Solvent Storage facility for 20 days

1.1.3 Justification of Project

The demand for products intended to be manufactured is increasing in the country. By setting up this project, Insecticides India Limited will be able to meet the demand of various products internationally and locally. This will also generate direct and indirect employment opportunity for various levels of people.

1.1.4 Importance to county and region

The unit is expected to be focused on exports all over the world, thereby being beneficial to India. The project activities would generate additional employment for activities like transportation, raw material supply, auxiliary, ancillary works etc. The project has favorable ranking by majority of local people and is looked upon as a step for further development of the area by way of improvement in transport, communication and other basic requirements for working population of the project and village community.

1.2 PROJECT DETAILS

1.2.1 Total Project Cost

Total capital investment for the project is Rs. 45.6708 Crores.

TABLE 1.1

BREAK UP OF PROJECT COST

Sr. No.	Item	Investment in Lakhs Rs.		
		Existing	Additional	Total
1	Land	70.48	0	70.48
2	Building and site development	581.75	450	1031.75
3	Plant and machinery	1471.48	1050	2521.48
4	Environment protection measures (includes cost of ETP, Tree Plantation, Evaporator System etc.)	789.37	154	943.37
	Total	**2913.08**	**1654**	**4567.08**

1.2.2 Plot Area

Total 11,958 sq. meter land area is available at site; out of this area about 4784 sq. meter (40.00%) area is covered as greenbelt and other forms of greenery.

TABLE 1.2

BREAK UP OF DIFFERENT LAND USE OF FACTORY

SR. NO.	LAND USE	EXISTING AREA (SQ.MT.)	PROPOSED AREA (SQ. MT.)	TOTAL AREA (SQ. MT.)
1	Production Plants	2000	600	2600
2	Parking	0	0	0
3	Security Building	30	0	30
4	Effluent Treatment plant	400	400	800
5	Utility	228	270	498
6	Raw Material and Finished Products Storage	1350	0	1350
7	Gas Tonner Storage	0	0	0
8	Tank Farm Area	230	0	230
9	Green Belt	4000	784	4784
10	Hazardous waste storage area	50	0	50
11	Road & Open Area	3670	-2054	1616
	Total	**11958**	**0**	**11958.0**

1.2.3 Exact Details about Infrastructural Facilities, Plant Machineries, etc. Required for the Proposed Project

TABLE 1.3

LIST OF MACHINERIES AND EQUIPMENTS

SR NO.	MACHINERY	CAPACITY	EXISTING	PROPOSED	TOTAL
1	S.S Reactor	10 KL	8	9	17
2	S.S Reactor	6.0 KL	13	13	26
3	S.S Reactor	5.0 KL	6	6	12
4	Glass line reactor	6.3 KL	5	9	14
5	Glass line reactor	5.0 KL	3	5	8
6	MS Reactor	5.0 KL	1	1	2
7	Agitated nutsche filter Drier	5.0 KL	4	6	10
8	RVD	1 to 5 KL	3	6	9
9	Centrifuge SS basket	48˝ Dia.	2	2	4
10	Nutsche filter	5 KL	2	2	4
11	SS tanks	2- 5 KL	42	30	72
12	Glass lined tanks	2- 5 KL	15	20	35
13	Pulverizer	100 Kg/hr	1	0	1
14	Ejectors	NA	11	10	21
15	Sparkler filter	NA	3	5	8

1.3 SALIENT FEATURES OF THE PROJECT & INFRASTRUCTURE FACILITIES INCLUDING POWER SOURCES

Sr. No.	Salient Features	Details
1	Location of project Longitude & Latitude	Plot No. E-442, 443 & 444, RIICO Industrial Area, Chopanki, Bhiwadi, Dist: Alwar – 301 707, Rajasthan 76° 52'42.00"E and 28°9'9.00"N
2	Status of Land acquisition	Land is already acquired
3	Land area of project site	11,958 sq. meters
4	Fuel to be used	Wood: 15 MT/Day Diesel: 1700 Lit./Day
5	Source of Water	Water requirement will be met through the RIICO Water Supply
6	Total Water Quantity	Domestic: 8 KL/Day Gardening: 10 KL/Day Industrial: 170 KL/Day Total Water Quantity: 188 KL/Day
7	Quantity of industrial effluent generation and domestic wastewater generation	Domestic: 7 KL/Day Industrial: 129 KL/Day Total Wastewater Generation: 136 KL/Day
8	Treatment of effluent	Effluent Treatment plant consist of Primary Treatment Facility & MEE
9	Disposal of treated effluent	Industrial wastewater will be treated in ETP & MEE and MEE Condensate will be sent to ETP. Domestic waste water will be treated in soak pit, mixed with MEE Condensate & effluent from

		washing and utilities and re-used.
10	Details of process emissions	The source of flue gas emission will be from Boiler, DG Set and Incinerator. The source of process gas emission will be from vent attached to reactors.
11	Hazardous waste generation	Discarded Drums, Containers, Bags & Liners, Used Lubricating Oil, ETP Sludge, Process Residue, MEE Salt & Incineration Ash and Stripper Sludge.
12	Disposal of hazardous waste	TSDF and Common Incineration site = M/s. UCCI, Udaipur.
13	Power requirement & source	Power required from JVVNL is 860 KW. Source of Power = JVVNL (Jaipur) and Standby power supply from, D.G. set = 380 KVA x 1 Nos. , 125 KVA x 1 Nos. & 500 KVA x 1 Nos.
14	Names & distance of National parks, Wildlife sanctuaries, Reserve Forests etc. Located within 10 Km from the plant boundary	There are no National parks, Wildlife sanctuaries, and Reserve Forests etc. located within 10 km from the plant boundary.
15	Any litigation/Court case pertaining to the project:	No litigation/Court case pertaining to the industry.
16	Total Cost of the Project: Rs. (Crores)	Total costs of the project will Rs. 45.67 Crores.
17	Nearest Town	Bhiwadi = 7 kms
18	Nearest Railway station	Pataudi Road = 24 kms
19	Nearest Air port	New Delhi = 50 km

1.4 PURPOSE OF EIA

The EIA study is carried out to assess the pollution potential and evaluate the adequacy and efficiency of proposed Pollution Control & Environmental Management System.

1.5 OBJECTIVES OF EIA

The main objectives of the study are

1) To assess the background environmental status,
2) To identify potential sources of pollution,
3) To predict and evaluate the impact on environment along with pollution control measures taken and
4) To prepare a comprehensive Environment Management Plan and Disaster Management Plan.

1.6 METHODOLOGIES FOR EIA

Taking into consideration proposed project activities and guidelines, an area of 10 km radius from the center of the project has been selected and is designated as the study area for the purpose of EIA studies.

1.6.1 Base Line Condition

The samples of ambient air, ground and surface water and soil are collected and analyzed as per the standard methods for establishing the baseline data and to determine the impact of proposed activity on the same.

1.6.2 Ambient Air Environment

The air environment around the plant was studied by setting up nine locations within the study area of 10 km radius from the project site and collection and monitoring the site specific meteorological data, viz. wind speed, wind direction, humidity, rainfall and ambient temperature was carried out. Design of network for ambient air quality monitoring locations is based on guidelines provided by CPCB. The ambient air samples were collected and analyzed for SPM, PM_{10}, $PM_{2.5}$, SO_2, NO_X, HCl, Cl_2, O_3, Pb, CO, NH_3, C_6H_6, Benzo (a) Pyrene

(BaP), Arsenic (As), Nickel (Ni) & VOCs for identification, prediction, evaluation and assessment of potential impact on ambient air environment.

1.6.3 Ground and Surface Water Environment

The water required for domestic and industrial use is being made available from the GIDC Water Authority. Hence, to assess the physico-chemical quality of the water, a number of water samples were collected and analyzed for pollution parameters viz., pH, TDS, Turbidity, BOD_3, COD, Fluorides, Chlorides, Sulphates, Nitrates, Ammonical Nitrogen, Hardness, Alkalinity, Oil & Grease and some heavy metals in order to find out the contamination, if any.

1.6.4 Noise Environment

Noise pollution survey was conducted in the study zone. The anticipated noise sources were industrial activities, which are likely to be increased due to proposed activity. Noise levels were also recorded in surrounding villages for evaluating general scenario of the study area. Hourly equivalent sound levels (Leq) were also recorded for calculating Day and Night noise levels in the surrounding villages.

1.6.5 Soil Environment

Soil sampling and analysis was carried out to assess physico-chemical characteristics of the soils and delineate existing cropping pattern, existing land use and topography, within the study area.

1.6.6 Biological Environment

Keeping in view, the importance of biological component of total environment due to the proposed project, biological characterization of terrestrial and aquatic environments, changes in species diversity of flora and fauna in terrestrial as well as aquatic systems were studied for impact analysis due to proposed project activity, if any.

1.6.7 Socio-Economic Environment

Demographic and related socio-economic data was collected from census handbook to assess socio-economic status of the study area. Assessment of impact on significant historical, cultural, and archeological sites/places in the area and economic and employment benefit arisen out from the project is given special attention.

1.6.8 Identification of Pollution Source

Detailed study of manufacturing process for proposed scenario is carried out along with input and output of materials, water and wastewater as well as infrastructure facilities available.

1.6.9 Evaluation of Pollution Control and Environmental Management System

The qualitative and quantitative analysis of various pollution sources as well as evaluation of pollution control system is carried out.

1.6.10 Evaluation of Impact

A comprehensive evaluation of environmental impact with reference to proposed activities is carried out.

1.6.11 Preparation of Environmental Management Plan

A comprehensive Environmental Management Plan has been prepared covering all the aspects of pollution prevention measures, Air and Water Pollution Control measures, Hazardous Waste Management, Environmental Surveillance and Environmental Management Plan.

The present report is an EIA conducted during Winter Season, 2018-19 (December, 2018 to February, 2019). The baseline environmental conditions have been established through field monitoring and literature survey.

1.7 STRUCTURE OF REPORT

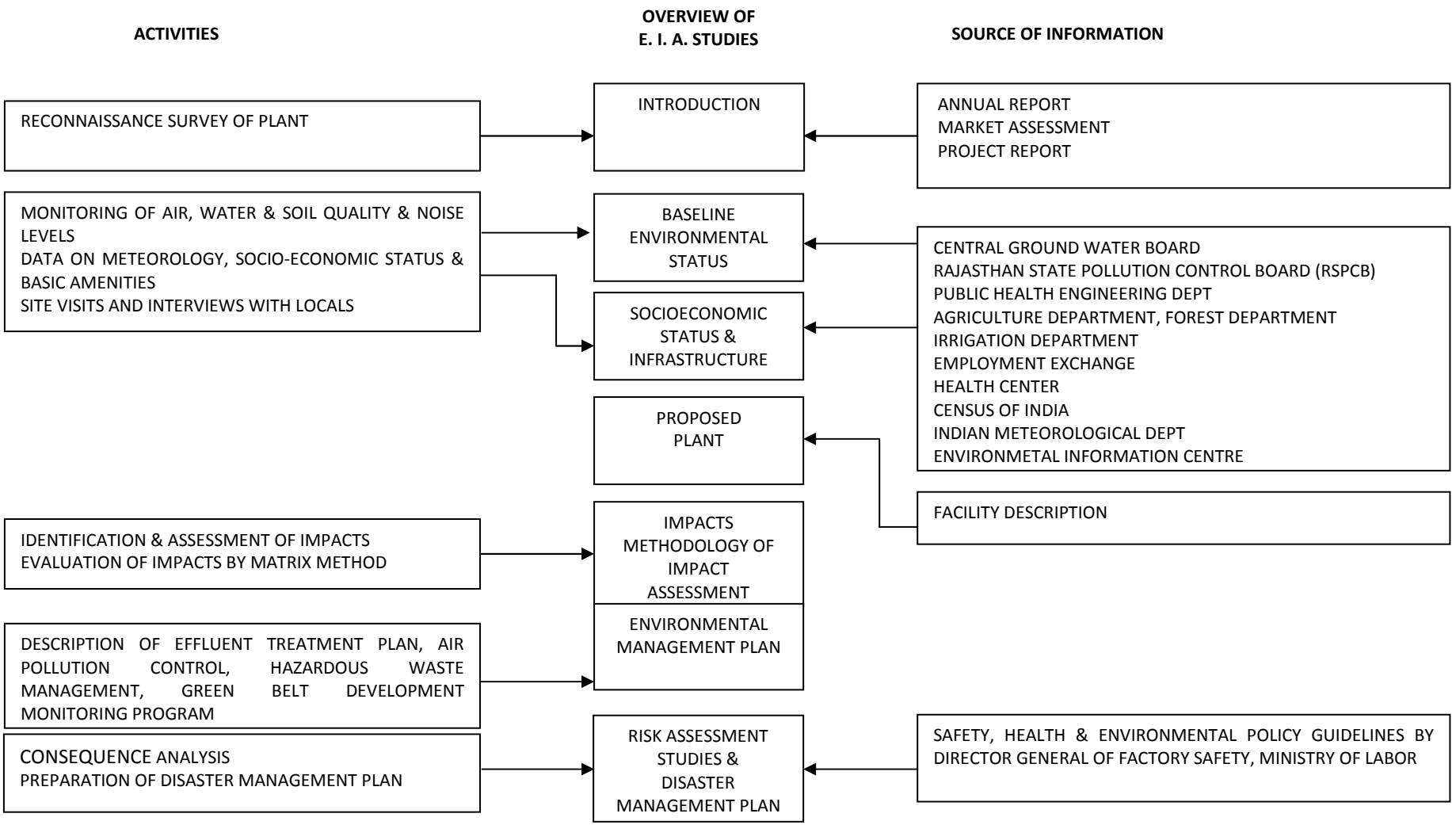
The objective of the EIA study is preparation of Environment Impact Assessment (EIA) report based on the guidelines of the Ministry of Environment, Forests & Climate Change (MoEFCC), CPCB and RSPCB. It incorporates the following.

- **Chapter 1** is an Introduction to the Industry and its premises. It also expresses the basic objectives and methodologies for EIA studies and work to be covered under each Environmental component.
- **Chapter 2** presents Project Description and Infrastructural facilities including all industrial and environmental aspects of M/s. Insecticides India Limited as well as manufacturing process details. This chapter also gives information about raw material storage and handling, water and wastewater quantitative details, air pollution and control system, Hazardous Waste generation, storage facility and disposal and utilities for proposed plant capacity. It also provides information about proposed Environmental Management Facilities available at the project site.
- **Chapter 3** covers Baseline Environmental Status including meteorological details, Identification of baseline status of Environmental components of the surrounding area covering air, water and land environment. Also presents a study of land use pattern, Biological Environment & Socio-Economic Environment giving details about District Alwar, Taluka Bhiwadi and the study area in terms of land use pattern, biological environment, and socio-economic environment.
- **Chapter 4** deals with Anticipated Environmental Impacts & Mitigation Measures, which provides quantification of significant impacts of the proposed activities of plant on various environmental components. Evaluation of the proposed pollution control facilities has been presented.
- **Chapter 5** describes Analysis of Alternatives (Technology & Site) considered with respect to Technology & Site.
- **Chapter 6** deals with Environmental Monitoring Plan
- **Chapter 7** describes Risk assessment and Disaster Management Plan that shall be adopted by the company.

- **Chapter 8** describes Project Benefits
- **Chapter 9** deals with Environmental Cost Benefit Analysis
- **Chapter 10** describes Environment Management Plan (EMP) to be adopted for mitigation of anticipated adverse impacts if any and to ensure acceptable impacts.
- **Chapter 11** describes Executive Summary & Conclusion of the Project.
- **Chapter 12** describes Disclosure of Consultants Engaged.

FIGURE 1.1

ACTIVITIES, SOURCES OF INFORMATION AND CONTENTS OF EIA REPORT



CHAPTER – 2:

PROJECT DESCRIPTION AND INFRASTRUCTURAL FACILITIES

2.1 BACKGROUND

M/s. Insecticides India Limited Proposes Expansion of Pesticide Technical Products (From 1800 MT/Annum to 9350 MT/Annum) in Existing Unit located at Plot No. E-442, 443 & 444, RIICO Industrial Area, Chopanki, Bhiwadi, Dist. Alwar – 301 707, Rajasthan.

2.2 LAND REQUIREMENT FOR THE PROJECT INCLUDING ITS BREAK UP FOR VARIOUS PURPOSES, ITS AVAILABILITY

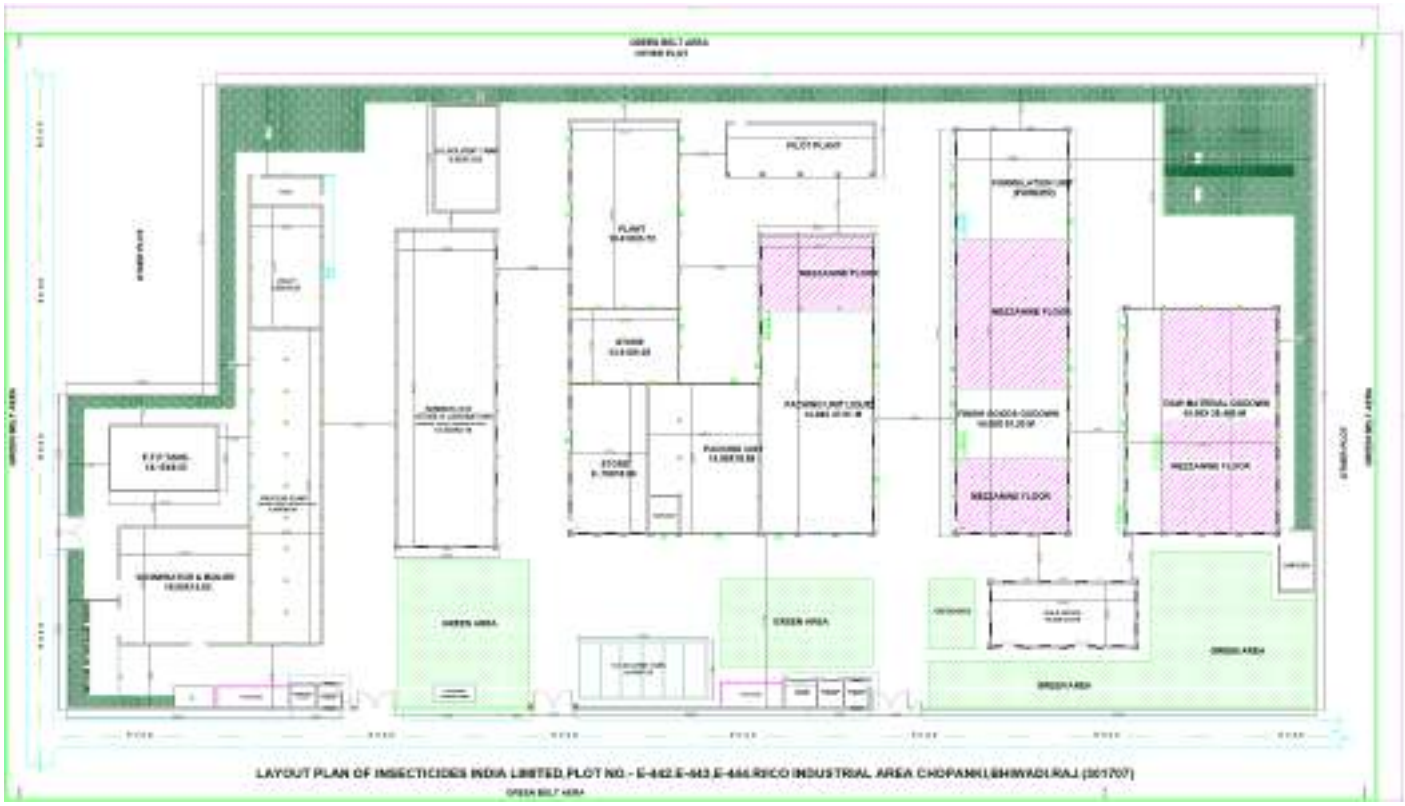
Total 11,958 sq. meter land area is available at site; out of this area about 4,784 sq. meter (40 %) area is covered as greenbelt and other forms of greenery.

BREAK UP OF DIFFERENT LAND USE OF FACTORY

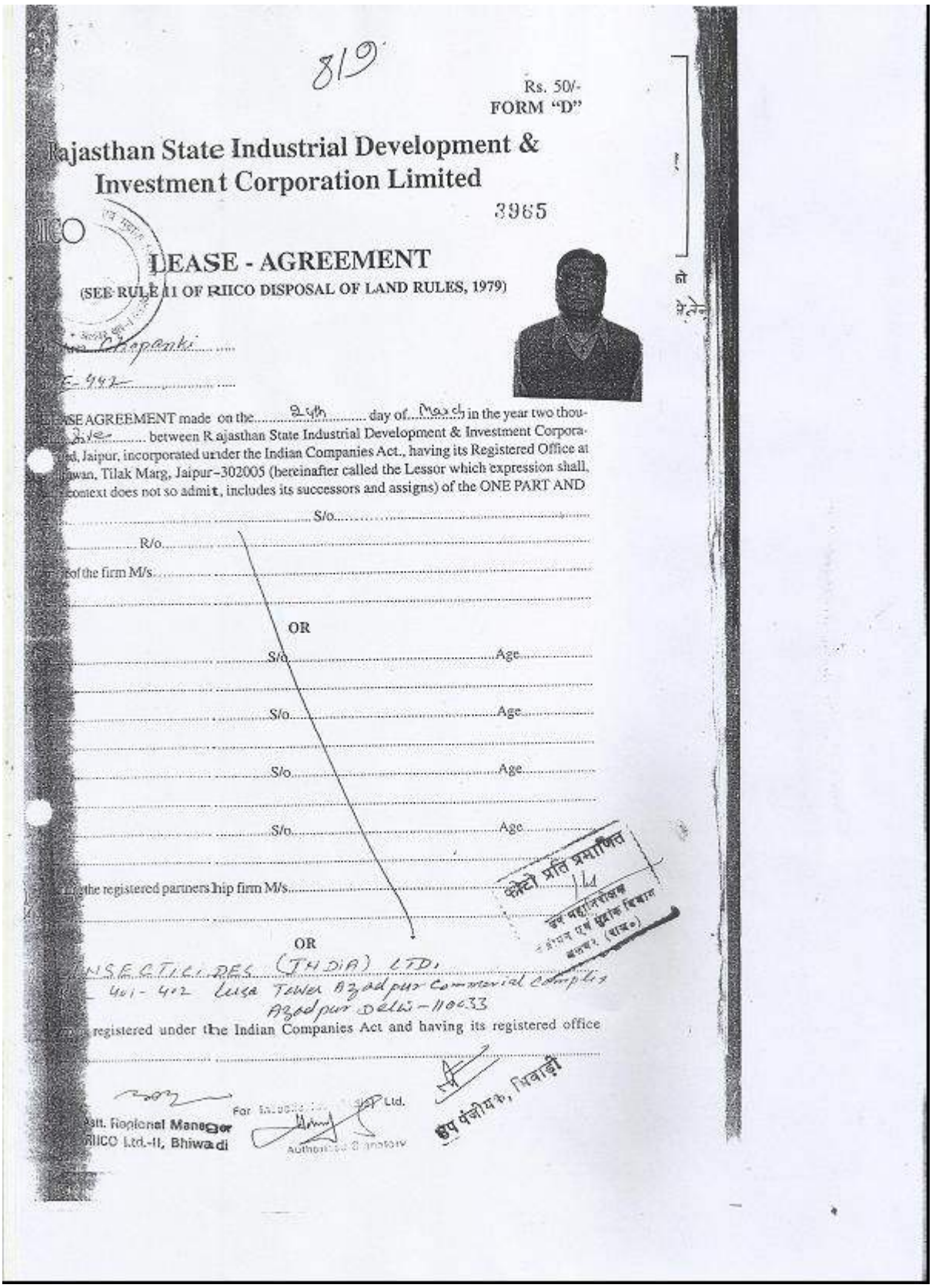
SR. NO.	LAND USE	EXISTING AREA (SQ.MT.)	PROPOSED AREA (SQ. MT.)	TOTAL AREA (SQ. MT.)
1	Production Plants	2000	600	2600
2	Parking	0	0	0
3	Security Building	30	0	30
4	Effluent Treatment plant	400	400	800
5	Utility	228	270	498
f6	Raw Material and Finished Products Storage	1350	0	1350
7	Gas Tonner Storage	0	0	0
8	Tank Farm Area	230	0	230
9	Green Belt	4000	784	4784
10	Hazardous waste storage area	50	0	50
11	Road & Open Area	3670	-2054	1616
	Total	**11958**	**0**	**11958.0**

FIGURE – 2.1

LAYOUT OF THE PLANT



2.2.1 Land possession documents. Copy of NA order showing permission to use the project land for industrial purpose. If located in RIICO, copy of plot holding certificate obtained from RSID&ICL Authority.



819

Rs. 50/-
FORM "D"

Rajasthan State Industrial Development & Investment Corporation Limited

3965

RIICO

LEASE - AGREEMENT

(SEE RULE 11 OF RIICO DISPOSAL OF LAND RULES, 1979)

Chopanki

E-442

LEASE AGREEMENT made on the 24th day of March in the year two thousand five between Rajasthan State Industrial Development & Investment Corporation Limited, Jaipur, incorporated under the Indian Companies Act., having its Registered Office at Jhawan, Tilak Marg, Jaipur-302005 (hereinafter called the Lessor which expression shall, if the context does not so admit, includes its successors and assigns) of the ONE PART AND

S/o

R/o

of the firm M/s

OR

S/o Age

S/o Age

S/o Age

S/o Age

the registered partnership firm M/s

OR

INSECTICIDES (INDIA) LTD.
401-402 Lusa Tower Azadpur Commercial Complex
Azadpur Delhi-110033

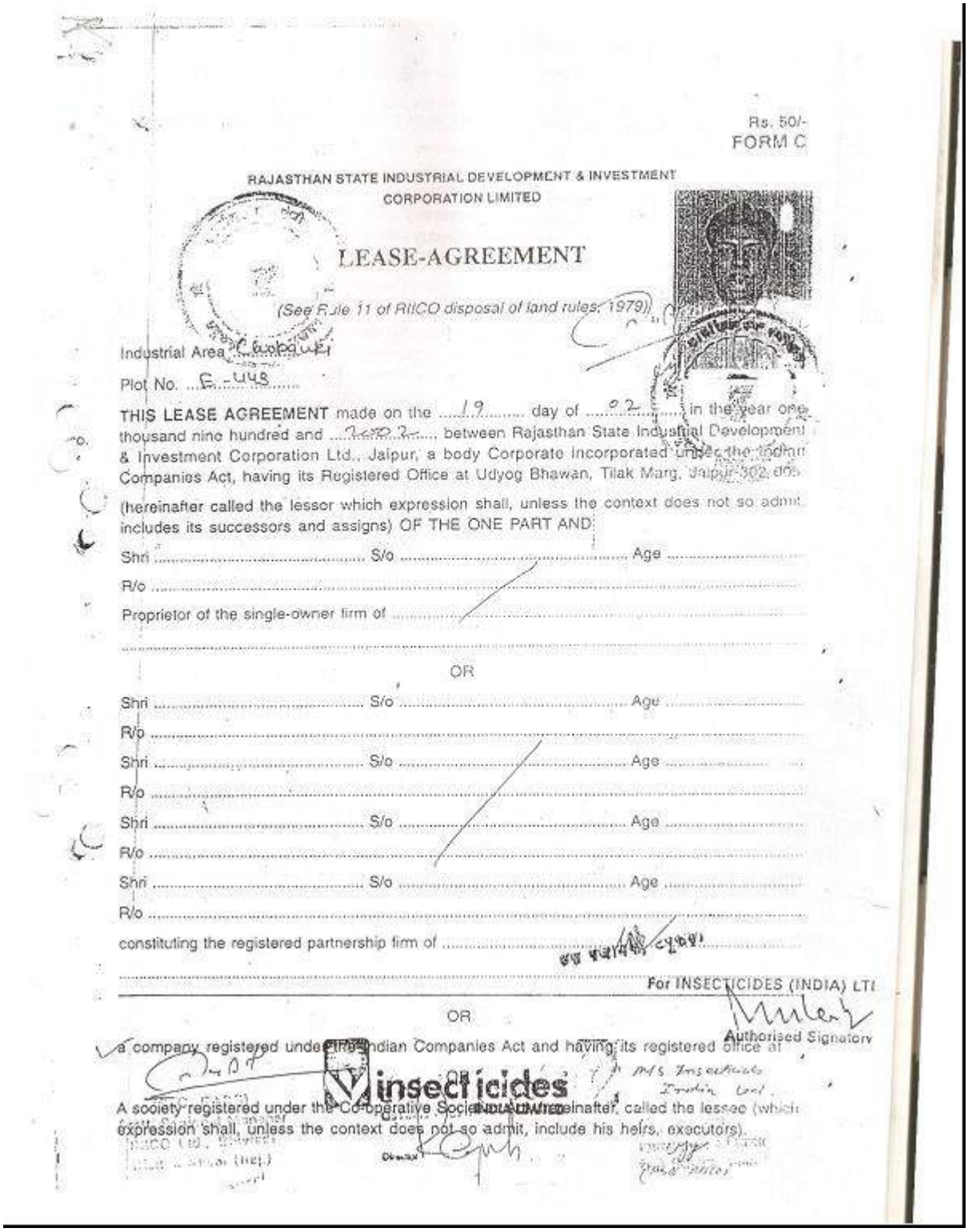
registered under the Indian Companies Act and having its registered office

Asstt. Regional Manager
RIICO Ltd.-II, Bhiwadi

For Insecticides India Ltd.
Authorised Signatory

उप पंजीयक, भिवाड़ी

फोटो प्रति प्रमाणित



Rs. 50/-
FORM C

RAJASTHAN STATE INDUSTRIAL DEVELOPMENT & INVESTMENT CORPORATION LIMITED

LEASE-AGREEMENT

(See Rule 11 of RIICO disposal of land rules, 1979)

Industrial Area Chopanki

Plot No. E-448

THIS LEASE AGREEMENT made on the 19 day of 02 in the year one thousand nine hundred and [illegible] between Rajasthan State Industrial Development & Investment Corporation Ltd., Jaipur, a body Corporate Incorporated under the Indian Companies Act, having its Registered Office at Udyog Bhawan, Tilak Marg, Jaipur-302 005

(hereinafter called the lessor which expression shall, unless the context does not so admit, includes its successors and assigns) OF THE ONE PART AND

Shri ..... S/o ..... Age .....

R/o .....

Proprietor of the single-owner firm of .....

.....

OR

Shri ..... S/o ..... Age .....

R/o .....

Shri ..... S/o ..... Age .....

R/o .....

Shri ..... S/o ..... Age .....

R/o .....

Shri ..... S/o ..... Age .....

R/o .....

constituting the registered partnership firm of .....

.....

For INSECTICIDES (INDIA) LTD

Authorised Signatory

OR

a company registered under the Indian Companies Act and having its registered office at

OR

A society registered under the Co-operative Societies Act and hereinafter called the lessee (which expression shall, unless the context does not so admit, include his heirs, executors).

(528) 187

Rs. 50/-
FORM 'C'

RAJASTHAN STATE INDUSTRIAL DEVELOPMENT & INVESTMENT CORPORATION LIMITED

LEASE-AGREEMENT

(See Rule 11 of RIICO disposal of land rules, 1979)

...a Chopanki
...E-444

...AGREEMENT made on the 26th day of March in the year two thousand ..... between Rajasthan State Industrial Development & Investment ... Ltd., Jaipur, a body Corporate incorporated under the Indian Companies Act, having its ...ffice at Udyog Bhawan, Tilak Marg, Jaipur-302 005.
... called the lessor which expression shall, unless the context does not so admit, includes ...rs and assigns) OF THE ONE PART AND

..... S/o ..... Age .....

...of the single-owner firm of .....

OR

..... S/o ..... Age .....

..... S/o ..... Age .....

..... S/o ..... Age .....

..... S/o ..... Age .....

...g the registered partnership firm of .....

फोटो प्रति प्रमाणित
वर्ग महानिरीक्षक
पंजीयन एवं मुद्रांक विभाग
जलंधर (राज०)

...ticides India Ltd.

OR

...y registered under the Indian Companies Act and having its registered office at Delhi.

OR

...registered under the Co-operative Societies Act, hereinafter, called the lessee (which expression ...ss the context does not so admit, include his heirs, executors)

...ional Manager
... Ltd; BHIWADI
...ALWAR (Raj.)

For In... (India) Limited
Authorised Signatory

उप पंजीयक, टपुकड़ा

2.3 PROJECT SETTING

M/s. Insecticides India Limited in Chopanki Industrial Estate is located at longitude 76° 52'42.00" E and latitude 28°9'9.0" N. Detailed Layout map of the plant is shown in Figure – 2.2.

M/s. Insecticides India Limited is located at Alwar which is one of the important industrial and commercial centers of Rajasthan and India. The nearest railway station is Pataudi Road on broad gauge section of Western Railway Line. The station is located at about **24.0 km** from the project site. Airport proximity is **50 km** from project site which is New Delhi.

2.3.1 Project Site and Plant Layout

Location (map showing general location, specific location and project boundary & project site layout) with coordinates.

FIGURE - 2.2

LOCATION OF THE PROJECT SITE

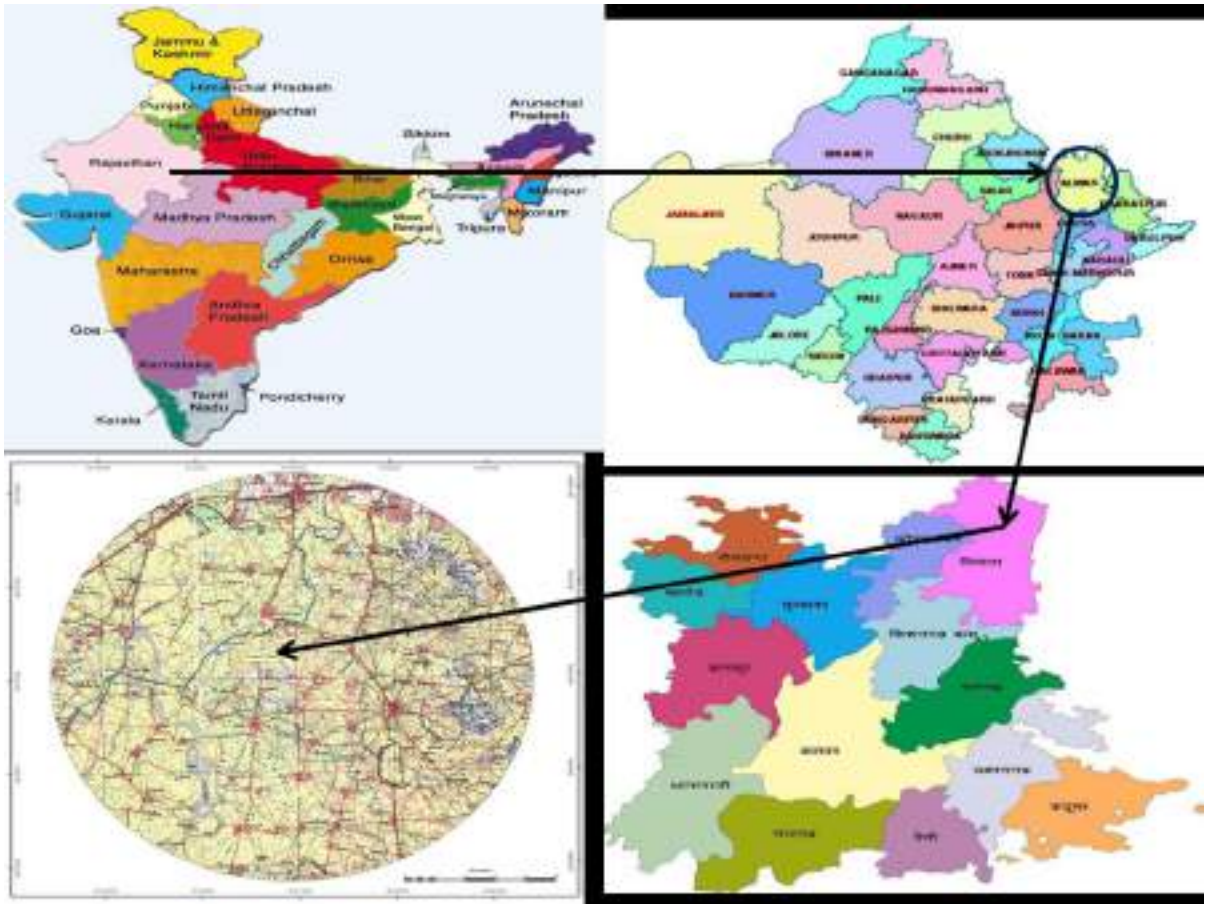
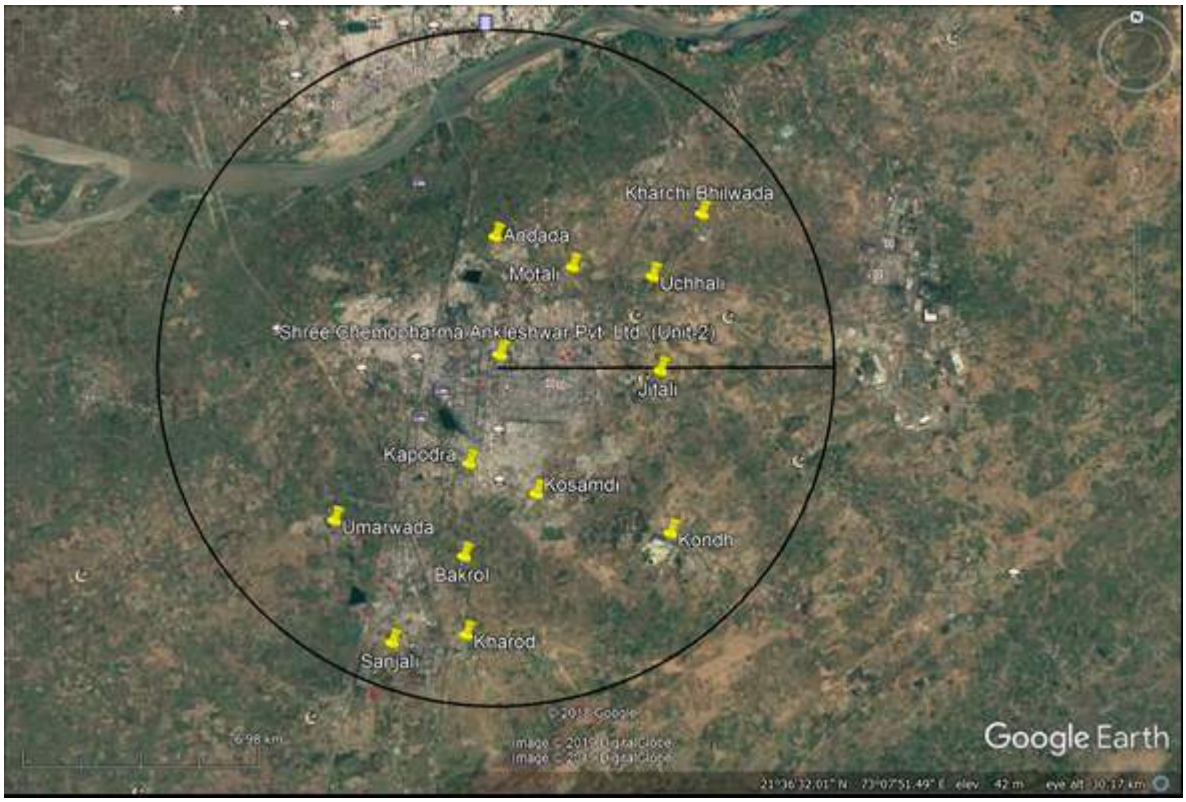


FIGURE - 2.2 (CONT.)

PROJECT SITE ON GOOGLE EARTH



PHOTOGRAPHS OF EXISTING PLANT

2.4 LOCATION OF THE PROJECT SITE AND NEAREST HABITATS WITH DISTANCES FROM THE PROJECT SITE TO BE DEMARCATED ON A TOPOSHEET (1: 50000 SCALE).

Key infrastructure features have been extracted from Survey of India (SoI) topographical maps of 1:50,000 scale. The features have been updated using satellite data and have been verified with ancillary information derived from TTK maps and guide maps. The locations of the settlement have been extracted from Census of India (CoI) maps and verified by using SoI topographical maps and satellite data.

2.4.1 Distance of Nearest Key Infrastructure Features from Project Site

The distance of railways and National and State highways are presented in Table 2.2 below.

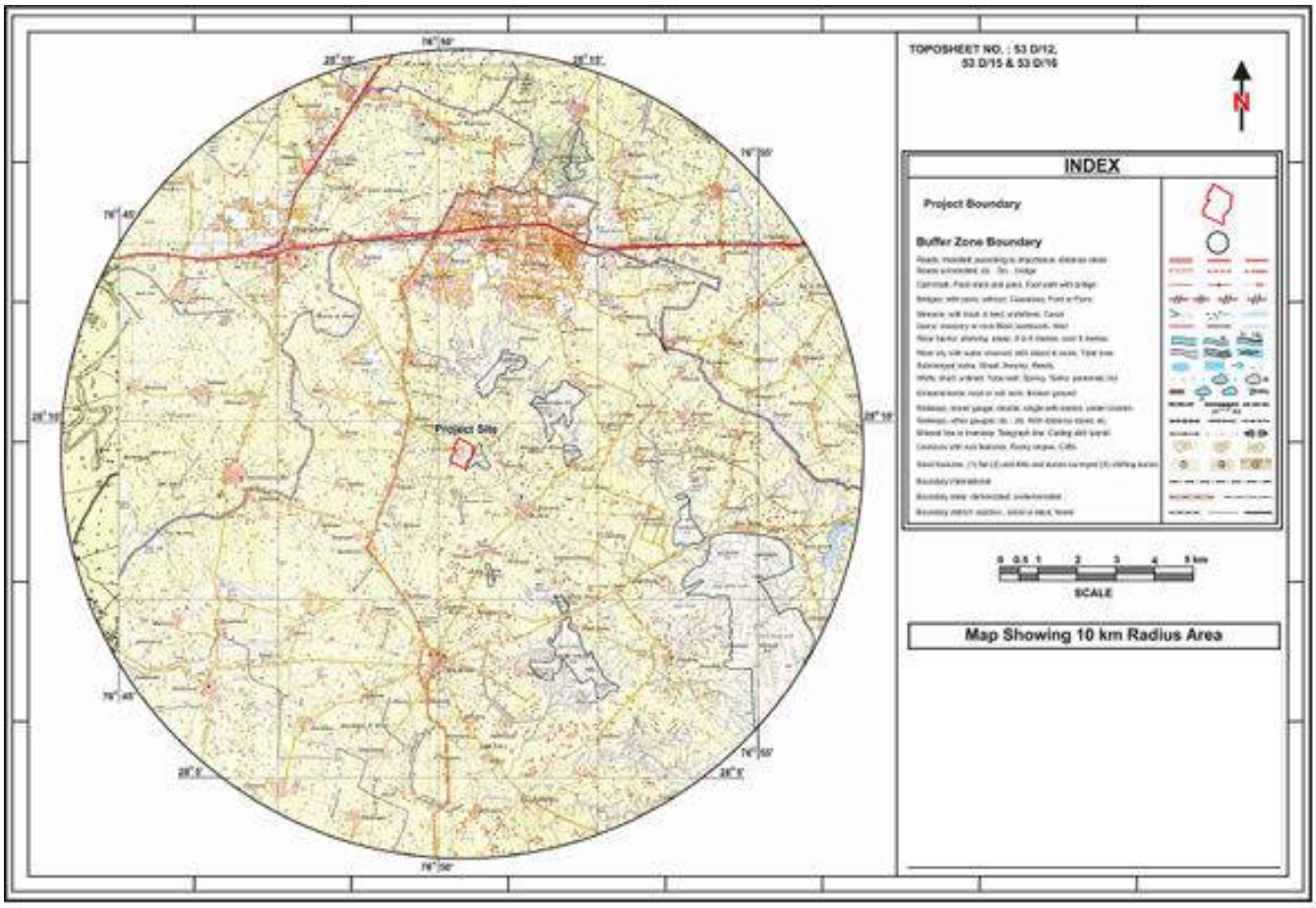
TABLE 2.1

DISTANCE OF NEAREST KEY INFRASTRUCTURE FEATURES FROM PROJECT SITE

Sr. No.	Nearest Infrastructure Feature	Distance from Project Area
1	Western Railway Main Line	35.5 km
2	National Highway NH-48	16.5km
3	State Highway	10.4 km
4	New Delhi Airport	50.0 Km
5	Bhiwadi	7 Km
6	UCCI	4.9 Km

FIGURE – 2.3

Key Infrastructure



2.5 TECHNICAL DETAILS OF THE PLANT/S ALONG WITH DETAILS ON BEST AVAILABLE TECHNOLOGIES (BAT), PROPOSED TECHNOLOGY AND REASONS FOR SELECTING THE SAME.

The factory is managed by a professional unit manager heading a professional team of managers, quality control staff, and supervisory staffs, skilled, semiskilled and unskilled workers. The brief manufacturing process is given below.

MANUFACTURING PROCESS OF TECHNICALS:

For the purpose of better clarity the production process is divided into following stages:

Stage 1

The raw materials and solvent samples are sent to QC lab for quality check.

Stage 2

If quality is approved, the material is loaded to a reaction vessel to produce crude pesticide in solvent. The crude pesticide is sent to laboratory to know the completion of the reaction and for quality check.

Stage 3

The Crude pesticide in solvent is ready for washing. As per the requirement of end product washing is carried out in batch.

Stage 4

After washing excess water is removed and the concentrated form of technical to sent to another vessel.

Stage 5

The concentrated technical is then sent for crystallization or epimerization (the process of converting one isomer to any other isomer).

Stage 6

After quality check the crystallized form or the converted isomer is sent for filtration and drying.

Stage 7

The mother liquor is separated and the end product technical is sent for packing and dispatch.

Note:

The excess water removed at stage 4 is called aqueous layer that is sent to ETP after detoxification.

The mother liquor separated at stage 7 is recycled and raw materials, solvent and products are recovered and rest waste material is sent to incinerator.

2.6 PHASE WISE PROJECT IMPLEMENTATION SCHEDULE WITH BAR CHART AND TIME FRAME, IN TERMS OF SITE DEVELOPMENT, INFRASTRUCTURE PROVISION, EMS IMPLEMENTATION ETC.

Construction work for proposed expansion project will begin only after getting EC & CTE.

PROJECT BAR CHART

Sr. No.	Activity	Status	MONTH											
			M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
1	Civil Construction Work	Plan												
		Actual												
2	Structural Work	Plan												
		Actual												
3	Mechanical Erection Work	Plan												
		Actual												
4	Commissioning Work	Plan												
		Actual												

2.7 CHEMICAL NAME OF EACH PROPOSED PRODUCT TO BE MANUFACTURED. DETAILS ON END USE OF EACH PRODUCT. (PROVIDE CAS NUMBER OF ALL THE PRODUCTS & RAW MATERIALS.).

TABLE 2.2

LIST OF PRODUCTS WITH PRODUCTION CAPACITY

SR. NO.	PRODUCT NAME	CATEGORY AS PER EIA NOTIFICATION	EXISTING	ADDITIONAL	TOTAL	CAS NOS.	LD_{50} (mg/kg)	
			CAPACITY (MT/ ANNUM)				Oral	Dermal
A. PESTICIDE TECHNICAL								
1.	**Phenoxy Herbicides**	5(b)	20	280	300			
	Quizalofop	5(b)				76578-12-6	1670	>5000
	2,4-D Ethyl Ester	5(b)				533-23-3	>2000	>2000
	2,4-D sodium salt	5(b)				2702-72-9;	>2000	>2000
	Clodinafop propargyl	5(b)				114420-56-3	1392	>2000
2.	**Imidazolinone Herbicide**	5(b)	50	0	50			
	Imazethapyr	5(b)				81335-77-5	5000	>2000
3.	**Sulfonyl Urea Herbicides**	5(b)	20	380	400			
	Metsulfuron methyl	5(b)				744223-64-6	>5000	>2000
	Sulfosulfuron	5(b)				141776-32-1	>5000	>5000
	Tribenuron methyl	5(b)				101200-48-0	>5000	>5000

	Flazasulfuron	5(b)				104040-78-0	>5000	>2000
	Iodosulfuron	5(b)				144550-36-7	2678	>2000
	Nicosulfuron	5(b)				111991-09-4	>5000	>2000
	Rimsulfuron	5(b)				122931-48-0	>5000	>2000
4.	**Organochlorine Herbicides**	5(b)	200	0	200			
	Butachlor	5(b)				23184-66-9	2000	>13000
	Pretilachlor	5(b)				51218-49-6	6099	>3100
5.	**Other Herbicides**	5(b)	600	200	800			
	Oxyfluorfen	5(b)				42874-03-3	>5000	>10000
	Paraquate	5(b)				1910-42-5	129	>911
	Diclofop methyl	5(b)				51338-27-3	563-693	>2000
	Diflufenican	5(b)				83164-33-4	>2000	>2000
	Sulcotrione	5(b)				99105-77-8	>5000	>4000
	Benfuresate	5(b)				68505-69-1	3536	>5000
	Glufosinate ammonium	5(b)				77182-82-2	2000	>4000
	Penoxsulam	5(b)				219714-96-2	>5000	>5000
	Pinoxaden	5(b)				243973-20-8	>5000	>5000
	Propanil	5(b)				709-98-8	367	4830
	Tembotrione	5(b)				335104-84-2	>2000	>5000
6.	**Carbamate Insecticide**	5(b)	10	90	100			
	Thiodicarb	5(b)				59669-26-0	66	>2000
7.	**Neo Nicotinoid Insecticides**	5(b)	100	2900	3000			
	Acetamiprid	5(b)				135410-20-7	217	>2000
	Imidacloprid	5(b)				138261-41-3	450	>5000
	Thiacloprid	5(b)				111988-49-9	621	>2000
	Thiamethoxam	5(b)				153719-23-4	1563	>2000
	Dinotefuran	5(b)				165252-70-0	2804	>2000
	Clothianidin	5(b)				210880-92-5	>5000	>2000
	Imidaclothiz	5(b)				105843-36-5	>2000	>2000
8.	**Organophosphorus Insecticides**	5(b)	300	0	300			
	Chlorpyriphos	5(b)				2921-88-2	135	>5000
9.	**Pyrethroid Insecticides**	5(b)	150	2850	3000			
	Allethrin	5(b)				584-79-2	2150	2650
	Alpha cypermethrin	5(b)				67375-30-8	57	>2000
	Cyfluthrin	5(b)				68359-37-5	500	>5000
	Cypermethrin	5(b)				52315-07-8	250-4150	>4920
	Delta cypermethrin	5(b)				52918-63-5	1965	>2000
	d-transallethrin	5(b)				28434-00-6	370	1200
	Lambda cyhalothrin	5(b)				91465-08-6	79	632
	Permethrin	5(b)				52645-53-1	430-4000	>2500
	Prallethrin	5(b)				23031-36-9	640	>5000
	Transfluthrin	5(b)				118712-89-3	>5000	>5000
	Bifenthrin	5(b)				82657-04-3	54.5	>2000

	Metofluthrin	5(b)				240494-70-6	>5000	>5000
10.	**Other Insecticides**	5(b)	100	200	300			
	Fipronil	5(b)				120068-37-3	97	>2000
	Buprofezin	5(b)				953030-84-7	2198	>5000
	Cartap hydrochloride	5(b)				15263-52-2	345	>1000
	Metalaxyl	5(b)				57837-19-1	633	>3100
	Novaluron	5(b)				116714-46-6	>5000	>2000
	Ethiprole	5(b)				181587-01-9	NA	NA
	Thiocyclam hydrogen oxalate	5(b)				31895-22-4	33900	NA
	Pymetrozine	5(b)				123312-89-0	5820	>2000
	Fenpyroximate	5(b)				134098-61-6	480	>2000
	Spirotetramat	5(b)				203313-25-1	>2000	>4000
	Flonicamid	5(b)				158062-67-0	>2000	>2000
	Flubendiamide	5(b)				272451-65-7	>2000	>2000
	Indoxacarb	5(b)				144171-61-9	1732	>5000
11.	**Conazole Fungicides**	5(b)	75	225	300			
	Difenoconazole	5(b)				119446-68-3	1453	>2010
	Hexaconazole	5(b)				79983-71-4	2189	>2000
	Ipconazole	5(b)				125225-28-7	888	>2000
	Paclobutrazol	5(b)				76738-62-0	2000	>1000
	Propiconazole	5(b)				60207-90-1	1517	>4000
	Tebuconazole	5(b)				107534-96-3	4000	>5000
	Tricyclazole	5(b)				41814-78-2	314	>2000
	Probenazole	5(b)				27605-76-1	NA	NA
	Prothioconazole	5(b)				178928-70-6	>2000	>2000
	Epoxiconazole	5(b)				133855-98-8	>2000	>2000
12.	**Other Fungicides**	5(b)	75	225	300			
	Thiophanate methyl	5(b)				23564-05-8	7500	>10000
	Pyraclostrobin	5(b)				175013-18-0	>5000	>2000
	Cyzofamid	5(b)				120116-88-3	>5000	>2000
13.	**Fermentation Technology**	5(b)	100	200	300			
	Abamectin	5(b)				71751-41-2	10-13.5	>2000
	Azoxystrobin	5(b)				131860-33-8	>5000	>2000
	Picoxystrobin	5(b)				117428-22-5	>2000	>2000
	Emamectin benzoate	5(b)				155569-91-8	56-63	>2000
	Total		**1800**	**7550**	**9350**			
B. PESTICIDE FORMULATIONS (KL/MT)								
1.	Pesticide formulation Bulk		1500	0	1500			
2..	Emulsifier formulation		500	0	500			
3.	Granule formulations		7500	0	7500			
4.	Liquid formulations		6000	0	6000			
5.	Powder formulations		4500	0	4500			
6.	R&D Unit		1 (Service)	0	1 (Service)			
	Total		**20,000**	**0**	**20,000**			

2.8 DETAILS ON RAW MATERIALS, SOURCE AND STORAGE WITHIN THE PREMISES

TABLE 2.3

LIST OF RAW MATERIALS

Sr. No.	Product Name	Raw Material Consumption (MT/MT of product)			CAS NOS.	LD_{50} (mg/kg)
		Existing	Additional	Total		
1.	**2-4-D Ethyl Ester**					
	2,4-D acid	0.95	0	0.95	94-75-7	699
	Ethyl alcohol	0.21	0	0.21	64-17-5	140
2.	**2-4-D Sodium Salt**					
	2,4 –Dichloro phenol	0.725	0	0.725	120-83-2	47
	Mono Chloro Acetic Acid	0.520	0	0.520	79-11-8	165
3.	**Abamectin**					
	Streptomycessavermitis	0.550	0	0.550	NA	NA
	Anthelminic	1.100	0	1.100	NA	NA
	Acaricidal	1.100	0	1.100	NA	NA
4.	**Acetamiprid**					
	N-Cyano methyl Acetamidate	0.500	0	0.500	5652-84-6	NA
	2-Chloro 5-(methyl amino methyl) Pyridine	0.730	0	0.730	18368-64-4	NA
	Methanol	0.200	0	0.200	67-56-1	5628
5.	**Allethrin**					
	Cyclohexane	0.930	0	0.930	110-82-7	39
	Allethrolone	0.540	0	0.540	29605-88-7	NA
	Pyridine	0.350	0	0.350	110-86-1	891
	Chrysanthemic acid chloride	0.640	0	0.640	4638-92-0	NA
6.	**Alpha Cypermethrin**					
	Meta phenoxy benzaldehyde	0.714	0	0.714	39515-51-0	1222
	Sodium cyanide	0.195	0	0.195	143-33-9	6.440
	n- Hexane	4.300	0	4.300	110-54-3	5000
	Cyprmethric acid chloride	0.835	0	0.835	52314-67-7	NA
7.	**Azoxystrobin**					
	MMCP	0	0.900	0.900	NA	NA
	Dimethyl Formamide	0	0.100	0.100	68-12-2	2800
	2-cyano phenol	0	0.350	0.350	611-20-1	NA
	Potassium Carbonate	0	0.250	0.250	584-08-7	2000
	Methanol	0	0.280	0.280	67-56-1	5628
8.	**Buprofezin**					
	p-nitrophenyl-N-chloromethyl carbamate	1.426	0	1.426	NA	NA
	Toluene	0.425	0	0.425	108-88-3	2600
	Thiourea	0.854	0	0.854	62-56-6	125
	Lime	0.282	0	0.282	1305-62-0	7300
	Ethylene dichloride	0.610	0	0.610	107-06-2	870
9.	**Butachlor**					
	2,6-Diethyl aniline	0.500	0	0.500	579-66-8	1800

	Benzene	0.265	0	0.265	71-43-2	3306
	Paraformaldehyde	0.170	0	0.170	30525-89-4	800
	Triethyl amine	0.0035	0	0.0035	121-44-8	460
	Chloroacetyle chloride	0.395	0	0.395	79-04-9	208
	N-Butanol	1.050	0	1.050	71-36-3	790
10.	**Cartap hydrochloride**					
	2-Dimethylamino-1, 3- dichloropropane	0.680	0	0.680	NA	NA
	Sodium thiosulphate	0.120	0	0.120	7772-98-7	5200
	Sodium cyanide	0.080	0	0.080	143-33-9	6.44
	Hydrochloric acid	0.150	0	0.150	7647-01-0	900
11.	**Chlorpyrifos**					
	Sodium Salt of trichloroPyridinol	0.658	0	0.658	37439-34-2	7500
	Diethyl Thio Phosphoryl Chloride	0.560	0	0.560	2524-04-1	1340
	Ethylene dichloride	0.263	0	0.263	107-06-2	870
12.	**Cyfluthrin**					
	FluroMeta Phenoxy Benzaldehyde	0.495	0	0.495	68359-57-9	650
	Sodium cyanide	0.140	0	0.140	143-33-9	6.44
	Cypermethric Acid chloride	0.578	0	0.578	52314-67-7	NA
	Hexane	0.050	0	0.050	110-54-3	5000
13.	**Cypermethrin**					
	Cypermethric Acid chloride	0.590	0	0.590	52314-67-7	NA
	Meta Phenoxy Benzaldehyde	0.485	0	0.485	39515-51-0	1222
	Sodium cyanide	0.145	0	0.145	143-33-9	6.44
	Phase Transfer Catalyst	0.006	0	0.006	NA	NA
	Hexane	0.045	0	0.045	110-54-3	5000
	Hypochlorite	1.630	0	1.630	14380-61-1	7500
14.	**Delta cypermethrin**					
	Ester of Bi-cisthemic acid	0.515	0	0.515	NA	NA
	Thionyl Chloride	0.150	0	0.150	7719-09-7	324
	Meta phenoxybenzaldehyde	0.485	0	0.485	39515-51-0	1222
	Sodium cyanide	0.150	0	0.150	143-33-9	6.44
15.	**Difenoconazole**					
	4-methyl-1, 3-dioxolane	0.281	0	0.281	1072-47-5	NA
	2-chloro-4-(4-chlorophenoxy) benzyl chloride	0.927	0	0.927	NA	NA
	Dimethyl Formamide	0.174	0	0.174	68-12-2	3000
	1,2,4-Trizole	0.236	0	0.236	288-88-0	1350
	Potassium hydroxide	0.562	0	0.562	1310-58-3	273
16.	**D-Transallethrin**					
	Cyclohexane	0.260	0	0.260	110-82-7	813
	Allethrelone	0.540	0	0.540	29605-88-7	NA
	Pyridine	0.015	0	0.015	110-86-1	1580
	Chrysanthemic acid chloride	0.637	0	0.637	14297-81-5	NA
17.	**Emamectin**					
	Streptomycessavermitis	0.455	0	0.455	NA	NA
	Anthelminic	0.910	0	0.910	NA	NA
	Acaricidal	0.910	0	0.910	NA	NA

	Methyl benzoate	0.225	0	0.225	93-58-3	1177
	Methanol	0.310	0	0.310	67-56-1	5628
18.	**Fipronil**					
	Fipronil Pyrazole	1.263	0	1.263	120068-37-3	NA
	Ammonium Thiocyanate	0.809	0	0.809	1762-95-4	500
	Oxone	3.906	0	3.906	10058-23-8	2000
	Triflouro methyl bromide	0.835	0	0.835	32247-96-4	NA
	Triflouro acetic acid	1.232	0	1.232	76-05-1	NA
19.	**Hexaconazole**					
	2,4-Dichloro valero phenol	0.800	0	0.800	NA	NA
	Dimethyl sulphide	1.160	0	1.160	75-18-3	3300
	Potassium hydroxide	0.693	0	0.693	1310-58-3	273
	Oxarine	0.733	0	0.733	NA	NA
	Dimethyl formamide	0.080	0	0.080	68-12-2	2800
	1,2,4-triazole	0.253	0	0.253	288-88-0	3000
20.	**Imazethapyr**					
	5-ethyl-3-pyridine carboxylic acid	0.818	0	0.818	NA	NA
	,5 Dihydro-4 methyl 4 (1 methyl ethyl)-5-oxo-1 H-imidazoline	0.682	0	0.682	NA	NA
	Dimethyl formamide	0.145	0	0.145	68-12-2	2800
	Sodium carbonate	0.636	0	0.636	497-19-8	5000
21.	**Imidacloprid**					
	2–Chloro, 5–chloro methyl Pyridine	0.855	0	0.855	70258-18-3	NA
	N – Nitro iminoIdmidazolidine	0.715	0	0.715	NA	NA
	Dimethyl formamide	0.108	0	0.108	68-12-2	2800
	Sodium carbonate	0.671	0	0.671	497-19-8	5000
	Methanol	0.020	0	0.020	67-56-1	5628
22.	**Indoxacarb**					
	Monoglyme	0.015	0	0.015	110-71-4	NA
	Sodium hydride	0.160	0	0.160	7646-69-7	NA
	Chloromethylformate	0.378	0	0.378	NA	NA
	Oxadiazine carboxylate	0.626	0	0.626	NA	NA
	Dichloromethane	0.060	0	0.060	70110-03-1	NA
23.	**Ipconazole**					
	Cyclopentanol	0.357	0	0.357	96-41-3	1250
	Dimethyl Sulphide	1.243	0	1.243	75-18-3	3300
	4-Chloro Benzyl Chloride	0.715	0	0.715	104-83-6	NA
	Potassium hydroxide	0.715	0	0.715	1310-58-3	363
	Dimethyl formamide	0.100	0	0.100	68-12-2	2800
	1,2,4-Trizole	0.300	0	0.300	288-88-0	3000
	Para formaldehyde	0.157	0	0.157	30255-89-4	800
24.	**Lambda Cyhalothrin**					
	Meta Phenoxy Benzaldehyde	0.470	0	0.470	39515-51-0	1222
	Sodium Cyanide	0.128	0	0.128	143-33-9	6.44
	TFP Acid Chloride	0.640	0	0.640	72748-35-7	NA
	N-Hexane	0.120	0	0.120	110-54-3	500
	Isopropyl alcohol	0.300	0	0.300	67-63-0	5500

25.	**Met sulfuron methyl**					
	O-sulfoisocyante Methyl Benzoate	0.634	0	0.634	NA	NA
	2-Amino 4-Methoxy 6-Methyl 1,3,5 Triazine	0.367	0	0.367	1668-54-8	NA
	Toluene	0.100	0	0.100	108-88-3	2600
26.	**Metalaxyl**					
	N-(2, 6 – Dimethyl Phenyl) Alanine – Methyl Ester	0.750	0	0.750	623950-05-0	NA
	Methoxy Acetyl Chloride	0.400	0	0.400	38870-89-2	NA
	Toluene	0.110	0	0.110	108-88-3	2600
27.	**Novaluron**					
	2,6-difluoro benzoyl isocyanate	0.321	0	0.321	60731-73-9	NA
	2-chloro-4-amino phenoxy ether	0.794	0	0.794	NA	NA
	Toluene	0.546	0	0.546	108-88-3	2600
28.	**Oxyfluorfen**					
	2-Chloro Trichloro p-Tolyl 3-Ethoxy phenyl Ether	0.877	0	0.877	NA	NA
	Nitric Acid	0.252	0	0.252	7697-37-2	2345
29.	**Paclobutrazol**					
	tert-pentan-3-ol	0.380	0	0.380	154222-11-4	710
	4-Chloro Benzyl Chloride	0.690	0	0.690	104-83-6	1287
	KOH	0.690	0	0.690	1310-58-3	273
	DMF	0.075	0	0.075	68-12-2	3000
	1,2,4 Triazol	0.290	0	0.290	288-88-0	3000
	K_2CO_3	0.070	0	0.070	584-08-7	2000
30.	**Paraquate**					
	4,4’ bipyridine	0.945	0	0.945	553-26-4	172
	Methyl iodide	1.866	0	1.866	74-88-4	101
	Silver Chloride	0.855	0	0.855	7783-90-6	2250
31.	**Permethrin**					
	Meta Phenoxy Benzyl Alcohol	0.524	0	0.524	39515-51-0	1222
	Cypermethric Acid Chloride	0.615	0	0.615	52314-67-7	NA
	n-Hexane	0.180	0	0.180	110-54-3	5000
32.	**Prallethrin**					
	Cyclopenten 1-hydroxy	0.535	0	0.535	NA	NA
	Sodium cyanide	0.162	0	0.162	143-33-9	6.44
	Chrysanthemic acid chloride	0.658	0	0.658	NA	NA
	Hexane	0.125	0	0.125	110-54-3	5000
33.	**Pretilachlor**					
	2,6-diethyl-N-(propoxyethyl) analine	0.703	0	0.703	61874-13-3	980
	Chloro acetyl chloride	0.453	0	0.453	79-04-9	208
	Hexane	0.047	0	0.047	110-54-3	5000
	Ammonia Gas	0.055	0	0.055	7664-41-7	350
34.	**Propiconazole**					
	4-propyl-1, 3-dioxolane	0.405	0	0.405	NA	NA
	Dimethyl Sulphide	1.175	0	1.175	75-18-3	3300
	2,4-dichloro **Benzyl** Chloride	0.845	0	0.845	94-99-5	NA
	Potassium hydroxide	0.675	0	0.675	1310-58-3	273
	1,2,4 Triazol	0.284	0	0.284	288-88-0	3000

	Potassium carbonate	0.068	0	0.068	584-08-7	2000
	Isopropyl alcohol	0.236	0	0.236	67-63-0	5500
35.	**Quizalofop**					
	R- (p hydroxyl phenoxy) propionic acid	0.405	0	0.405	94050-90-5	NA
	Potassium carbonate	0.143	0	0.143	584-08-7	2000
	6-Chloroquinoxaline	0.733	0	0.733	5448-43-1	NA
	Dimethyl formamide	0.570	0	0.570	68-12-2	2800
	Methanol	0.143	0	0.143	67-56-1	5628
36.	**Tebuconazole**					
	1-(4-Chlorophenyl)-4, 4'-dimethyl-pent-3-one	0.755	0	0.755	NA	NA
	Dimethyl sulphate	0.502	0	0.502	77-78-1	140
	Potassium hydroxide	0.323	0	0.323	1310-58-3	273
	Dimethyl formamide	0.025	0	0.025	68-12-2	2800
	Sodium Sulfide	0.026	0	0.026	75-18-3	3300
	1,2,4 Triazol	0.255	0	0.255	288-88-0	3000
	Potassium carbonate	0.040	0	0.040	584-08-7	2000
37.	**Thiacloprid**					
	2-Chloro, 5-Chloro methyl Pyridine	0.857	0	0.857	70258-18-3	NA
	ThiazolidinylideneCyanamide	0.714	0	0.714	NA	NA
	Dimethyl formamide	0.100	0	0.100	68-12-2	2800
	Sodium carbonate	0.672	0	0.672	497-19-8	4090
38.	**Thiodicarb**					
	Methomyl Tech – Powder	0.933	0	0.933	16752-77-5	NA
	Toluene	0.110	0	0.110	108-88-3	2600
	sulphur dichloride	0.302	0	0.302	10545-99-0	NA
39.	**Thiophanate methyl**					
	Ethylene dichloride	0.080	0	0.080	107-06-2	370
	Sodium Thiocyanate	0.526	0	0.526	540-72-7	764
	Methyl chloroformate	0.600	0	0.600	79-22-1	50
	O-Phenylene Diamine	0.350	0	0.350	95-54-5	660
40.	**Transfluthrin**					
	Tetra fluoro benzyl alcohol	0.521	0	0.521	53072-18-7	NA
	Chrysanthemic acid chloride	0.633	0	0.633	4638-92-0	NA
	Hexane	0.186	0	0.186	110-54-3	5000
41.	**Tricyclazole**					
	3-methyl-(1,2)-benzothiazole Chloride	0.733	0	0.733	NA	NA
	Potassium hydroxide	0.667	0	0.667	1310-58-3	273
	Dimethyl formamide	0.087	0	0.087	68-12-2	2800
	1,2,4 Triazol	0.280	0	0.280	288-88-0	3000
	Potassium carbonate	0.067	0	0.067	584-08-7	2000
42.	**Sulfosulfuron**					
	2-ethylsulfonylimidazo[1,2a]pyridine-3-sulfonamide	0.628	0	0.628	141776-47-8	NA
	4,6-dimethoxy-2-(Phenoxy carbonyl)aminopyrimidine	0.760	0	0.760	89392-03-0	NA
	Triethyl amine	0.340	0	0.340	121-44-8	546

43.	**Tribenuron methyl**					
	2-carbomethoxybenzene sulfonamide	0	0.735	0.735	57683-71-3	NA
	4-Methoxy-6-dimethyl -1,3,5-triazin-2-amine	0	0.515	0.515	NA	NA
	Butyl isocyanate	0	0.368	0.368	111-36-4	600
	Phosgene	0	0.390	0.390	75-44-5	NA
	Xylene	0	0.220	0.220	95-47-6	3608
44.	**Flazasulfuron**					
	3N-methoxycarbonyl 3-trifluoromethyl pyridine-2-sulfonamide	0	0.718	0.718	NA	NA
	2-amino-4,6-dimethoxy pyrimidine	0	0.401	0.401	36315-01-2	NA
	1,2-dichloro ethane	0	0.267	0.267	107-06-2	870
45.	**Iodosulfuron methyl**					
	methyl 2-{[(chloromethoxy)carbonyl] sulfamoyl}-4-iodobenzoate	0	0.885	0.885	NA	NA
	4-Methoxy-6-methyl 1,3,5-triazine-2-amine	0	0.280	0.280	1668-54-8	NA
	Dibutyl urea	0	0.018	0.018	1792-17-2	NA
	Dodacane	0	1.795	1.795	112-40-3	142
46.	**Nicosulfuron**					
	2-sulfoamido-3-(N,N-dimethyl)-carbo amidopyridine	0	0.685	0.685	NA	NA
	4,6-dimethoxy pyrimidine phenyl carbamate	0	0.790	0.790	89392-03-0	NA
	Dibutyl urea	0	0.460	0.460	1792-17-2	NA
	Acetonitrile	0	4.700	4.700	75-05-8	269
47.	**Rimusulfuron**					
	3-ethane sulfonylpyridine-2-sulfonamide	0	0.935	0.935	117671-01-9	NA
	4,6-dimethoxy pyrimidine phenyl carbamate	0	1.560	1.560	89392-03-0	NA
	Dibutyl urea	0	0.790	0.790	1792-17-2	NA
	Acetonitrile	0	4.700	4.700	75-05-8	269
48.	**Diclofop-methyl (DCFM)**					
	4-(2,4-dichloro phenoxy) phenol	0	1.235	1.235	NA	NA
	2-chloro-methyl propionate	0	0.575	0.575	17639-93-9	NA
	Toluene	0	0.515	0.515	108-88-3	2600
	Ethyl acetate	0	0.065	0.065	141-78-6	11.3
49.	**Diflufenican**					
	2-(3-trifluoromethyl Phenoxy) nicotinyl chloride	0	0.993	0.993	NA	NA
	Dichloro ethane	0	0.357	0.357	107-06-2	870
	2,4-difluoroaniline	0	0.360	0.360	367-25-9	820
	Triethyl amine	0	0.422	0.422	121-44-8	546
50.	**Sulcotrione**					
	1,3-cyclohexanedione	0	0.485	0.485	504-02-9	NA
	Pyridine	0	0.375	0.375	110-86-1	891
	2-chloro-4(methyl sulfonyl) benzoic acid chloride	0	1.100	1.100	53250-83-2	NA
	Methylene chloride	0	0.383	0.383	75-09-2	1600

	Acetonitrile	0	5.100	5.100	75-05-8	269
	Triethyl amine	0	0.425	0.425	121-44-8	546
	Potassium cyanide	0	0.064	0.064	151-50-8	5
	Ethylene dichloride	0	0.170	0.170	107-06-2	370
51.	**Clodinafop propargyl**					
	RHPPA	0	0.550	0.550	NA	NA
	5-chloro-2,3-DFP	0	0.450	0.450	NA	NA
	Toluene	0	0.025	0.025	108-88-3	2600
	Sodium hydroxide	0	0.250	0.250	1310-73-2	140
	Propargyl chloride	0	0.175	0.175	624-65-7	NA
52.	**Benfuresate**					
	Morpholine	0	0.370	0.370	110-91-8	1450
	Isobuteraldehyde	0	0.310	0.310	78-84-2	2810
	4-benzoquinone	0	0.455	0.455	106-51-4	130
	Ethane sulfonyl chloride	0	0.535	0.535	594-44-5	360
	Toluene	0	0.460	0.460	108-88-3	2600
53.	**Glufosinate ammonium**					
	Ethanol	0	0.100	0.100	64-17-5	7000
	Acrolein	0	0.310	0.310	107-02-8	7
	Sodium cyanide	0	0.640	0.640	143-33-9	6.44
	Ammonium carbonate	0	0.270	0.270	10361-29-2	NA
	Barium hydroxide	0	0.330	0.330	22326-55-2	NA
	Sulfuric acid	0	0.870	0.870	7664-93-9	2140
	Ammonium hydroxide	0	0.800	0.800	7664-41-7	350
54.	**Dinotefuran**					
	3-HMTHF	0	0.540	0.540	NA	NA
	Thionyl chloride	0	0.635	0.635	7719-09-7	324
	Ammonia	0	0.360	0.360	7664-41-7	350
	MMNCl	0	0.700	0.700	NA	NA
	Toluene	0	0.075	0.075	108-88-3	2600
55.	**Clothianidin**					
	1,5-Dimethyl-2-nitroiminohexahydro-1,3,5-triazine	0	0.740	0.740	136516-16-0	1009 to 3950
	Sodium hydroxide	0	0.170	0.170	1310-73-2	140
	Dimethyl formamide	0	2.000	2.000	68-12-2	2800
	2-chloro-5-thiazolymethylchloride	0	0.715	0.715	105827-91-6	NA
	Ethanol	0	0.350	0.350	64-17-5	140
56.	**Imidaclothiz**					
	Dimethyl formamide	0	0.080	0.080	68-12-2	2800
	Sodium hydroxide	0	0.180	0.180	1310-73-2	140
	N – Nitro iminoIdmidazolidine	0	0.500	0.500	NA	NA
	2-chloro-5-chloromethyl thiazole	0	0.636	0.636	105827-91-6	NA
57.	**Bifenthrin**					
	Lambda cyhalothric acid	0	0.625	0.625	72748-35-7	NA
	Thionyl chloride	0	0.250	0.250	7719-09-7	324
	Bifenthrin alcohol	0	0.488	0.488	76350-90-8	2219
	Hexane	0	0.095	0.095	110-54-3	5000

58.	**Ethiprole**					
	Compound A	0	1.000	1.000	NA	NA
	Ethylene dichloride	0	0.050	0.050	107-06-2	870
	Acetic acid	0	0.032	0.032	64-19-7	3310
	Hydrogen per oxide	0	0.325	0.325	7722-84-1	2000
	Sodium sulfite	0	0.100	0.100	7757-83-7	820
59.	**Thiocyclam hydrogen oxalate**					
	Toluene	0	3.000	3.000	108-88-3	2600
	Allyl chloride	0	0.300	0.300	107-05-1	425
	Sodium hydroxide	0	0.325	0.325	1310-73-2	140
	Dimethyl amine	0	0.450	0.450	124-40-3	790
	Sodium thiosulphate	0	1.200	1.200	7772-98-7	5200
	Sodium sulfide	0	0.500	0.500	7757-83-7	820
60.	**Pymetrozine**					
	Ethylene dichloride	0	4.000	4.000	107-06-2	870
	Methyl acetate	0	0.375	0.375	79-20-9	5001
	Hydrazine hydrate	0	0.495	0.495	7803-57-8	83
	Triphosgene	0	0.500	0.500	32315-10-9	NA
	Potassium carbonate	0	0.325	0.325	584-08-7	1870
	Chloroacetone	0	0.450	0.450	78-95-5	100
	Hydrochloric acid	0	0.100	0.100	7647-01-0	900
	Nicotinaldehyde	0	0.400	0.400	872-85-5	1600
61.	**Fenpyroximate**					
	Dichloro ethane	0	3.000	3.000	107-06-2	870
	1.3-DMPPCO	0	0.590	0.590	NA	NA
	TBCMB	0	0.580	0.580	NA	NA
	Potassium carbonate	0	0.180	0.180	584-08-7	1870
62.	**Pyraclostrobin**					
	4-chlorophenyl hydrazine	0	0.425	0.425	1073-70-7	NA
	Methyl acrylate	0	0.260	0.260	96-33-3	500-5000
	1-BMNB	0	0.565	0.565	NA	NA
	Ammonium chloride	0	0.100	0.100	12125-02-9	1300
	Methyl chloroformate	0	0.265	0.265	79-22-1	60
	Potassium carbonate	0	0.040	0.040	584-08-7	1870
	Dimethyl sulfate	0	0.150	0.150	77-78-1	NA
63.	**Cyzofamid**					
	2,2-DCPTE	0	0.660	0.660	NA	NA
	Glyoxal	0	0.420	0.420	107-22-2	2000-5000
	Hydroxylamine hydrochloride	0	0.700	0.700	5470-11-1	141-640
	Thionyl chloride	0	0.390	0.390	7719-09-7	324
	Potassium carbonate	0	0.225	0.225	584-08-7	1870
	N-NDMASC	0	0.470	0.470	NA	NA
64.	**Thiamethoxam**					
	Dimethyl formamide	0.50	0	0.50	68-12-2	2800
	2-chloro-5-chloromethyl thiazole	0.600	0	0.600	105827-91-6	NA
	3-Methyl-N-nitro iminoperhydro-1,3,5-oxadiazine	0.575	0	0.575	153719-38-1	NA

	Potassium carbonate	0.250	0	0.250	584-08-7	1870
65.	**Penoxsulam**					
	2-FTMA	0	0.400	0.400	NA	NA
	Sodium Methoxide	0	0.012	0.012	124-41-4	1687
	2,2 Difluro ethanol	0	0.185	0.185	359-13-7	NA
	HCl (30%)	0	0.310	0.310	7647-01-0	900
	Sodium Nitrite	0	0.175	0.175	7632-00-0	157.9
	Sodium Sulfite	0	0.315	0.315	7757-83-7	2610
	5,8 DMTPA	0	0.420	0.420	NA	NA
	Dichloroethane	0	2.500	2.500	107-06-2	625
66.	**Pinoxaden**					
	MDEMP Acetate	0	0.600	0.600	NA	NA
	Dimethyl Carbonate	0	0.250	0.250	616-38-6	>5000
	Sodium Hydroxide	0	0.011	0.011	1310-73-2	NA
	Dichloroethane	0	2.000	2.000	107-06-2	625
	1,2,5-ODDHB	0	0.700	0.700	NA	NA
	2,2 DMPC	0	0.325	0.325	NA	NA
67.	**Propanil**					
	3,4 dichloro aniline	0	0.810	0.810	95-76-1	545
	Soda Ash	0	0.160	0.160	497-19-8	5000
	Propionic Acid	0	0.370	0.370	79-09-4	2600
68.	**Tembotrione**					
	Chlorobenzene	0	3.000	3.000	108-90-7	2000
	MCMMSB	0	0.650	0.650	NA	NA
	Bromine	0	0.400	0.400	7726-95-6	2600
	HCl (30%)	0	0.325	0.325	7647-01-0	900
	Thionyl Chloride	0	0.275	0.275	7719-09-7	324
	Cyclohexane-1,3 dione	0	0.275	0.275	504-02-9	NA
69.	**Metofluthrin**					
	2,2-DMPCPC Acid	0	0.470	0.470	NA	NA
	Thionyl Chloride	0	0.360	0.360	7719-09-7	324
	Caustic solution	0	0.120	0.120	1310-73-2	NA
	TFMM phenyl methanol	0	0.675	0.675	NA	NA
70.	**Spirotetramat**					
	2,5 DMBAA	0	0.475	0.475	NA	NA
	Thionyl Chloride	0	0.350	0.350	7719-09-7	324
	Methanol	0	0.100	0.100	67-56-1	5628
	HCl (30%)	0	0.385	0.385	7647-01-0	900
	Potassium Carbonate	0	0.400	0.400	584-08-7	2000
	Ethoxy Formyl Chloride	0	0.310	0.310	NA	NA
71.	**Flonicamid**					
	4- TFMNA	0	0.900	0.900	NA	NA
	2-AAN HCl	0	0.450	0.450	NA	NA
	Triphosgene	0	0.475	0.475	32315-10-9	>2000
72.	**Flubendiamide**					
	IMMTPMPFPPP	0	1.000	1.000	NA	NA
	m-CPBA	0	0.550	0.550	NA	NA

73.	**Probenazole**					
	Saccharine Amide	0	0.915	0.915	81-07-2	NA
	Allyl Alcohol	0	0.290	0.290	107-18-6	64
	Soda Ash	0	0.160	0.160	497-19-8	5000
	Thionyl Chloride	0	0.620	0.620	7719-09-7	324
	Toluene	0	2.500	2.500	108-88-3	2600
	Dichloromethane	0	2.500	2.500	75-09-2	>2000
74.	**Picoxystrobin**					
	Methyl Ester	0	0.970	0.970	NA	NA
	Pyridinone	0	0.560	0.560	NA	NA
	Potassium Carbonate	0	0.400	0.400	584-08-7	2000
	Toluene	0	0.950	0.950	108-88-3	2600
	Methanol	0	0.400	0.400	67-56-1	5628
75.	**Epoxiconazole**					
	1,2,4-triazole	0	0.245	0.245	288-88-0	2000
	Sodium Hydroxide	0	0.180	0.180	1310-73-2	NA
	Hydrochloric Acid	0	0.100	0.100	7647-01-0	900
	Dimethyl Formamide	0	0.280	0.280	68-12-2	2800
76.	**Prothioconazole**					
	1,2-Dichloro benzene	0	0.455	0.455	95-50-1	>2000
	Chloro cyclopropane	0	0.236	0.236	7393-45-5	>2000
	2-hydroxypropanyl chloride	0	0.295	0.295	627-30-5	>2000
	Xylene	0	2.0	2.0	1330-20-7	>2000
	1,2,4- Triazole-5-thione	0	0.315	0.315	3179-31-5	>2000

Sr. No.	Product Name	Quantity (MT/ MT)	Source	Transportation	Distance from Project Site	Type of Linkage
1	**2-4-D Ethyl Ester**					
	2,4-D acid	0.95	Swati Chemical Industries, Vadodara	By Road	760	Open Market
	Ethyl alcohol	0.21	KLJ Resources Ltd, Kandla	By Road	880	Open Market
2	**2-4-D Sodium Salt**					
	2,4 –Dichloro phenol	0.725	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Mono Chloro Acetic Acid	0.520	Terratech Chemicals (India) Pvt. Ltd, Ankleshwar	By Road	752	Open Market
3	**Abamectin**					
	Streptomycessavermitis	0.550	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Anthelminic	1.100	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Acaricidal	1.100	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
4	**Acetamiprid**					
	N-Cyano methyl Acetamidate	0.500	Nanging Bangnong, China	By Sea	2700	Open Market
	2-Chloro 5-(methyl amino methyl) Pyridine	0.730	Nanging Bangnong, China	By Sea	2700	Open Market
	Methanol	0.200	KLJ Resources Ltd, Kandla	By Road	880	Open Market
5	**Allethrin**					

	Cyclohexane	0.930	Akin Chemicals Pvt Ltd, Kandla	By Road	885	Open Market
	Allethrolone	0.540	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Pyridine	0.350	Etong, China	By Sea	2275	Open Market
	Chrysanthemic acid chloride	0.640	Etong, China	By Sea	2275	Open Market
6.	**Alpha Cypermethrin**					
	Meta phenoxy benzaldehyde	0.714	Agropack, Ankleshwar	By Road	820	Open Market
	Sodium cyanide	0.195	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
	n- Hexane	4.300	C.J Shah & Co, Kandla	By Road	882	Open Market
	Cyprmethric acid chloride	0.835	Herenba Industries Ltd., Mumbai	By Road	1075	Open Market
7.	**Azoxystrobin**					
	MMCP	0.900	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Dimethyl Formamide	0.100	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	2-cyano phenol	0.350	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Potassium Carbonate	0.250	Sudarshan Pharma Industries, Bhiwandi	By Road	1090	Open Market
	Methanol	0.280	KLJ Resources Ltd, Kandla	By Road	880	Open Market
8.	**Buprofezin**					
	p-nitrophenyl-N-chloromethyl carbamate	1.426	Sajjan India Ltd, Panoli	By Road	801	Open Market
	Toluene	0.425	Atlas Chemical Industries, Kandla	By Road	885	Open Market
	Thiourea	0.854	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Lime	0.282	Nishal Enterprises, Ankleshwar	By Road	760	Open Market
	Ethylene dichloride	0.610	Chemtrade Overseas Pvt Ltd, Hazira	By Road	880	Open Market
9.	**Butachlor**					
	2,6-Diethyl aniline	0.500	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Benzene	0.265	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Paraformaldehyde	0.170	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Triethyl amine	0.0035	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Chloroacetyle chloride	0.395	Srichaitanya Chlorides Pvt. Ltd., Hyderabad	By Road	1486	Open Market
	N-Butanol	1.050	Goel Industries, Bhiwandi	By Road	1090	Open Market
10.	**Cartap hydrochloride**					
	2-Dimethylamino-1, 3-dichloropropane	0.680	FJ Agro, China	By Sea	2880	Open Market
	Sodium thiosulphate	0.120	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Sodium cyanide	0.080	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
	Hydrochloric acid	0.150	Plastochem Industries, Bhiwadi	By Road	15	Open Market
11.	**Chlorpyrifos**					
	Sodium Salt of trichloro Pyridinol	0.658	CFAR industries, China	By Sea	2800	Open Market

	Diethyl Thio Phosphoryl Chloride	0.560	Excel Industries, Mumbai	By Road	1082	Open Market
	Ethylene dichloride	0.263	Chemtrade, Kandla	By Road	870	Open Market
12.	**Cyfluthrin**					
	FluroMeta Phenoxy Benzaldehyde	0.495	Herenba Industries Ltd., Dahej	By Road	830	Open Market
	Sodium cyanide	0.140	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
	Cypermethric Acid chloride	0.578	Herenba Industries Ltd., Mumbai	By Road	1092	Open Market
	Hexane	0.050	KLJ resources Ltd, Kandla	By Road	880	Open Market
13.	**Cypermethrin**					
	Cypermethric Acid chloride	0.590	Herenba Industries Ltd., Mumbai	By Road	1092	Open Market
	Meta Phenoxy Benzaldehyde	0.485	UPL Ltd, Ankleshwar	By Road	820	Open Market
	Sodium cyanide	0.145	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
	Phase Transfer Catalyst	0.006	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
	Hexane	0.045	KLJ Resources Ltd, Kandla	By Road	880	Open Market
	Hypochlorite	1.630	H.K Chemical Industries, Bhiwadi	By Road	12	Open Market
14.	**Delta cypermethrin**					
	Ester of Bi-cisthemic acid	0.515	Nanging Bangnong, China	By Sea	2700	Open Market
	Thionyl Chloride	0.150	Kutch Chemical Industries Ltd, Panoli	By Road	805	Open Market
	Meta phenoxybenzaldehyde	0.485	UPL Ltd, Ankleshwar	By Road	820	Open Market
	Sodium cyanide	0.150	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
15.	**Difenoconazole**					
	4-methyl-1, 3-dioxolane	0.281	FJ Agro, China	By Sea	2880	Open Market
	2-chloro-4-(4-chlorophenoxy) benzyl chloride	0.927	FJ Agro, China	By Sea	2880	Open Market
	Dimethyl Formamide	0.174	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	1,2,4-Trizole	0.236	Nanging Bangnong, China	By Sea	2700	Open Market
	Potassium hydroxide	0.562	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
16.	**D-Transallethrin**					
	Cyclohexane	0.260	Akin Chemicals Pvt Ltd, Kandla	By Road	885	Open Market
	Allethrelone	0.540	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Pyridine	0.015	Etong, China	By Sea	2275	Open Market
	Chrysanthemic acid chloride	0.637	Etong, China	By Sea	2275	Open Market
17.	**Emamectin**					
	Streptomycessavermitis	0.455	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Anthelminic	0.910	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Acaricidal	0.910	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Methyl benzoate	0.225	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Methanol	0.310	KLJ Resources Ltd, Kandla	By Road	880	Open Market
18.	**Fipronil**					Open Market
	Fipronil Pyrazole	1.263	FJ Agro, China	By Sea	2880	Open Market

	Ammonium Thiocyanate	0.809	Hebai Chengsin, China	By Sea	3700	Open Market
	Oxone	3.906	FJ Agro, China	By Sea	2880	Open Market
	Triflouro methyl bromide	0.835	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Triflouro acetic acid	1.232	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
19.	**Hexaconazole**					
	2,4-Dichloro valero phenol	0.800	Nanging Bangnong, China	By Sea	2700	Open Market
	Dimethyl sulphide	1.160	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Potassium hydroxide	0.693	Krishna Solvechem Ltd, Ankleshwar	By Road	825	Open Market
	Oxarine	0.733	Nanging Bangnong, China	By Sea	2700	Open Market
	Dimethyl formamide	0.080	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	1,2,4-triazole	0.253	Nanging Bangnong, China	By Sea	2700	Open Market
20.	**Imazethapyr**					
	5-ethyl-3-pyridine carboxylic acid	0.818	Nanging Bangnong, China	By Sea	2700	Open Market
	5 Dihydro-4 methyl 4 (1 methyl ethyl)-5-oxo-1 H-imidazoline	0.682	Beliite Chemical, China	By Sea	2790	Open Market
	Dimethyl formamide	0.145	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Sodium carbonate	0.636	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
21.	**Imidacloprid**					
	2–Chloro, 5–chloro methyl Pyridine	0.855	Nanging Bangnong, China	By Sea	2700	Open Market
	N – Nitro iminoIdmidazolidine	0.715	Nanging Bangnong, China	By Sea	2700	Open Market
	Dimethyl formamide	0.108	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Sodium carbonate	0.671	PK Chlorochem, Ankleshwar	By Road	815	Open Market
	Methanol	0.020	KLJ Resources Ltd, Kandla	By Road	880	Open Market
22.	**Indoxacarb**					
	Monoglyme	0.015	Nanging Bangnong, China	By Sea	2700	Open Market
	Sodium hydride	0.160	PK Chlorochem, Ankleshwar	By Road	815	Open Market
	Chloro methyl formate	0.378	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Oxadiazine carboxylate	0.626	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Dichloromethane	0.060	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
23.	**Ipconazole**					
	Cyclopentanol	0.357	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Dimethyl Sulphide	1.243	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	4-Chloro Benzyl Chloride	0.715	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Potassium hydroxide	0.715	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Dimethyl formamide	0.100	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	1,2,4-Trizole	0.300	Nanging Bangnong, China	By Sea	2700	Open Market
	Para formaldehyde	0.157	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
24.	**Lambda Cyhalothrin**					Open Market

	Meta Phenoxy Benzaldehyde	0.470	Herenba Industries Ltd., Ankleshwar	By Road	824	Open Market
	Sodium Cyanide	0.128	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
	TFP Acid Chloride	0.640	FJ Agro, China	By Sea	2880	Open Market
	N-Hexane	0.120	KLJ Resources Ltd, Kandla	By Road	880	Open Market
	Isopropyl alcohol	0.300	KLJ Resources Ltd, Kandla	By Road	880	Open Market
25.	**Met sulfuron methyl**					Open Market
	O-sulfoisocyante Methyl Benzoate	0.634	Nanging Bangnong, China	By Sea	2700	Open Market
	2-Amino 4-Methoxy 6-Methyl 1,3,5 Triazine	0.367	Nanging Bangnong, China	By Sea	2700	Open Market
	Toluene	0.100	Atlas Chemical Industries, Kandla	By Road	885	Open Market
26.	**Metalaxyl**					Open Market
	N-(2, 6 – Dimethyl Phenyl) Alanine – Methyl Ester	0.750	Nanging Bangnong, China	By Sea	2700	Open Market
	Methoxy Acetyl Chloride	0.400	Shiva chemicals, Panoli	By Road	802	Open Market
	Toluene	0.110	Atlas Chemical Industries, Kandla	By Road	885	Open Market
27.	**Novaluron**					Open Market
	2,6-difluoro benzoyl isocyanate	0.321	FJ Agro, China	By Sea	2880	Open Market
	2-chloro-4-amino phenoxy ether	0.794	FJ Agro, China	By Sea	2880	Open Market
	Toluene	0.546	Atlas Chemical Industries, Kandla	By Road	885	Open Market
28.	**Oxyfluorfen**					Open Market
	2-Chloro Trichloro p-Tolyl 3-Ethoxy phenyl Ether	0.877	Nanging Bangnong, China	By Sea	2700	Open Market
	Nitric Acid	0.252	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
29.	**Pacloburazol**					
	tert-pentan-3-ol	0.380	Sinochem china, China	By Sea	3400	Open Market
	4-Chloro Benzyl Chloride	0.690	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	KOH	0.690	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	DMF	0.075	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	1,2,4 Triazol	0.290	Nanging Bangnong, China	By Sea	2700	Open Market
	K_2CO_3	0.070	PK Chlorochem, Ankleshwar	By Road	815	Open Market
30.	**Paraquate**					
	4,4’ bipyridine	0.945	FJ Agro, China	By Sea	2880	Open Market
	Methyl iodide	1.866	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Silver Chloride	0.855	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
31.	**Permethrin**					
	Meta Phenoxy Benzyl Alcohol	0.524	Herenba Industries Ltd., Ankleshwar	By Road	824	Open Market
	Cypermethric Acid Chloride	0.615	Herenba Industries Ltd. , Ankleshwar	By Road	824	Open Market
	n-Hexane	0.180	KLJ Resources Ltd, Kandla	By Road	880	Open Market
32.	**Prallethrin**					

	Cyclopenten 1-hydroxy	0.535	Etong, China	By Sea	2275	Open Market
	Sodium cyanide	0.162	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
	Chrysanthemic acid chloride	0.658	Etong, China	By Sea	2275	Open Market
	Hexane	0.125	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
33.	**Pretilachlor**					
	2,6-diethyl-N-(propoxyethyl) analine	0.703	Etong, China	By Sea	2275	Open Market
	Chloro acetyl chloride	0.453	Deedy, Ankleshwar	By Road	795	Open Market
	Hexane	0.047	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Ammonia Gas	0.055	GACL, Dahej	By Road	841	Open Market
34.	**Propiconazole**					
	4-propyl-1, 3-dioxolane	0.405	Etong, China	By Sea	2275	Open Market
	Dimethyl Sulphide	1.175	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	2,4-dichloro Benzyl Chloride	0.845	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Potassium hydroxide	0.675	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	1,2,4 Triazol	0.284	Nanging Bangnong, China	By Sea	2700	Open Market
	Potassium carbonate	0.068	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Isopropyl alcohol	0.236	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
35.	**Quizalofop**					
	R- (p hydroxyl phenoxy) propionic acid	0.405	Etong, China	By Sea	2275	Open Market
	Potassium carbonate	0.143	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	6-Chloroquinoxaline	0.733	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Dimethyl formamide	0.570	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Methanol	0.143	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
36.	**Tebuconazole**					
	1-(4-Chlorophenyl)-4, 4'-dimethyl-pent-3-one	0.755	FJ Agro, China	By Sea	2880	Open Market
	Dimethyl sulfate	0.502	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Potassium hydroxide	0.323	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Dimethyl formamide	0.025	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Sodium Sulfide	0.026	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	1,2,4 Triazol	0.255	Nanging Bangnong, China	By Sea	2700	Open Market
	Potassium carbonate	0.040	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
37.	**Thiacloprid**					
	2-Chloro, 5-Chloro methyl Pyridine	0.857	Nanging Bangnong, China	By Sea	2700	Open Market
	ThiazolidinylideneCyanamide	0.714	Sajjan India Ltd, Panoli	By Road	801	Open Market

	Dimethyl formamide	0.100	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Sodium carbonate	0.672	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
38.	**Thiodicarb**					
	Methomyl Tech – Powder	0.933	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Toluene	0.110	Atlas Chemical Industries, , Kandla	By Road		Open Market
	Sulphur dichloride	0.302	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
39.	**Thiophanate methyl**					
	Ethylene dichloride	0.080	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Sodium Thiocyanate	0.526	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Methyl chloroformate	0.600	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	O-Phenylene Diamine	0.350	Anhui, China	By Sea	3900	Open Market
40.	**Transfluthrin**					
	Tetra fluoro benzyl alcohol	0.521	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Chrysanthemic acid chloride	0.633	Etong, China	By Sea	2275	Open Market
	Hexane	0.186	Nanging Bangnong, China	By Sea	2700	Open Market
41.	**Tricyclazole**					
	3-methyl-(1,2)-benzothiazole Chloride	0.733	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Potassium hydroxide	0.667	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Dimethyl formamide	0.087	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	1,2,4 Triazol	0.280	Nanging Bangnong, China	By Sea	2700	Open Market
	Potassium carbonate	0.067	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
42.	**Sulfosulfuron**					
	2-ethyl sulfonyl imidazo [1,2a]pyridine-3-sulfonamide	0.628	Nanging Bangnong, China	By Sea	2700	Open Market
	4,6-dimethoxy-2-(Phenoxy carbonyl)aminopyrimidine	0.760	Nanging Bangnong, China	By Sea	2700	Open Market
	Triethyl amine	0.340	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
43.	**Tribenuron methyl**					
	2-carbomethoxybenzene sulfonamide	0.735	Nanging Bangnong, China	By Sea	2700	Open Market
	4-Methoxy-6-dimethyl -1,3,5-triazin-2-amine	0.515	Nanging Bangnong, China	By Sea	2700	Open Market
	Butyl isocyanate	0.368	Nanging Bangnong, China	By Sea	2700	Open Market
	Phosgene	0.390	Nanging Bangnong, China	By Sea	2700	Open Market
	Xylene	0.220	Atlas Chemical Industries, Kandla	By Road	885	Open Market
44.	**Flazasulfuron**					
	3N-methoxycarbonyl 3-trifluoro methyl pyridine-2-sulfonamide	0.718	Nanging Bangnong, China	By Sea	2700	Open Market
	2-amino-4,6-dimethoxy pyrimidine	0.401	Nanging Bangnong, China	By Sea	2700	Open Market
	1,2-dichloro ethane	0.267	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market

45.	**Iodosulfuron methyl**					Open Market
	methyl 2-{[(chloromethoxy) carbonyl] sulfamoyl}-4-iodobenzoate	0.885	FJ Agro, China	By Sea	2880	Open Market
	4-Methoxy-6-methyl 1,3,5-triazine-2-amine	0.280	FJ Agro, China	By Sea	2880	Open Market
	Dibutyl urea	0.018	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Dodacane	1.795	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
46.	**Nicosulfuron**					
	2-sulfoamido-3-(N,N-dimethyl)-carbo amidopyridine	0.685	Nanging Bangnong, China	By Sea	2700	Open Market
	4,6-dimethoxy pyrimidine phenyl carbamate	0.790	Nanging Bangnong, China	By Sea	2700	Open Market
	Dibutyl urea	0.460	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Acetonitrile	4.700	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
47.	**Rimusulfuron**					
	3-ethane sulfonylpyridine-2-sulfonamide	0.935	Nanging Bangnong, China	By Sea	2700	Open Market
	4,6-dimethoxy pyrimidine phenyl carbamate	1.560	Nanging Bangnong, China	By Sea	2700	Open Market
	Dibutyl urea	0.790	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Acetonitrile	4.700	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
48.	**Diclofop-methyl (DCFM)**					
	4-(2,4-dichloro phenoxy) phenol	1.235	Etong, China	By Sea	2275	Open Market
	2-chloro-methyl propionate	0.575	Etong, China	By Sea	2275	Open Market
	Toluene	0.515	Atlas Chemical Industries, Kandla	By Road	885	Open Market
	Ethyl acetate	0.065	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
49.	**Diflufenican**					
	2-(3-trifluoromethyl Phenoxy) nicotinyl chloride	0.993	Nanging Bangnong, China	By Sea	2700	Open Market
	Dichloro ethane	0.357	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	2,4-difluoroaniline	0.360	Nanging Bangnong, China	By Sea	2700	Open Market
	Triethyl amine	0.422	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
50.	**Sulcotrione**					
	1,3-cyclohexanedione	0.485	Akin Chemicals Pvt Ltd, Hazira	By Road	882	Open Market
	Pyridine	0.375	Nanging Bangnong, China	By Sea	2700	Open Market
	2-chloro-4(methyl sulfonyl) benzoic acid chloride	1.100	Nanging Bangnong, China	By Sea	2700	Open Market
	Methylene chloride	0.383	Sanjay chemical (India) Pvt Ltd,	By Road	1112	Open Market

			Bhiwandi			
	Acetonitrile	5.100	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Triethyl amine	0.425	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Potassium cyanide	0.064	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Ethylene dichloride	0.170	KLJ Resources Ltd, Bhiwandi	By Road	1108	Open Market
51.	**Clodinafop propargyl**					
	RHPPA	0.550	Nanging Bangnong, China	By Sea	2700	Open Market
	5-chloro-2,3-DFP	0.450	Nanging Bangnong, China	By Sea	2700	Open Market
	Toluene	0.025	Atlas Chemical Industries, Kandla	By Road	885	Open Market
	Sodium hydroxide	0.250	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Propargyl chloride	0.175	Nanging Bangnong, China	By Sea	2700	Open Market
52.	**Benfuresate**					
	Morpholine	0.370	Nanging Bangnong, China	By Sea	2700	Open Market
	Isobuteraldehyde	0.310	Nanging Bangnong, China	By Sea	2700	Open Market
	4-benzoquinone	0.455	Nanging Bangnong, China	By Sea	2700	Open Market
	Ethane sulfonyl chloride	0.535	Nanging Bangnong, China	By Sea	2700	Open Market
	Toluene	0.460	Atlas Chemical Industries, Kandla	By Road	885	Open Market
53.	**Glufosinate ammonium**					
	Ethanol	0.100	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Acrolein	0.310	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
	Sodium cyanide	0.640	Hindusthan Chemicals Company, Surat	By Road	875	Open Market
	Ammonium carbonate	0.270	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Barium hydroxide	0.330	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Sulfuric acid	0.870	Plastochem Industries, Bhiwadi	By Road	15	Open Market
	Ammonium hydroxide	0.800	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
54.	**Dinotefuran**					
	3-HMTHF	0.540	Etong, China	By Sea	2275	Open Market
	Thionyl chloride	0.635	Kutch Chemical Industries Ltd, Panoli	By Road	805	Open Market
	Ammonia	0.360	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	MMNCl	0.700	Etong, China	By Sea	2275	Open Market
	Toluene	0.075	Atlas Chemical Industries, Kandla	By Road	885	Open Market
55.	**Clothianidin**					
	1,5-Dimethyl-2-nitroiminohexahydro-1,3,5-triazine	0.740	Nanging Bangnong, China	By Sea	2700	Open Market
	Sodium hydroxide	0.170	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Dimethyl formamide	2.000	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	2-chloro-5-thiazolymethylchloride	0.715	Nanging Bangnong, China	By Sea	2700	Open Market

	Ethanol	0.350	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
56.	**Imidaclothiz**					
	Dimethyl formamide	0.080	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	Sodium hydroxide	0.180	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	N – Nitro iminoIdmidazolidine	0.500	Beliite Chemical, China	By Sea	2790	Open Market
	2-chloro-5-chloromethyl thiazole	0.636	Nanging Bangnong, China	By Sea	2700	Open Market
57.	**Bifenthrin**					
	Lambda cyhalothric acid	0.625	Nanging Bangnong, China	By Sea	2700	Open Market
	Thionyl chloride	0.250	Kutch Chemical Industries Ltd, Panoli	By Road	805	Open Market
	Bifenthrin alcohol	0.488	Nanging Bangnong, China	By Sea	2700	Open Market
	Hexane	0.095	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
58.	**Ethiprole**					
	Compound A	1.000	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Ethylene dichloride	0.050	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Acetic acid	0.032	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Hydrogen per oxide	0.325	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Sodium sulfite	0.100	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
59.	**Thiocyclam hydrogen oxalate**					
	Toluene	3.000	Atlas Chemical Industries, Kandla	By Road	885	Open Market
	Allyl chloride	0.300	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Sodium hydroxide	0.325	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Dimethyl amine	0.450	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Sodium thiosulphate	1.200	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Sodium sulfide	0.500	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
60.	**Pymetrozine**					
	Ethylene dichloride	4.000	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Methyl acetate	0.375	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Hydrazine hydrate	0.495	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Triphosgene	0.500	Triveni Chemicals, Ankleshwar	By Road	790	Open Market
	Potassium carbonate	0.325	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Chloroacetone	0.450	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Hydrochloric acid	0.100	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market

	Nicotinaldehyde	0.400	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
61.	**Fenpyroximate**					
	Dichloro ethane	3.000	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	1.3-DMPPCO	0.590	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	TBCMB	0.580	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Potassium carbonate	0.180	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
62.	**Pyraclostrobin**					
	4-chlorophenyl hydrazine	0.425	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Methyl acrylate	0.260	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	1-BMNB	0.565	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Ammonium chloride	0.100	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Methyl chloroformate	0.265	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Potassium carbonate	0.040	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Dimethyl sulfate	0.150	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
63.	**Cyzofamid**					
	2,2-DCPTE	0.660	Nanging Bangnong, China	By Sea	2700	Open Market
	Glyoxal	0.420	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Hydroxylamine hydrochloride	0.700	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Thionyl chloride	0.390	Kutch Chemical Industries Ltd, Panoli	By Road	805	Open Market
	Potassium carbonate	0.225	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	N-NDMASC	0.470	Nanging Bangnong, China	By Sea	2700	Open Market
64.	**Thiamethoxam**					
	Dimethyl formamide	0.50	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
	2-chloro-5-chloromethyl thiazole	0.600	Nanging Bangnong, China	By Sea	2700	Open Market
	3-Methyl-N-nitro iminoperhydro-1,3,5-oxadiazine	0.575	Beliite Chemical, China	By Sea	2790	Open Market
	Potassium carbonate	0.250	PK Chlorochem, Ankleshwar	By Road	815	Open Market
65.	**Penoxsulam**					
	2-FTMA	0.400	Etong, China	By Sea	2275	Open Market
	Sodium Methoxide	0.012	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	2,2 Difluro ethanol	0.185	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	HCl (30%)	0.310	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market

	Sodium Nitrite	0.175	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Sodium Sulfite	0.315	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	5,8 DMTPA	0.420	Nanging Bangnong, China	By Sea	2700	Open Market
	Dichloroethane	2.500	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
66.	**Pinoxaden**					
	MDEMP Acetate	0.600	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Dimethyl Carbonate	0.250	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	Sodium Hydroxide	0.011	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Dichloroethane	2.000	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	1,2,5-ODDHB	0.700	Etong, China	By Sea	2275	Open Market
	2,2 DMPC	0.325	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
67.	**Propanil**					
	3,4 dichloro aniline	0.810	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Soda Ash	0.160	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Propionic Acid	0.370	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
68.	**Tembotrione**					
	Chlorobenzene	3.000	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	MCMMSB	0.650	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Bromine	0.400	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	HCl (30%)	0.325	Plastochem Industries, Bhiwadi	By Road	15	Open Market
	Thionyl Chloride	0.275	Kutch Chemical Industries Ltd, Panoli	By Road	805	Open Market
	Cyclohexane-1,3 dione	0.275	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
69.	**Metofluthrin**					
	2,2-DMPCPC Acid	0.470	Nanging Bangnong, China	By Sea	2700	Open Market
	Thionyl Chloride	0.360	Kutch Chemical Industries Ltd, Panoli	By Road	805	Open Market
	Caustic solution	0.120	Nishal Enterprises, Bhiwadi	By Road	15	Open Market
	TFMM phenyl methanol	0.675	FJ Agro, China	By Sea	2880	Open Market
70.	**Spirotetramat**					
	2,5 DMBAA	0.475	Etong, China	By Sea	2275	Open Market
	Thionyl Chloride	0.350	Kutch Chemical Industries Ltd, Panoli	By Road	805	Open Market
	Methanol	0.100	KLJ Resources Ltd, Kandla	By Road	880	Open Market
	HCl (30%)	0.385	Plastochem Industries, Bhiwadi	By Road	15	Open Market
	Potassium Carbonate	0.400	PK Chlorochem, Ankleshwar	By Road	815	Open Market

	Ethoxy Formyl Chloride	0.310	Etong, China	By Sea	2275	Open Market
71.	**Flonicamid**					
	4- TFMNA	0.900	Nanging Bangnong, China	By Sea	2700	Open Market
	2-AAN HCl	0.450	Nanging Bangnong, China	By Sea	2700	Open Market
	Triphosgene	0.475	Triveni Chemicals, Ankleshwar	By Road	790	Open Market
72.	**Flubendiamide**					
	IMMTPMPFPPP	1.000	Nanging Bangnong, China	By Sea	2700	Open Market
	m-CPBA	0.550	Nanging Bangnong, China	By Sea	2700	Open Market
73.	**Probenazole**					
	Saccharine Amide	0.915	Blue Circle Organics Pvt Ltd, Mumbai	By Road	1050	Open Market
	Allyl Alcohol	0.290	Chemex Organochem Private Limited, Mumbai	By Road	1062	Open Market
	Soda Ash	0.160	RR Innovative Pvt Ltd, Bhiwandi	By Road	1104	Open Market
	Thionyl Chloride	0.620	Kutch Chemical Industries Ltd, Panoli	By Road	805	Open Market
	Toluene	2.500	Atlas Chemical Industries, Kandla	By Road	885	Open Market
	Dichloromethane	2.500	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
74.	**Picoxystrobin**					
	Methyl Ester	0.970	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Pyridinone	0.560	FJ Agro, China	By Sea	2880	Open Market
	Potassium Carbonate	0.400	PK Chlorochem, Ankleshwar	By Road	815	Open Market
	Toluene	0.950	Atlas Chemical Industries, Kandla	By Road	885	Open Market
	Methanol	0.400	KLJ Resources Ltd, Kandla	By Road	880	Open Market
75.	**Epoxiconazole**					
	1,2,4-triazole	0.245	Nanging Bangnong, China	By Sea	2700	Open Market
	Sodium Hydroxide	0.180	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Hydrochloric Acid	0.100	Plastochem Industries, Bhiwadi	By Road	15	Open Market
	Dimethyl Formamide	0.280	Atlas Chemical Industries, Bhiwandi	By Road	1074	Open Market
76.	**Prothioconazole**					
	1,2-Dichloro benzene	0.455	Krishna Solvechem Ltd, Bhiwandi	By Road	1080	Open Market
	Chloro cyclopropane	0.236	O.C Specialities Pvt Ltd, Bhiwandi	By Road	1100	Open Market
	2-hydroxypropanyl chloride	0.295	Sanjay chemical (India) Pvt Ltd, Bhiwandi	By Road	1112	Open Market
	Xylene	2.0	Atlas Chemical Industries, Kandla	By Road	885	Open Market
	1,2,4- Triazole-5-thione	0.315	Nanging Bangnong, China	By Sea	2700	Open Market

2.9 MANUFACTURING PROCESS, CHEMICAL REACTION AND MASS BALANCE OF EACH PRODUCTS

(1) 2-4-D Ethyl Ester

Manufacturing Process:

Stage 1

Charge 2,4-DCP and caustic lye in the reaction vessel. Stir the reaction mass for 1 hour. Charge Mono Chloro Acetic Acid slowly in the reaction mass in 3-4 hrs and stir the reaction mass at 80-900C and reflux the reaction mass for 2 hrs at 90-1000C. Until the reaction is complete.

Stage 2

Cool it and filter the reaction mass to remove mother liquor. Crude 2,4-D sodium salt is obtained.

Stage 3

Add water and dilute sulphuric acid 50% to wet cake with water and agitate the reactor for 2 hours. Reaction mass is cooled to room temperature. Filter and dry to remove most of the moisture.

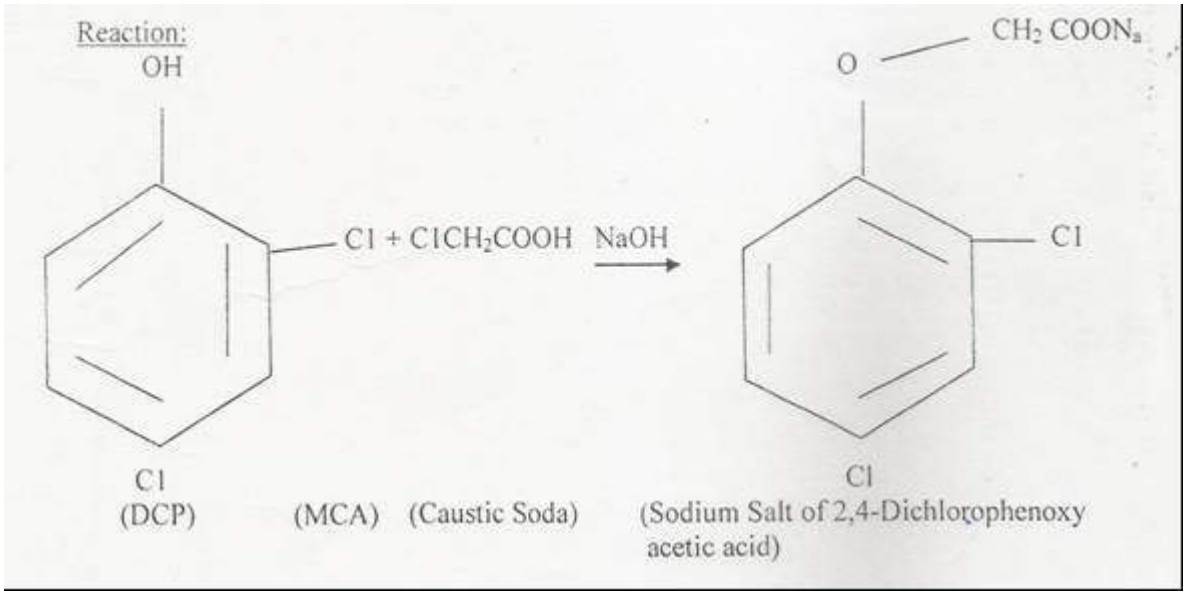
Stage 4

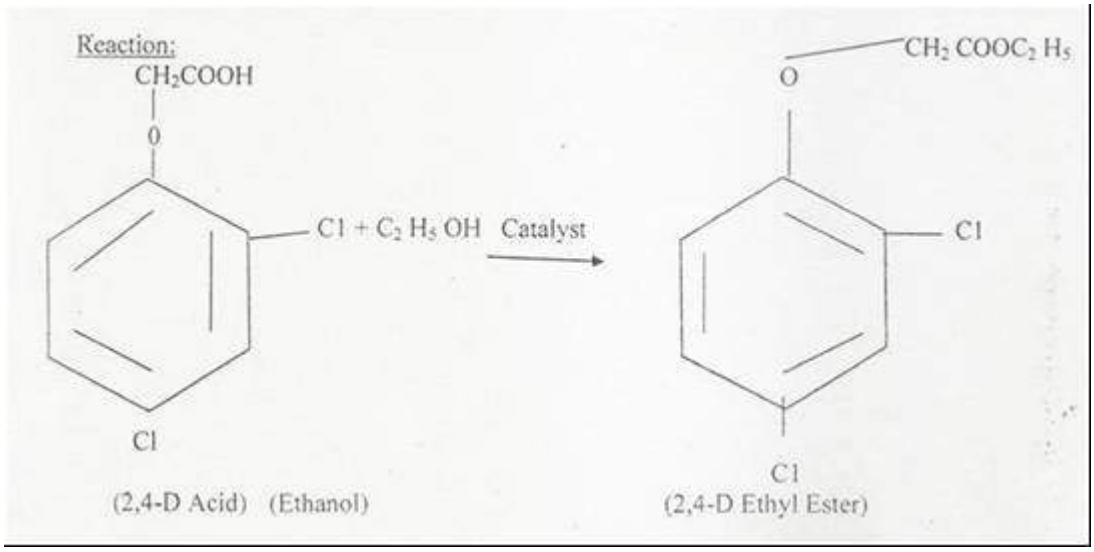
Dry 2,4-D acid, ethanol and catalyst are charged in the reactor and the mixture is heated to reflex in the kettle which is fitted with a water separator and solvent recycling line and agitator. Water is removed azotopically.

Stage 5

The catalyst layere is removed from bottom, The mixture is washed with water followed by 5% solution of sodium bicarbonate solution to neutralize the reaction mass. 1090 Kg 2,4-D ethyl ester is obtained.

Chemical Reaction:





Flow diagram & Mass Balance:

Mass balance of 2,4-D Ethyl ester

IN PUT	Kg		OUT PUT	Kg
2,4-DCP	700	**Stage 1 2,4-D Sodium salt formation**		
MCA	500		Reaction mass	2250
Caustic lye 47%	1050			
Reaction mass	2250	**Stage 2 Filteration**	Aqueous effluent	1150
			Crude 2,4-D Sodium salt	1100
Crude 2,4-D Sodium salt	1100	**Stage 3 Reaction**	Aqueous effluent	380
Water	50		2,4-D Acid	970
dilute sulphuric acid	200			
2,4-D acid	970	**Stage 4 Reaction**	Aqueous effluent	80
Ethanol	220		Crude 2,4-D Ethyl ester	1120
Catalyst	10			
Crude 2,4-D Ethyl ester	1120	**Stage 5 Washing**	Aqueous effluent	1600
Sodium bicarbonate	70		2,4-D Ethyl ester	1090
Water	1500			
Total	**9740**			**9740**

(2) 2-4-D Sodium Salt

Manufacturing Process:

Stage 1

Charge 2,4-DCP and caustic lye in the reaction vessel. Stir the reaction mass for 1 hour. Charge Mono Chloro Acetic Acid slowly in the reaction mass in 3-4 hrs and stir the reaction mass at 80-90^{0}C and reflux the reaction mass for 2 hrs at 90-100^{0}C. Until the reaction is complete.

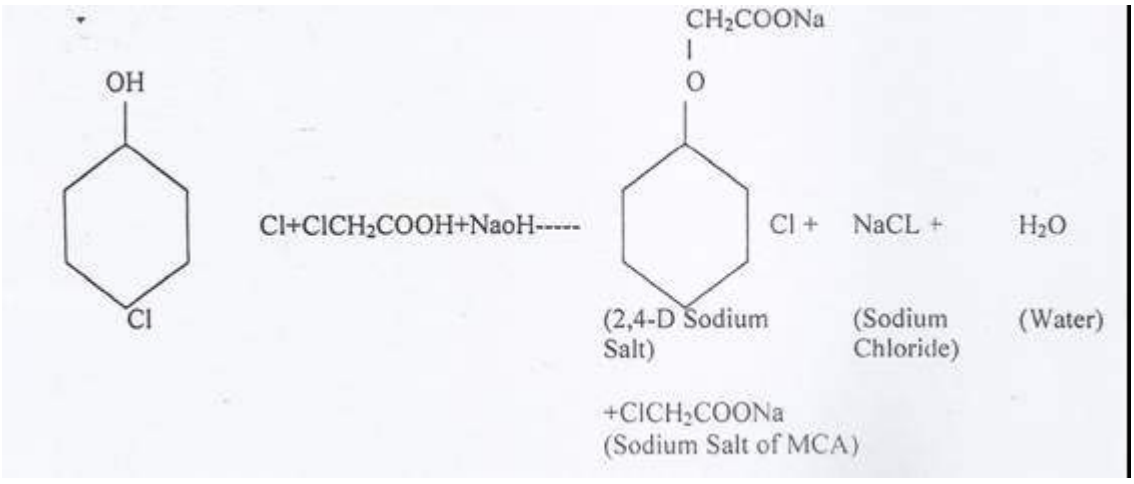
Stage 2

Cool it and filter the reaction mass to remove mother liquor.

Stage 3

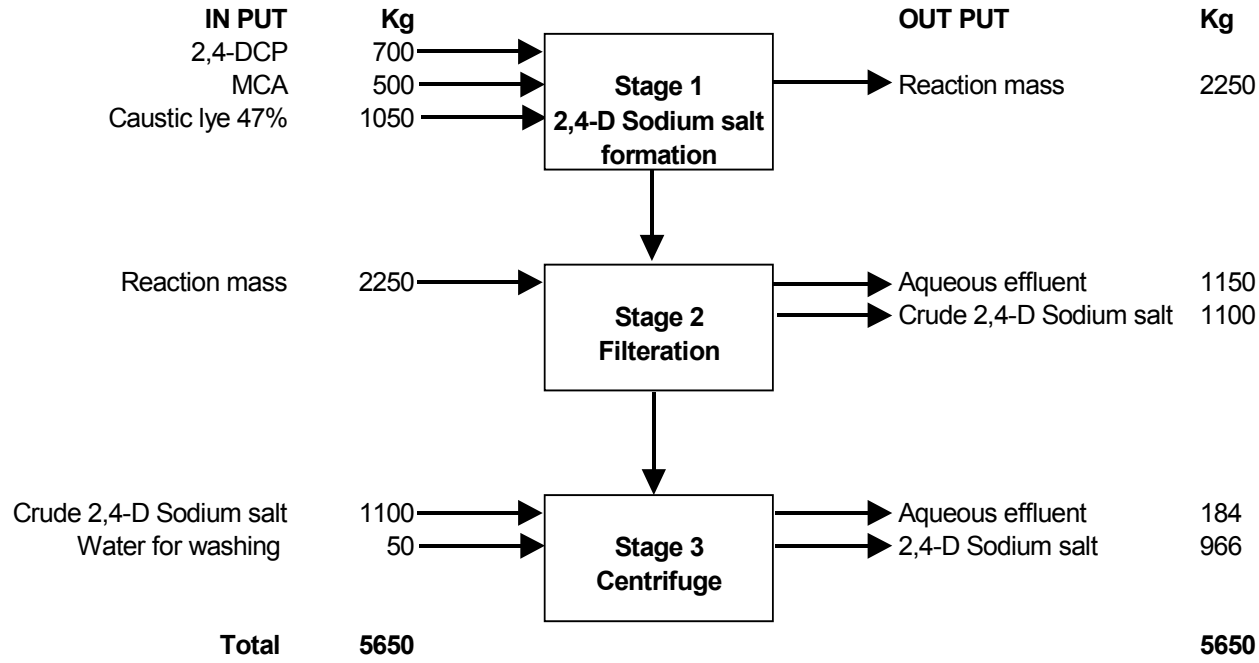
Wash wet cake with water and dry the wet 2,4-D Sodium salt in drier at 80-90^{0}C.

Chemical Reaction:



Flow diagram & Mass Balance:

Mass balance of 2,4-D Sodium salt

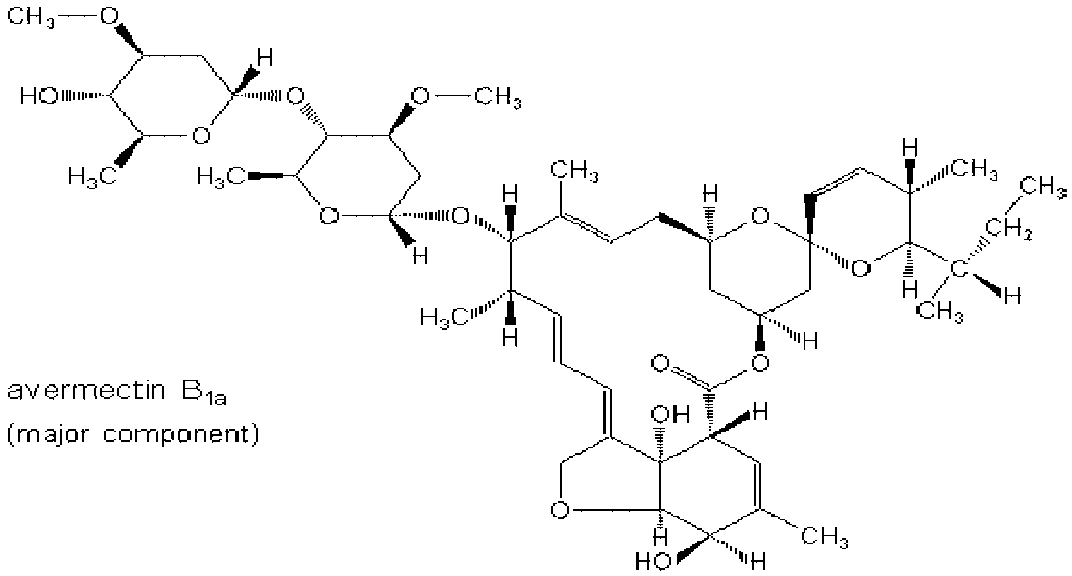


(3) Abamectin

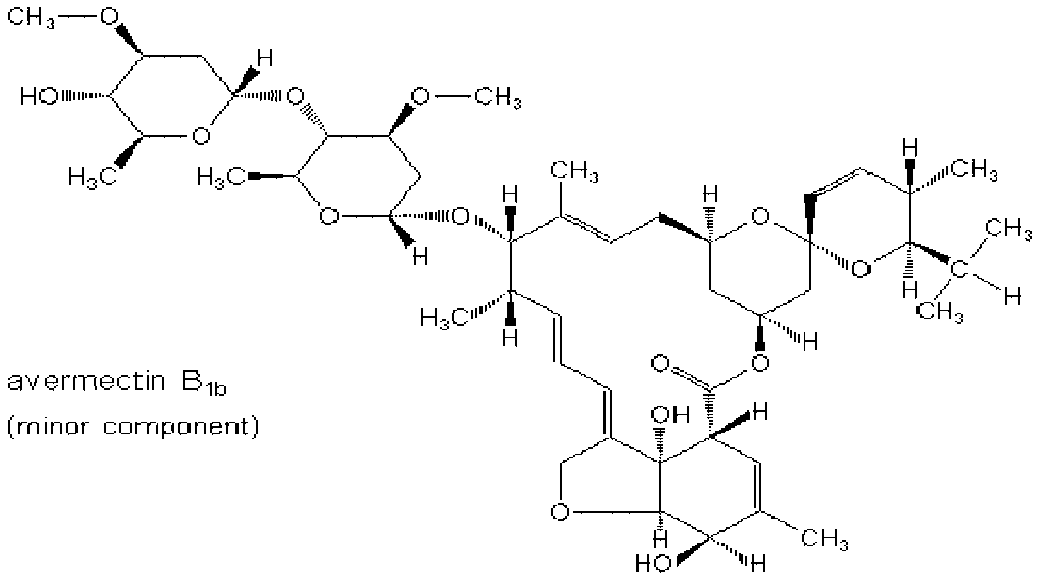
Manufacturing process:

It is a mixture containing 80% avermectin-B1a (i) and 20% avermectin B1b (ii). It is isolated from fermentation of streptomycess avermitis with an anthelminic and acaricidal. The molecular formula is as below:

C48H72O14 (avermectin B1a) + C47H70O14 (avermectin B1b)

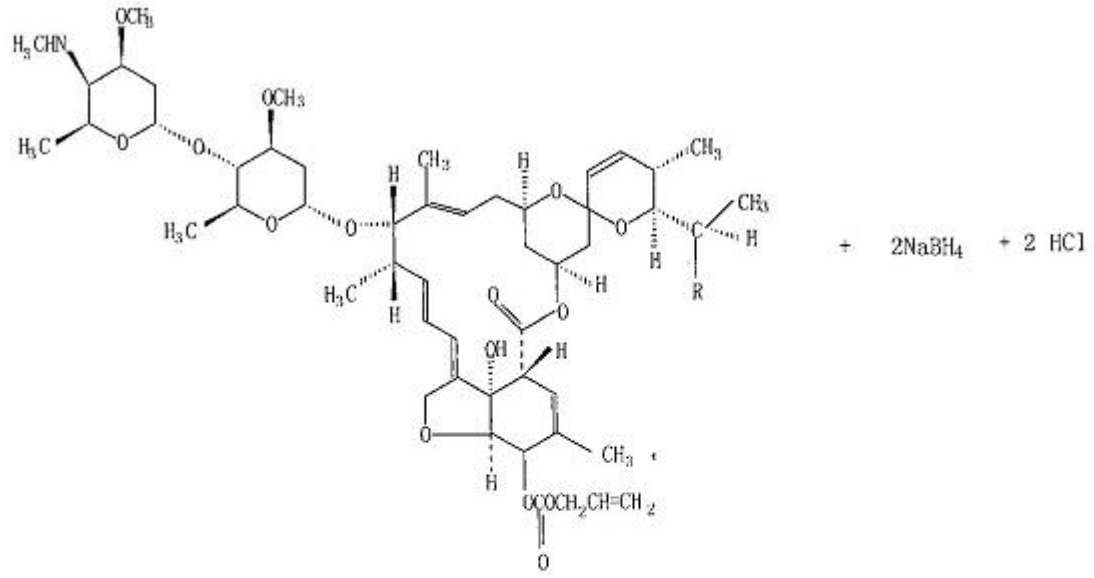


avermectin B_{1a}
(major component)



avermectin B_{1b}
(minor component)

Chemical Reaction:



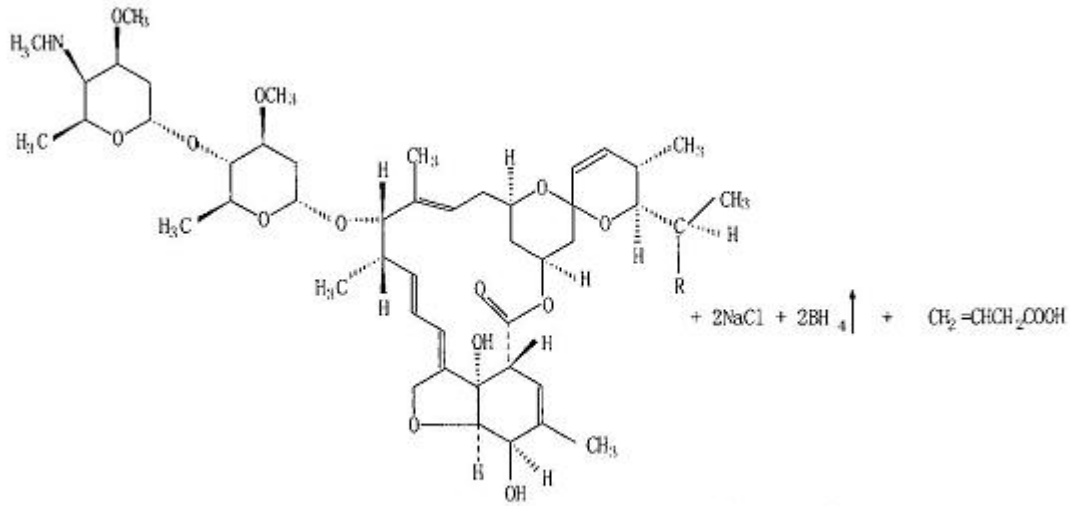
4-deoxy-4-epi-4-methylamino-5 AOC Avermectin B1 + $2NaBH_4$ + 2 HCl

Sodium Borohydride

Hydrochloric acid

Ethanol Anhydrous (As Solvent)

Tetrakis (triphenylphosphine) palladium (As catalyzer)



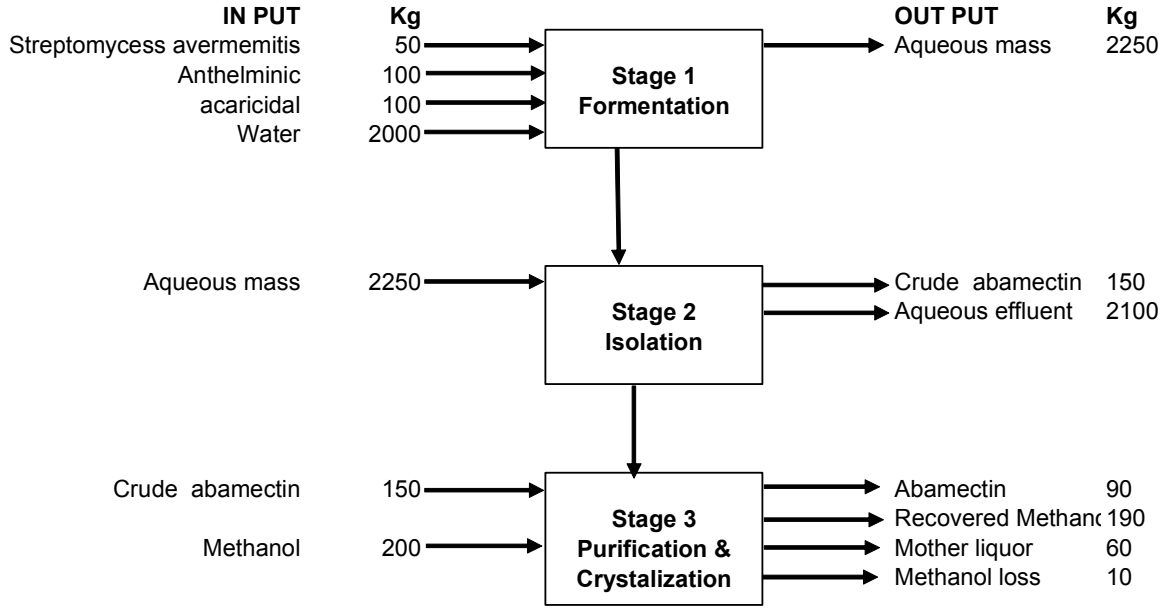
4-deoxy-4-epi-4-methylamino Avermectin B1 + 2NaCl + $2BH_4\uparrow$ + $CH_2=CHCH_2COOH$

Sodium Chloride

Hydrogen boron ,Crotonic acid

Flow diagram & Mass Balance:

Mass balance of Abamectin

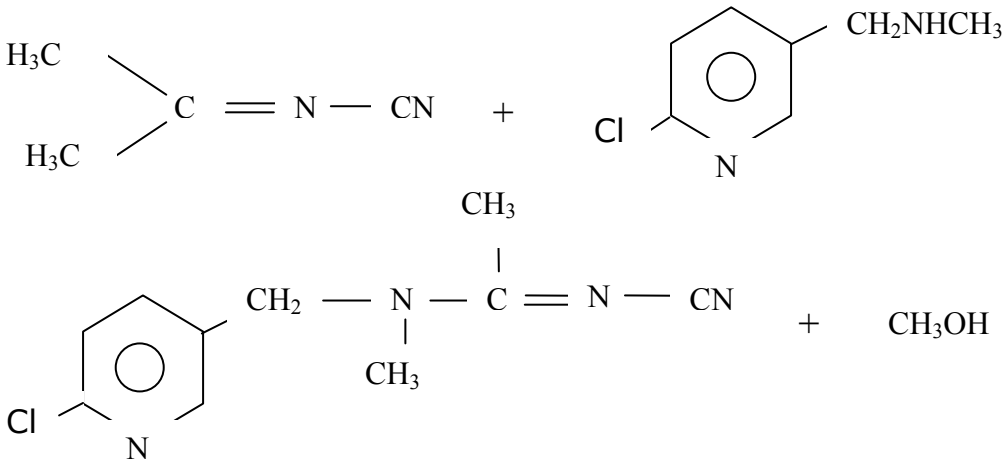


(4) Acetamiprid

MANUFACTURING PROCESS:

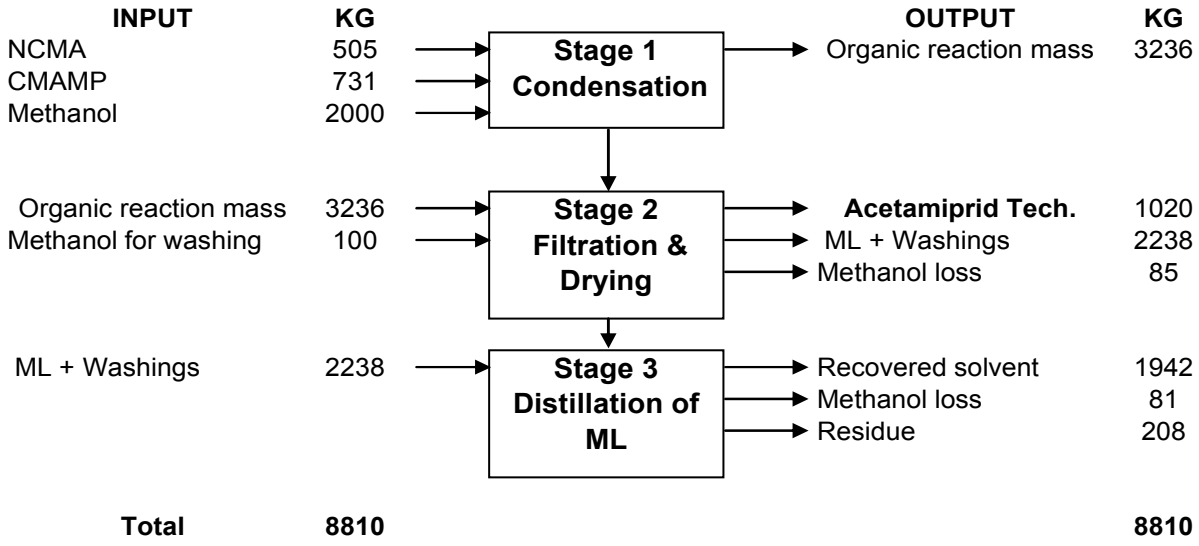
N-Cyano methyl Acetamidate (NCMA) is reacted with 2-Chloro 5-(methyl amino methyl) Pyridine (CMAMP) in solvent media. After the reaction is completed the product is filtered and solvent is concentrated to yield more products as well as recover solvent which is recycled.

CHEMICAL REACTION:



ACETAMIPRID

Flow diagram & Mass Balance:



(5) Allethrin

Manufacturing Process:

Stage 1

Charge cyclo hexane, allethrelone and pyridine in the reaction vessel. Stir the reaction mass for 1 hour. Charge acid chloride slowly in the reaction in 3-4 hrs and maintain the reaction at 400C for 3 hrs until reaction is complete.

Stage 2

After completion of the reaction stage 1 charge water and hydrochloric acid. Stir for ½ an hour for pyridine hydrochloride separation.

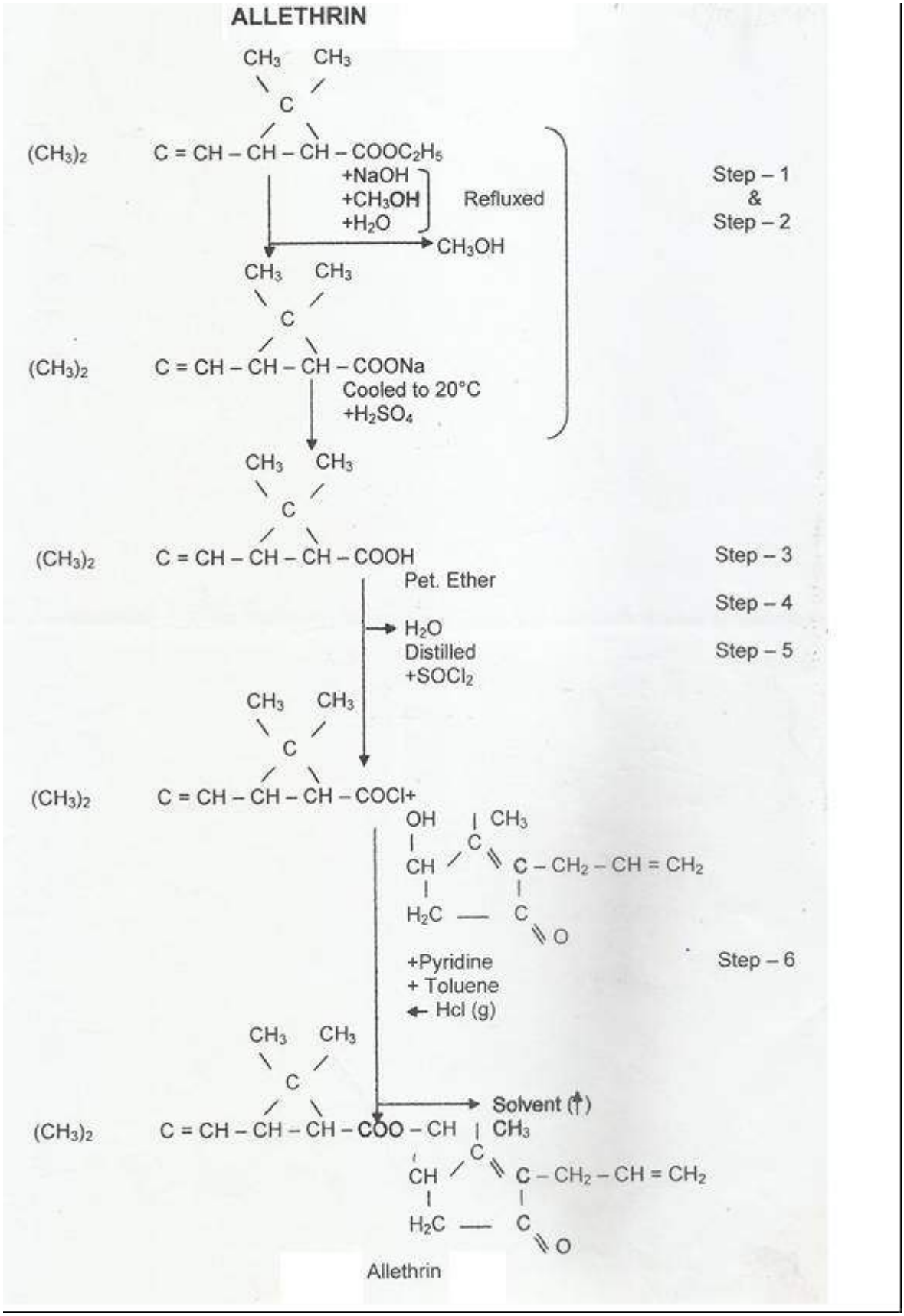
Stage 3

After hydrochloride separation, neutralize reaction mass with NOH and wash organic layer with water.

Stage 4

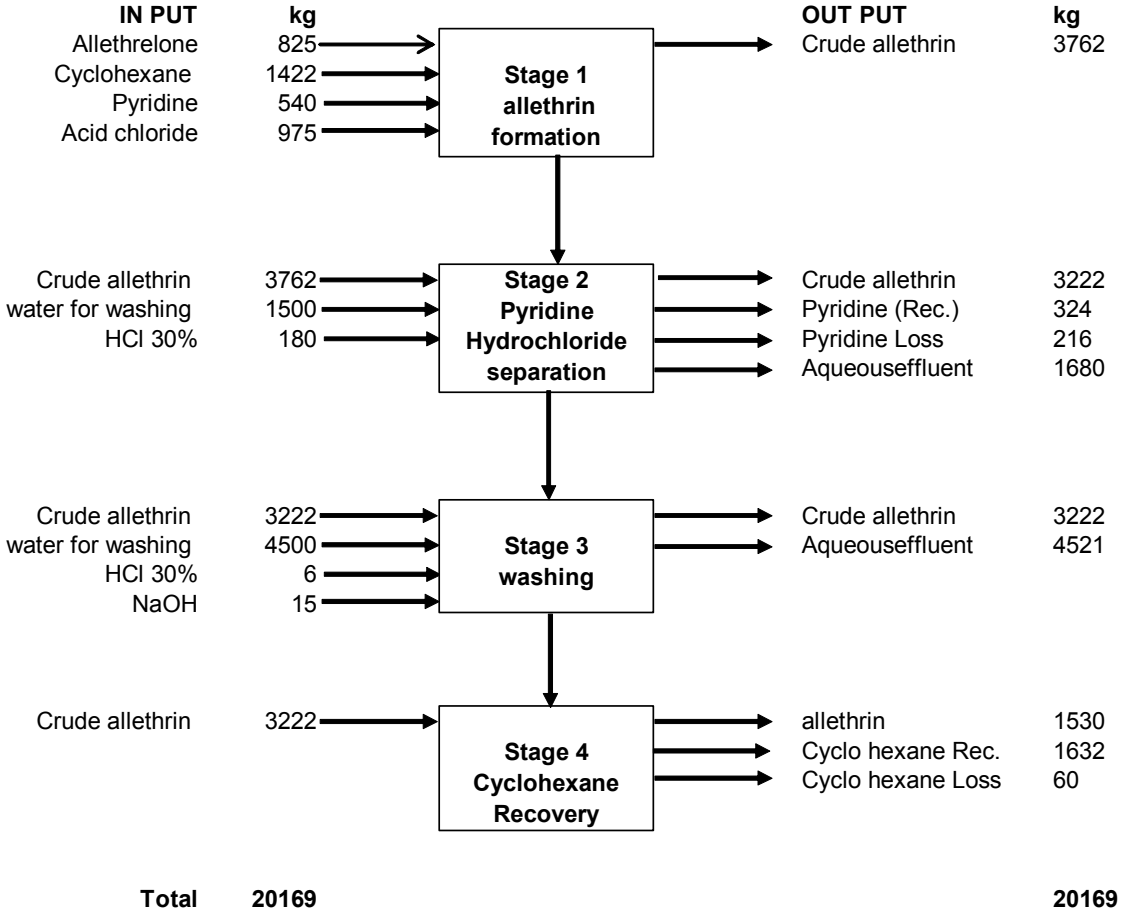
Separate the organic layer. Recover cyclo hexane under vacuum. Partially cool it and filter the allethrin for packing.

CHEMICAL REACTION:



Flow diagram & Mass Balance:

Mass balance of allethrin



Total	**20169**		**20169**

(6) Alpha Cypermethrin

Manufacturing Process:

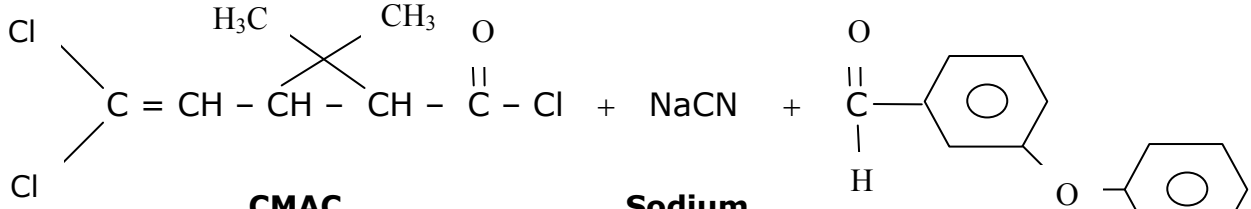
Metaphenoxy Benzaldehyde is reacted with sodium cyanide to form Metaphenoxy Benzaldehyde cyanohydrin as intermediate. This on Reaction with Cyprmethric acid chloride (CMAC) of high cis > 96% form the product Alpha-Cypermethrin oil. In this process n-Hexane is used as solvent along with phase transfer catalyst.

The reaction is washed by Soda-ash solution and plane water.

The n-Hexane is then stripped off to get pure Alpha-Cypermethrin oil in Racemic form which is epimerised by catalyst in presence of IPA- solvent to form the final product Alpha Cypermethrin of >95% Purity.

Aqueous layers of reaction as well as washing which contains traces of sodium cyanide is treated by sodium hypochlorite 8% solution to kill cyanide up to 0.2 PPM level, which is ten mixed up with main effluent treatment streams (ETP) and after further treatment drained to gutter.

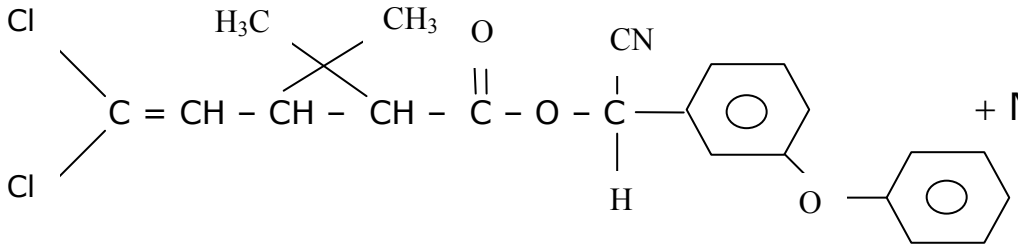
Chemical Reaction:



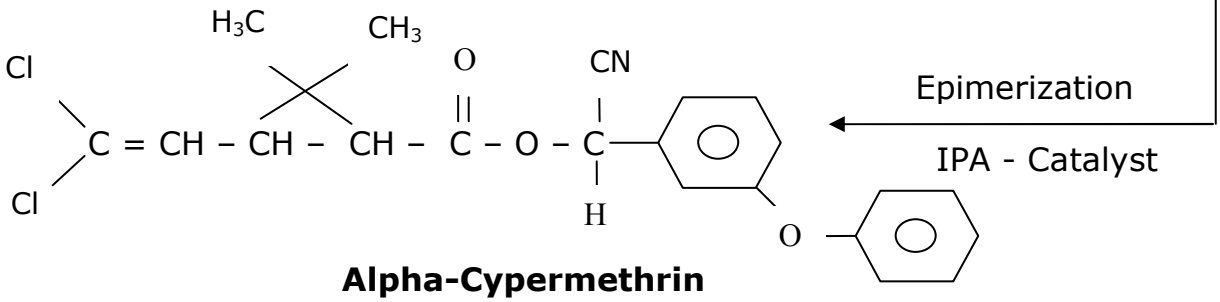
CMAC (MW- 227.5)

Sodium Cyanide (MW- 49.1)

MPBAD (MW-198)



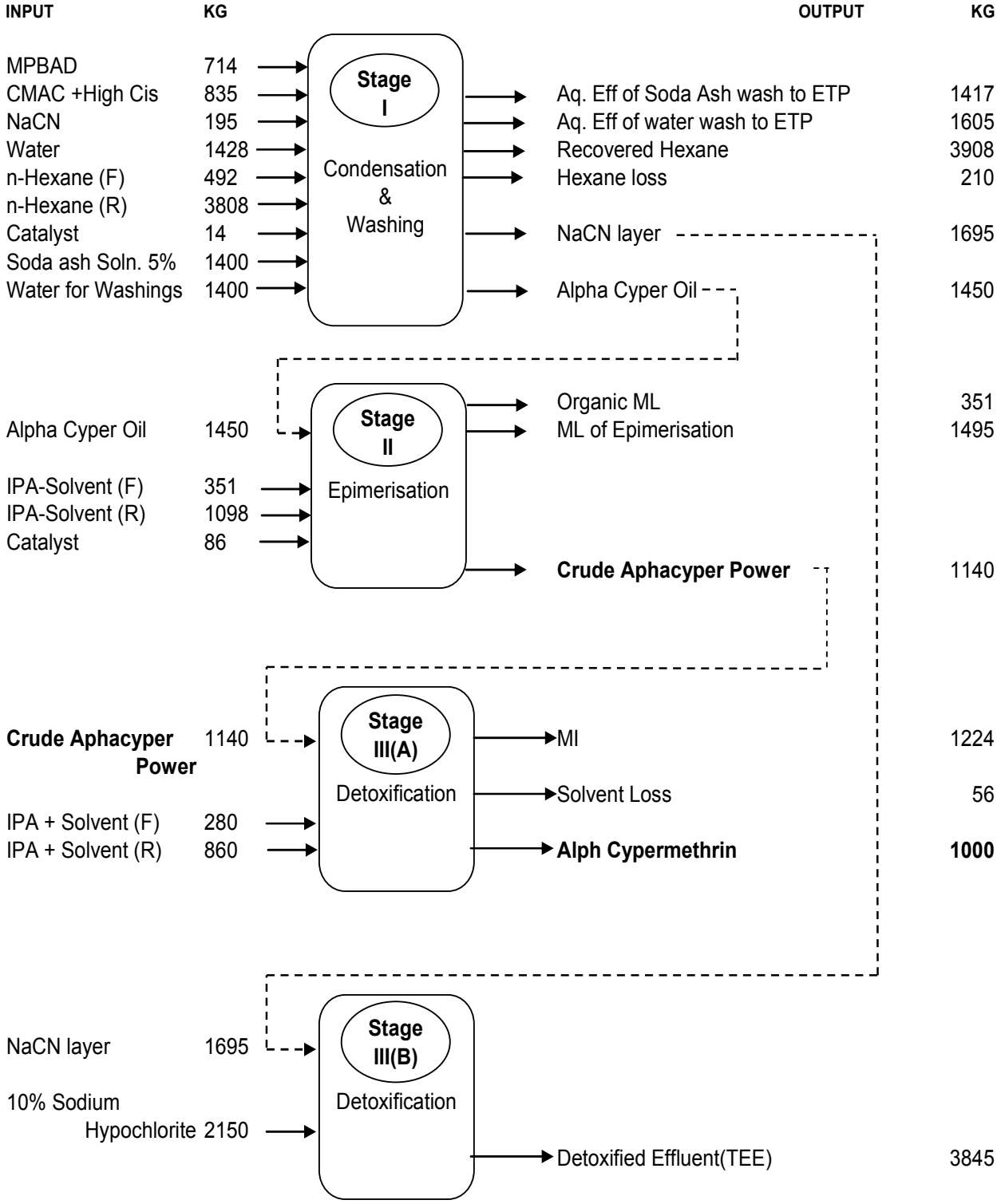
Alpha-Cypermethrin Oil (MW- 416.3)



Alpha-Cypermethrin (MW- 416.3)

Flow diagram & Mass Balance:

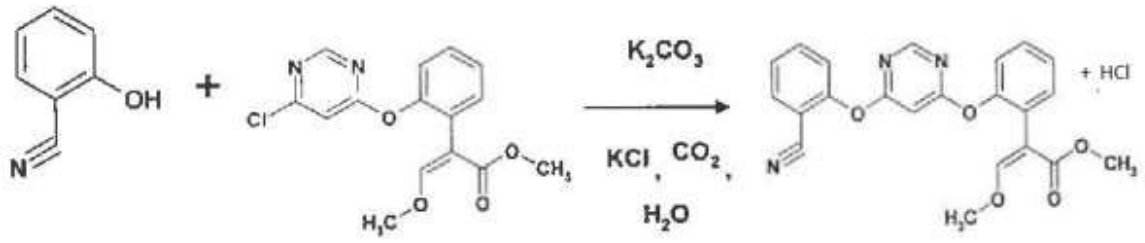
Alpha - Cyperrmethrin Tech.



(7) Azoxystrobin
Manufacturing Process:

The Methyl-3-methoxy {2-(2[6-chloropyrimidin-4-yl)oxy]phenyl} acrylate (MMCP) in dimethyl formamide (DMF) is reacted with potassium carbonate and 2-cyano phenol. The mass is maintained at high temperature for completion of the reaction. The sample is checked for unreacted MMCP by HPLC. The mass is filtered and the filtrate is distilled under vacuum to recover DMF. dichloroethane is added tO the residue and the mass is washed two times with water. Distill out dichloroethane completely under vacuum and then methanol is added. It is then heated to reflux and filtered. The filtrate is cooled slowly over a period of time to crystallize the product. The product is filtered and the wet cake is dried at 75.C to get the finished product. It is then analyzed for the Azoxystrobin content.

Chemical Reaction:



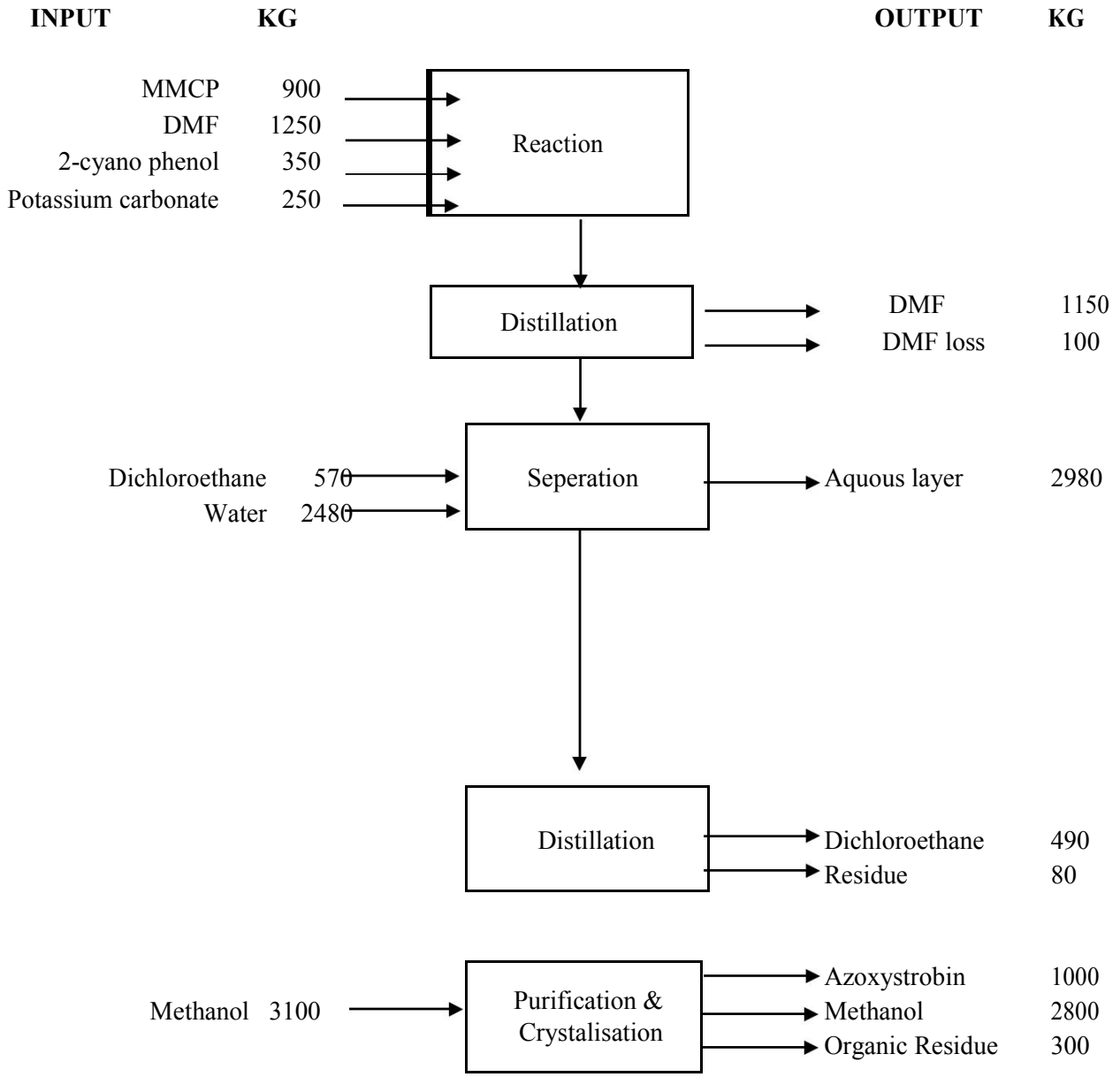
2-cyano phenol

Methyl-3-methoxy,{2-(2[6-chloropyrimidin-4-yl)oxy]phenyl}acrylate (MMCP)

Azoxystrobin Technical

Mass Balance:

MASS BALANCE OF AZOXYSTROBIN



TOTAL	**8900**		**8900**

(8) Buprofezin

Manufacturing Process:

Step-1 Charge PNNCC, Toluene, and lime in the reaction vessel. Stir the reaction mass for 2-3 hours. Charge Thiourea slowly in the reaction mass in 2-3 hours and stir the reaction mass at higher temperature until raw material is totally consumed.

Step-2 After completion of reaction, Filter the reaction mass to isolate inorganic solid.

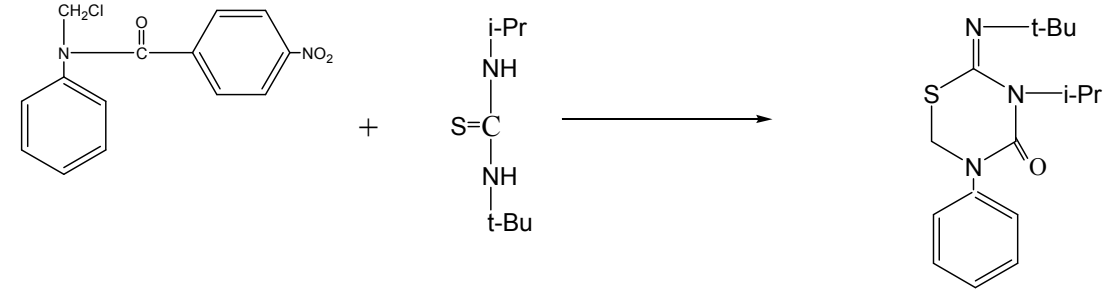
Step-3 Wash inorganic solid with toluene. Recover toluene under vacuum from clear organic phase.

Step-4 Add EDC in the crude solid. Charge TEA slowly at room temperature and stir the reaction mass for 3 hours.

Step-5 Reaction mass is washed with water. Separate the layers. Recover EDC under vacuum partially.

Step-6 Cool the conc. mass slowly and filter the crystals. Dry the wet product at 50 – 65%.

CHEMICAL REA CTION:

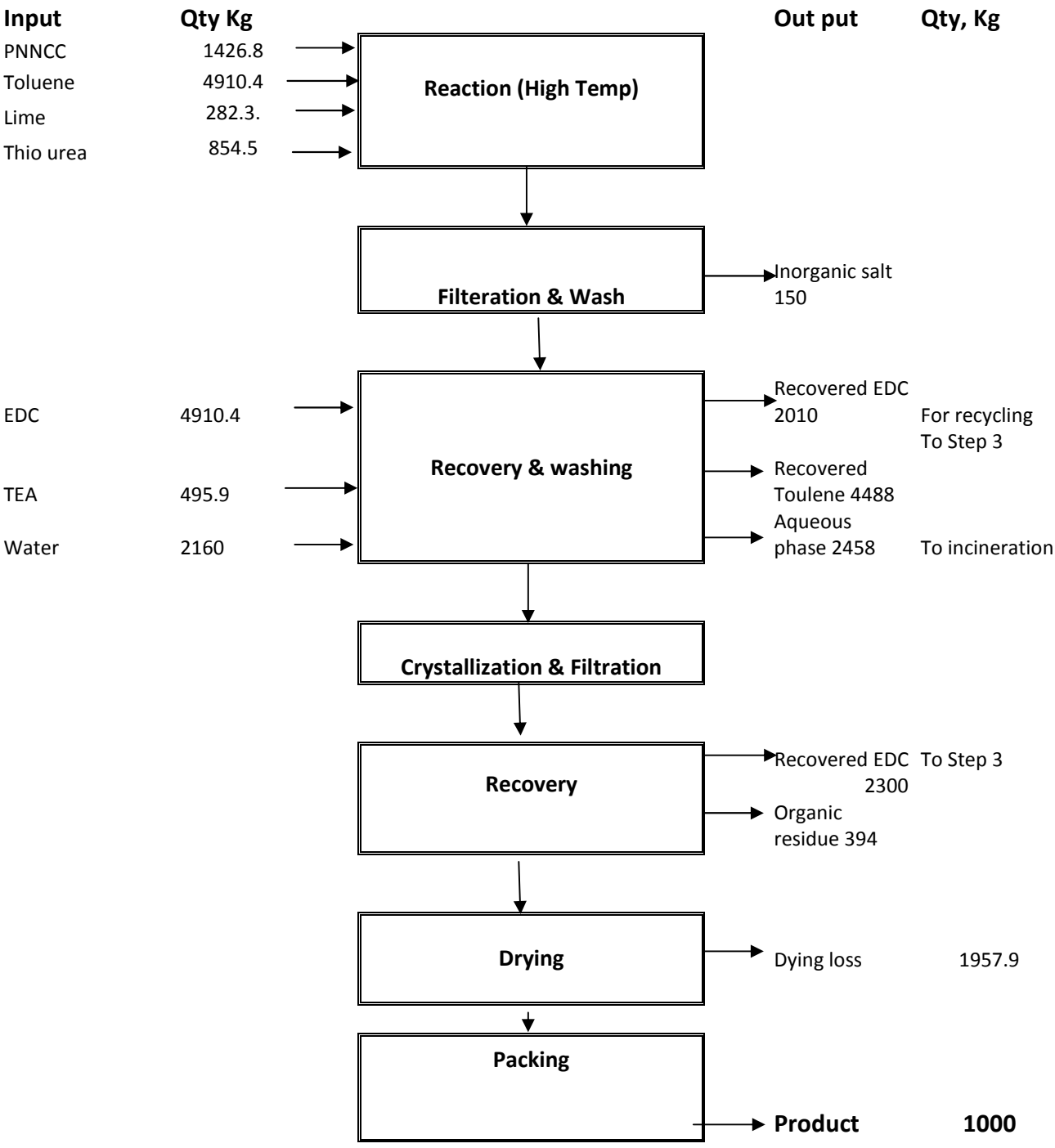


p - Nitrophenyl N - Chloromethyl Carbamate

N-isopropyl- N-tert-butyl Thiourea

BUPROFEZIN

Flow diagram & Mass Balance:



(9) Butachlore

Manufacturing Process:

Stage 1

Charge 2,6-DEA, Benzene, Paraformaldehyde in to the reactor and heat the reaction mixture at 80^0C temperature for 4 hrs in the presents of catalyst. When reaction is over, the material is cooled at 40^0C temperature. Distilled out Benzene under vacuum at 80^0C temperature and cool it.

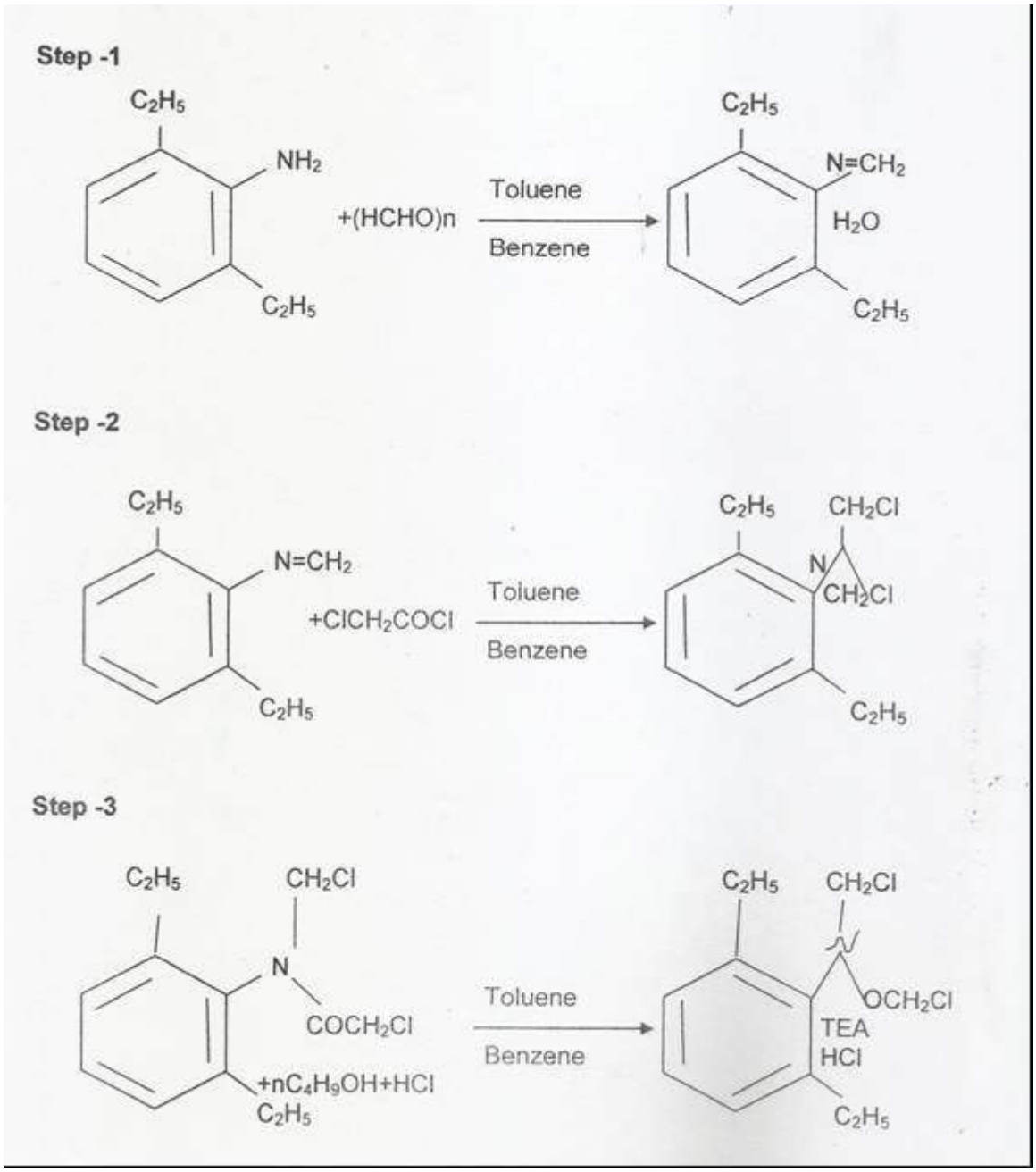
Stage 2

Charge Chloro acetyle chloride into the reactor and charge intermediate (stage 1) slowly in the reaction mass at 20^0C temperature and maintain the reaction for 5 hrs.

Stage 3

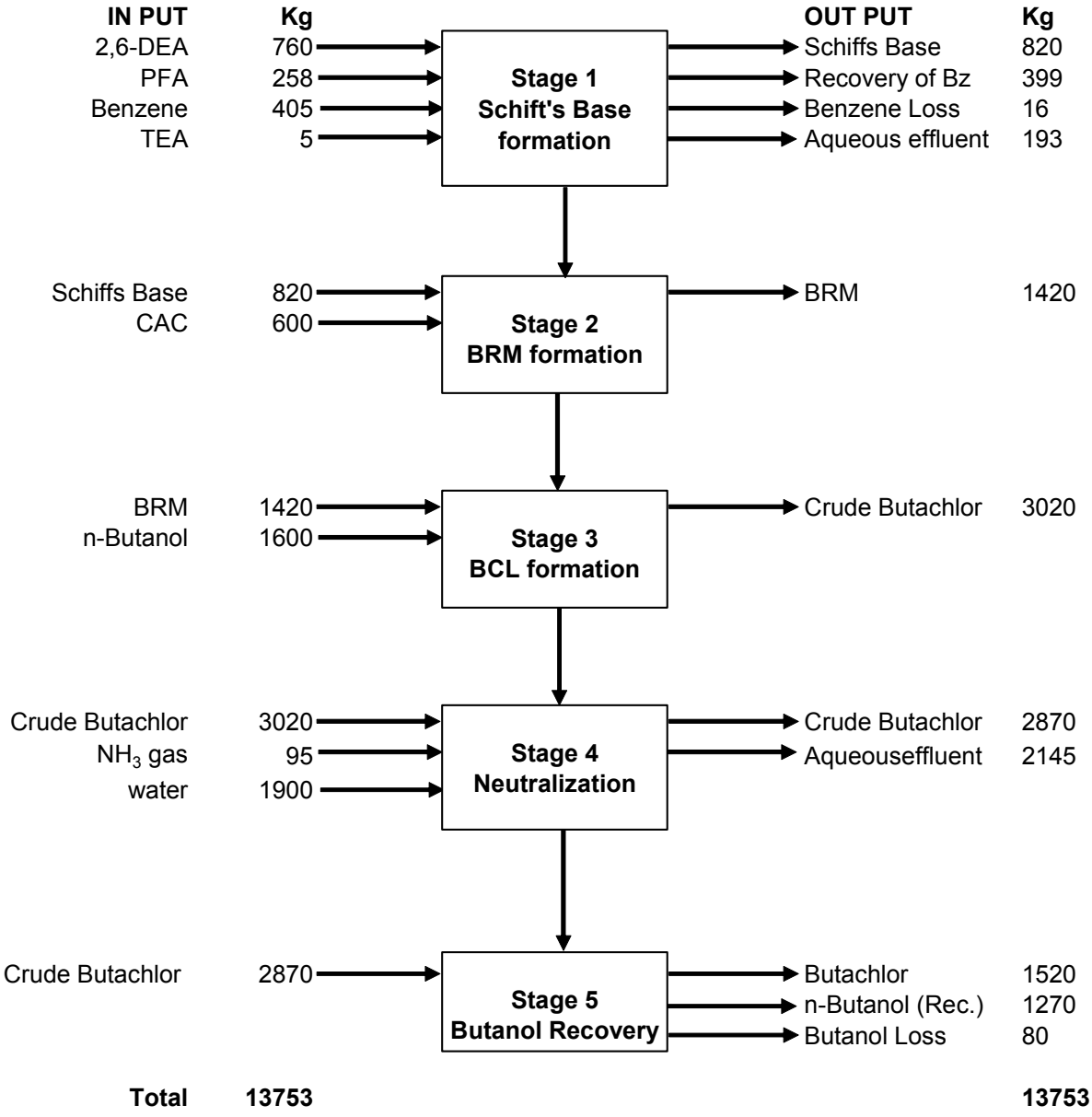
Charge n-Butanol into the reactor and react with intermediate (stage 2) at 40^0C temperature. Maintain the mass for 4 hrs. Neutralized the reaction mass with ammonia gas till pH-8. Wash the reaction mass with water. Separate organic layer and take it to distillation vessel for Butanol recovery under vacuum up to 90^0C temperature. Cool it to 10^0C and filter the Butachlor for packing.

Chemical Reaction:



Flow diagram & Mass Balance:

Mass balance of Butachlor Technical



(10) Cartap hydrochloride

Manufacturing Process:

Cartap Hydrochloride (1, 3-bis carbamoylthio-2-dimethylamino propane hydrochloride) is synthesized in the following sequence starting from 2-dimethylamino-1, 3-dichloropropane.

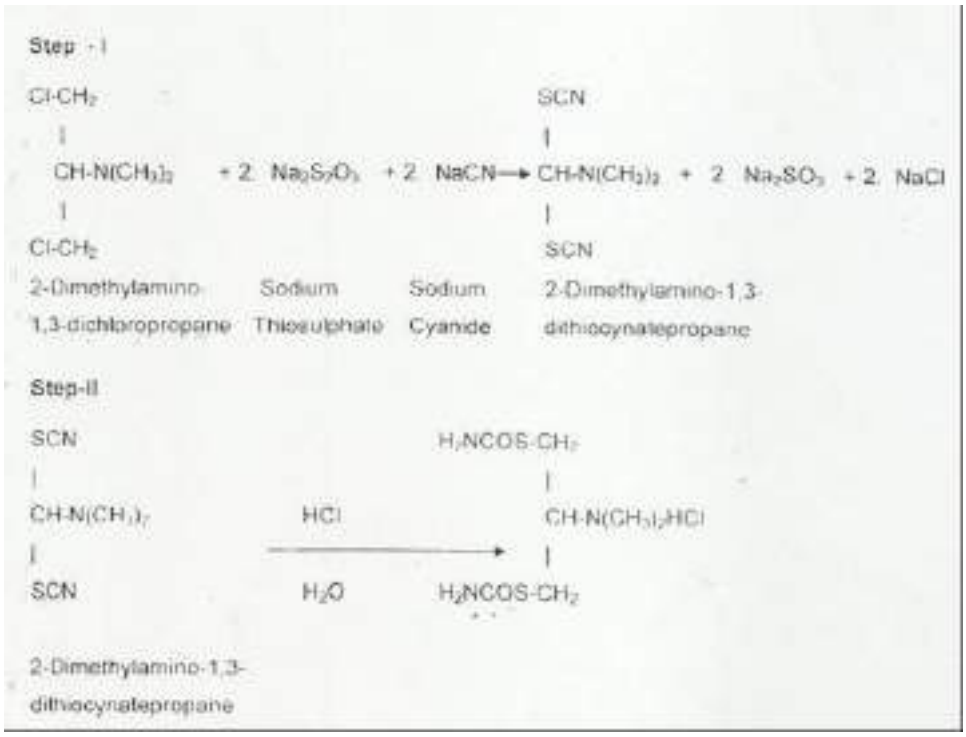
Step – I

2-Dimethylamino-1, 3- dichloropropane is taken in aqueous solvent and reacted with sodium Thiosulphate at elevated temperature. Reaction mass is stirred for five hours and solvent is partially removed. Reaction mass is cooled to room temperature and sodium cyanide is added slowly. Reaction is continued for four hours. Product, thus formed is filtered and washed with water and suck dried.

Step-II

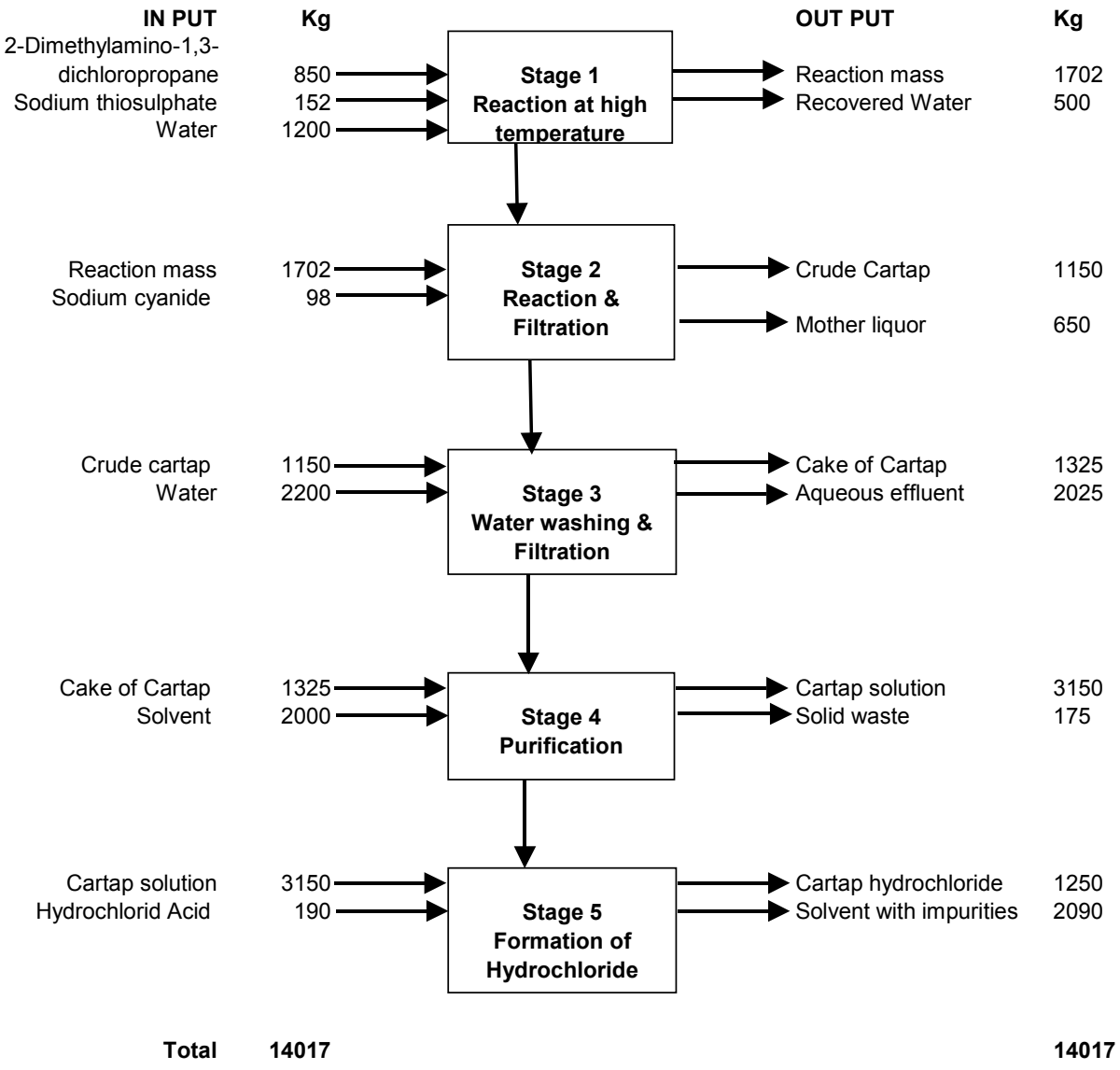
Cake of the product, 2-dimethylamino-1, 3-dithiocyanate propane is transferred to reactor and slurried with the solvent. Slurry is filtered to remove by-product and filtrate is again taken to reactor. Hydrochloric acid is added at room temperature and stirred for two hours. Cartap hydrochloride thus formed is filtered and dried.

Chemical Reaction:



Flow diagram & Mass Balance:

Mass balance of Cartap hydrochloride



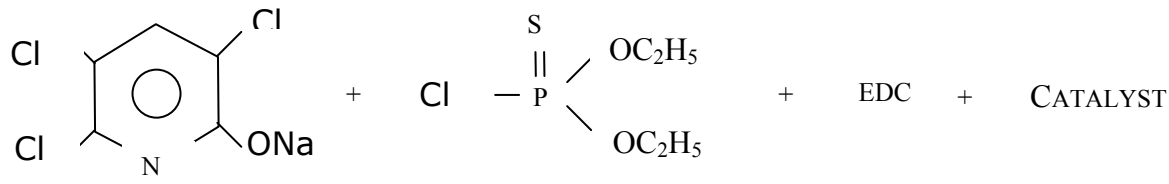
(11) Chlorpyriphos

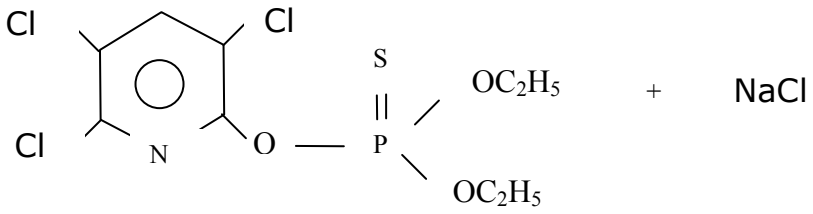
Manufacturing Process:

Sodium Salt of trichloro Pyridinol (NaTCP) is reacted with Diethyl Thio Phosphoryl Chloride (DETC) in presence of catalyst and solvent to get Chlorpyrifos Tech. of 94% purity. Recovered solvent is recycled in next batch.

Finally Toxin Effluent which contains traces of pesticides is taken to Hydrolysis stage for detoxification. Where Aqueous Mass is treated at high temp. By Alkali for the rapid hydrolysis of pesticides to simpler non- toxic compounds.

Chemical Reaction:





Flow Diagram & Mass Balance:

Mass balance of Chlorpyrifos

INPUT	KG		OUTPUT	KG
NaTCP	763	Stage 1 CPP Preparation	Chlorpyrifos	1160
DETC	650		Recovered solvent- EDC	2895
Water for Reaction	760		EDC loss	320
Water for washing	3150		Aqueous effluent	4095
Catalyst	9		Water loss	62
EDC	3200			
Aqueous effluent	4095	Stage 2 Alkali Hydrolysis	Wet cake NaTCP	35
C. S. lye 48%	50		DETOXIFIED Aq. Mass	4110
Detoxified Aq. Mass	4110	Stage 3 TEE Distillation	Distilled Water	3854
			Detoxified Aq. Mass	214
			Water loss	42
Total	**16787**			**16787**

(12) Cyfluthrin

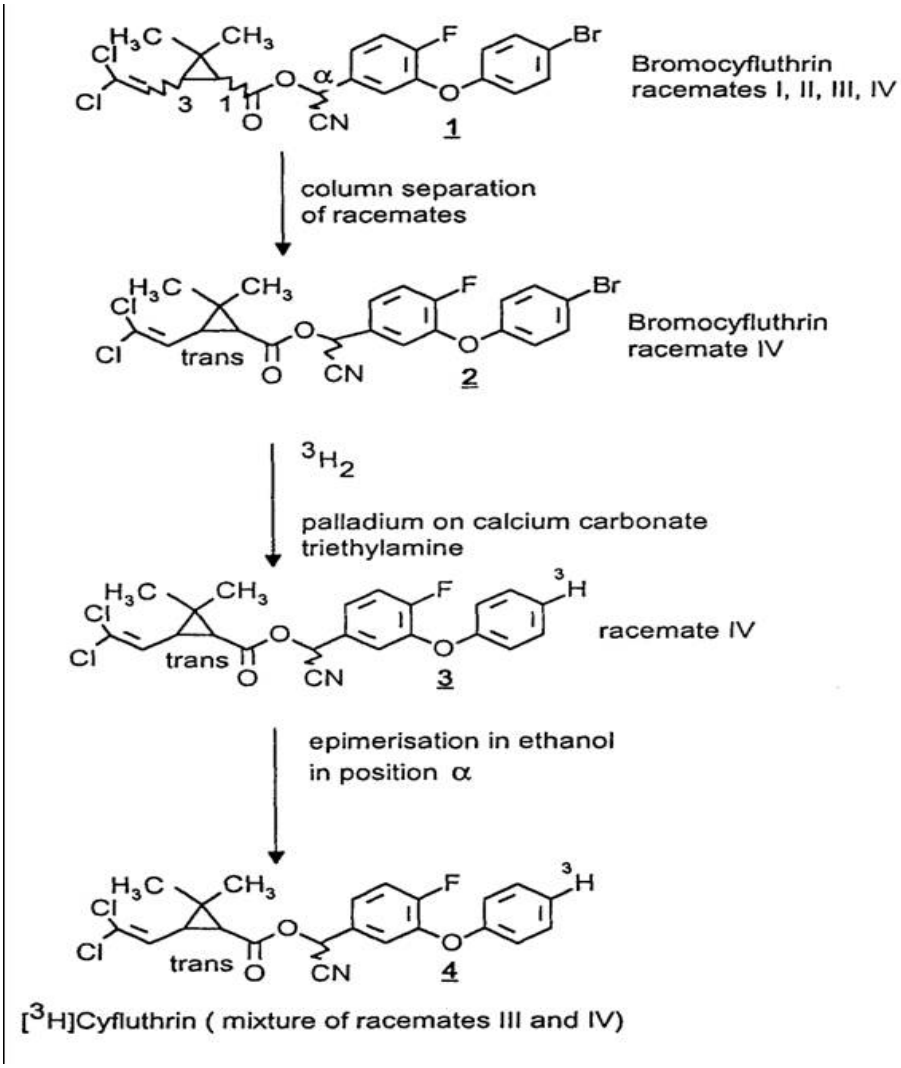
Manufacturing Process:

Fluro Meta Phenoxy Benzaldehyde is reacted with sodium cyanide to form fluro Meta Phenoxy Benzaldehyde Cyanohydrin as an intermediate. This on reaction with Cypermethric Acid chloride forms the final product Cyfluthrin. In this process n-Hexane is used as solvent along with phase transfer Catalyst.

The reaction mass of Cyfluthrin is washed by soda ash solution and water.

Finally n-Hexane is distilled off to get pure Cyfluthrin. Aqueous layer which contain traces of sodium cyanide is detoxified by the treatment of Sodium Hypochlorite 10% solution to < 0.2 ppm level.

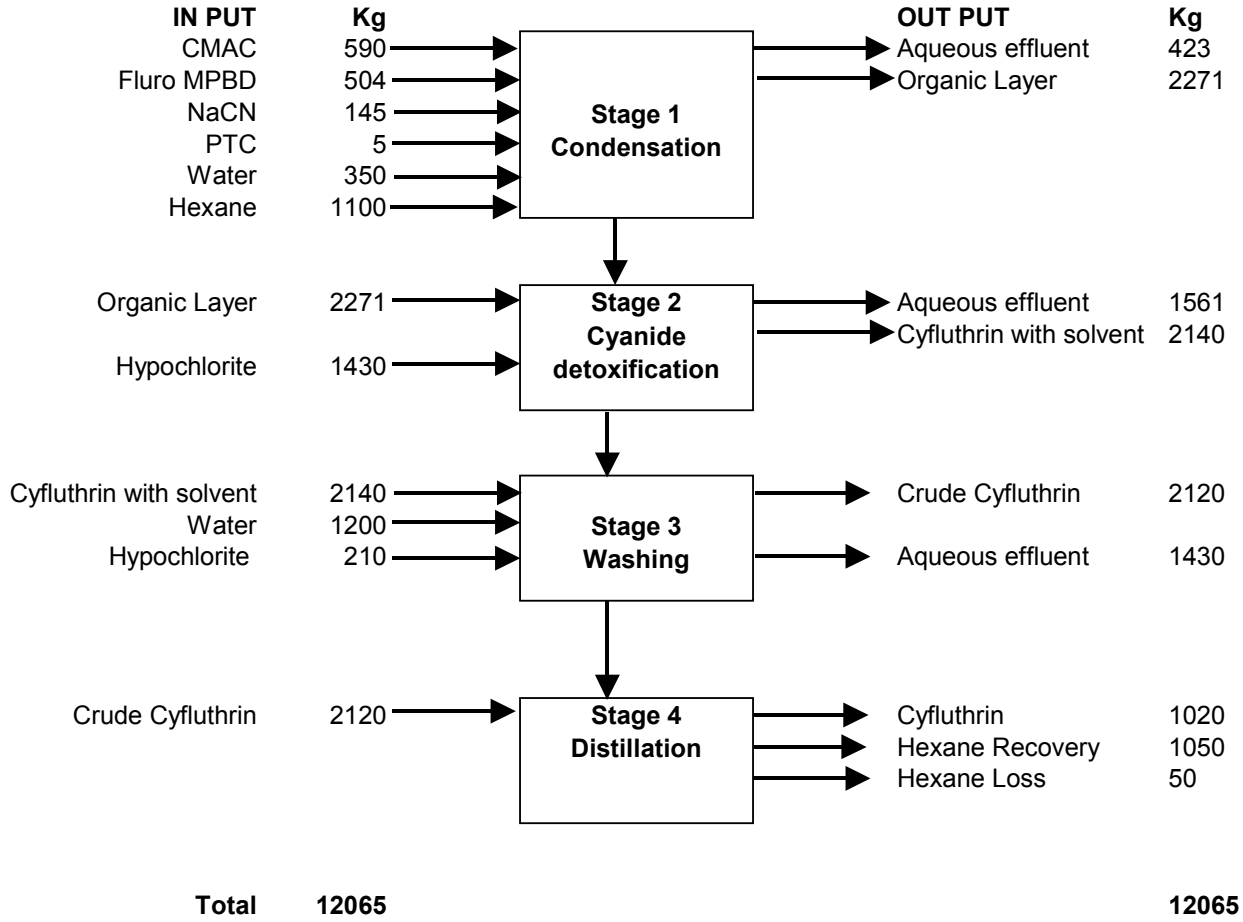
Chemical Reaction:



[^{3}H]Cyfluthrin (mixture of racemates III and IV)

Flow Diagram & Mass Balance:

Mass balance of Cyfluthrin



Total	**12065**		**12065**

(13) Cypermethrin

Manufacturing Process:

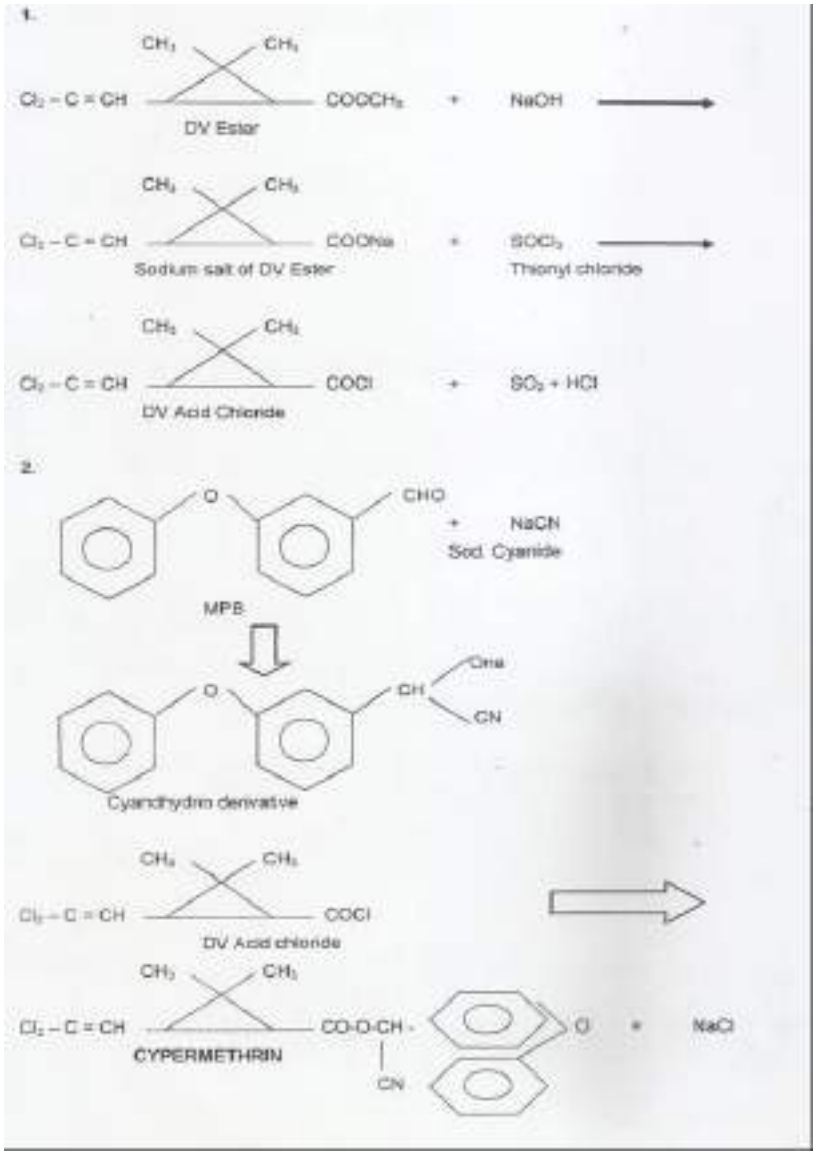
Meta Phenoxy Benzaldehyde is reacted with Sodium Cyanide to form Meta Phenoxy Benzaldehyde Cyanohydrin as an intermediate. This on reaction with Cypermethric Acid Chloride forms the final Product Cypermethrin. In this process n-Hexane is used as solvent along with phase transfer Catalyst.

The reaction mass of Cypermethrin is washed by Soda Ash solution & Water.

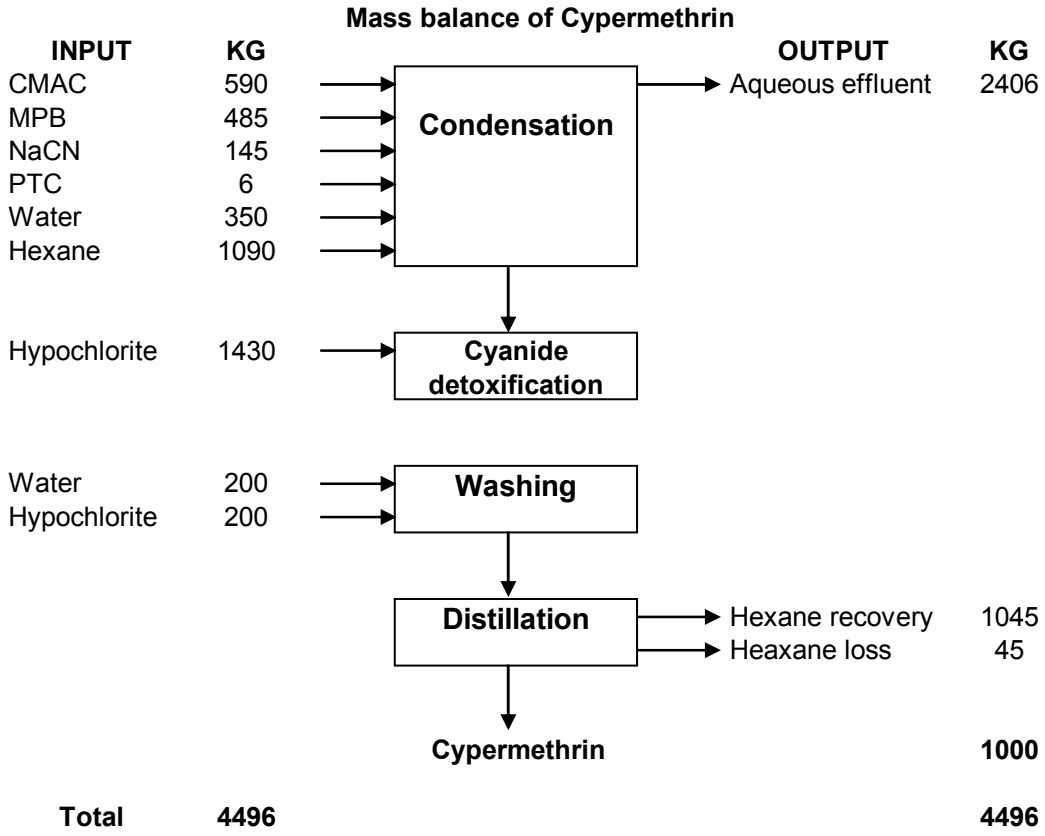
Finally n-Hexane is stripped off to get pure Cypermethrin.

Aqueous layer which contain traces of Sodium Cyanide is detoxified by the treatment of Sodium Hypochlorite 8 – 10% Solution to < 0.2 ppm Level.

Chemical Reaction:



Flow Diagram & Mass Balance:



(14) Delta cypermethrin

Manufacturing Process:

Stage 1

Ester of Bicisthemic acid is reacted with Thionyl Chloride to form Bicisthemic acid chloride. In presence of Caustic soda.

Stage 2

M-phenoxybenzaldehyde is reacted with Sodium cyanide to form Metaphenoxy benzaldehyde cyanohydrin as an intermediate. This on reaction with Bicisthemic acid Chloride forms the product deltamethrin. The reaction mass of deltamethrin is washed with water.

Aqueous layer which contain traces of Sodium cyanide is detoxified by the treatment of Sodium hypo chlorite 10-12% solution to < 0.2 ppm level.

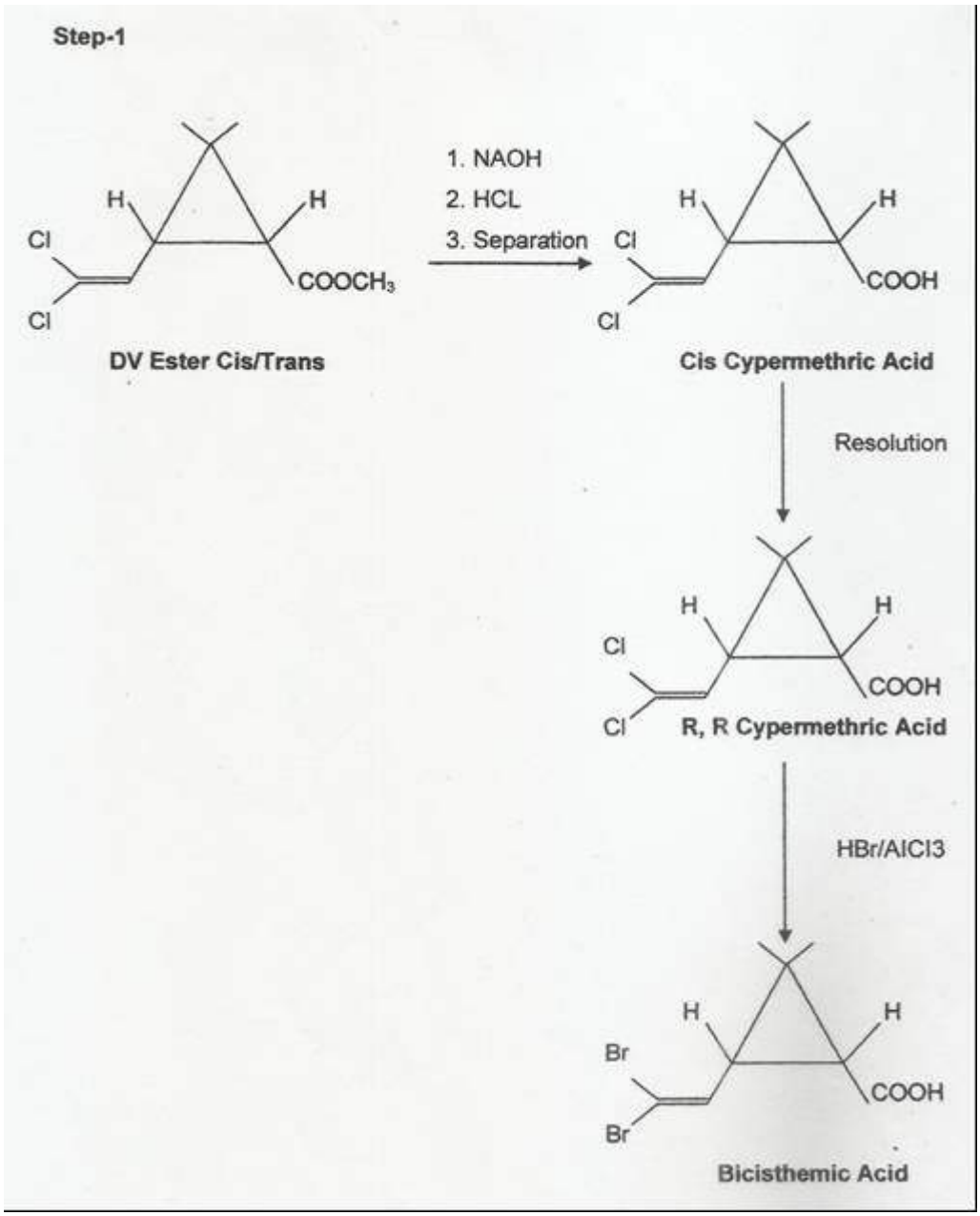
Stage 3

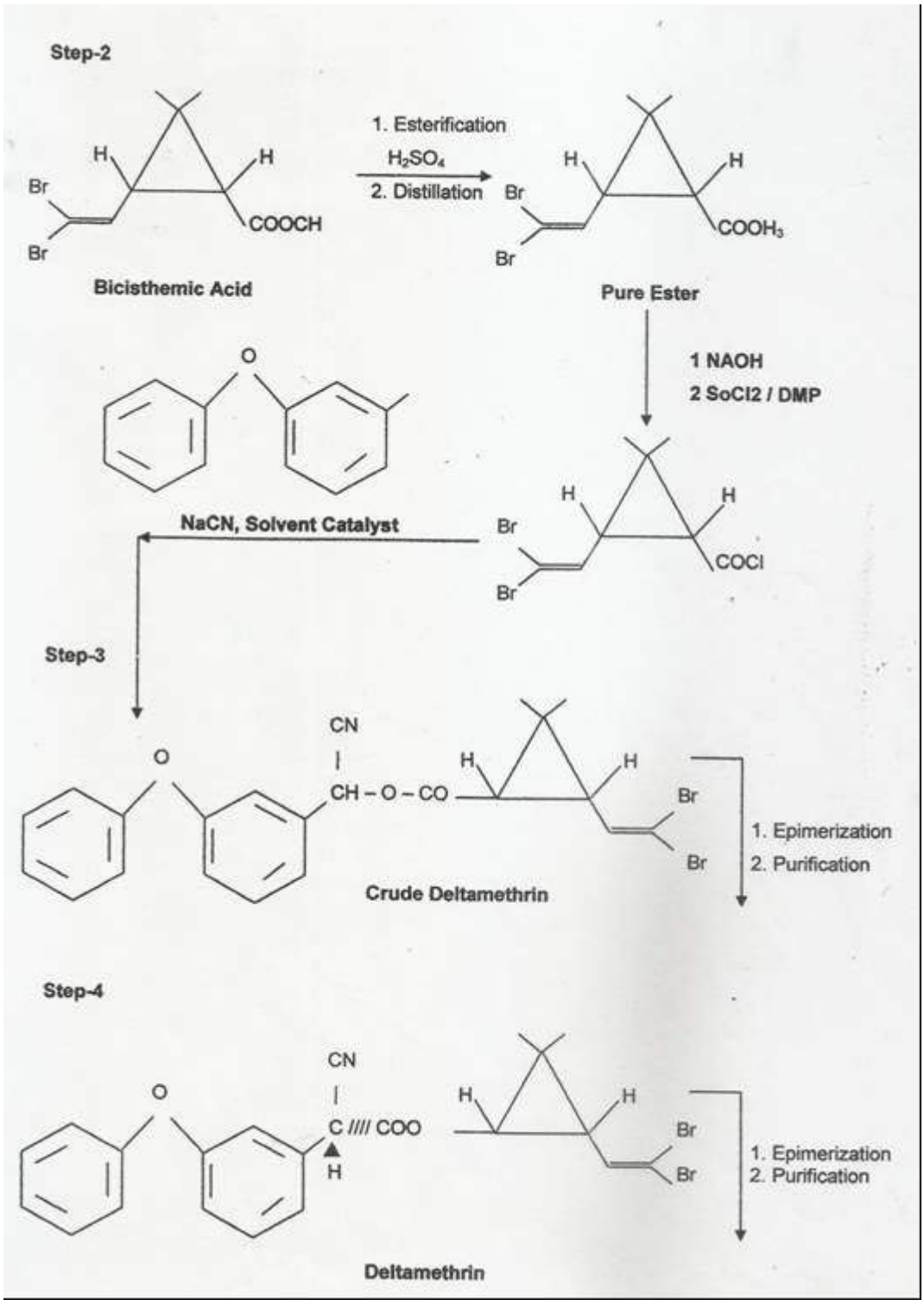
Deltamethrin is epimerized in presence of Di isopropyl amine and isopropyl alcohol at low temperature to form deltamethrin.

Stage 4

Finally DMF is distilled off to get pure deltamethrin technical.

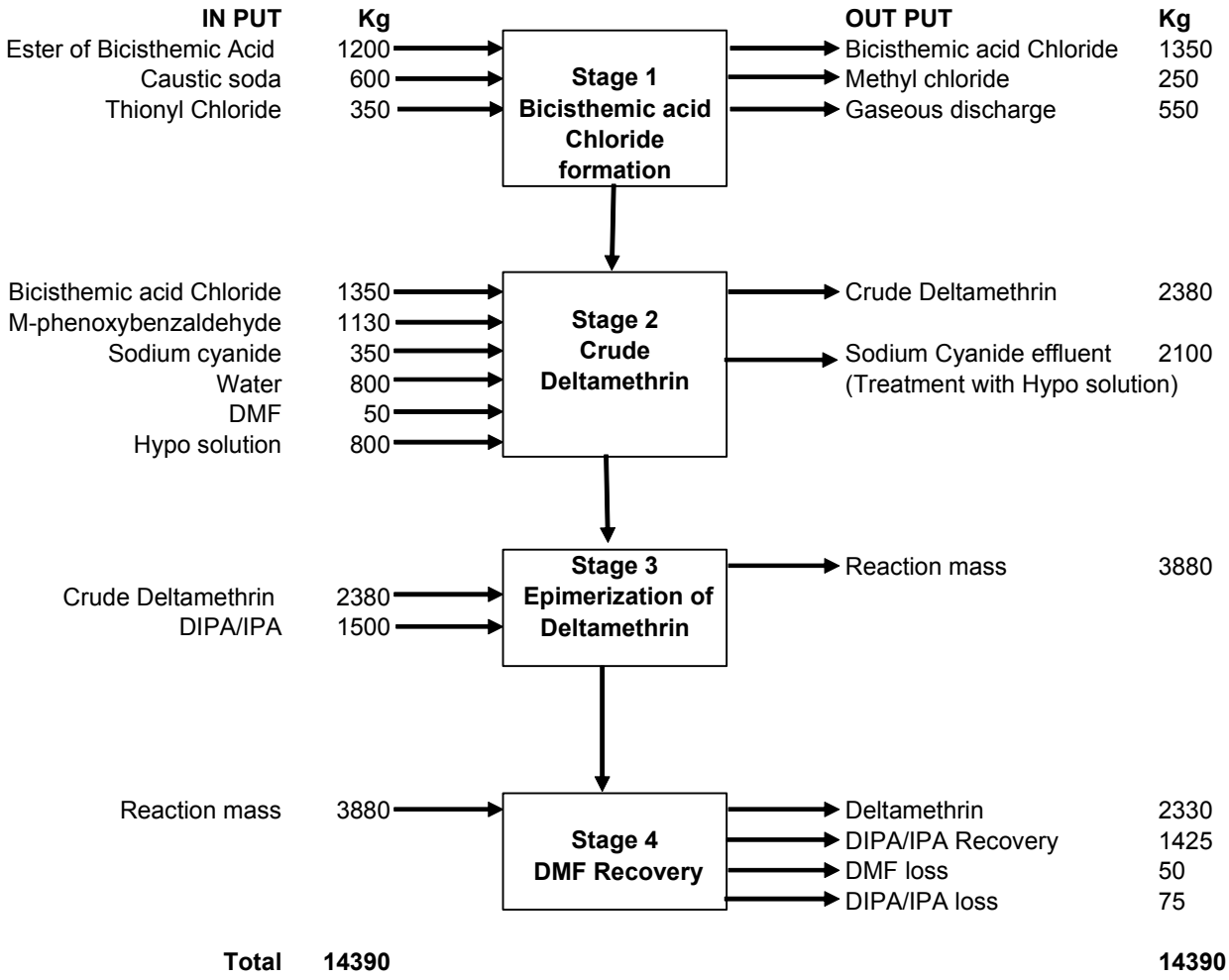
Chemical Reaction:




Step-2
1. Esterification
H_2SO_4
2. Distillation
Bicisthemic Acid
Pure Ester
1 NAOH
2 SoCl2 / DMP
NaCN, Solvent Catalyst
Step-3
Crude Deltamethrin
1. Epimerization
2. Purification
Step-4
Deltamethrin
1. Epimerization
2. Purification

Flow diagram & Mass Balance:

Mass balance of Deltamethrin



(15) Difenconazole

Manufacturing Process:

Stage 1

Charge 4-methyl-1, 3-dioxolane in the reactor and stir for 30 minute and charge 2-chloro-4-(4-chlorophenoxy) benzyl chloride slowly in the reaction mass for 2-3 hrs and maintain the temperature for 3 hrs and check the sample for reaction complete. After reaction is complete add KOH flakes slowly. Maintain the reaction mass for 4 hrs until the reaction is complete.

Stae 2

Charge intermediate, Dimethyl Formamide, 1,2,4-Trizole and K2CO3 in the reactor and maintain the reaction for 3 hrs at high temperature until the reaction is complete.

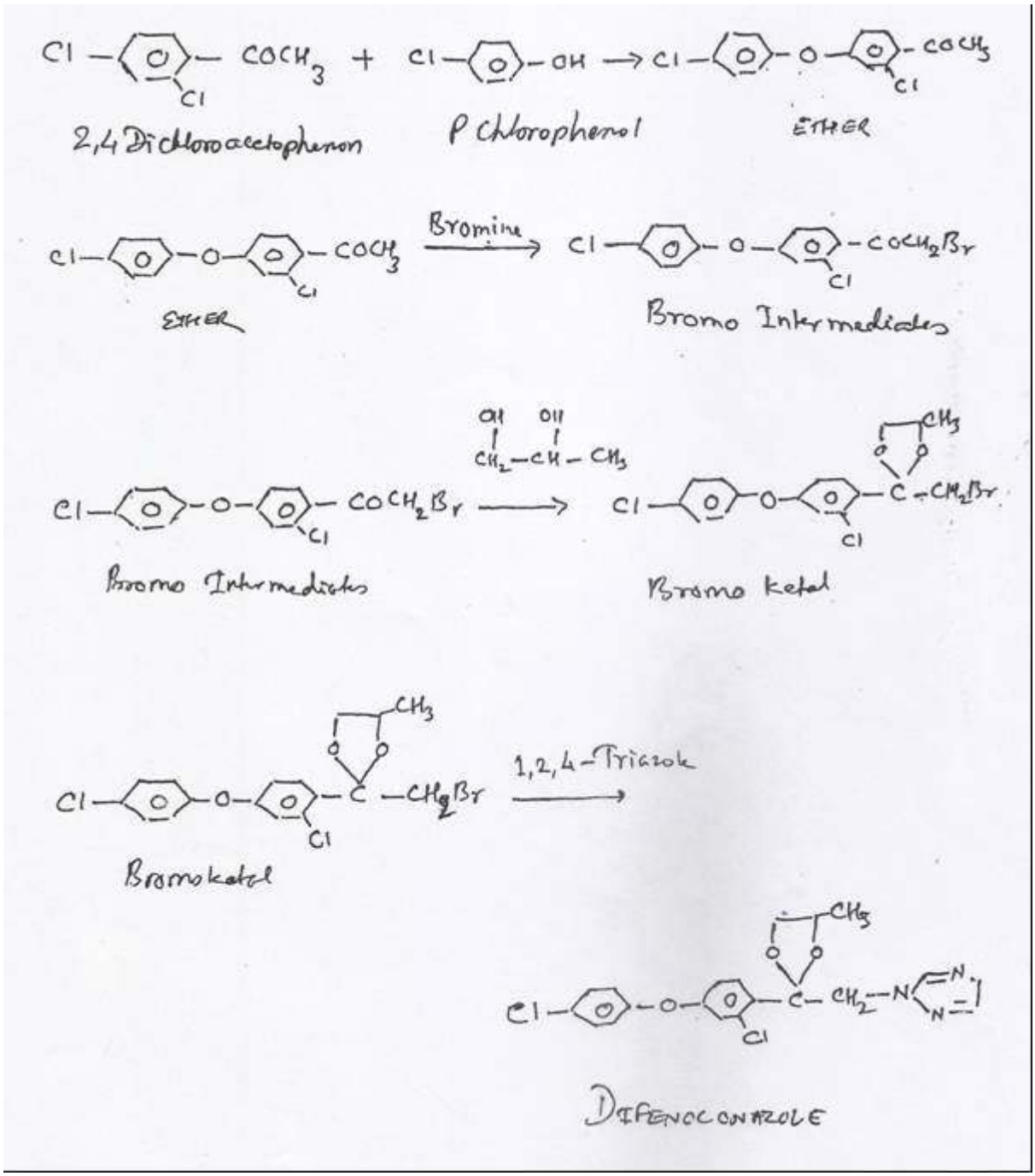
Stage 3

Recover DMF under vacuum partially.

Stage 4

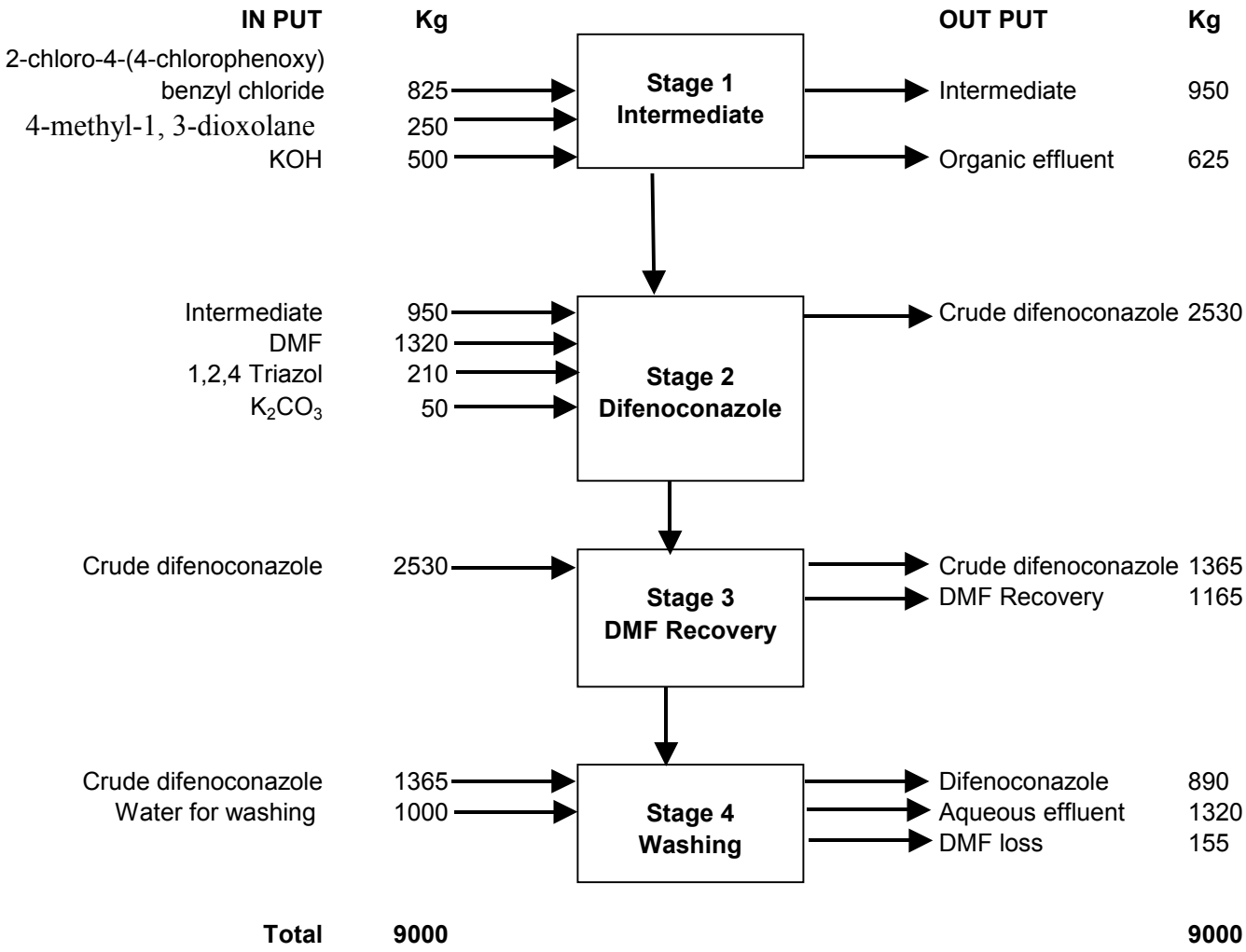
Wash the reaction mass with water. Dry the wet cake of difenoconazole in drier.

Chemical Reaction:



Flow diagram & Mass Balance:

Mass balance of Difenoconazole



(16) D-Transallethrin

Manufacturing Process:

Stage 1

Charge cyclo hexane, allethrelone and pyridine in the reaction vessel. Stir the reaction mass for 1 hour. Charge acid chloride slowly in the reaction in 3-4 hrs and maintain the reaction at 40^0C for 3 hrs until reaction is complete.

Stage 2

After completion of the reaction (stage 1), charge water and hydrochloric acid. Stir for ½ an hour for pyridine hydrochloride separation.

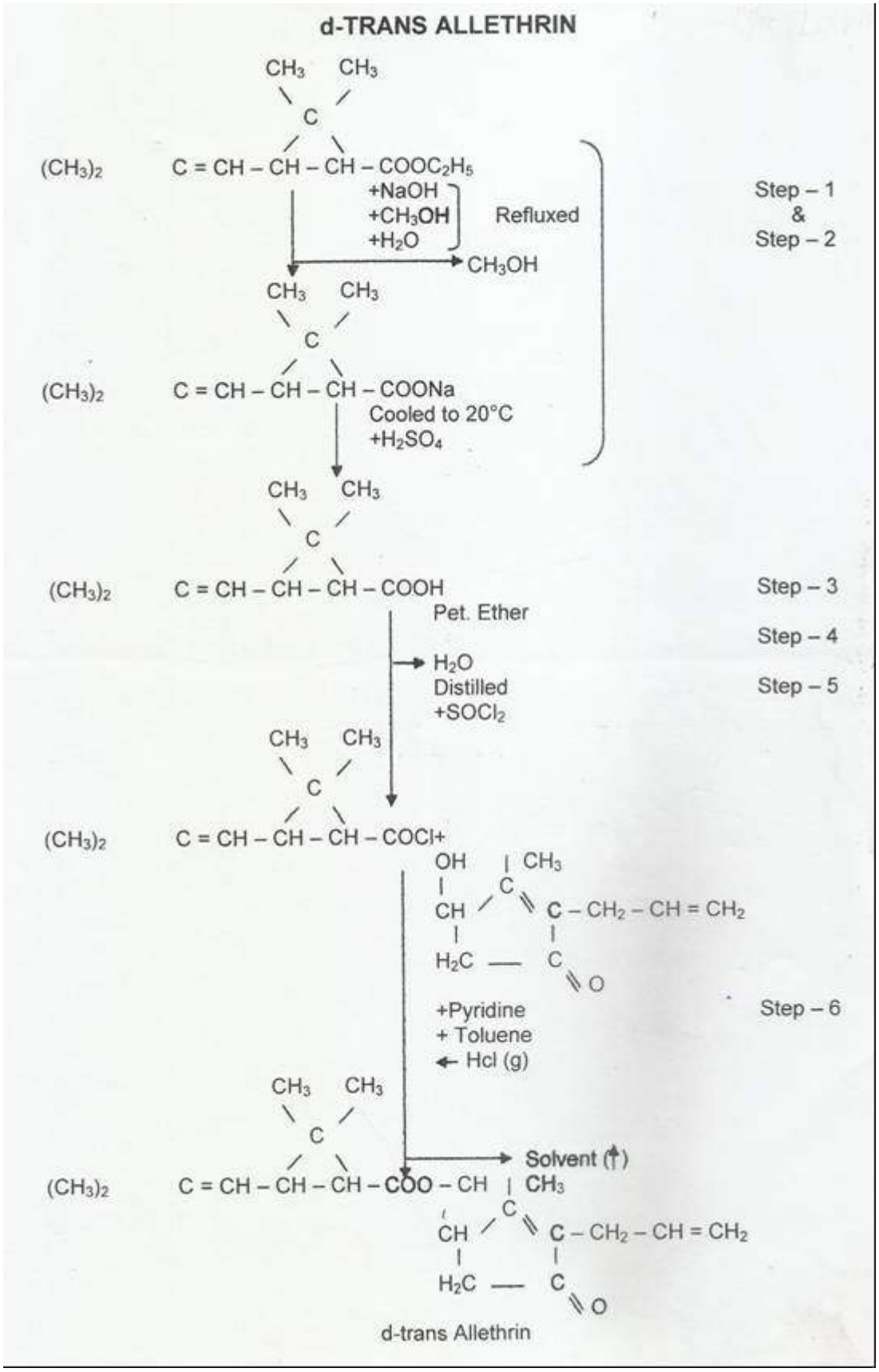
Stage 3

After hydrochloride separation, neutralize reaction mass with NOH and wash organic layer with water.

Stage 4

Separate the organic layer. Recover cyclo hexane under vacuum. Partially cool it and filter the d-Transallethrin for packing.

Chemical Reaction:



Flow diagram & Mass Balance:

Mass balance of d-Transallethrin

IN PUT	kg		OUT PUT	kg
Allethrelone	825	Stage 1 d-Trans allethrin formation	Crude d-Transallethrin	3762
Cyclohexane	1422			
Pyridine	540			
Acid chloride	975			
Crude d-Trans	3762	Stage 2 Pyridine Hydrochloride separation	Crude d-trans	3222
water for washing	1500		Pyridine (Rec.)	518
HCl 30%	180		Pyridine Loss	22
			Aqueouseffluent	1680
Crude d-trans	3222	Stage 3 d-trans washing	Crude d-trans	3222
water for washing	4500		Aqueouseffluent	4521
HCl 30%	6			
NaOH	15			
Crude d-Trans	3222	Stage 4 Cyclohexane Recovery	d-Trans allethrin	1530
			Cyclo hexane Rec.	288
			Cyclo hexane Loss	72
Total	**20169**			**20169**

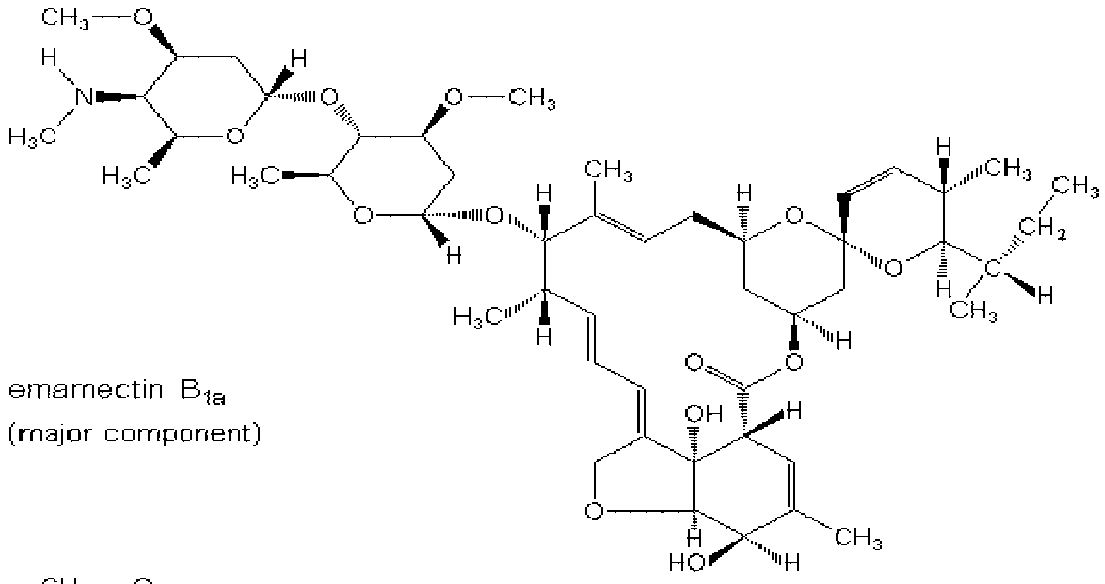
(17) Emamectin

Manufacturing Process:

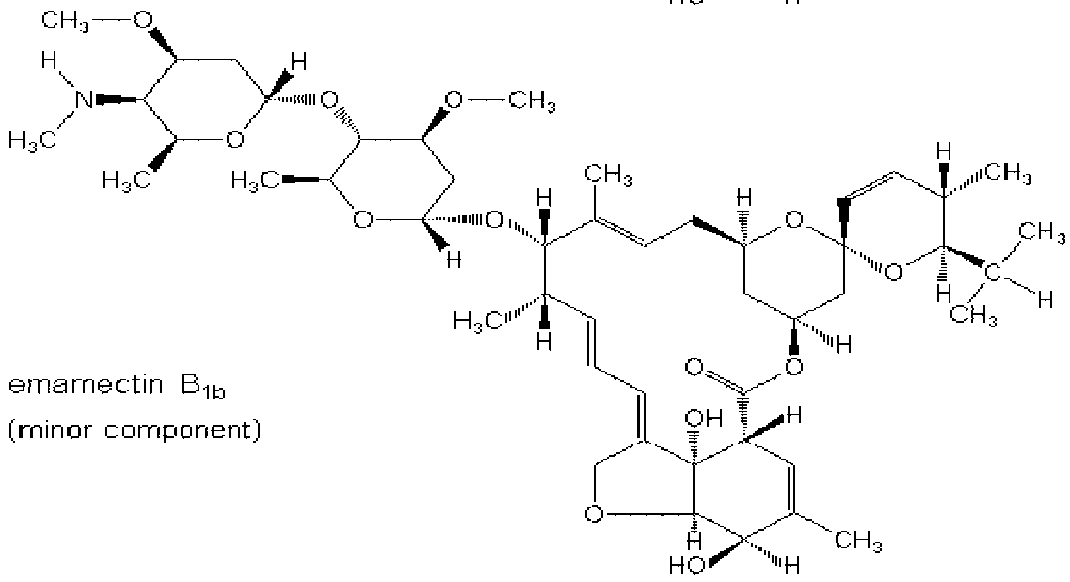
It is a composite mixture of 90% emamectin B1a and 10% emamectin B1b as their benzoate salts. It is isolated from fermentation of streptomycess avermitis with an anthelminic and acaricidal. Then methylamine is added in the mixture. Finally benzoate salt is prepared by reaction with methyl benzoate.

The molecular formula is as below:

C49H75NO13 (emamectin B1a) + C48H73NO13 (emamectin B1b)



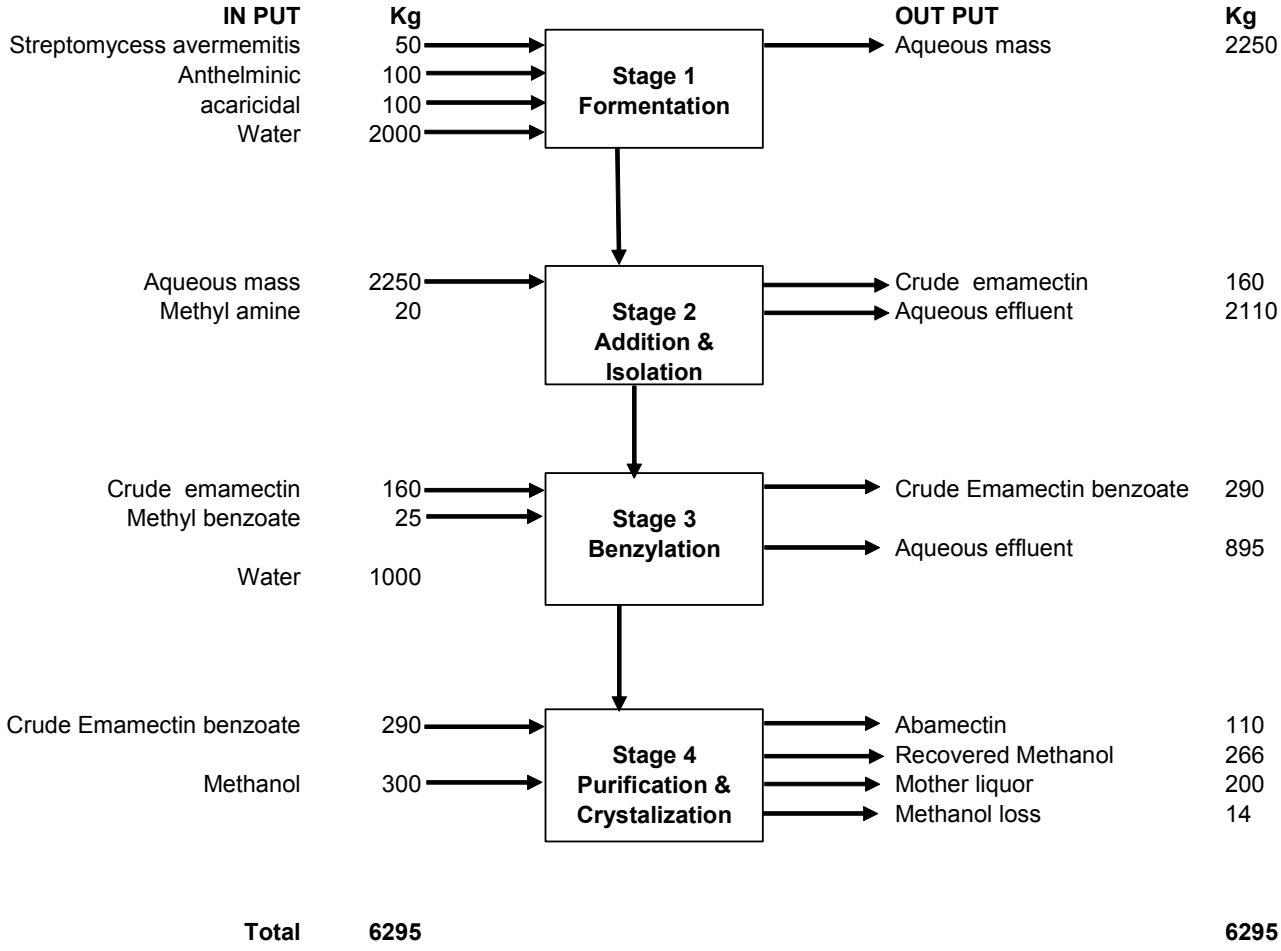
emamectin B_{1a}
(major component)



emamectin B_{1b}
(minor component)

Flow diagram & Mass Balance:

Mass balance of Emamectin benzoate



Total	**6295**		**6295**

(18) Fipronil

Manufacturing Process:

STEP – I: Fipronil Pyrazole to Fipronil Thicyanate (FPP to FPT):

- Fipronil Pyrazole and Ammonium Thiocyanate are condensed in the presence of oxidant Oxone® and MeOH as solvent.
- Reaction is completed in 3.0 hrs at 39 – 40 °C.
- An inorganic salt is filtered, washed with MeOH and dried.
- MeOH is recovered from filtrate partially under reduced pressure. Recovered MeOH is recycled.
- Partially concentrated mass is dumped in to water at RT. Stirred for 3 – 4 Hrs at RT.
- Product (FPT) is filtered at RT and washed with water.
- Product (FPT) is dried at 50 °C till constant weight is obtained.

STEP – II: Fipronil Thicyanate to Desoxy Fipronil (FPT to DOF):

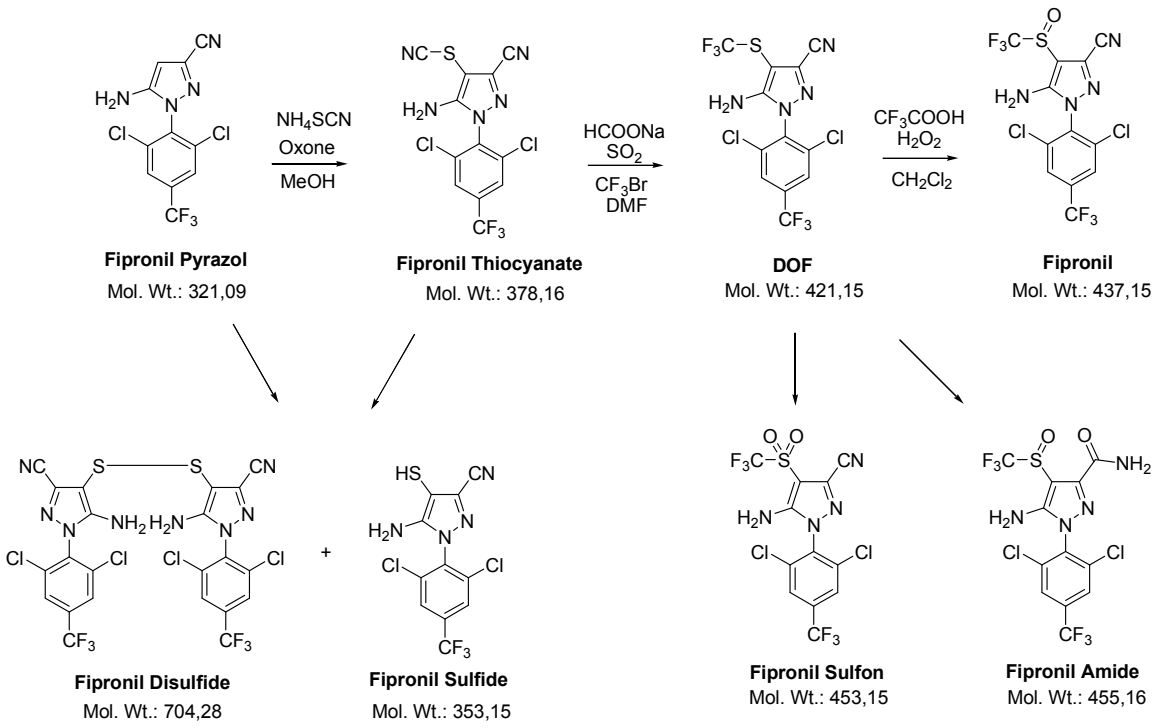
- Fipronil Thiocyanate and CF3Br are reacting in the presence of SO2 (g), Sodium formate and DMF as solvent.
- Reaction is carried out under pressure in Auto clave at 70°c.
- Reaction mixture is cooled down at 40 °C.
- The pressure in autoclave is released and scrubbed in 7 % NaOCl soln.
- Reaction mass is transferred to mixture of water + Isopropyl acetate solution and stirred for ½ hrs at RT.
- Organic and Aq. phases are separated. Aq. phase is extracted with IPAc and then treated with NaOCl solution and incinerated.
- Combined organic phase is washed with water. Washed organic phase taken for partial IPAc recovery under reduced pressure. Recovered IPAc is recycled. Partial concentrated mass is taken for crystallization.
- Product is crystallized out and filtered out and dried.
- Mother liquor is subjected for isopropyl acetate recovery. Reco. IPAc is recycled and organic residue is incinerated.

STEP – III: Des-oxy Fipronil to Fipronil (DOF to FP):

- Des-Oxy Fipronil, Trifluoro acetic acid and chloro benzene are mixed at RT.
- H_2O_2 is added for 30 min. at low temperature.
- After completion of reaction chloro benzene is charged and CF3COOH is distilled out.
- Product is crystallized out in Ethanol and water, filtered and dried.

Chemical Reaction:

Fipronil Synthesis - Step 1 to 3 - and possible impurities



/MN

Flow diagram & Mass Balance:

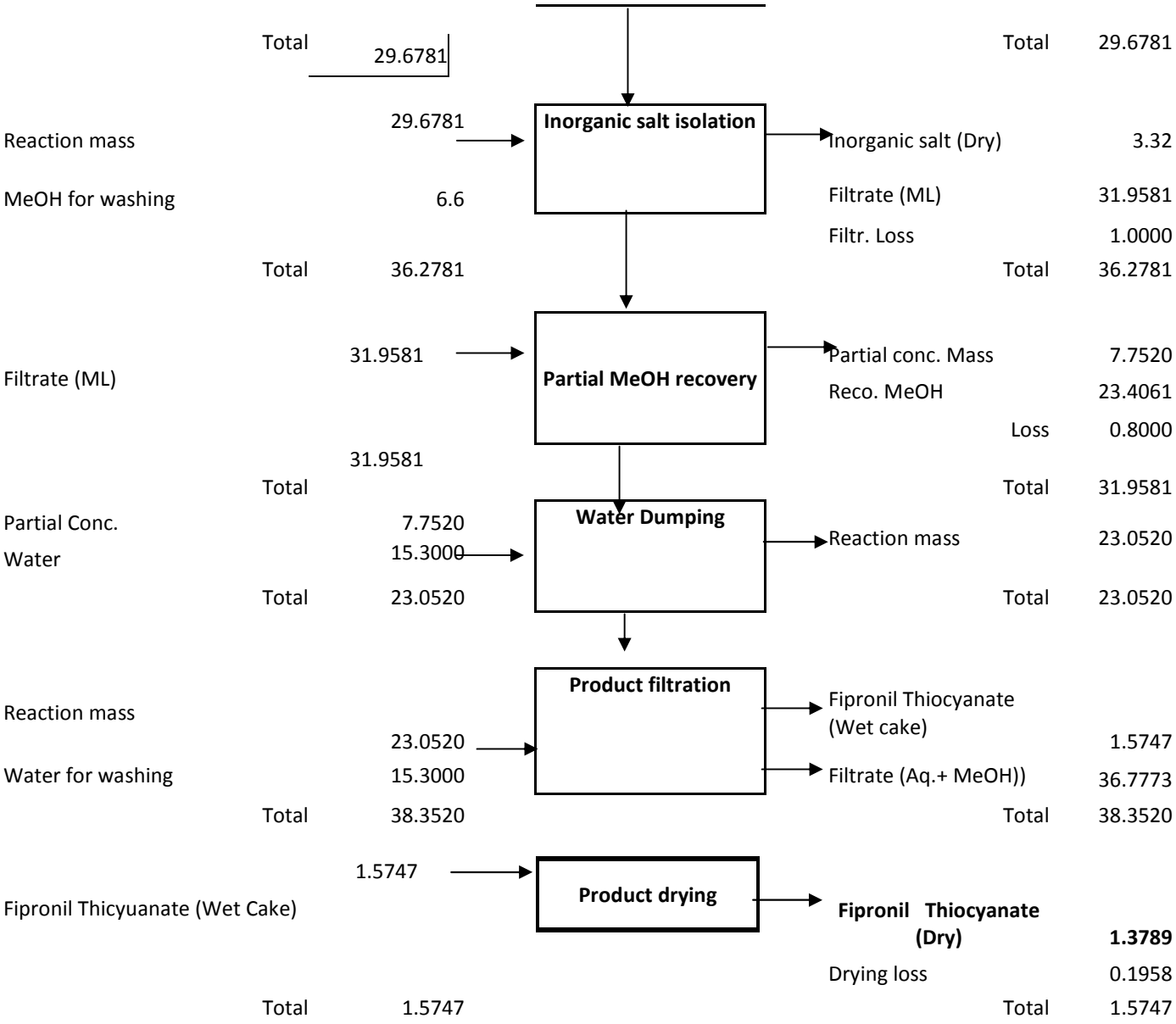
INPUT **OPERATIONS** **OUTPUT**

STEP - I: Fipronil Pyrazole to Fipronil Thiocyanate:

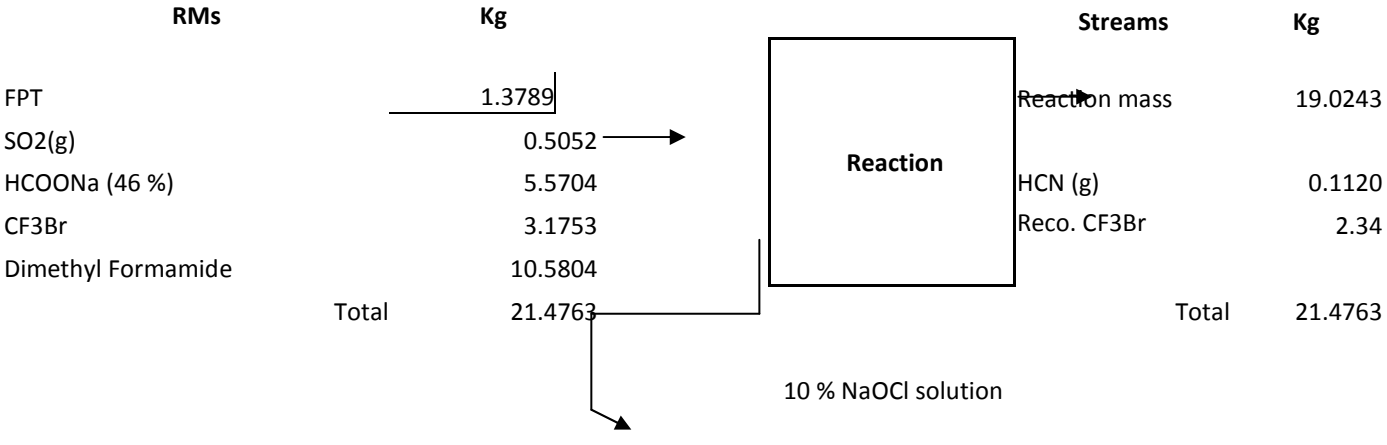
RMs	Kg
Fipronil Pyrazole (95 %)	1.2632
NH4SCN (98.5 %)	0.8089
Oxone®	3.906
MeOH	23.7

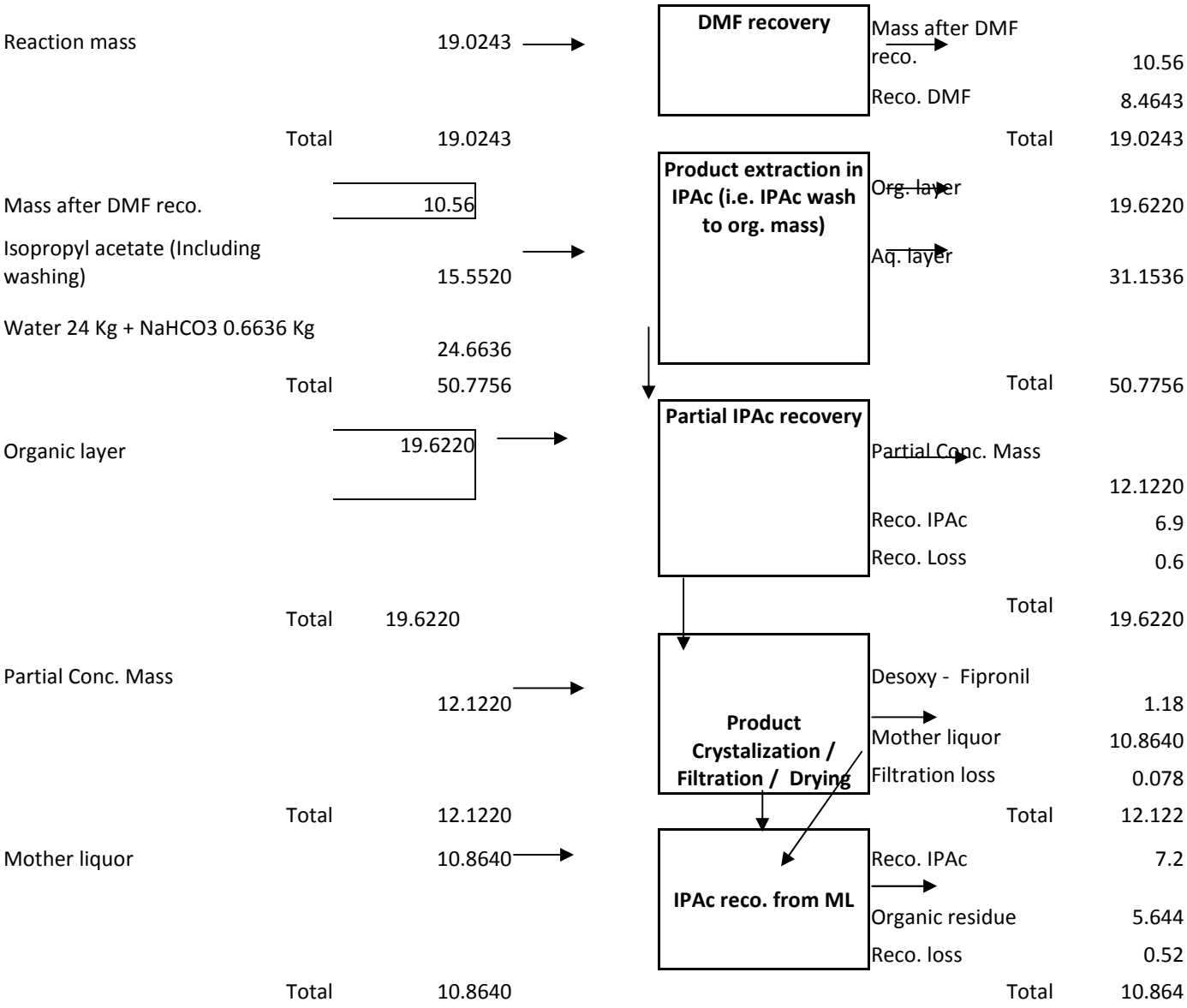
→ **Oxidation / Condensation** →

Streams	Kg
Reaction mass	29.6781

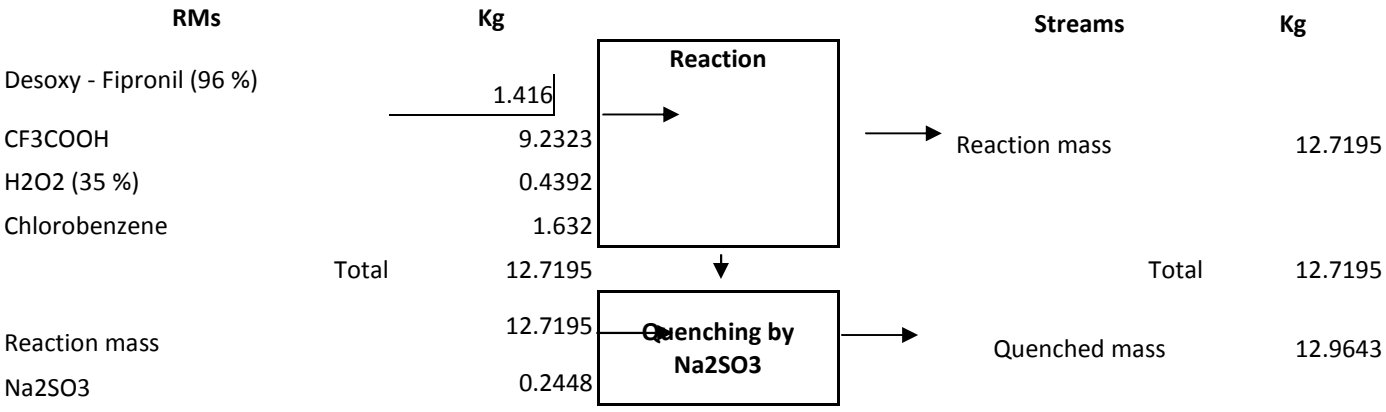


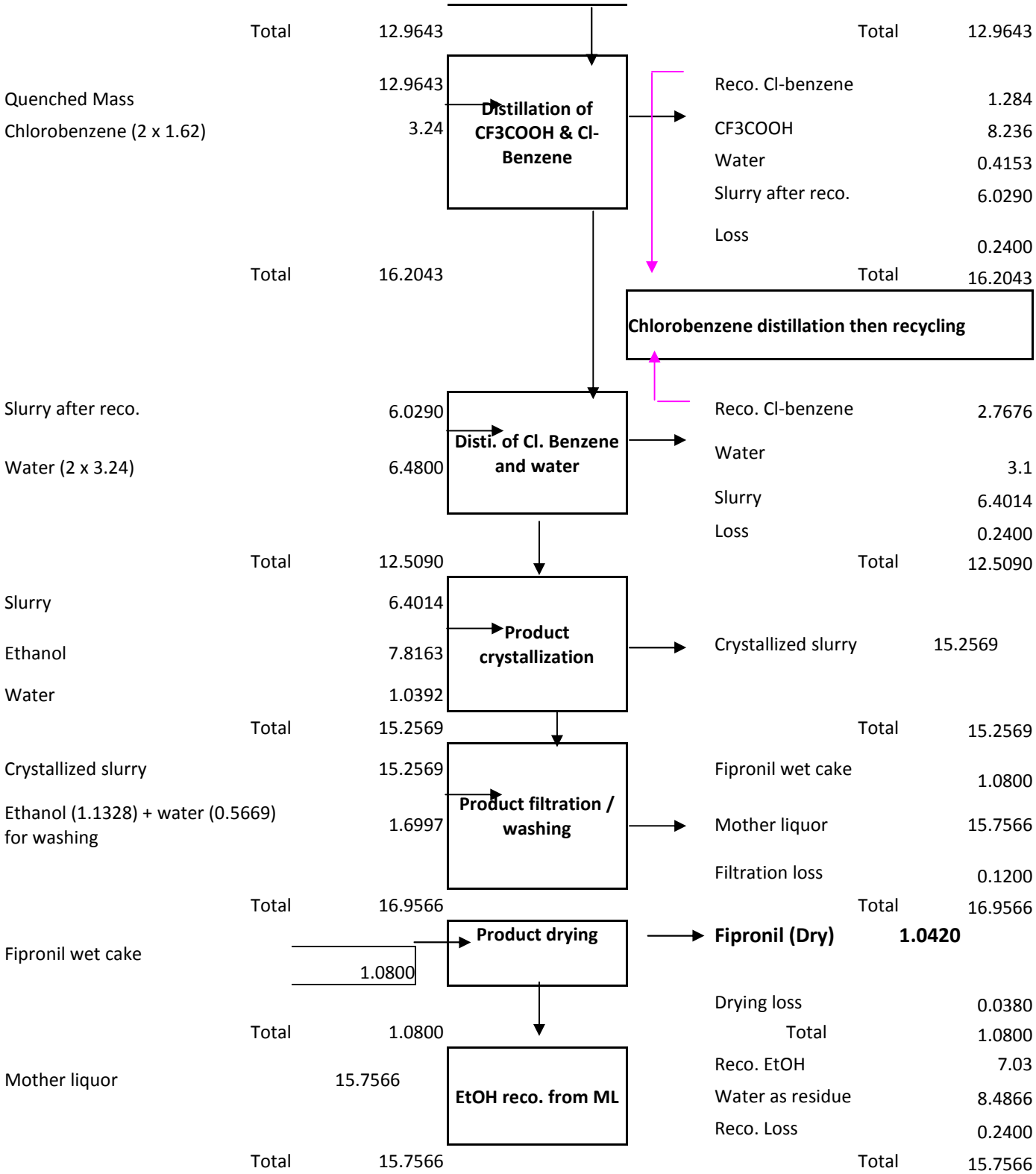
STEP - II: Fipronil Thiocyanate to Desoxy-Fipronil:





STEP - III: Desoxy-Fipronil to Fipronil:




Total 12.9643
12.9643
Quenched Mass
Chlorobenzene (2 x 1.62) 3.24
Distillation of CF3COOH & Cl-Benzene
Reco. Cl-benzene 1.284
CF3COOH 8.236
Water 0.4153
Slurry after reco. 6.0290
Loss 0.2400
Total 16.2043
Total 12.9643
Total 16.2043
Chlorobenzene distillation then recycling
Slurry after reco. 6.0290
Water (2 x 3.24) 6.4800
Disti. of Cl. Benzene and water
Reco. Cl-benzene 2.7676
Water 3.1
Slurry 6.4014
Loss 0.2400
Total 12.5090
Total 12.5090
Slurry 6.4014
Ethanol 7.8163
Water 1.0392
Product crystallization
Crystallized slurry 15.2569
Total 15.2569
Total 15.2569
Crystallized slurry 15.2569
Ethanol (1.1328) + water (0.5669) for washing 1.6997
Product filtration / washing
Fipronil wet cake 1.0800
Mother liquor 15.7566
Filtration loss 0.1200
Total 16.9566
Total 16.9566
Fipronil wet cake 1.0800
Product drying
Fipronil (Dry) 1.0420
Drying loss 0.0380
Total 1.0800
Total 1.0800
Mother liquor 15.7566
EtOH reco. from ML
Reco. EtOH 7.03
Water as residue 8.4866
Reco. Loss 0.2400
Total 15.7566
Total 15.7566

(19) Hexaconazole

Manufacturing Process:

Stage 1

Charge 2,4-Dichloro valero phenol and Dimethyl sulphide in the reactor and stir for 30 minute and charge Dimethyl sulphate slowly in the reaction mass in 2-3 hrs. Maintain the temperature for 5 hrs and check the sample for reaction for Valero phenol content. After reaction is complete, add KOH flakes slowly. Maintain the reaction mass for 4 hrs until the reaction is complete.

Stage 2

Charge oxarine, Dimethyl formamide, 1,2,4-Trizole and K_2CO_3 in the reactor and maintain the reaction for 3 hrs at high temperature until the reaction is complete.

Stage 3

Recover DMF under vacuum partially.

Stage 4

Wash the reaction mass with water.

Stage 5

Add heptane in the crude Hexaconazole and stir for 2 hrs. Cool the reaction mass and filter the Hexaconazole.

Stage 6

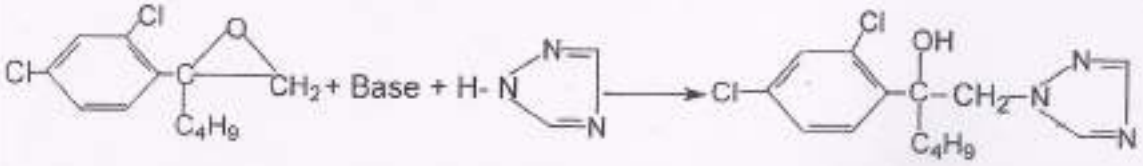
Dry the product Hexaconzole in drier.

Chemical Reaction:

Stage 1:

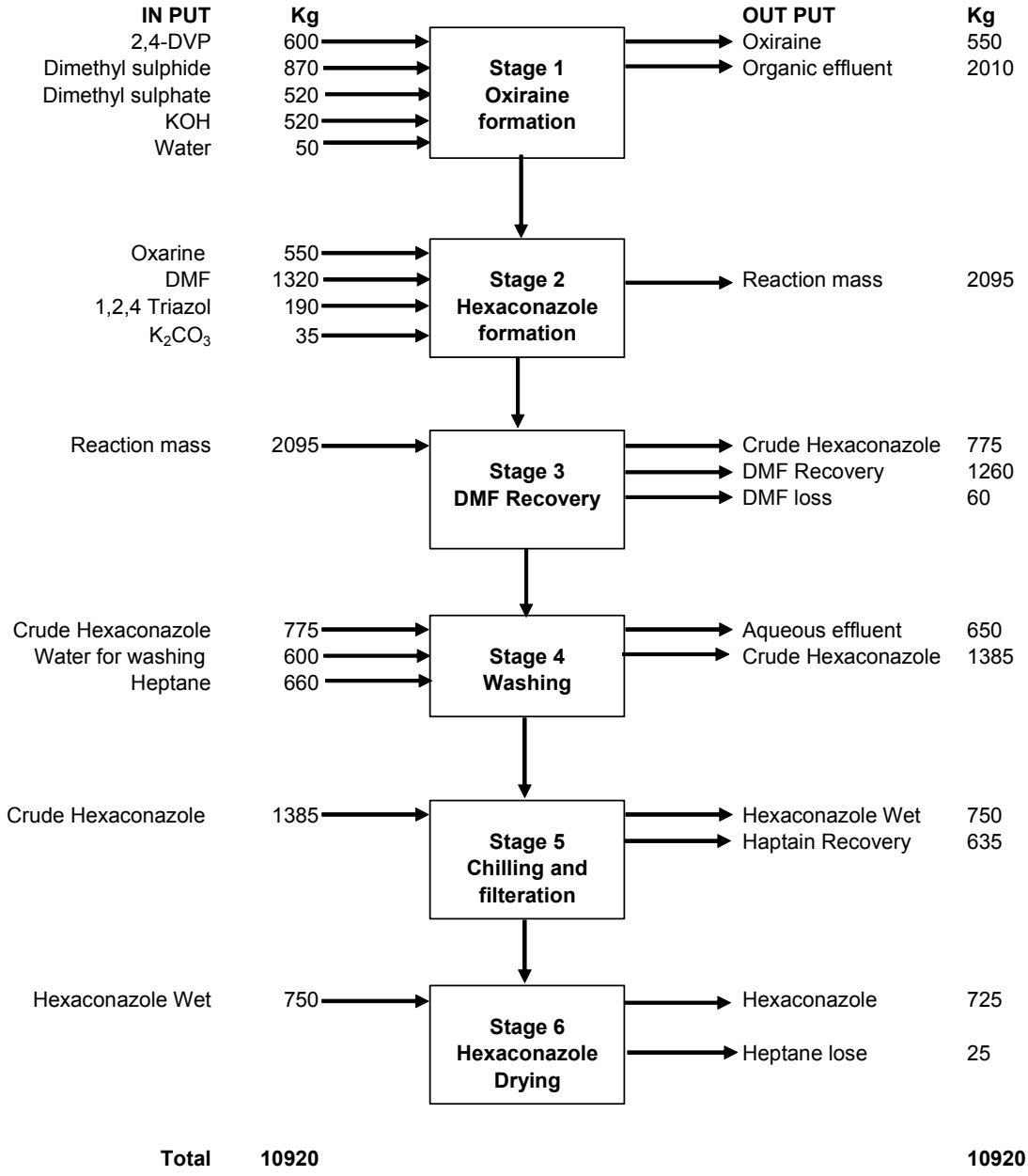
Stage 2:

Stage 3:



Flow diagram & Mass Balance:

Mass balance of Hexaconazole



(20) Imazethapyr

Manufacturing Process:

Stage 1

5-ethyl-3-pyridine carboxylic acid (EPCA) is reacted with 4,5 Dihydro-4 methyl 4 (1 methyl ethyl)-5-oxo-1 H-imidazoline in present of catalyst and DMF solvent. The Hydrochloric acid, which is formed during the reaction, is scavenged by putting Sodium carbonate as acid scavenger.

Stage 2

The resulting mass is diluted by water and filtered to remove the salts of Sodium Chloride (NaCl) & Sodium bicarbonate. The organic mass is then treated with water and finally solvent is removed by distillation.

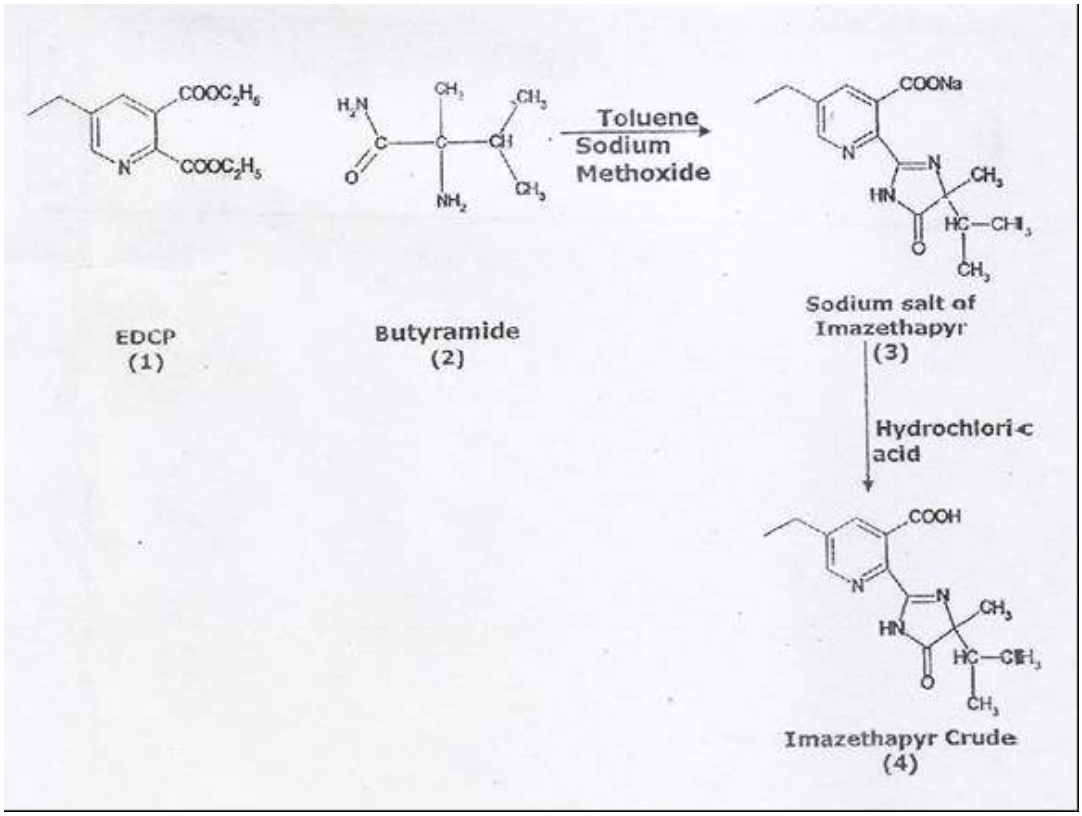
Stage 3

The concentrated mass is then crystallized to get pure product – Imazethapyr technical.

Stage 4

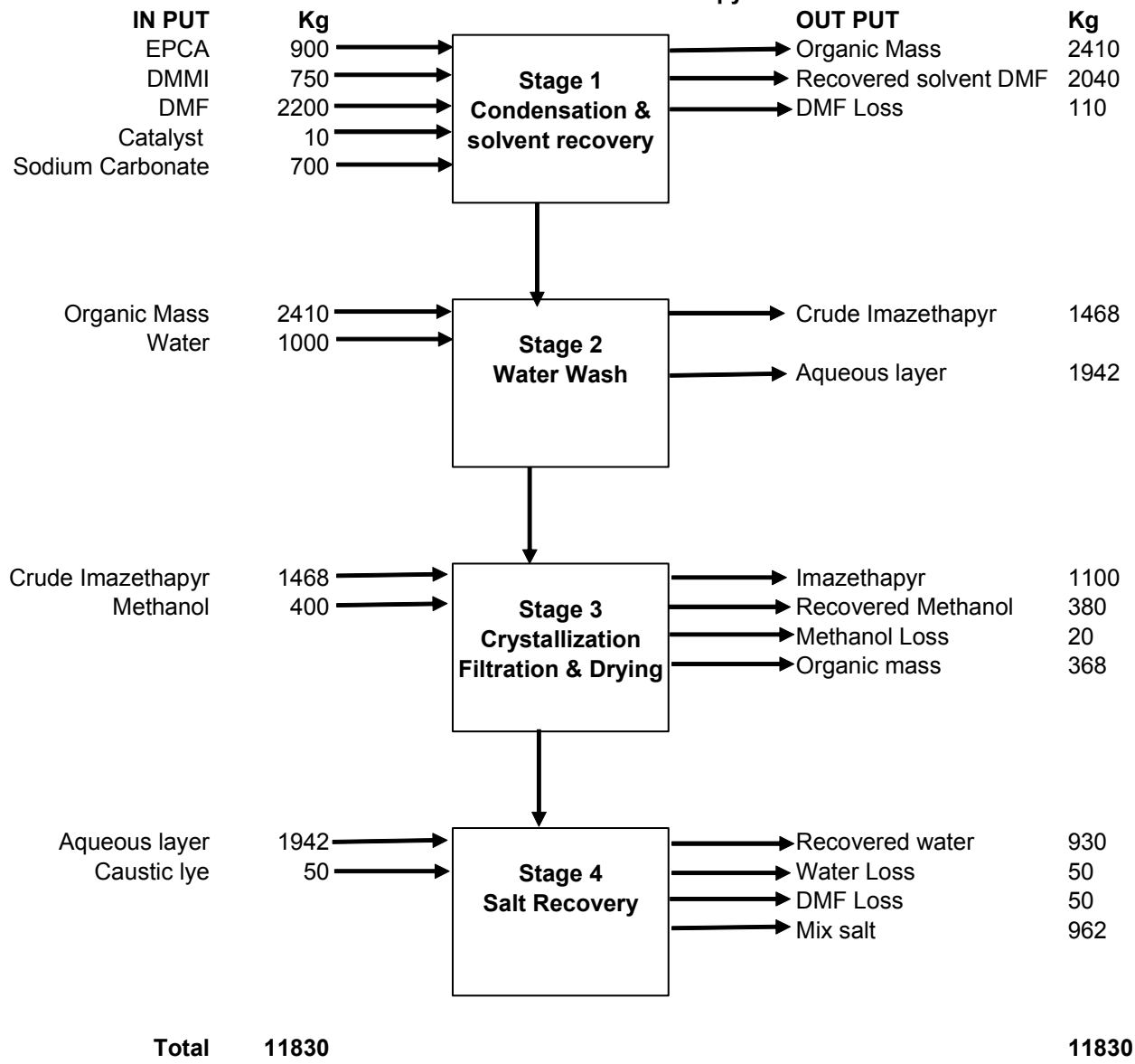
Finally toxic effluent, which contains traces of pesticides, is taken to hydrolysis stage for detoxification. Where aqueous mass is treated at high temperature by Alkali for the rapid hydrolysis of pesticides to simpler non-toxic compounds.

Chemical Reaction:



Flow diagram & Mass Balance:

Mass balance of Imazethapyr



(21) Imidacloprid

Manufacturing Process:

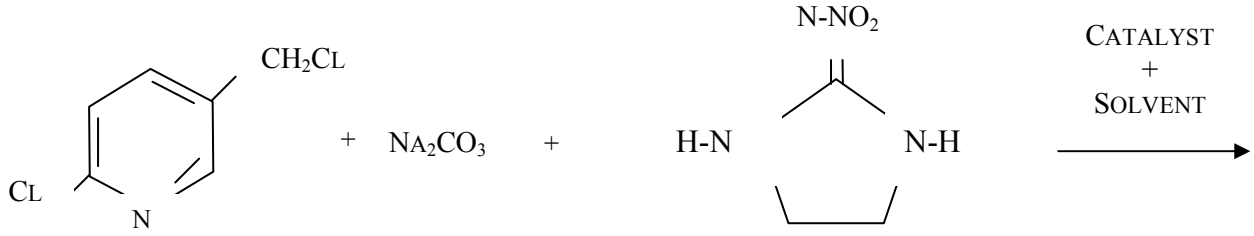
2 – Chloro, 5 – Chloro methyl Pyridine (CCMP) is reacted with N – Nitro imino Idmidazolidine (N-Nll) in present of catalyst and solvent.

The Hydrochloric acid, which is formed during the reaction, is scavenged by putting Sodium carbonate as acid scavenger. The resulting mass is diluted by water and filtered to remove the salts of Sodium Chloride (NaCl) & Sodium bicarbonate.

The organic mass is then treated with water and finally solvent is removed by distillation. The concentrated mass is then crystallized to get pure product – Imidacloprid (Tech).

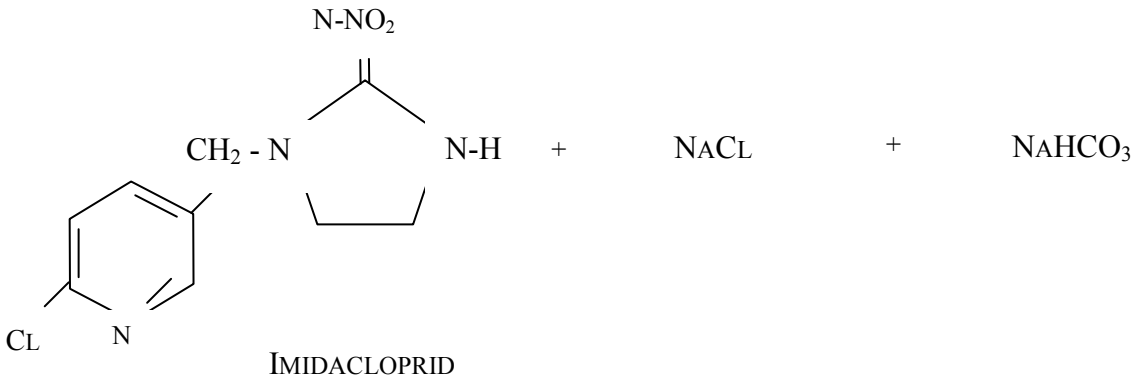
Finally Toxic Effluent which contains traces of Pesticides is taken to Hydrolysis stage for detoxification. Where aqueous mass is treated at high temperature. By Alkali for the rapid hydrolysis of pesticides to simpler non-toxic compounds.

Chemical Reaction:



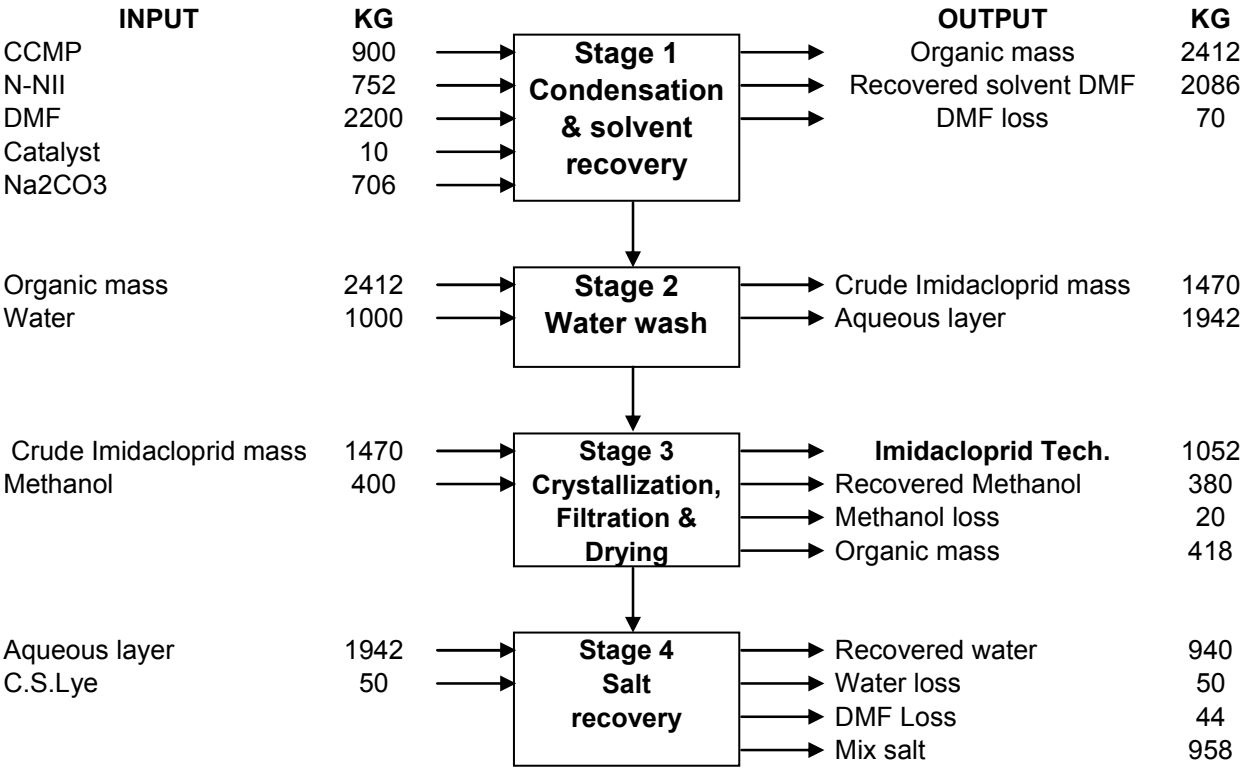
CCMP
M.W.162

N-NII



IMIDACLOPRID

Flow diagram & Mass Balance:



(22) Indoxacarb

Manufacturing Process:

Stage 1

Charge Monoglyme, NaH 60% and Chloromethyl formate in the reaction vessel. Stir the reaction mass for 2-3 hrs. Charge oxadiazine carboxylate slowly in the reaction mass in 3-4 hrs and stir the reaction mass until reaction is complete.

Stage 2

After completion of the reaction, recover Monoglyme under vacuum.

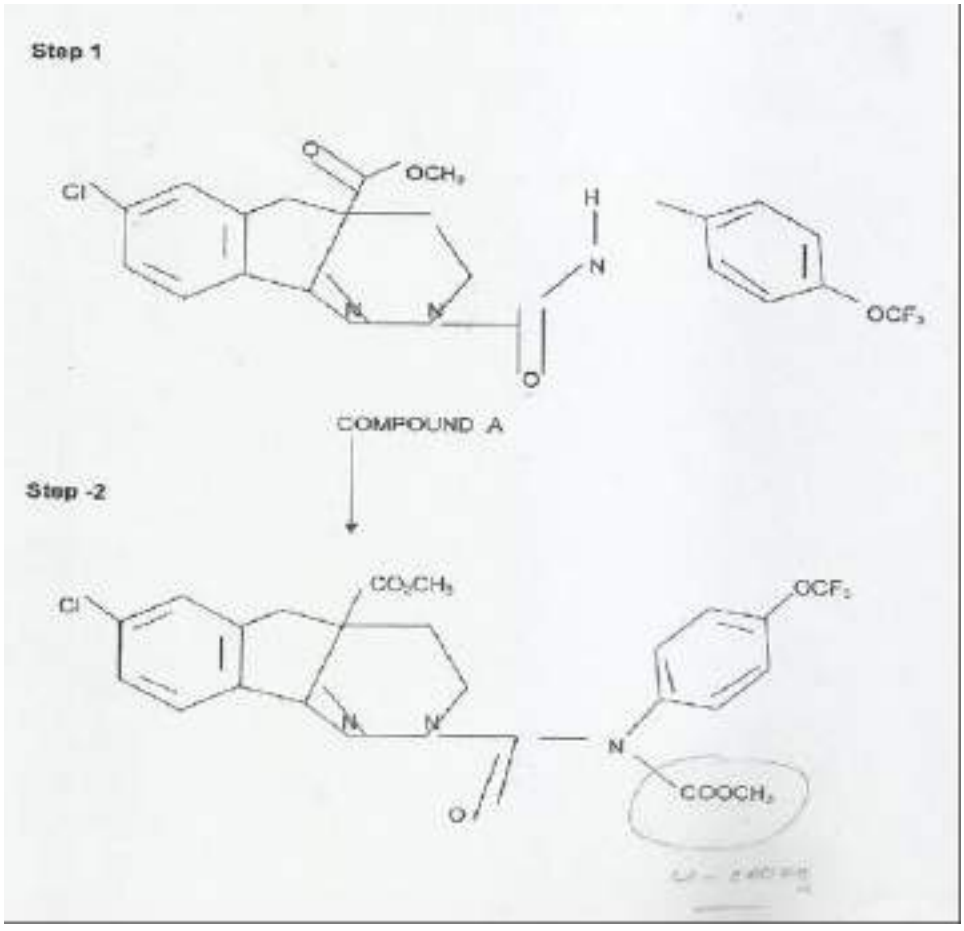
Stage 3

After Monoglyme recovery, acidify the material with Hydrochloric acid-1N and separate organic layer. Add MDC in the crude indoxacarb

Stage 4

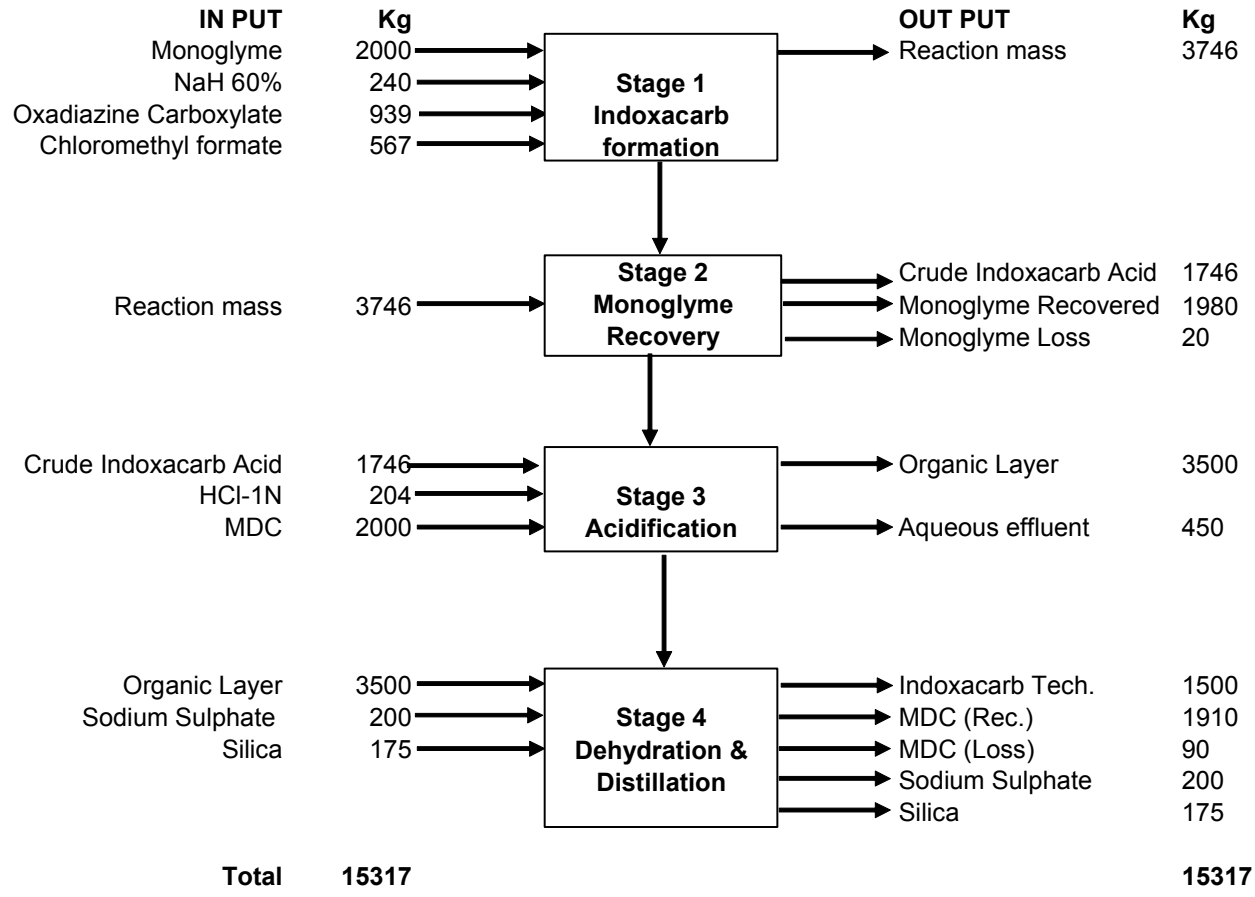
After acidification of reaction mass, dehydration is done with sodium sulphate and silica. Recover MDC under vacuum and filter the crystals. Dry the wet product.

Chemical Reaction:



Flow diagram & Mass Balance:

Mass balance of Indoxacarb



(23) Ipconazole

Manufacturing Process:

Stage 1

Charge cyclopentanol and Dimethyl Sulphide in the reactor and stir for 30 minute and charge 4-Chloro Benzyl Chloride slowly in the reaction mass 2-3 hrs and maintain the temperature for 3 hrs and check the sample for reaction complete. After reaction is complete add KOH flakes slowly. Maintain the reaction mass for 4 hrs until the reaction is complete.

Stage 2

Charge intermediate Dimethyl Formamide, 1,2,4-Trizole, K_2CO_3, Iso propanol and PFA in the reactor and maintain the reaction for 3 hrs at high temperature until the reaction is complete.

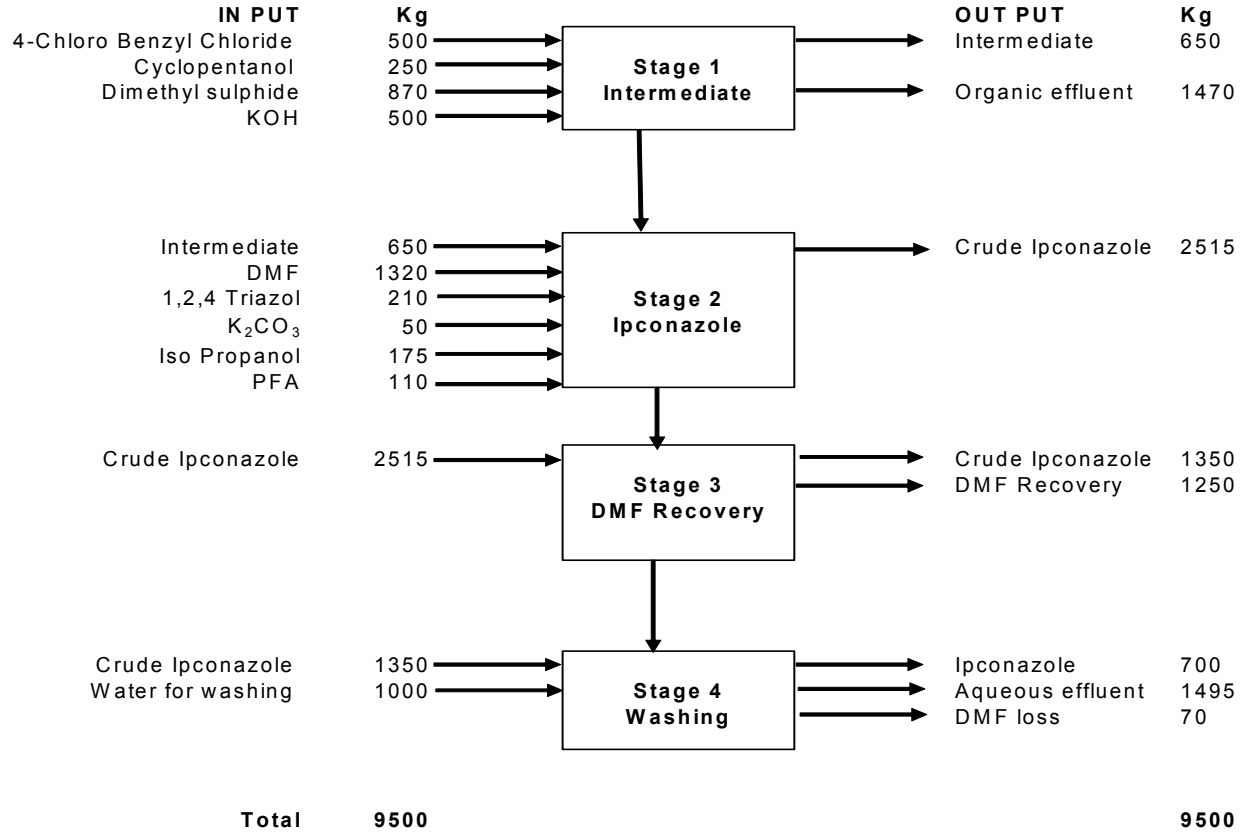
Stage 3

Recover DMF under vacuum partially.

Stage 4

Wash the reaction mass with water. Wet Ipconazole drying in drier.

Mass balance of Ipconazole



(24) Lambda Cyhalothrin

Manufacturing Process:

Meta Phenoxy Benzaldehyde is reacted with Sodium Cyanide to form Meta Phenoxy Benzaldehyde Cyanhydrin as an intermediate. This on reaction with Fluoro Propenyl Acid Chloride (TFP Acid Chloride) form the Product Cyhalothrin. in this process n - Hexane is used as solvent along with phase transfer catalyst.

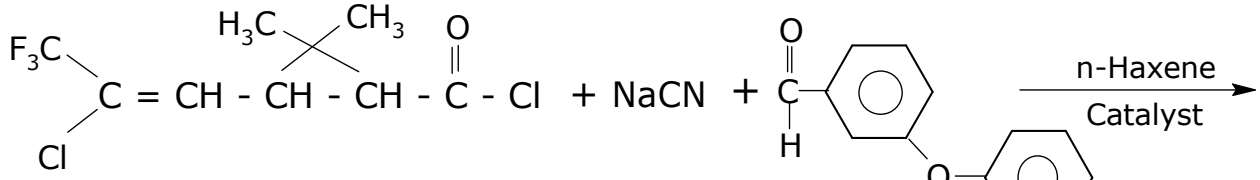
The reaction mass of Cyhalothrin is washed by Soda Ash solution as well as water.

Solvent n-Hexane is stripped off toget pure Cyhalothrin oil. Finally Cyhalothrin oil is epimerised to give Lambda Cyhalothrin of 85%.

An aqueous layer which contains traces of Sodium Cyanide is detoxified by the treatment of Sodium Hypochlorite Solution (8-10%) up to < 0.2 ppm level. Then it is mixed up with main ETP stream for further treatment & finally drained to gutter.

Chemical Reaction:

Lambda Cyhalothrin



Cyhalothrin

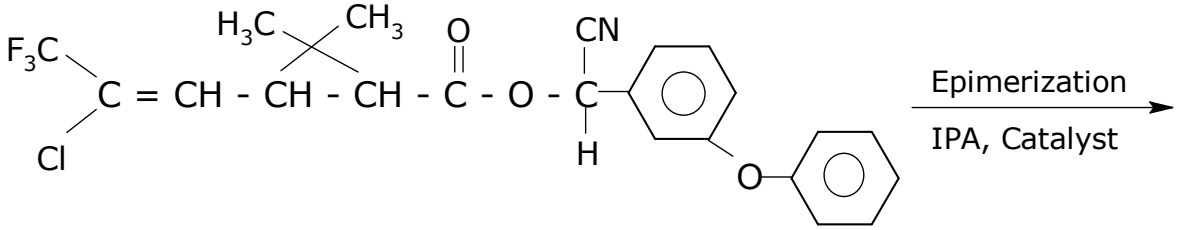
(MW- 449.9)

Sodium Cyanide

(MW- 49.1)

Meta Phenoxy Benzaldehyde

(MW- 198)



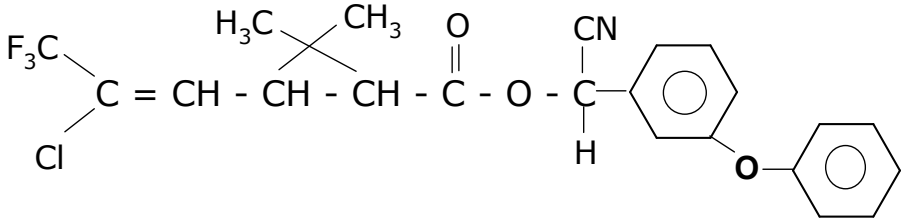
Cyhalothrin

(MW- 449.9)

+ NaCl

Sodium Chloride

(MW- 58.5)

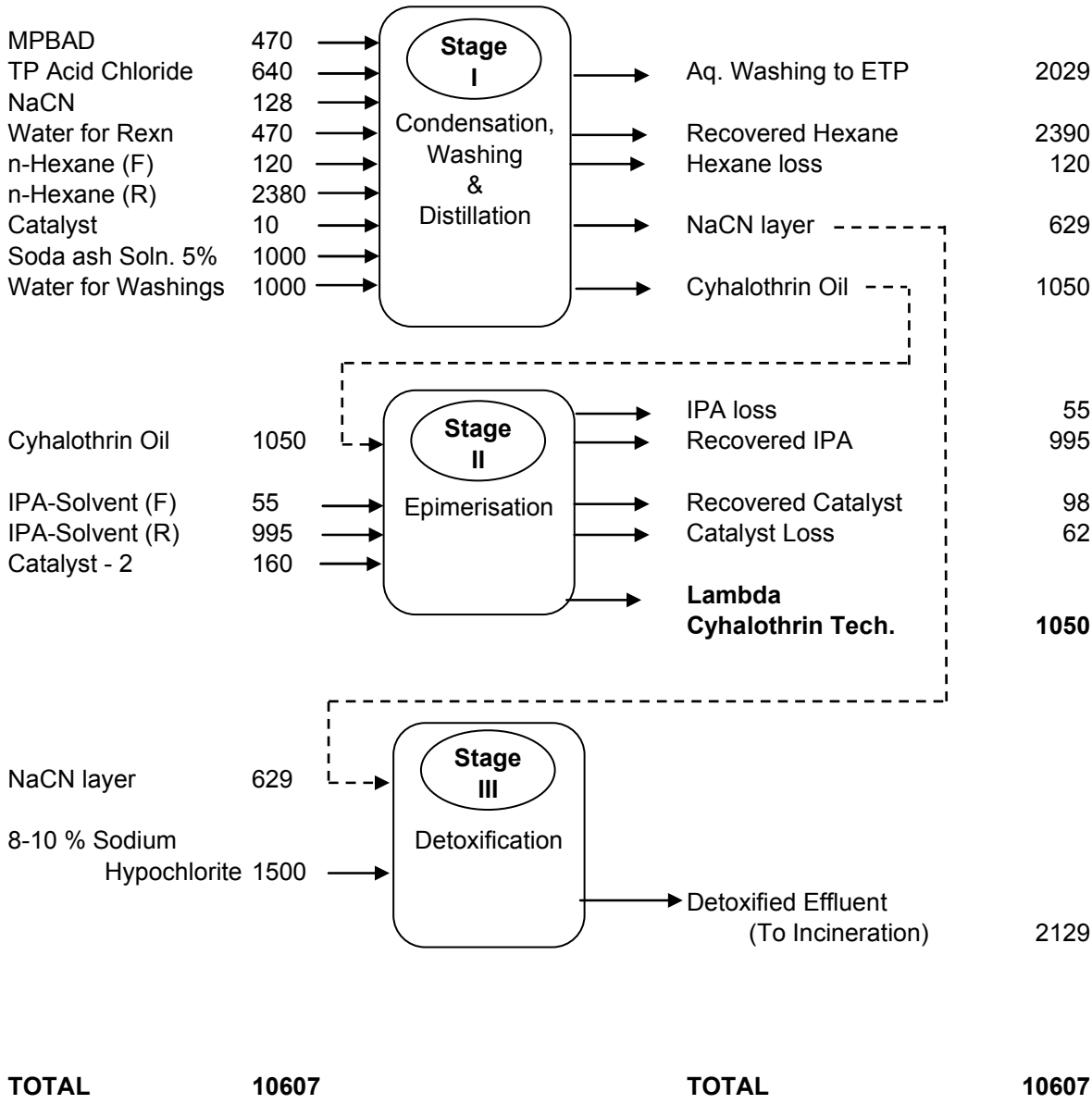


Lambda Cyhaloyhrin

(MW- 449.9)

Flow diagram & Mass Balance:

Lambda Cyhalothrin



TOTAL	**10607**	**TOTAL**	**10607**

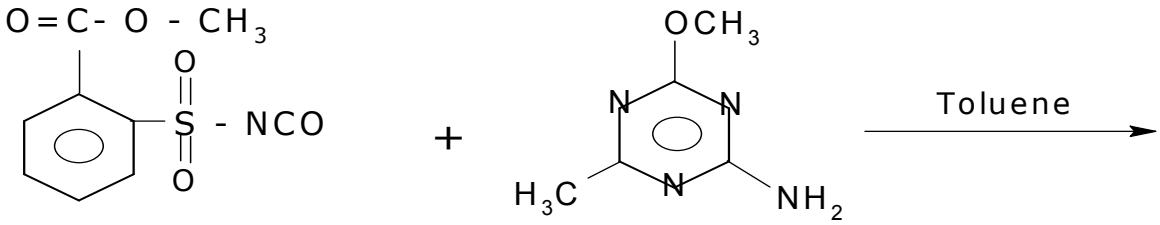
(25) Met sulfuron methyl

Manufacturing Process:

O-sulfo isocyante Methyl Benzoate reacts with 2-Amino 4-Methoxy 6-Methyl 1,3,5 Triazine in presence of Solvent-Toluene. Since this reaction is addition reaction, no Bi-Product of Effluent is generated. On coling crystal form which is filtered out and solvent distilled out and recycled.

Chemical Reaction:

Metsulfuron Methyl (Tech.)

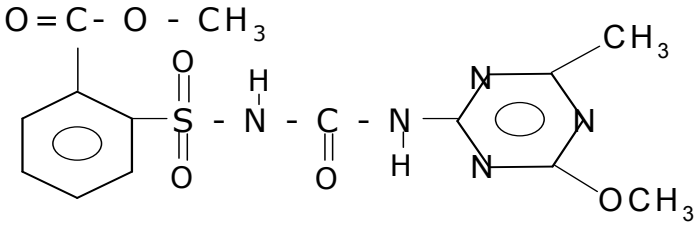


O- sulfo Iso Cyanate Methyl Benzoate

(MW- 241.4)

2- Amino 4- Methoxy 6-Methyl 1,3,5 Triazine

(MW- 139.97)

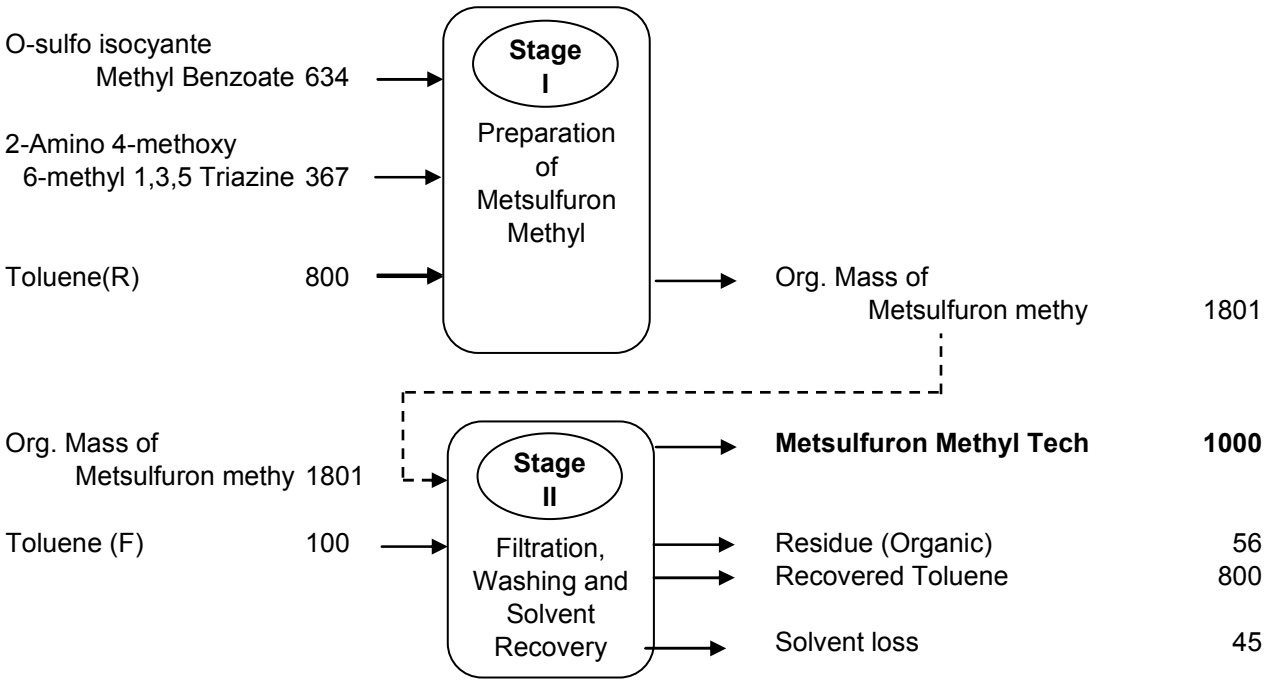


Metasulfuron Methyl

(MW- 381.37)

Flow diagram & Mass Balance:

Met sulfuron methyl



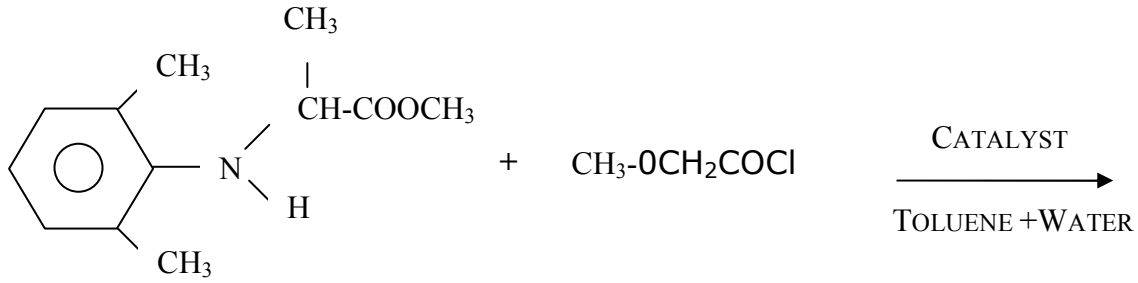
(26) Metalaxyl

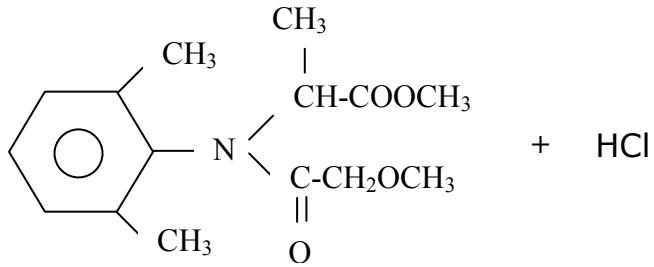
Manufacturing Process:

N-(2, 6 – Dimethyl Phenyl) Alanine – Methyl Ester reacts with Methoxy Acetyl Chloride in presence of catalyst and solvent to get Metalaxyl solution. This solution is then wasted with water & solvent is distilled out to get Metalaxyl (Tech).

Finally Toxic Effluent which contains traces of Pesticides is taken to Hydrolysis stage for detoxification Where Aqueous Mass is treated at high temp. By Alkali for the rapid hydrolysis of pesticides to simpler non-toxic compounds.

Chemical Reaction:





\+ HCl

METALXYL

Flow diagram & Mass Balance:

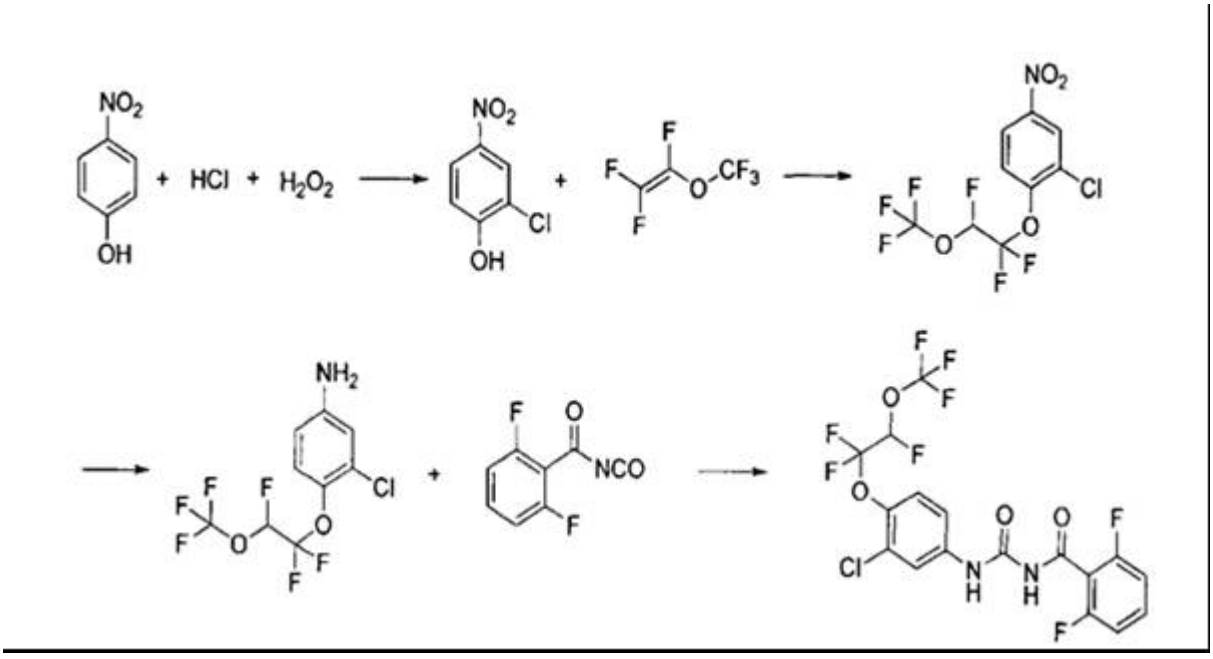
INPUT	KG		OUTPUT	KG
N-(2,6- Dimethyl phenyl) alanine-methyl ester	765	Stage 1 Preparation	Organic mass	3270
methoxy acetyl chloride	405			
Catalyst	15		Aqueous Effluent	80
Toluene	2250			
Water for washing	50		30% HCl solution	447
Water for HCl scrubbing	312			
Organic mass of	3270	Stage 2 Solvent recovery	**Metalaxyl Tech.**	1020
			Recovered solvent	2140
			Solvent loss	110
Aqueous Effluent	80	Stage 3 Alkali Hydrolysis (Detoxification)	Detoxified Aqueous mass	130
C.S.Lye 48%	50			
Total	**7197**			**7197**

(27) Novaluron

Manufacturing Process:

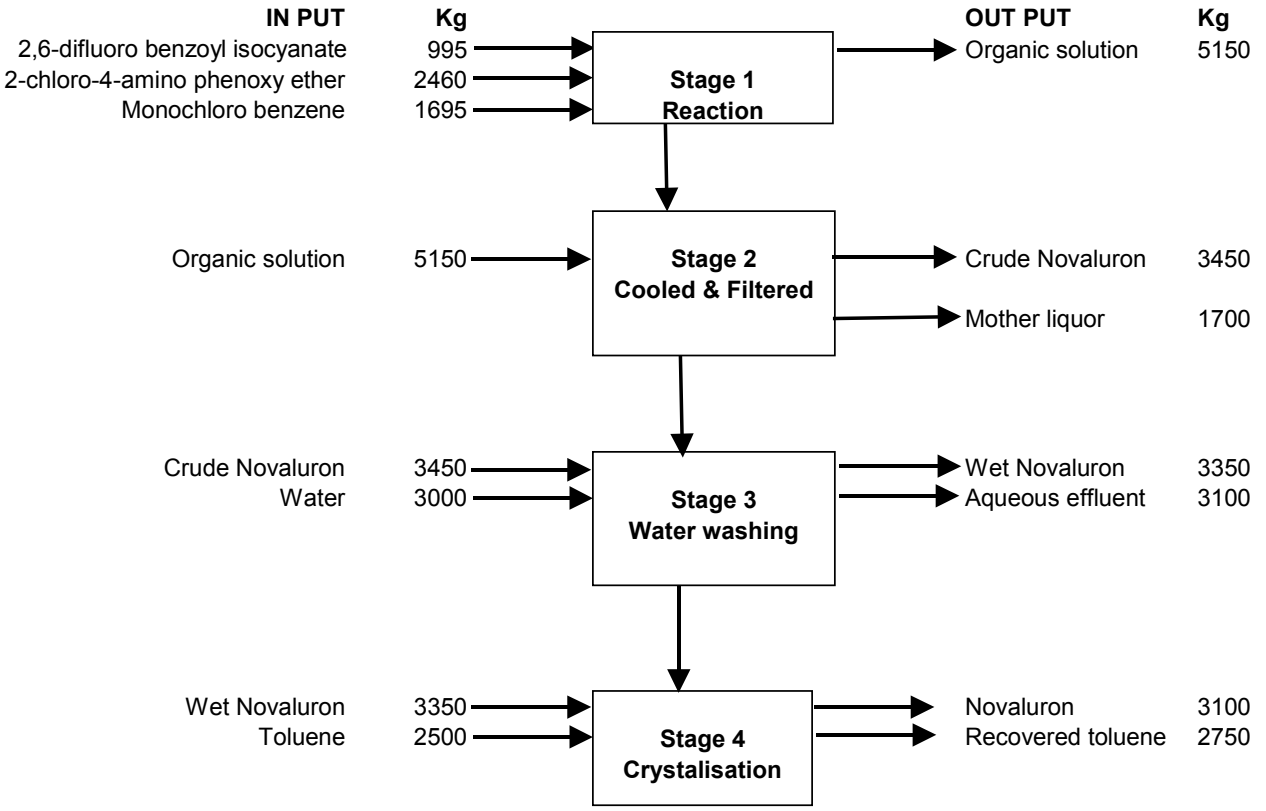
1. Novaluron technical is prepared by reaction of 2,6-difluoro benzoyl isocyanate with 2-chloro-4-amino phenoxy ether in presence of monochloro benzene as a solvent.
2. After completion of the reaction, the reaction mass is cooled, filtered and washed with water.
3. Novaluron wet cake is then recrystallised with toluene, filtered and dried to get Novaluron technical

Chemical Reaction:



Flow diagram & Mass Balance:

Mass balance of Novaluron

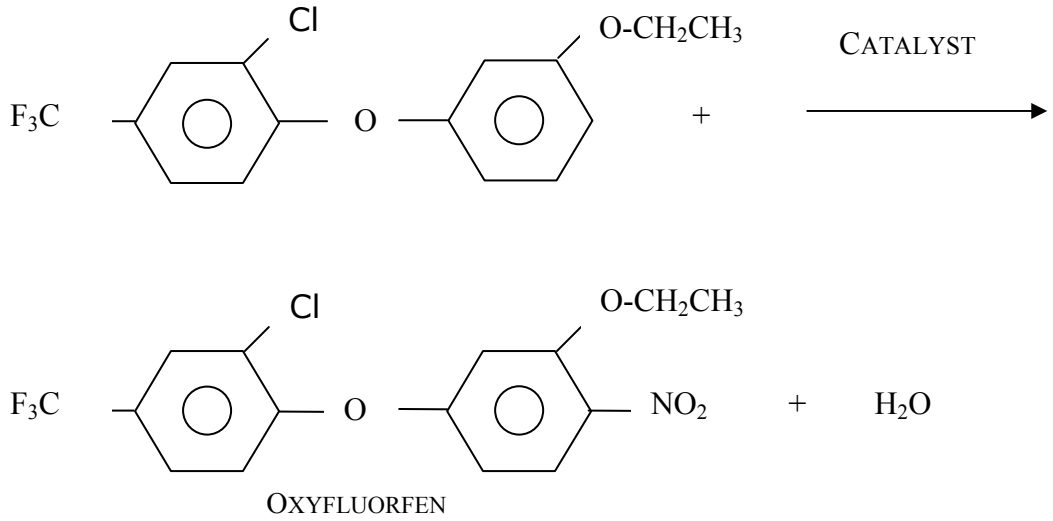


(28) Oxyfluorfen

Manufacturing Process:

2-Chloro Trichloro p-Tolyl 3-Ethoxy phenyl Ether (TFTEPE) reacts with Nitric Acid in presence of Catalyst to get the finished product Oxyfluorfen. The slurry formed is cool to room temperature and filtered out to get wet cake which is wash out and dried on dryer to get pure Oxyfluorfen Tech. On cooling crystal form which is filtered out and solvent distilled out and recycled.

Chemical Reaction:



OXYFLUORFEN

Flow diagram & Mass Balance:

INPUT	KG		OUTPUT	KG
2-Chloro ααα- Trichloro p-tolyl 3- Ethoxy phenyl Ether	886	→ Stage 1 Preparation of Oxyfluorfen →	Organic mass of Oxyfluorfen	1246
Nitric acid	255	→		
Catalyst	5	→		
H2SO4	100	→		
Organic mass of Oxyfluorfen	1246	→ Stage 2 Filtration & Solvent recovery →	**Oxyfluorfen**	1010
		→	Aqueous spent acid	224
Water	100	→	Water loss on drying	112
Total	**2592**			**2592**

(29) Pacloburazol

Manufacturing Process:

Stage 1

Charge tert-pentan-3-ol in the reactor and stir for 30 minute and charge 4-Chloro Benzyl Chloride slowly in the reaction mass for 2-3 hrs and maintain the temperature for 3 hrs and check the sample for reaction complete. After reaction is complete add KOH flakes slowly. Maintain the reaction mass for 4 hrs until the reaction is complete.

Stage 2

Charge intermediate, Dimethyl Formamide, 1,2,4-Trizole and K2CO3 in the reactor and maintain the reaction for 3 hrs at high temperature until the reaction is complete.

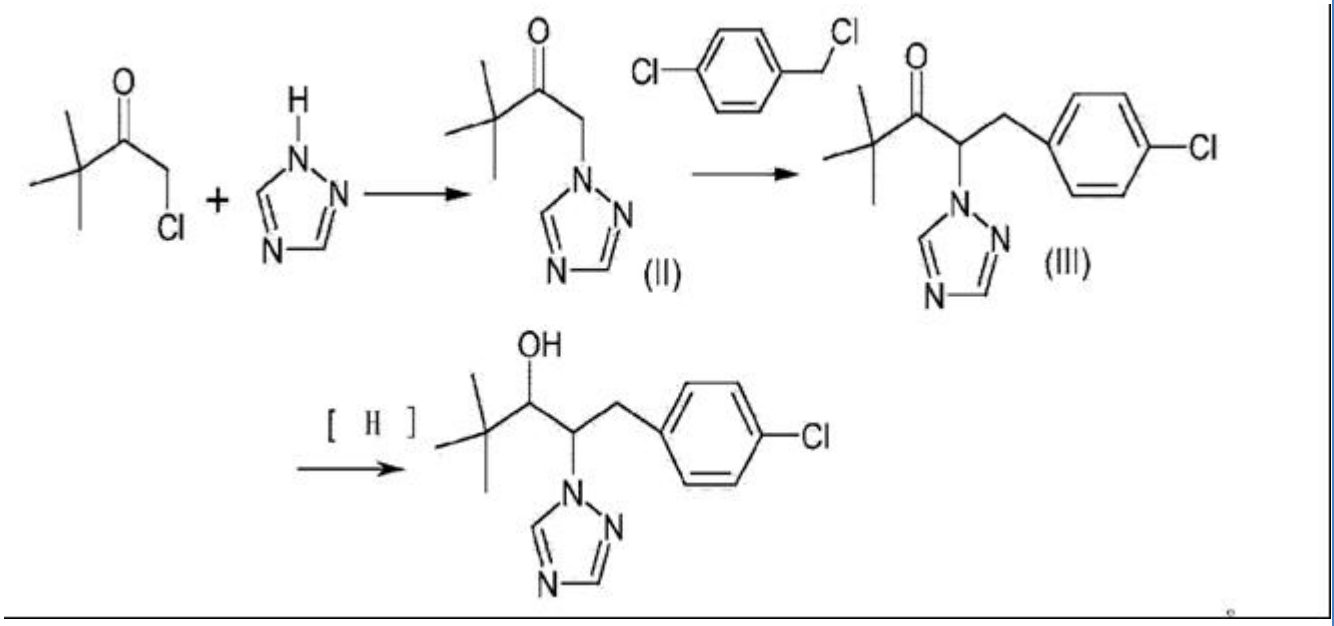
Stage 3

Recover DMF under vacuum partially.

Stage 4

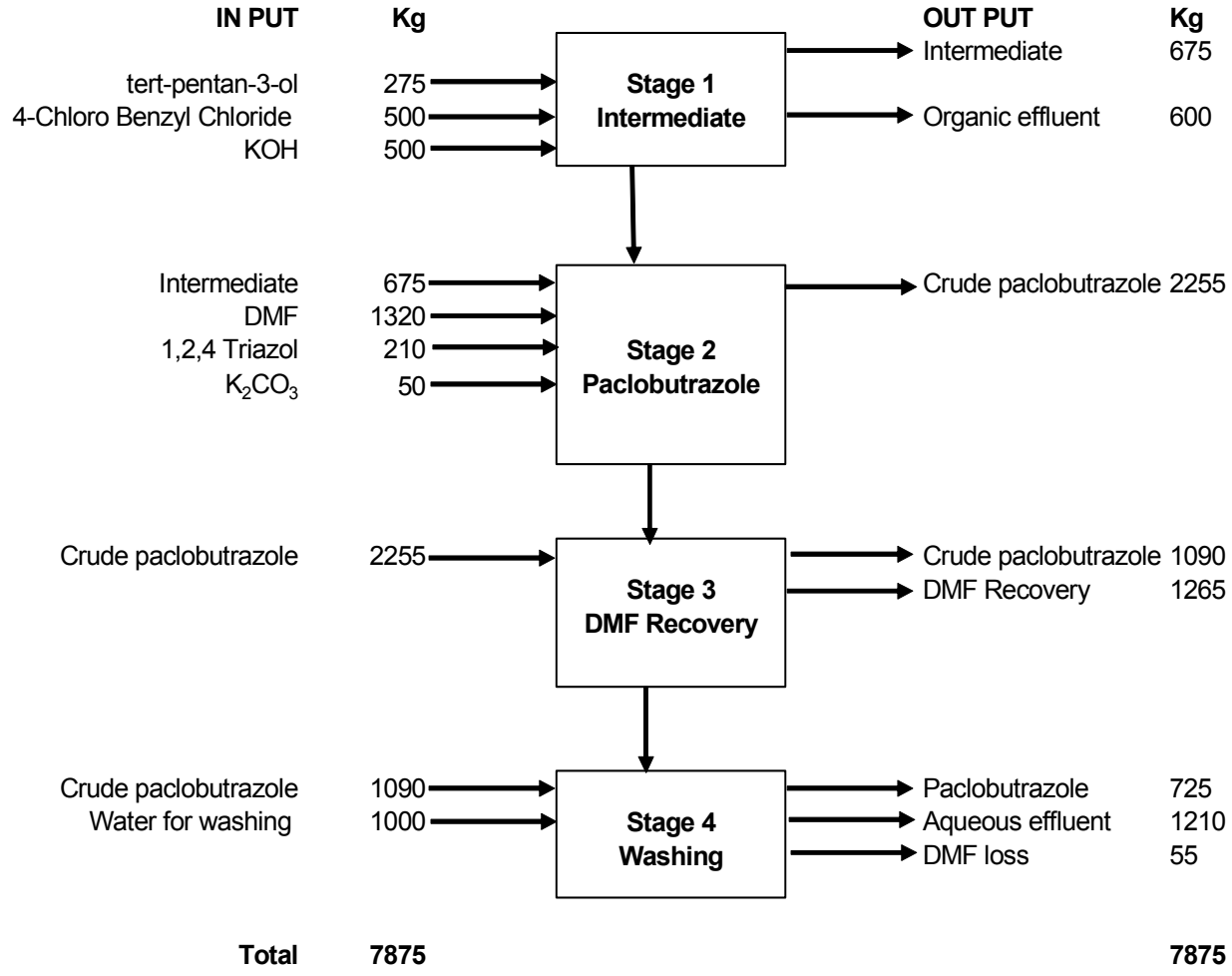
Wash the reaction mass with water. Dry the wet cake of paclobutrazole in drier.

Chemical Reaction:



Flow diagram & Mass Balance:

Mass balance of Paclobutrazole



(30) Paraquate

Manufacturing Process:

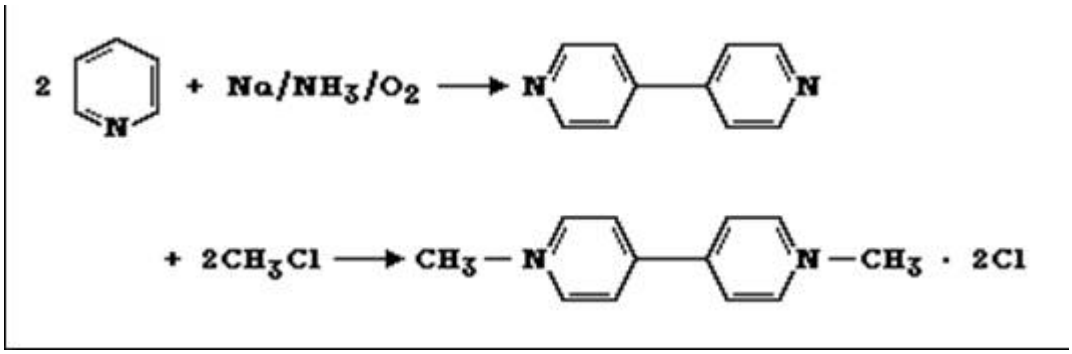
Stage 1

Charge 4,4' bipyridine in the reactor and stir for 30 minute. Charge methyl iodide slowly in the reaction mass 2-3 hrs at 105^0C and maintain the temperature for 3 hrs and check the sample for reaction complete.

Stage 2

Charge crude paraquate in the reactor and a two-fold excess of barium chloride is added to promote ion exchange. Wash the reaction mass with water to get pure paraquate technical.

Chemical Reaction:



Flow diagram & Mass Balance:

Mass balance of Paraquat

IN PUT	Kg		OUT PUT	Kg
4,4' bipyridine	850	Stage 1 Paraquate formation	Crude Paraquate	2530
Methyl iodide	1680			
Crude Paraquate	2530	Stage 2 Washing	Paraquate	900
Silver Chloride	770		Aqueous effluen	2400
Total	**5830**			**5830**

(31) Permethrin

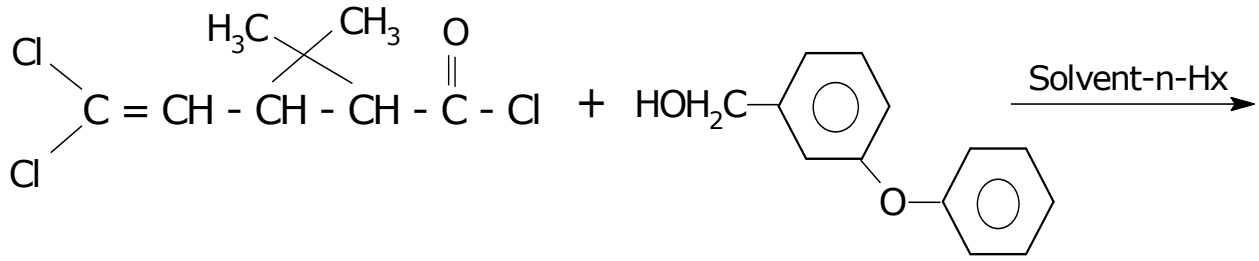
Manufacturing Process:

Meta Phenoxy Benzyl Alcohol is reacted with Cypermethric Acid Chloride (CMAC) in presence of solvent n-Hexane to give the permethrin mass. Hydrochloric acid gas is generated during the reaction which is scrubbed in water to get 30% solution of hydrochloric acid.

The resulting mass is then washed by soda ash solution as well as water. Finally solvent is stripped off to recover it & to get the pure Permethrin Tech.

Chemical Reaction:

Permathrin (Tech.)

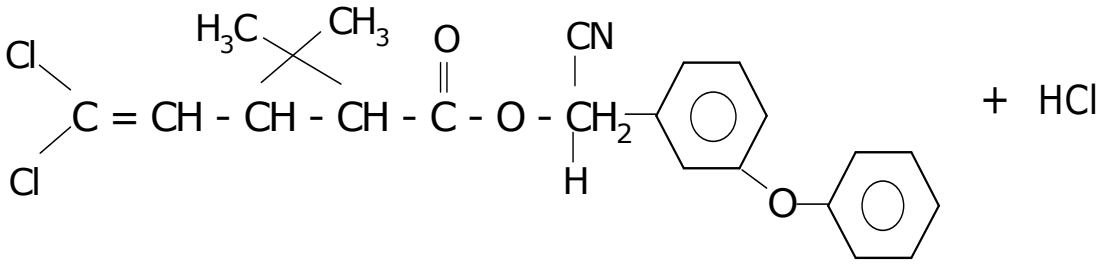


CMAC

(MW- 227.5)

MPBAL

(MW- 200.3



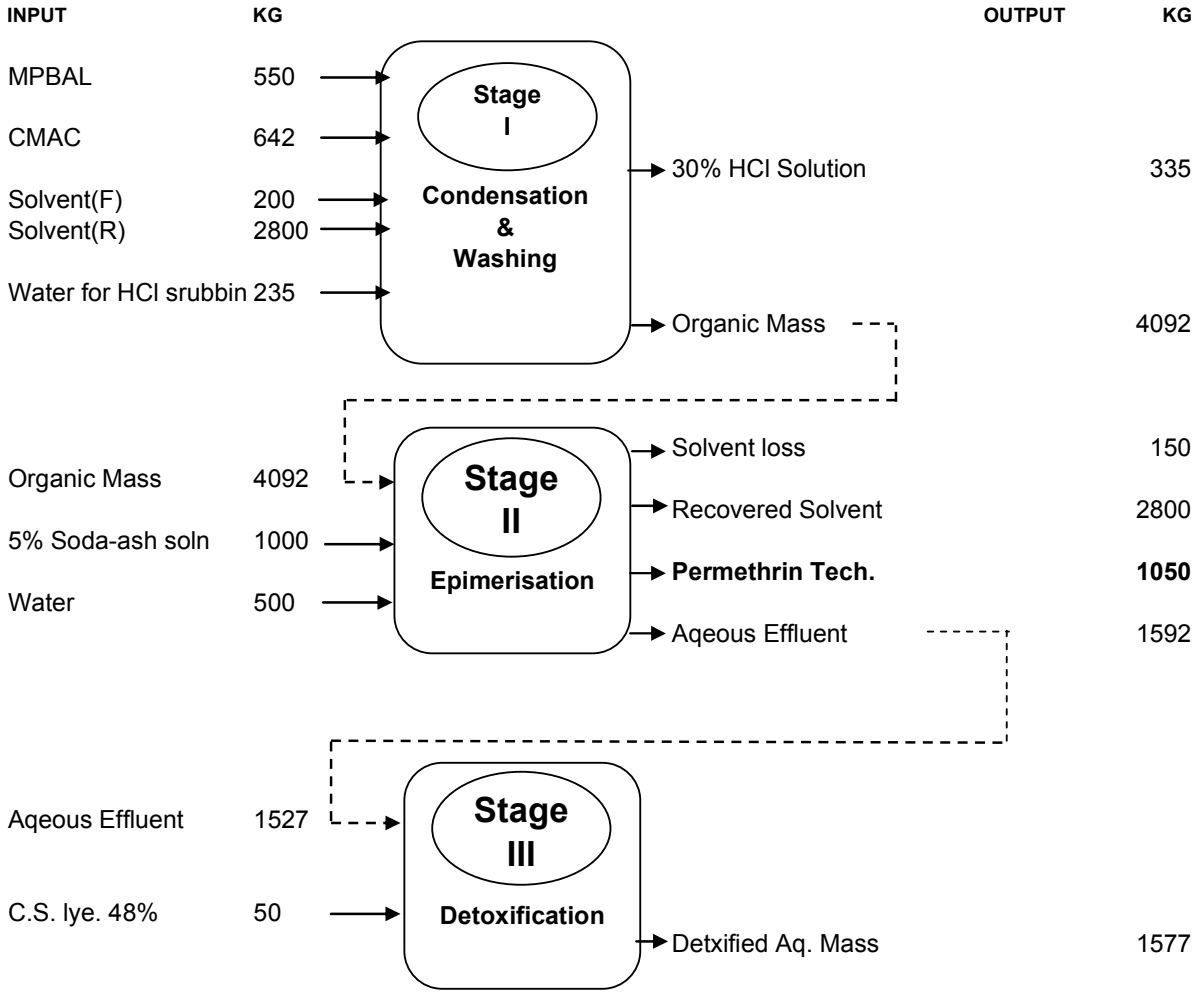
Permethrin

(MW- 391.3)

Hydrochloric Acid

(MW- 36.5)

Flow diagram & Mass Balance:



(32) Prallethrin

Manufacturing Process:

Stage 1

Cyclo penten 1-hydroxy is reacted with Sodium cyanide to form as an intermediate. This on reaction with Chrysanthemic acid chloride forms the final product Prallethrin. In this process n-Hexane is used as solvent along with TEBA.

Stage 2

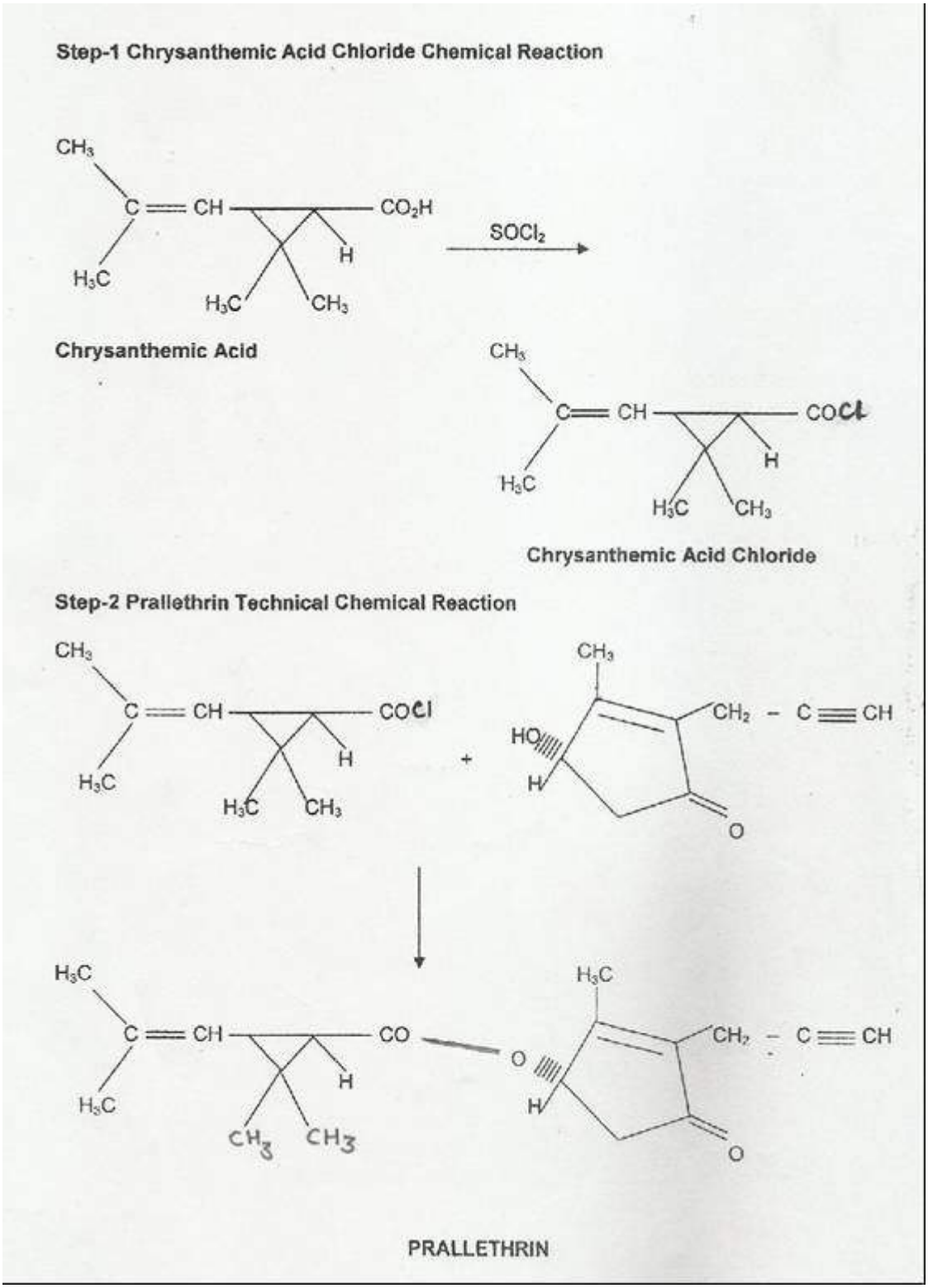
The reaction mass of Prallethrin is washed by Soda ash solution and water.

Stage 3

n-Hexane is distilled off to get pure prallethrin.

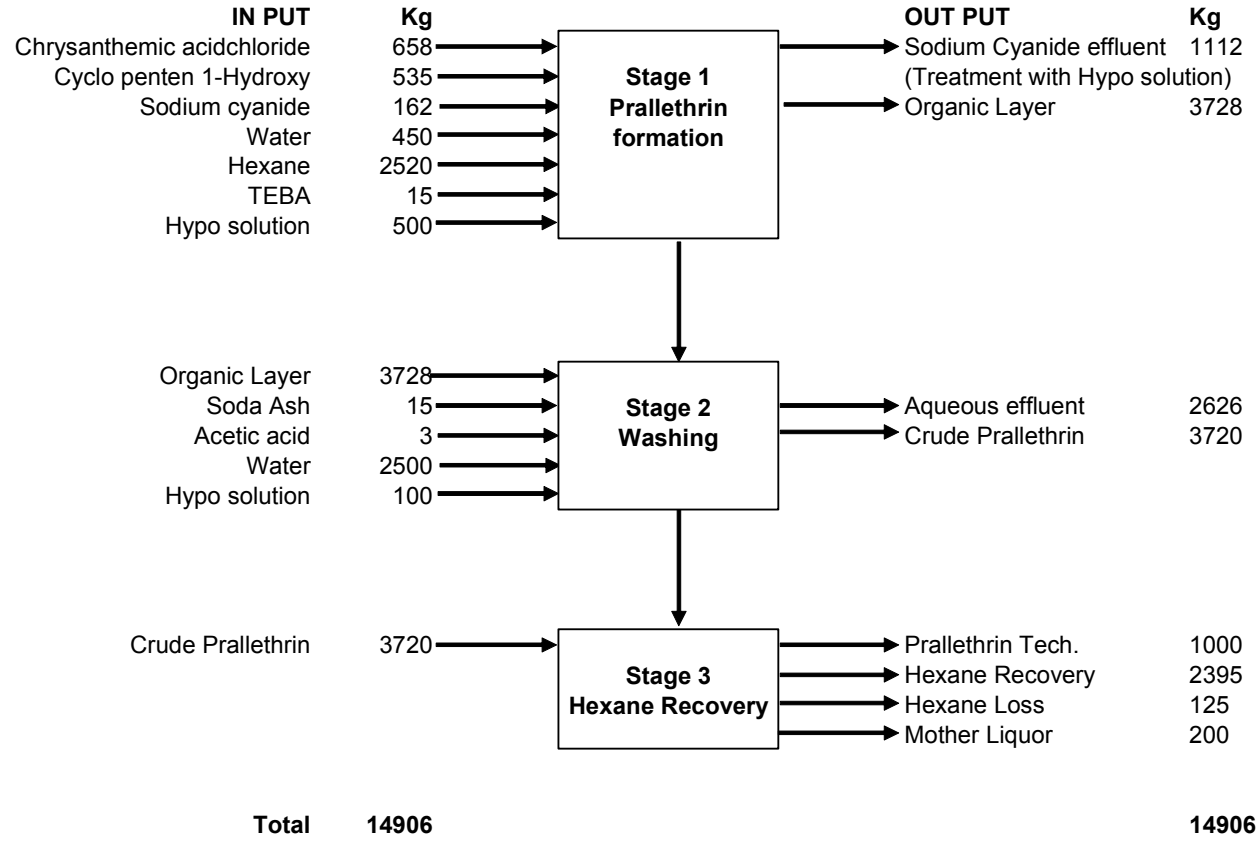
Aqueous layer, which contains traces of Sodium cyanide, is detoxified by the treatment of Sodium hypochlorite 10% solution to < 0.2 ppm level.

Chemical Reaction:



Flow diagram & Mass Balance:

Mass balance of Prallethrin



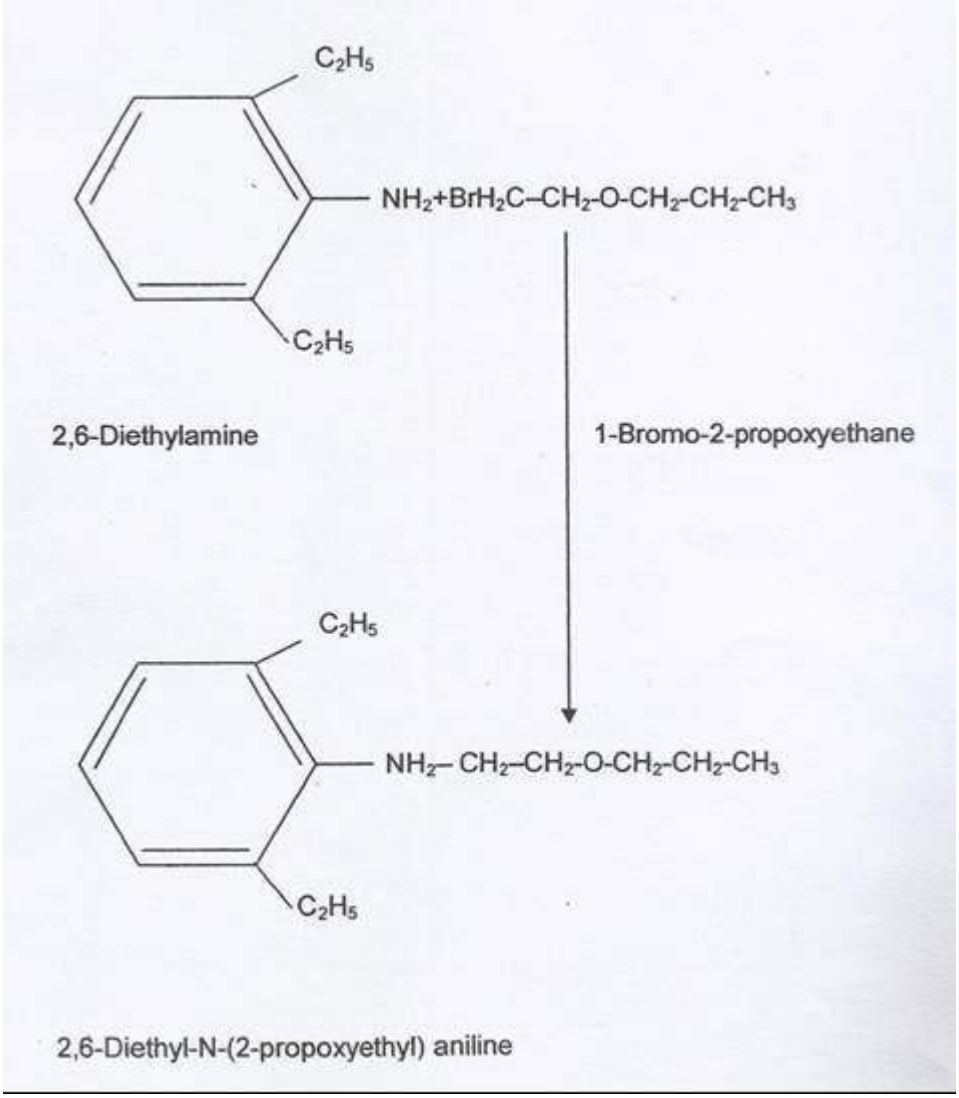
(33) Pretilachlor

Manufacturing Process:

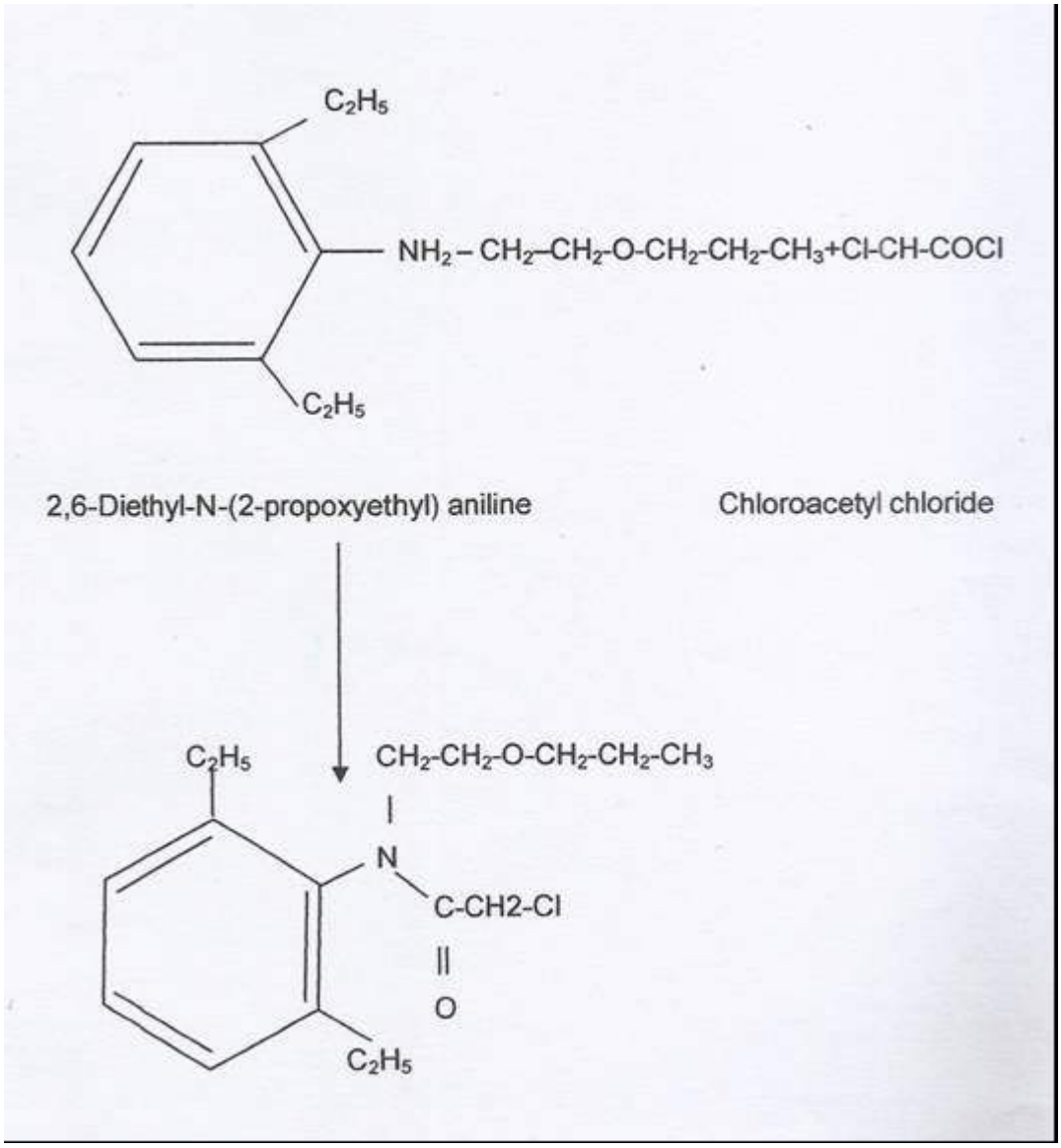
Charge DEPA and Hexane into the reactor with agitation at 30^0C temperature and charge chloro acetyle chloride slowly in the reaction mass at 30^0C. When the reaction is over, cool the material and neutralize with ammonia gas till pH-8. Wash the material with water. After washing organic layer, take it to distillation vessel for hexane recovery under vacuum upto 80^0C. Cool it to 20^0C. Filter the Pretilachlor for packing.

Chemical Reaction:

Stage-I

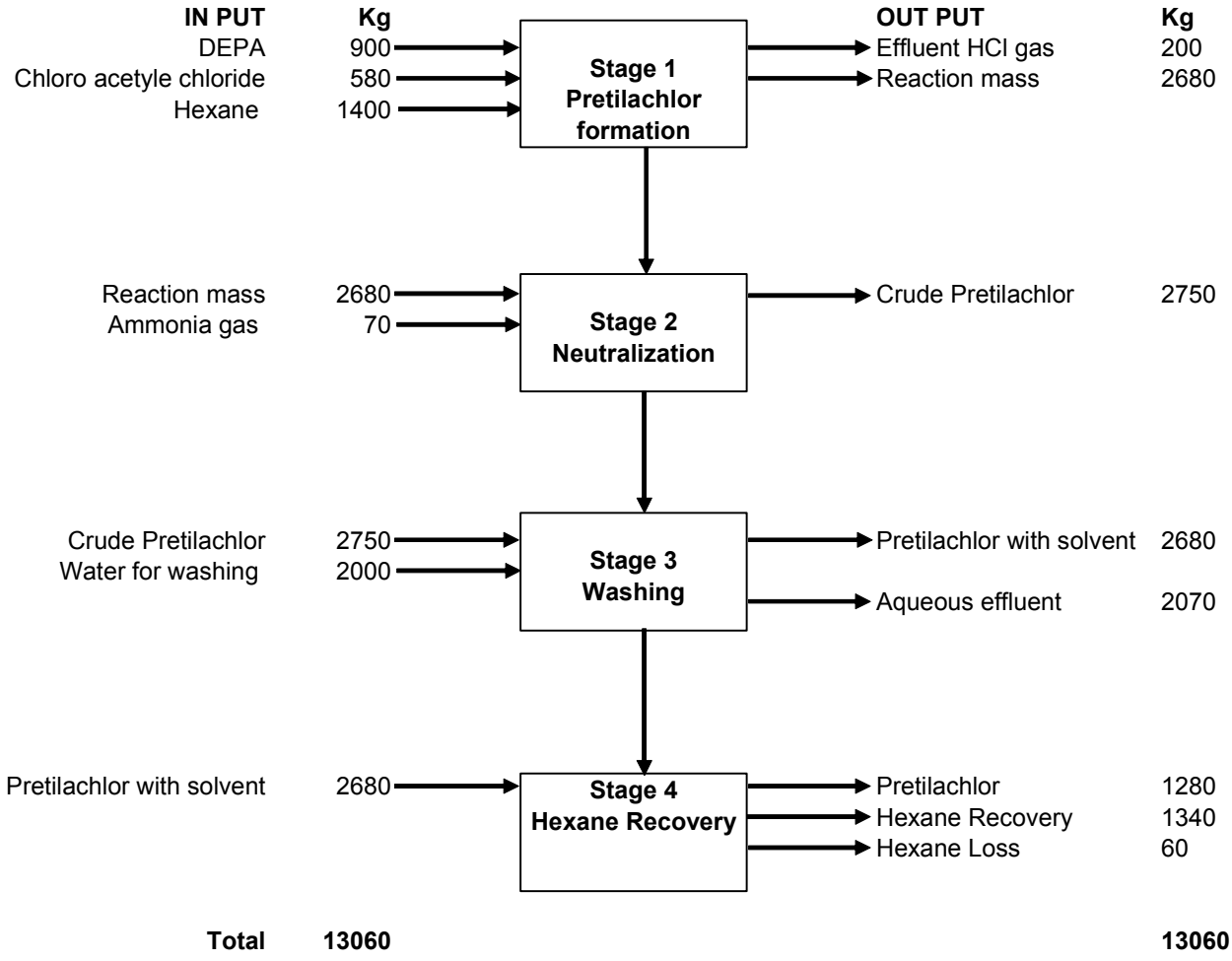


Stage-II


C2H5
NH2 – CH2–CH2-O-CH2-CH2-CH3+Cl-CH-COCl
C2H5
2,6-Diethyl-N-(2-propoxyethyl) aniline
Chloroacetyl chloride
C2H5
CH2-CH2-O-CH2-CH2-CH3
N
C-CH2-Cl
O
C2H5

Flow diagram & Mass Balance:

Mass balance of Pretilachlor



(34) Propiconazole

Manufacturing process:

Stage 1

Charge 4-propyl-1, 3-dioxolane and Dimethyl Sulphide in the reactor and stir for 30 minute and charge 2,4-dichloro Benzyl Chloride slowly in the reaction mass for 2-3 hrs and maintain the temperature for 3 hrs and check the sample for reaction complete. After reaction is complete add KOH flakes slowly. Maintain the reaction mass for 4 hrs until the reaction is complete.

Stage 2

Charge intermediate, Dimethyl Formamide, 1,2,4-Trizole, K2CO3 and Iso propanol in the reactor and maintain the reaction for 3 hrs at high temperature until the reaction is complete.

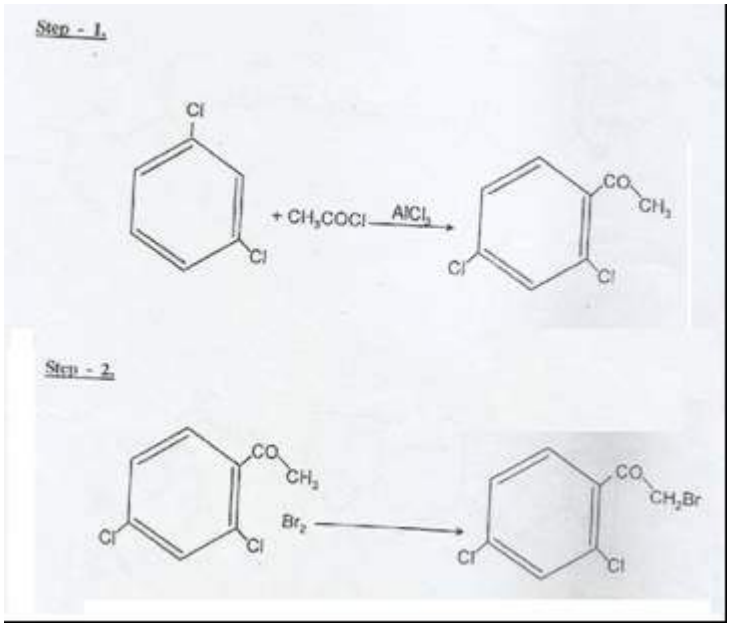
Stage 3

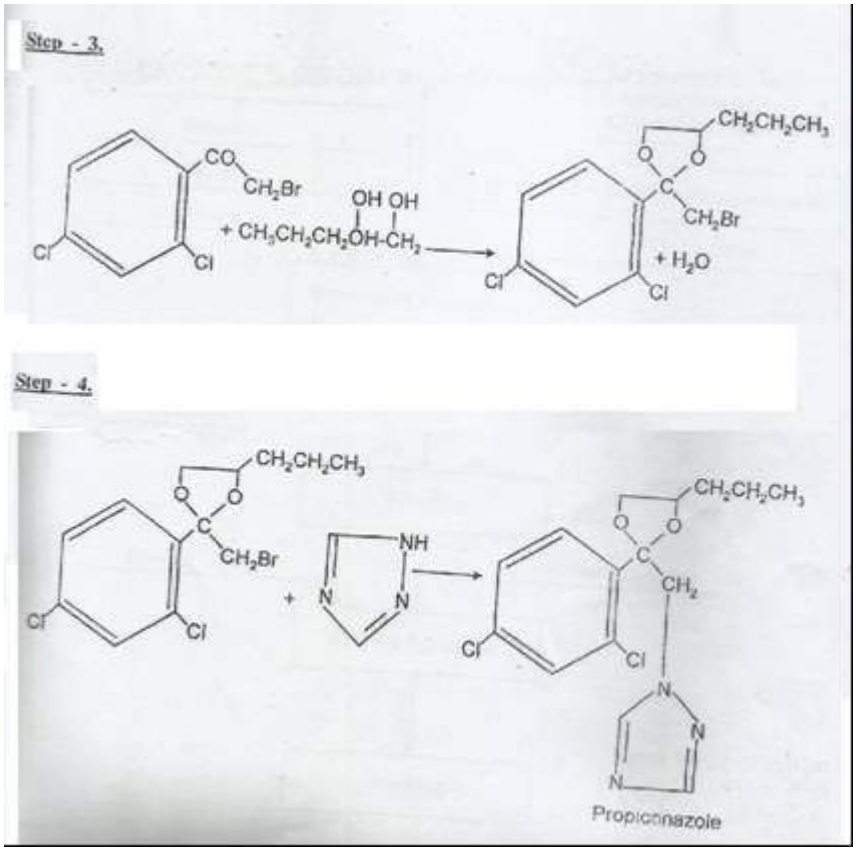
Recover DMF under vacuum partially.

Stage 4

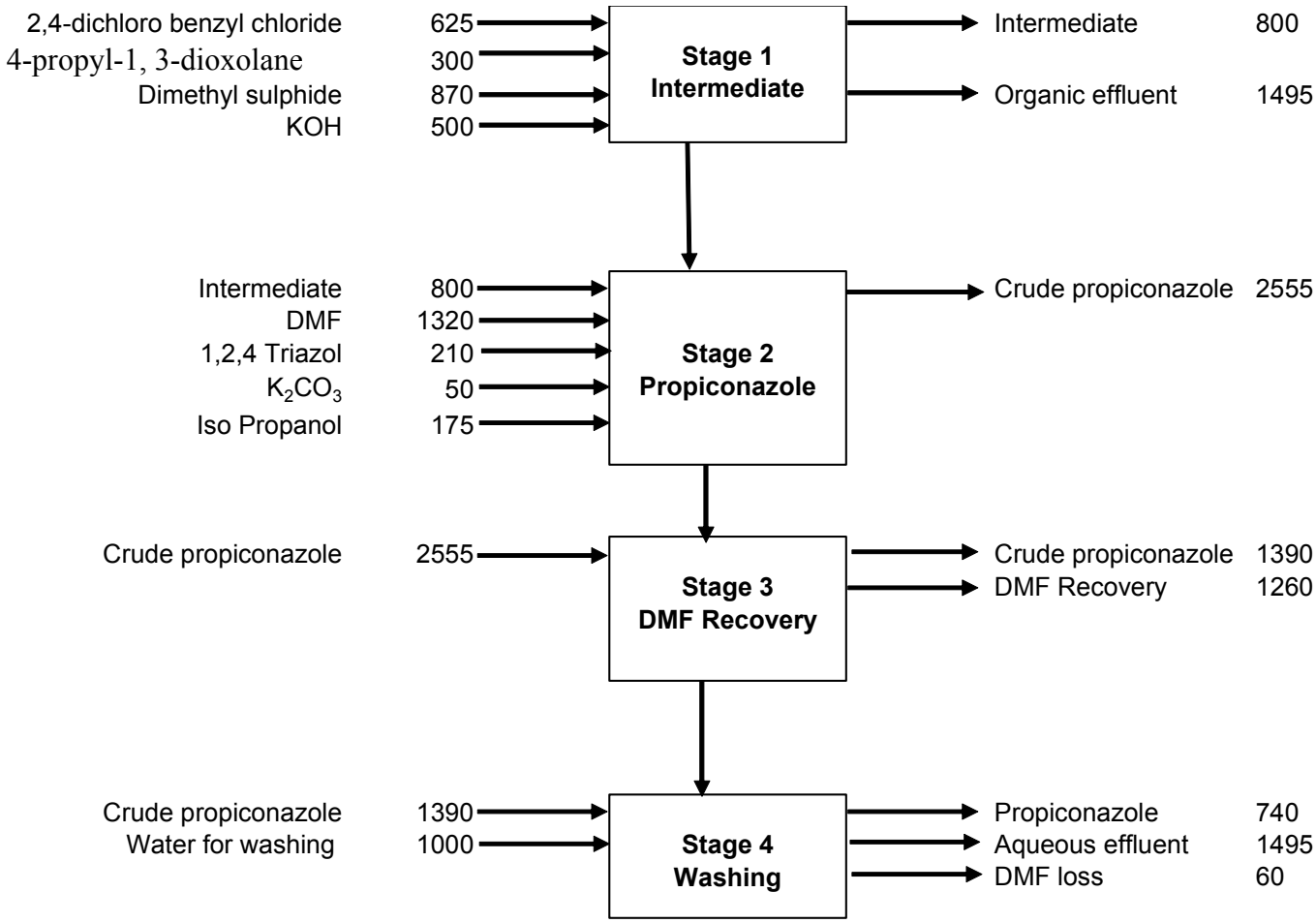
Wash the reaction mass with water. Dry the wet cake in drier.

Chemical Reaction:





Flow diagram & Mass Balance:



Total	**9795**		**9795**

(35) Quizalofop

Manufacturing Process:

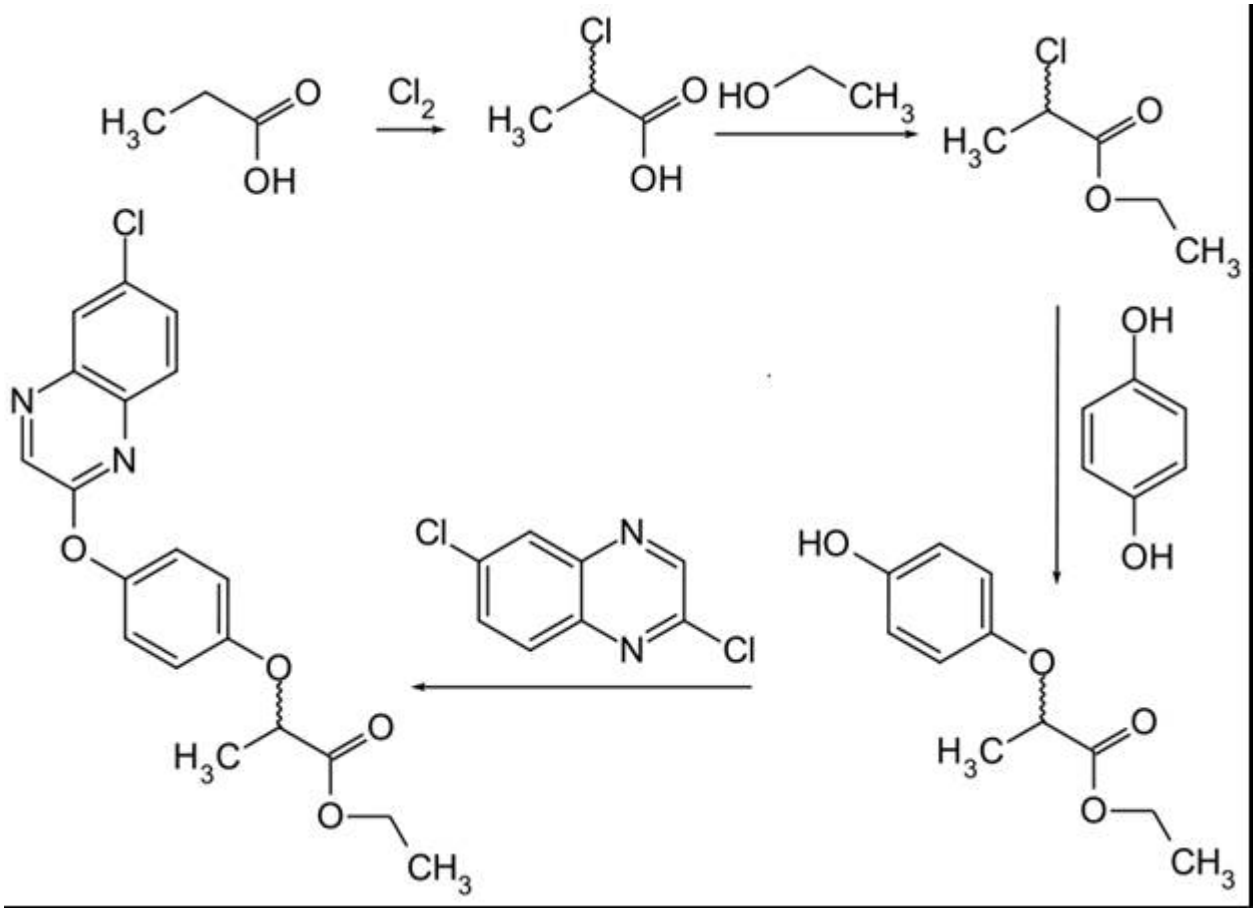
Stage 1

R- (p hydroxyl phenoxy) propionic acid is reacted with 6-Chloroquinoxaline in solvent dimethyl formamide in presence of potassium carbonate. After the reaction is completed the product is filtered.

Stage 2

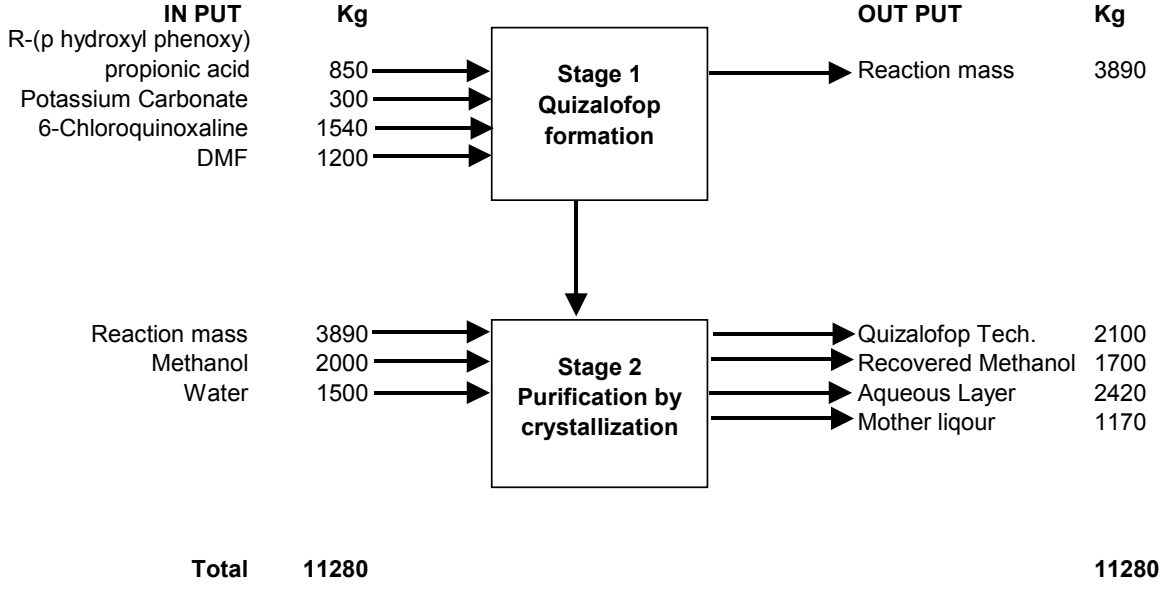
Wash organic layer with water and crystallized with methanol for purification. Recover methanol under vacuum partially. Cool the concentrate mass slowly and filter the crystals. Dry the wet product at 50-55^{0}C.

Chemical Reaction:



Flow diagram & Mass Balance:

Mass balance of Quizalofop



Total	**11280**		**11280**

(36) Tebuconazole

Manufacturing Process:

Step: - 1 Process for the preparation of Dimethyl Sulfide (Solvent)

Dimethyl sulfate is reacted with aqueous solution of Sodium sulfide at 75 - 800C, to form dimethyl sulfide. The Product is condensed and collected in receiver. Then nitrogen is purged into the reactor to get maximum possible dimethyl sulfide recovery.

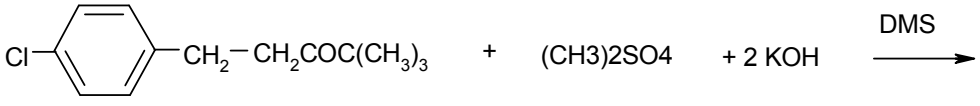
Spent liquor containing sodium sulfate is then transferred to ETP.

$(CH_3)_2SO_4 + Na_2S + H_2O = (CH_3)_2S + Na_2SO_4 + H_2O$

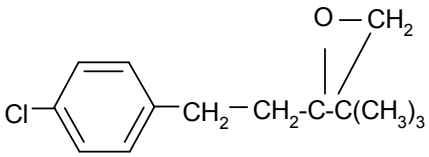
Step: - 2 Process for the preparation of Oxirane

1-(4-Chlorophenyl)-4, 4'-dimethyl-pent-3- one (CPDP) is made to react with dimethyl sulphate and potassium hydroxide in presence of dimethyl sulfide to give tebuoxirane. The solvent dimethyl sulfide is recovered by distillation and then the intermediate product (tebuoxirane) separated from the reactor. Then water is added in the reactor to dissolve salt formed during the reaction and transferred to ETP.

TEBU OXIRANE SYNTHESIS



1-(4-CHLOROPHENYL)-4,4'-DIMETHYL-PENT-3-ONE (CPDP)



Oxirane

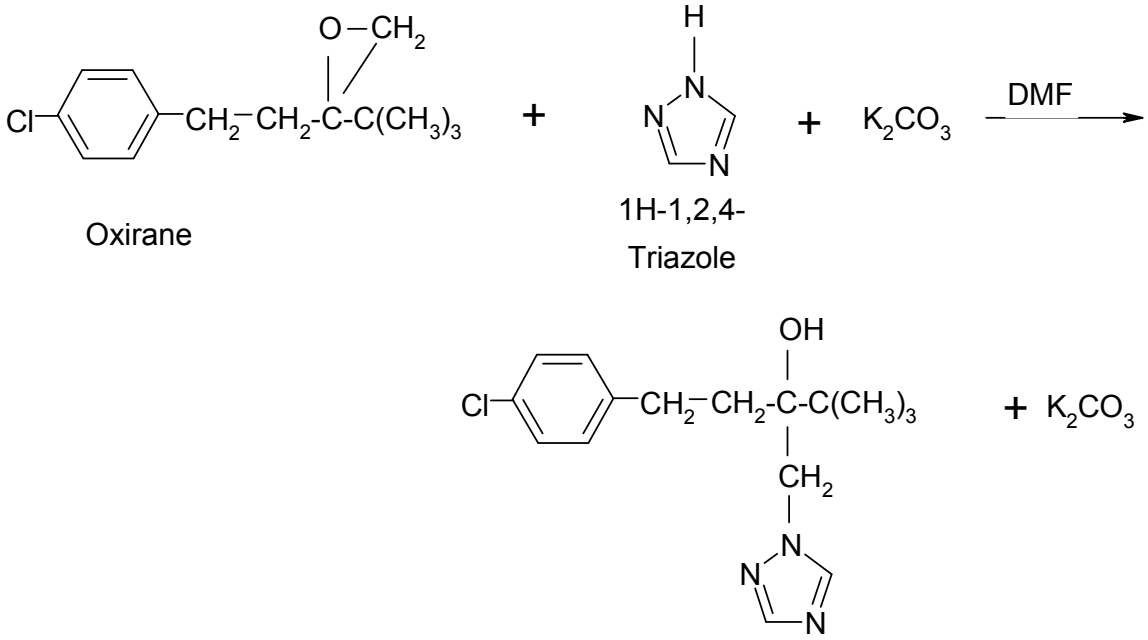
$+ K_2SO_4 + H_2O$

Step: - 3 CONDENSATION

In dimethyl formamide, potassium carbonate, 1, 2, 4-triazole is added and then above prepared oxirane is added at reflux temperature. After completion of the reaction the mass is filtered and then solvent DMF is distilled out. Then the product Tebuconazole is isolated by adding water. The slurry is filtered, centrifuged and dried.

The filtered potassium carbonate sludge is washed with DMF to recover the product. Treated sludge is then transferred to solid waste.

The mother liquor is transferred to ETP.



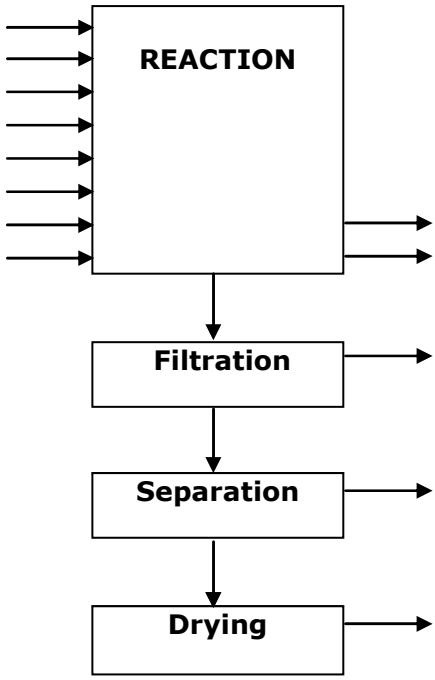
Oxirane

1H-1,2,4-Triazole

Tebuconazole

Flow diagram & Mass Balance:

INPUT	KG
Dimethyl Sulfate	502
Sodium sulfide	26
Ketal	755
KOH	323
1,2,4-triazole	255
K2CO3	40
DMF	1420
Water	7750
Steam :	4900



OUTPUT	KG
DMF Recovery	1395.00
losses	25
Liquid effluent	13502
KCH3SO4- 499.31	
Pot. Sulfate -73.6	
Water -12571.35	
Solid waste	49.00
Tebuconazole	**1000**

Total **15971** **15971**

(37) Thiacloprid

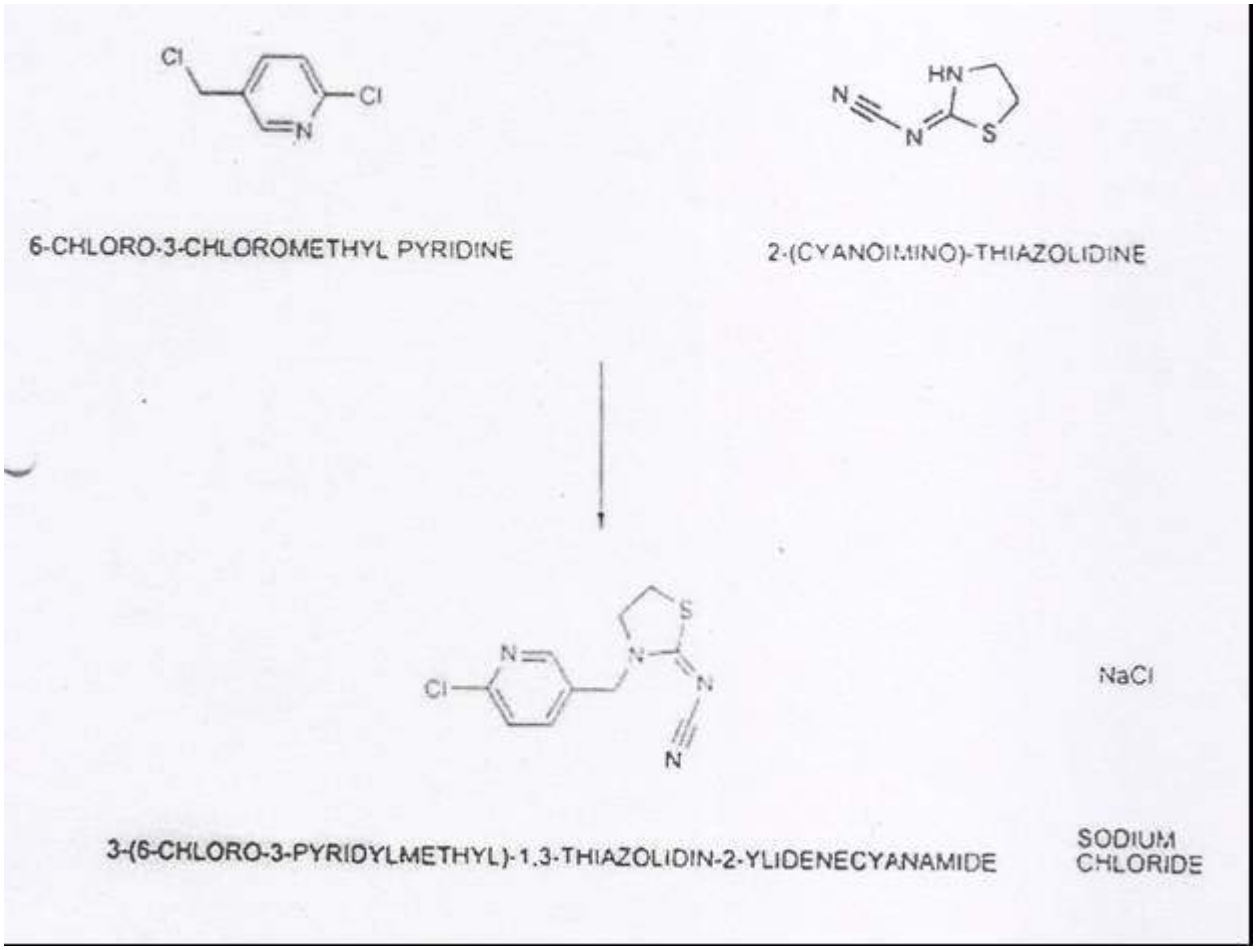
Manufacturing Process:

2-Chloro, 5-Chloro methyl Pyridine (CCMP) is reacted with Thiazolidinylidene Cyanamide in present of catalyst and solvent. The Hydrochloric acid, which is formed during the reaction, is scavenged by putting Sodium carbonate as acid scavenger. The resulting mass is diluted by water and filtered to remove the salts of Sodium Chloride (NaCl) and sodium bicarbonate.

The organic mass is then treated with water. Finally solvent is removed by distillation. The concentrated mass is then crystallized to get pure product – Thiacloprid Technical.

Finally Toxic Effluent, which contains traces of pesticides, is taken to hydrolysis stage for detoxification. Where aqueous mass is treated at high temperature by Alkali for the rapid hydrolysis of pesticides to simpler non-toxic compounds.

Chemical Reaction:



Flow diagram & Mass Balance:

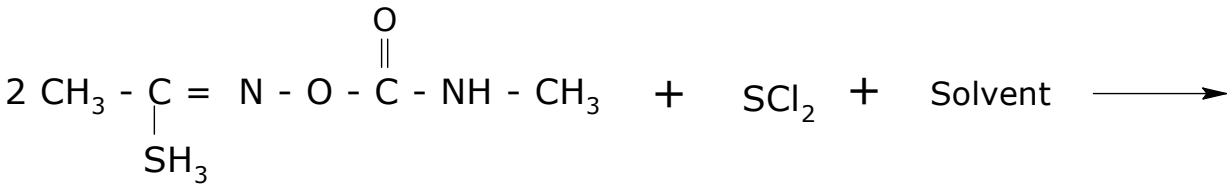
(38) Thiodicarb

Manufacturing Process:

In a glass lined reactor charge Methomyl Tech – Powder and solvent Toluene at room temperature then add sulphur dichloride to get Thiodicarb Tech. During reaction HCl gas generates is absorbs in water in scrubbing system this HCl is used for neutralisation or to sell out.

Chemical Reaction:

Thiocarb (TECH)

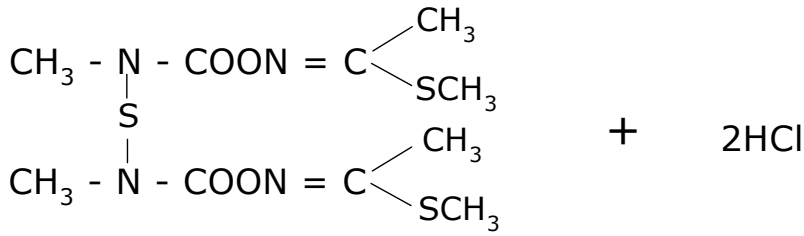


Methomyl

MW- 2 Mole (162)= 324

Sulphur dichloride

(MW- 103)



Thiodicarb

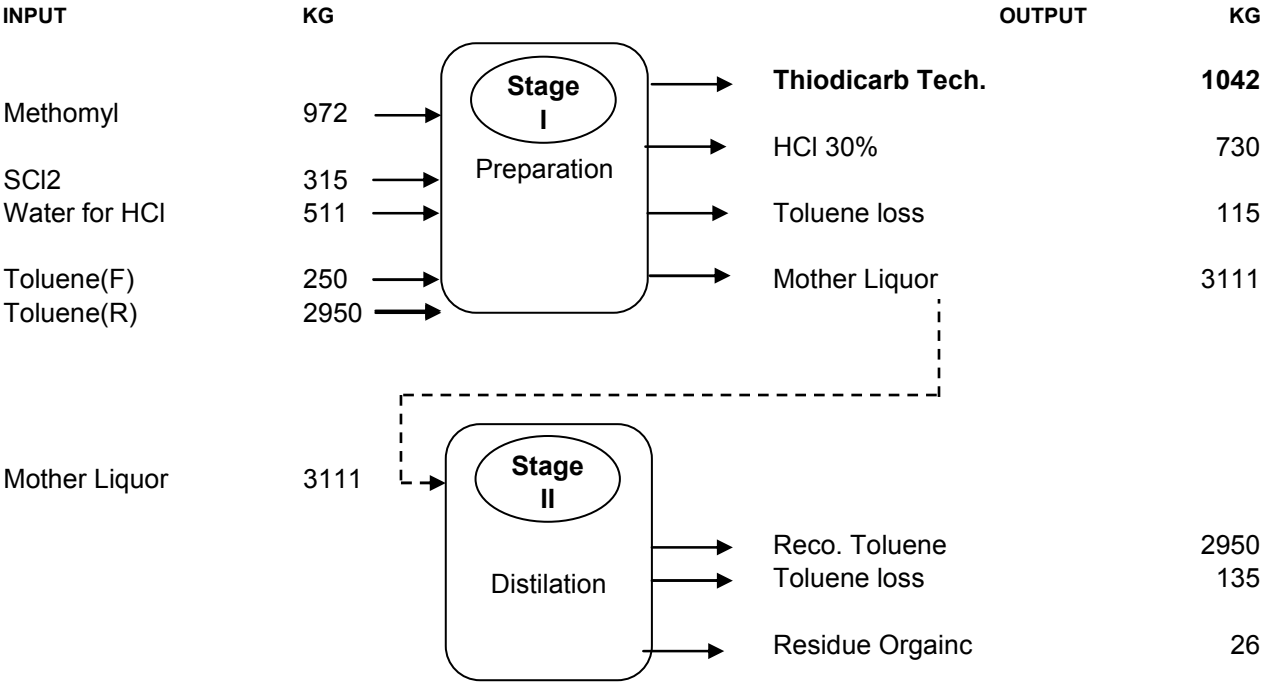
(MW- 354.5)

Hydrochloric Acid

MW- 2 Mole (36.5)

Flow diagram & Mass Balance:

Thiodicarb Tech.



TOTAL	**8109**	**TOTAL**	**8109**

(39) Thiophanate methyl

Manufacturing Process:

Step 1

Ethylene dichloride is taken into a reactor provided with gear – motor agitator and distillation column – condenser assembly.

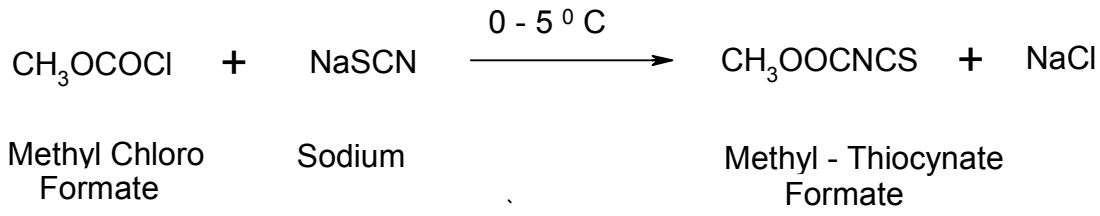
Sodium Thiocyanate is added in Ethylene dichloride. Then is reacted with Methyl chloro formate in the ratio of 1 mol: 1 mol at temp. < 5 0C and Methyl Thiocyanate formate is formed.

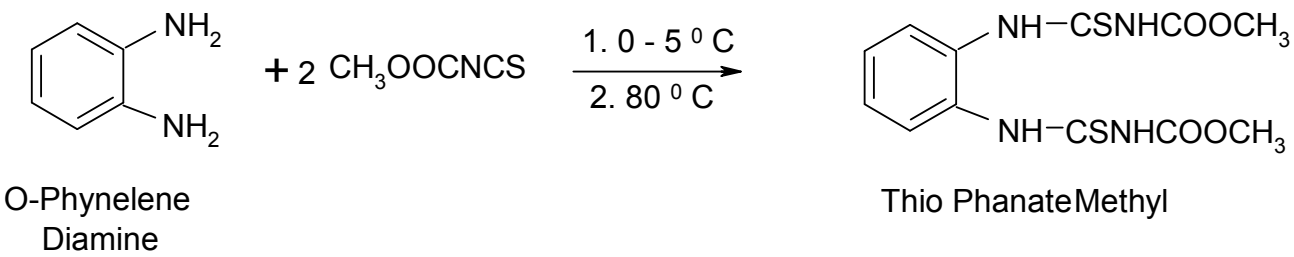
Step 2

In above ethylene dichloride layer, solution of O-Phenylene Diamine prepared in EDC is added and after addition the reaction mass is heated to reflux for 3.0 hrs and then Reaction product is filtered off, washed with water and then dried and pulverized and packed as Thiophanate Methyl Technical.

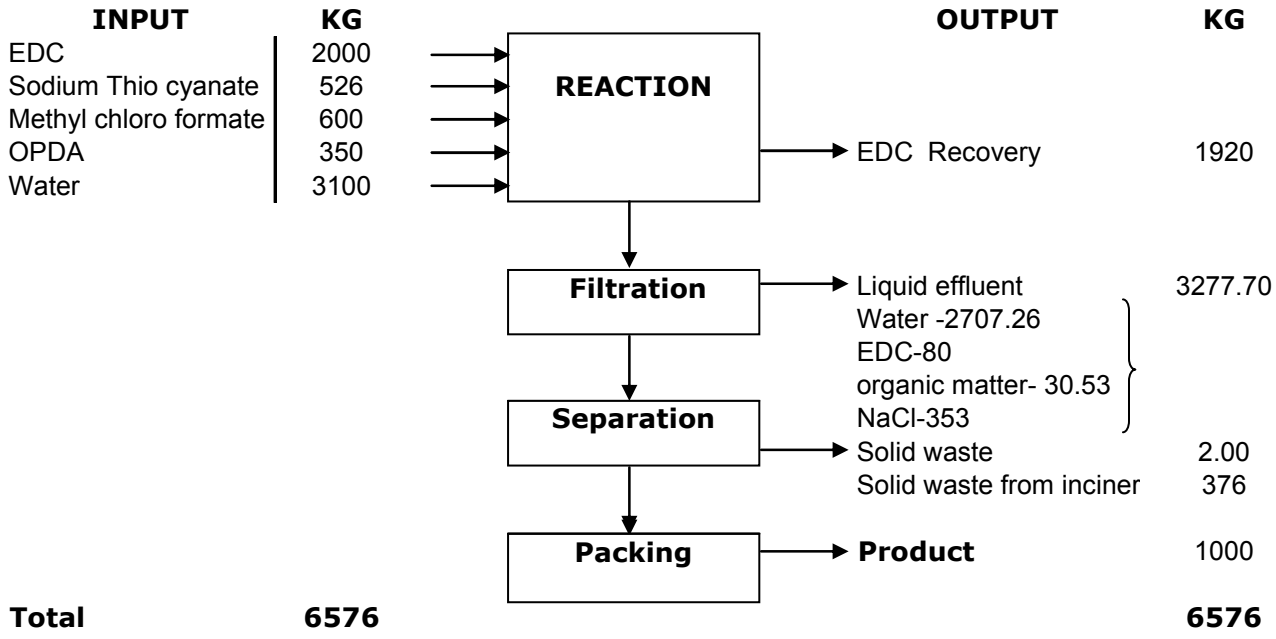
Filtrate and washes are collected and distilled to recover EDC. Final aqueous layer is then sent to ETP.

Chemical Reactions:





Flow diagram & Mass Balance:



(40) Transfluthrin

Manufacturing Process:

Stage 1

Tetrafluoro benzyl alcohol is reacted with CMAC to form the product Transfluthrin in presence of catalyst.

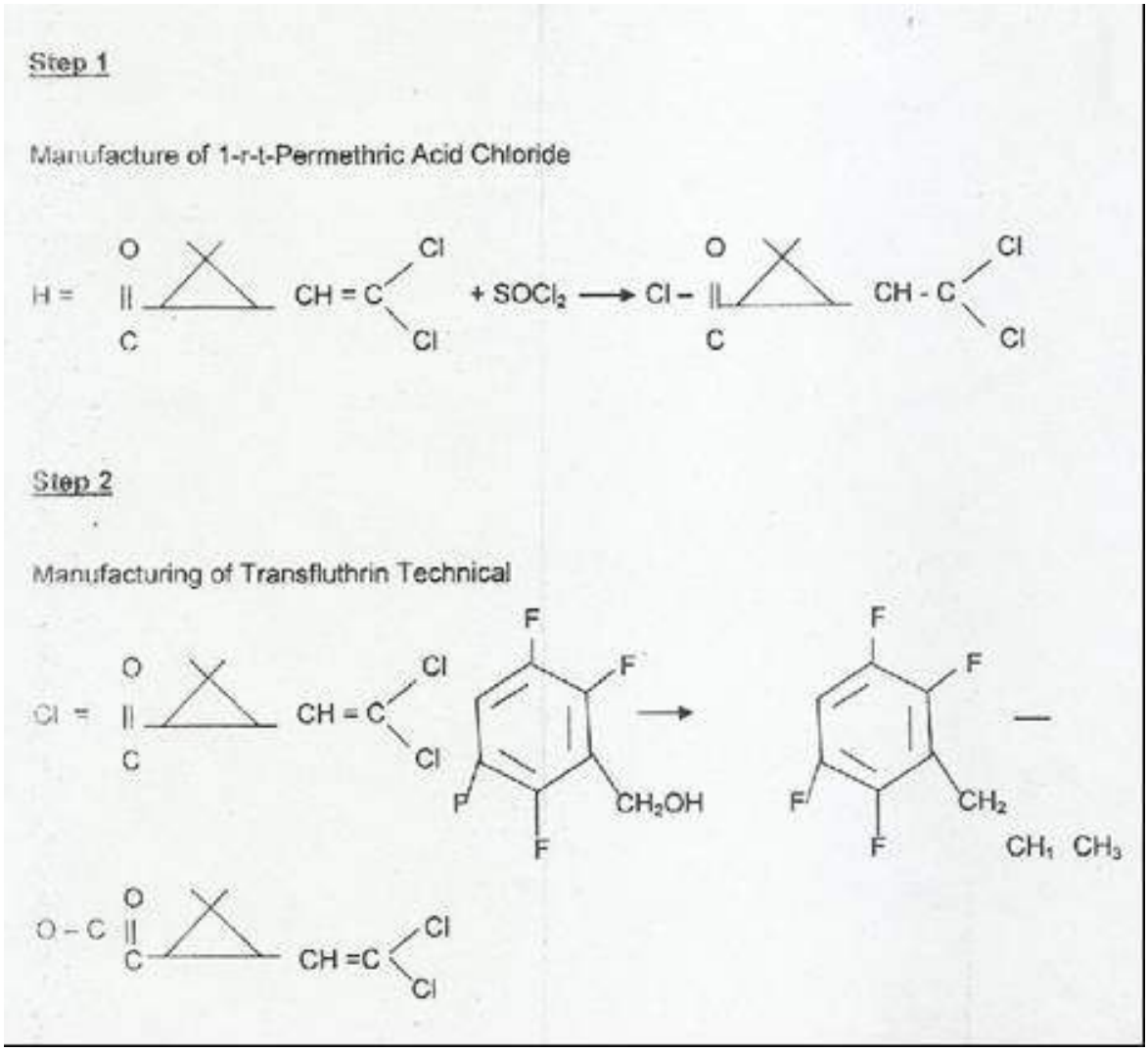
Stage 2

Add Hexane in crude Transfluthrin for separation in water washing. The reaction mass of Transfluthrin is washed by Sodium carbonate solution and water.

Stage 3

Finally hexane is stripped off to get pure Transfluthrin technical.

Chemical Reaction:



Flow diagram & Mass Balance:

Mass balance of Transfluthrin

IN PUT	Kg		OUT PUT	Kg
CMAC	595	Stage 1 Transfluthrin	HCl gas	90
Tetrafluoro benzyl alcohol	490		Reaction mass	995
Reaction mass	995	Stage 2 Washing	Aqueous effluent	3053
Hexane	1750		Transfluthrin with solvent	2745
Water	3000			
Sodium Carbonate	50			
Acetic Acid	3			
Transfluthrin with solvent	2745	Stage 3 Hexane Recovery	Transfluthrin Tech.	940
			Hexane Recovery	1575
			Hexane Loss	175
			Mother liquor	55
Total	**9628**			**9628**

(41) Tricyclazole

Manufacturing Process:

Stage 1

Charge solvent in the reactor and add 3-methyl-(1,2)-benzothiazole Chloride slowly in the reaction mass for 2-3 hrs and maintain the temperature for 3 hrs. Add KOH flakes slowly. Maintain the reaction mass for 4 hrs until the reaction is complete.

Stage 2

Charge intermediate Dimethyl Formamide, 1,2,4-Trizole and K2CO3 in the reactor and maintain the reaction for 3 hrs at high temperature until the reaction is complete.

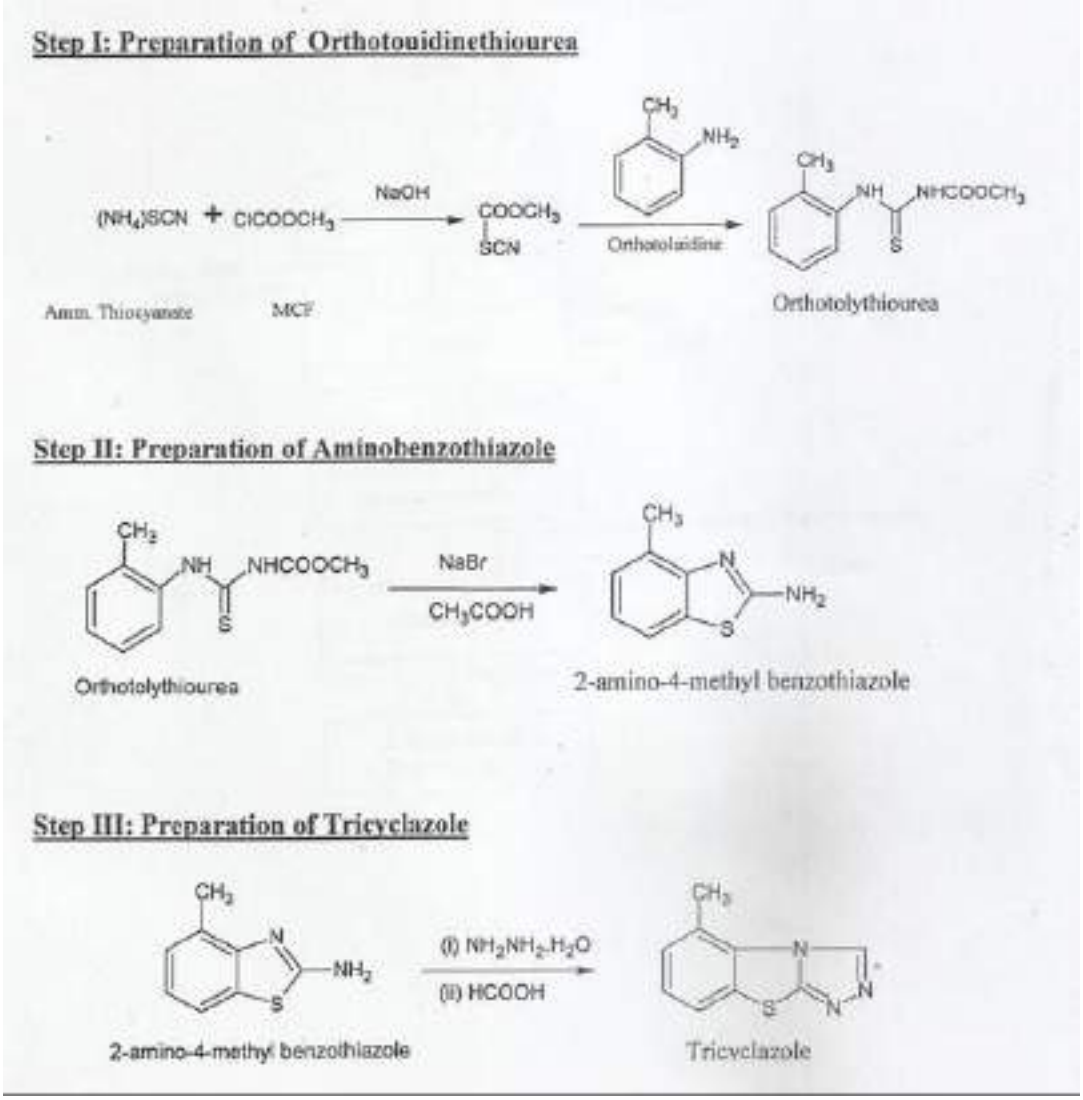
Stage 3

Recover DMF under vacuum partially.

Stage 4

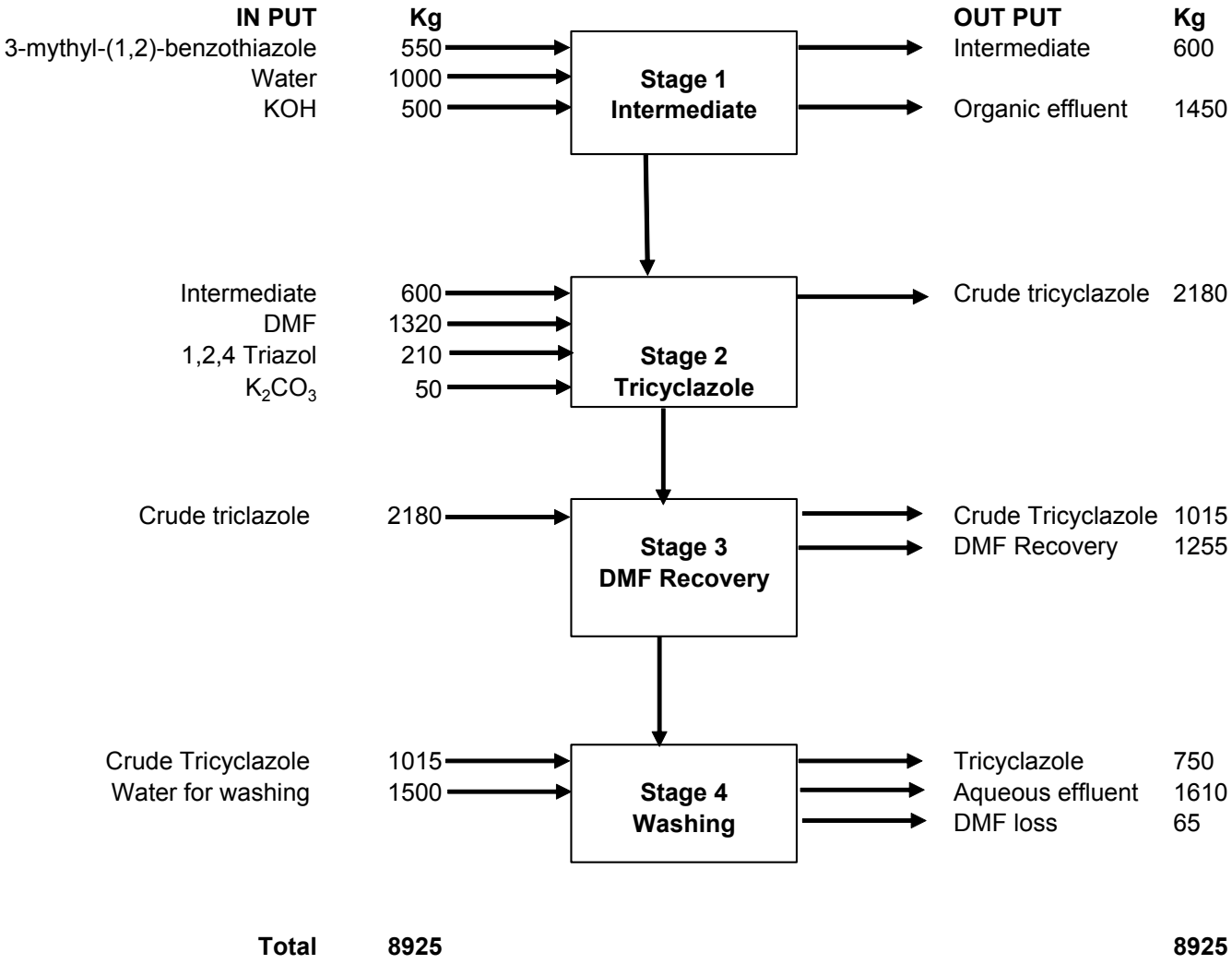
Wash the reaction mass with water. Dry the wet cake of tricyclazole in drier.

Chemical Reaction:



Flow diagram & Mass Balance:

Mass balance of Tricyclazole



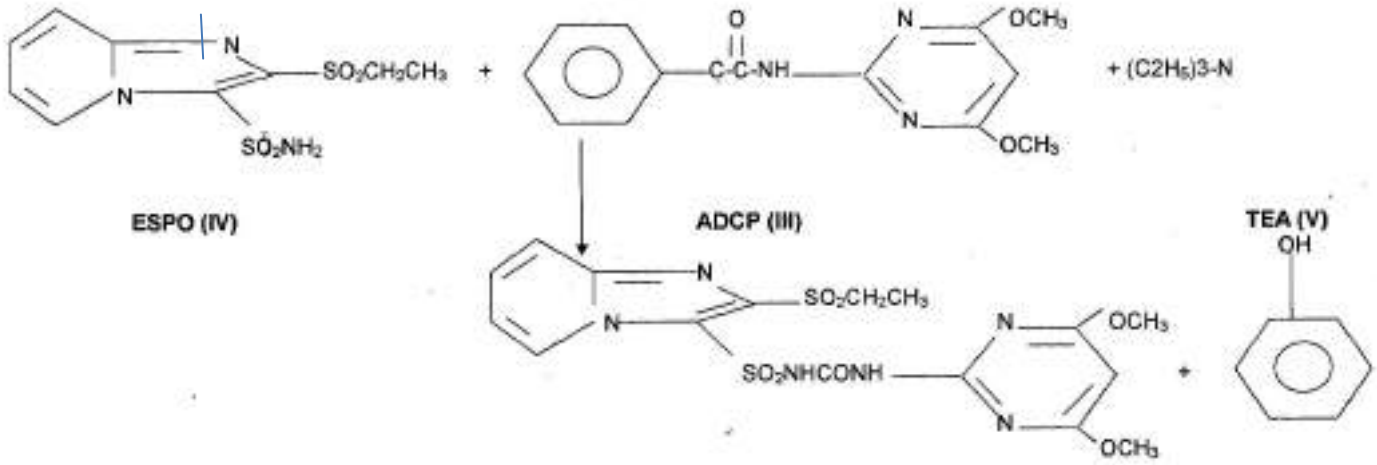
Total	**8925**		**8925**

(42) Sulfosulfuron

Manufacturing Process:

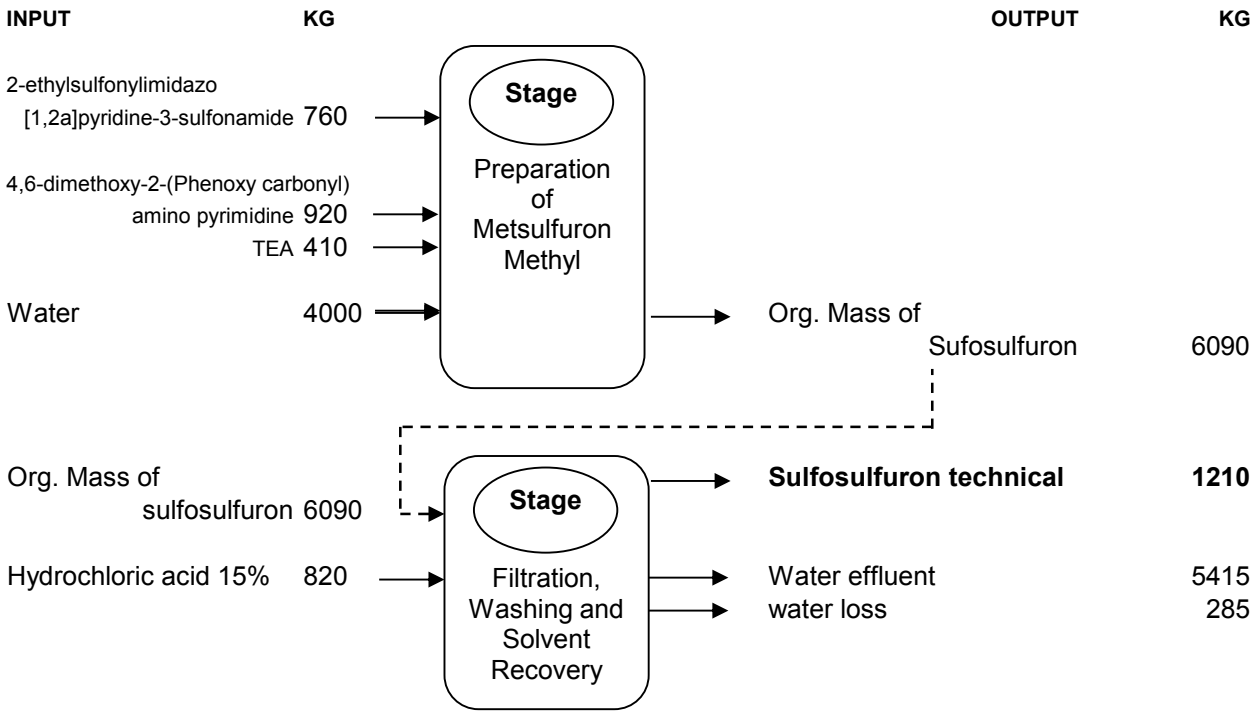
Charge water and 2-ethylsulfonylimidazo[1,2a]pyridine-3-sulfonamide stir for 15 min. Cool to 18-20^{0}C and Charge 4,6-dimethoxy-2-(Phenoxy carbonyl) amino pyrimidine, stir for 15 min. Add TEA @20-22^{0}C for 1.3-2.0 hrs. Raise the temp @42-48^{0}C Maintain for 4-5 hrs. Sample for analysis (ESPO<0.5%, ADCP<1.0%). Temp raised @50-55^{0}C. Add HCl 15% up to pH=4. Agitate with 30 min. Filter the material@50-55^{0}C. Wash with hot water(50-60^{0}C) till solution clear and pH neutral. Filter the material and dry @75^{0}C till constant weight.

Chemical Reaction:



Flow diagram & Mass Balance:

Sulfosulfuron

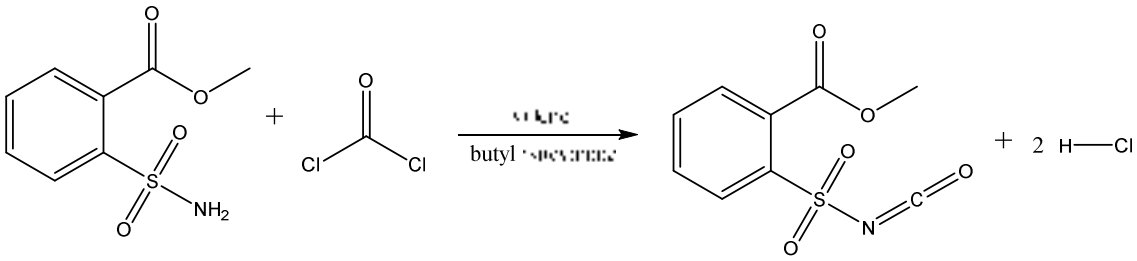


(43) Tribenuron methyl

Manufacturing Process:

Step 1: Synthesis of 2-carbomethoxybenzenesulfonylisocyanate

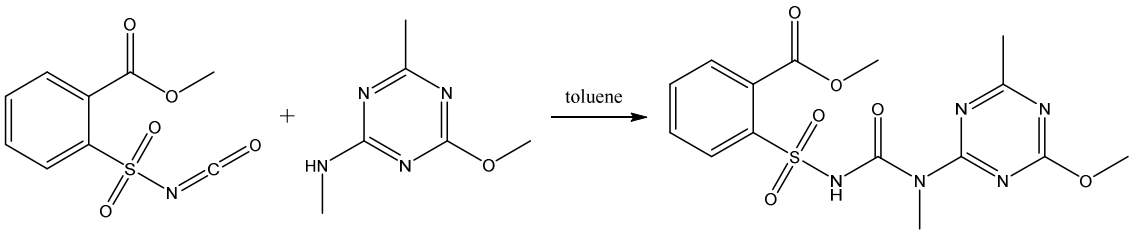
Xylene, butyl isocyanate and 2-carbomethoxybenzene sulfonamide (200 kg) are charged into a 2000 L reactor connected to a scrubber with circulation of 5% sodium hydroxide. The mixture is heated to reflux (135°-138°C) and kept for half an hour. Phosgene is then passed into the reaction mass through a sparger under a dry ice reflux condenser, allowing the reaction temperature to drop to 120°C over a period of 7-8 hours. The HCl gas generated from the reaction is passed into the scrubber. The addition is continued until the reflux temperature remains 120°C without further phosgene addition. A sample is removed and checked for the presence of sulfonamide (by GC) and the reaction is considered to be complete when the concentration of 2-carbomethoxybenzene sulfonamide is less than 0.5%. The reaction mass is cooled to room temperature and filtered. The filtrate is distilled to recover xylene and butyl isocyanate, and 2-carbo methoxybenzenesulfonylisocyanate (225 kg, 0.863 kmol, purity is 92.4%) is obtained.



Step 2: Synthesis of tribenuron-methyl

Toluene is charged into the previous reactor containing 2-carbo methoxybenzenesulfonylisocyanate (225 kg) and the reaction mass is stirred to make a homogeneous mixture. 4-Methoxy-*N*,6-dimethyl-1,3,5-triazin-2-amine (140kg) is charged and the reaction mass is stirred for 4-5 hours at 30°C. The reaction is monitored by GC and is considered to be complete when the concentration of 4-methoxy-*N*,6-dimethyl-1,3,5-triazin-2-amine is less than 0.5%. The tail gas is passed through a scrubber. When the reaction is complete, the solids obtained are filtered, and the solvent is recovered from the

mother liquor. The solid product is washed with methanol and dried, to give tribenuron-methyl (around 272 kg).



Flow diagram & Mass Balance:

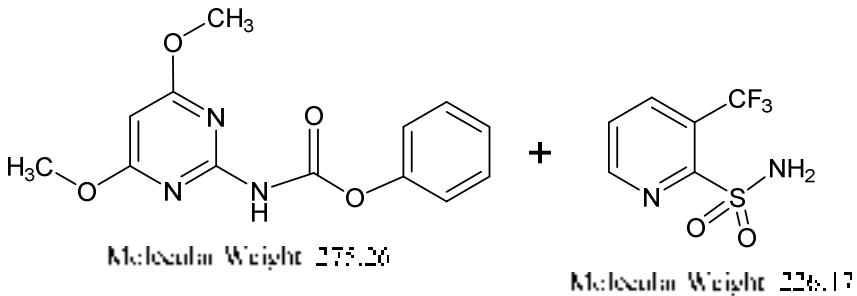
Tribenuron methyl

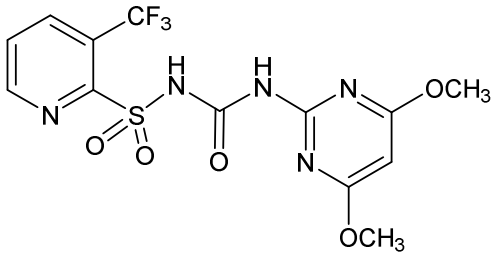
INPUT	KG		OUTPUT	KG
2-carbomethoxybenzene sulfonamide	200	Stage: Preparation of Tribenuron Methyl	Xylene recovered	1140
Xylene	1200		xylene loss	60
Butyl isocynate	100		Butyl isocynate recovered	70
Phosgene	106		Gases and vapours	111
			Org. Mass of 2-carbo methoxybenzene sulfonylisocyanate	225
Org. Mass of 2-carbo methoxybenzene sulfonylisocyanate	225	Stage: Filtration, Washing and Solvent Recovery	**Tribenuron methyl techn**	**272**
Toluene	800		Mother liquor	213
			Toluene	680
4-Methoxy-*N*,6-dimethyl -1,3,5-triazin-2-amine	140			
TOTAL	**2771**		**TOTAL**	**2771**

(44) Flazasulfuron

Manufacturing Process:

A 3,000L reactor containing a mixture of 1,2-dichloroethane, Intermediate 3N-methoxycarbonyl 3-trifluoromethylpyridine-2-sulfonamide and 2-amino-4,6-dimethoxypyrimidine was heated to reflux at 85°Cfor 8 hours, the resulting mixturewas cooled to 5-30°Cand filtered andthe solid was washed with 200Kgsolvent 1,2-dichloroethane and dried to get 825 KgFlazasulfuron the purity is 94.5% (HPLC,by weight), and the Yield is 95.0%.



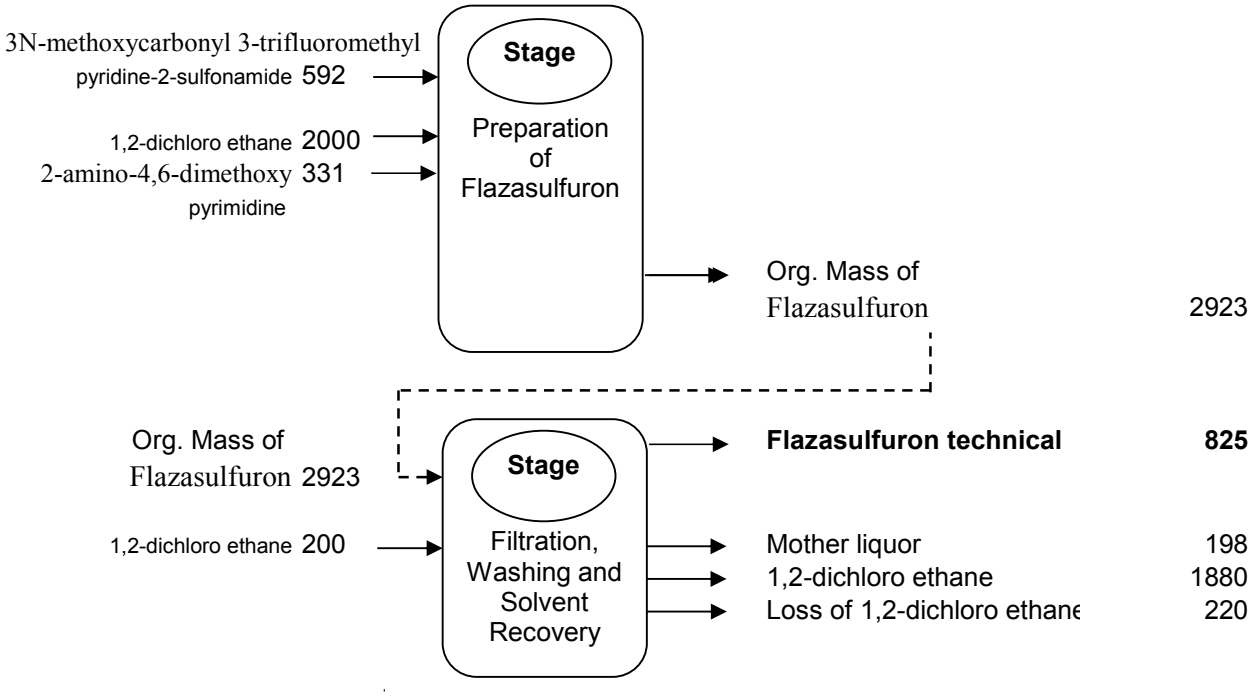


Flazasulfuron

Molecular Weight 407.32

Flow diagram & Mass Balance:

Flazasulfuron



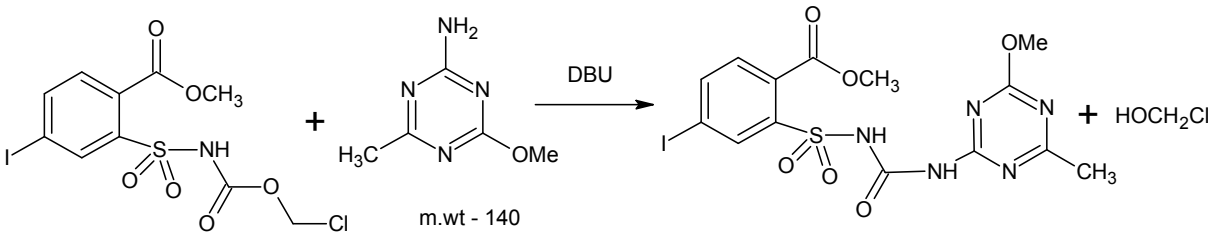
TOTAL	**6046**	**TOTAL**	**6046**

(45) Iodosulfuron methyl

Manufacturing Process:

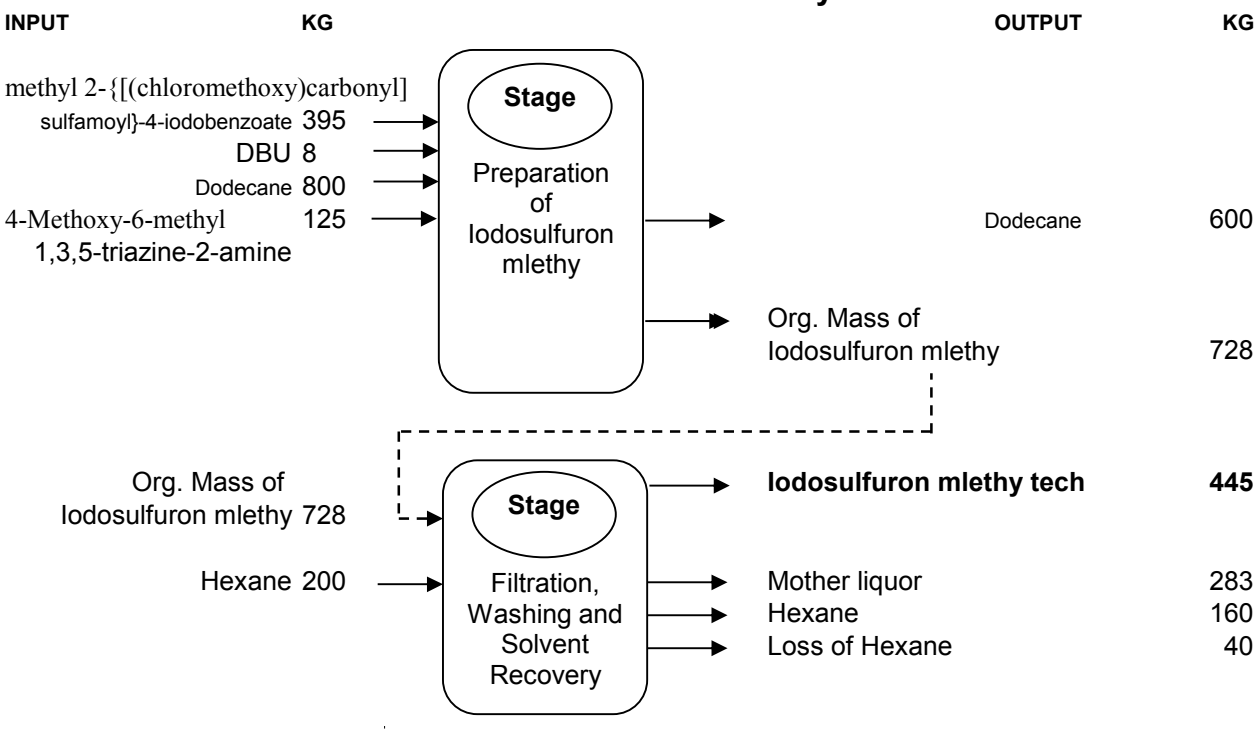
Stap-1

Dodecane (800 kg), intermediate 3 (395 kg, 0.875 kmol) and DBU (8 kg) are chargedinto a 2000L reactor and agitation is started. 4-Methoxy-6-methyl 1,3,5-triazine-2-amine (125 kg, 0.875 kmol) is slowly added to the reaction mixture over a period of 1 hour at 25-30°C with stirring. After addition, the reaction mass is slowly heated to 190°C maintained at 190-200°C for a period of 4 hours. Progress of the reaction is monitored by GC and the reaction is considered to be complete when the concentration of Intermediate 3 is less than 1%. After completion of reaction, part of the solvent is distilled under vacuum and the reaction mass is cooled to 20°C. The slurry thus obtained is filtered; wet cake is washed with hexane (200 kg) and then dried in a 1000L rotary vacuum drier to giveiodosulfuron-methyl (445 kg, 0.84 kmol). The yield is 96% and the purity is 96% by HPLC.



Flow diagram & Mass Balance:

Iodosulfuron methyl



TOTAL	**2256**	**TOTAL**	**2256**

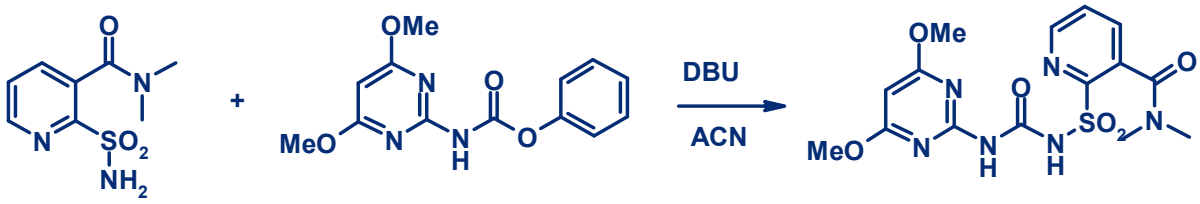
(46) Nicosulfuron

Manufacturing Process:

Charge 2-sulfoamido-3-(N,N-dimethyl)-carbo aamidopyridine in 2000L reactor, then charge 4,6-dimethoxy pyrimidine phenyl carbamate with acetonitrile 300 litre. Charge DBU (mixture in acetonitrile) slowly over a period of 2 hours at 30^0C under stirring. Maintain the mixture for 1 hour at room temperature.

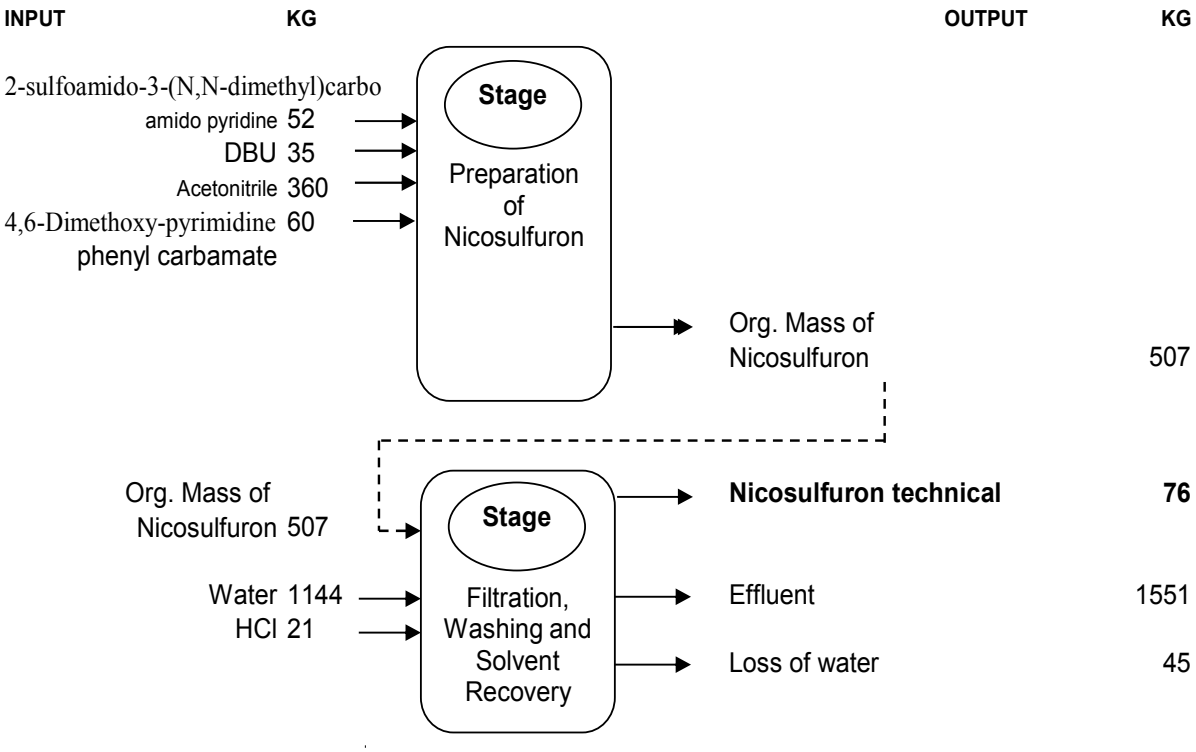
940 litre water is added to the reaction mixture.Acidify it to pH 3 by adding concentrated HCl at room temperature over a period of 1 hour. Maintain for 1 hour. Filter the precipitated product and wash with water. Dry the product under high vacuum at 60^0C.

Chemical equation:



Flow diagram & Mass Balance:

Nicosulfuron



TOTAL	**2179**	**TOTAL**	**2179**

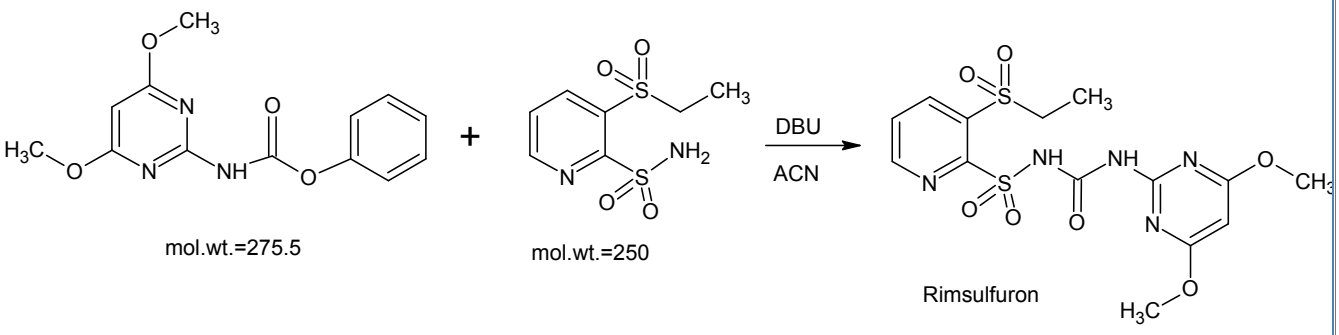
(47) Rimusulfuron

Manufacturing Process:

Charge 3-ethane sulfonylpyridine-2-sulfonamide in areactor, then charge 4,6-dimethoxy pyrimidine phenyl carbamate with acetonitrile 1000 litre. Charge DBU (mixture in acetonitrile) slowly over a period of 2 hours at 0^0C under stirring. Maintain the mixture for 1 hour at 0^0C temperature.

2000 litre water is added to the reaction mixture. Acidify it to pH 3 by adding concentrated HCl at room temperature over a period of 1 hour. Maintain for 1 hour. Filter the precipitated product and wash with water. Wash the precipitate with hexane finally. Dry the product under high vacuum at 50^0C.

Chemical equation:



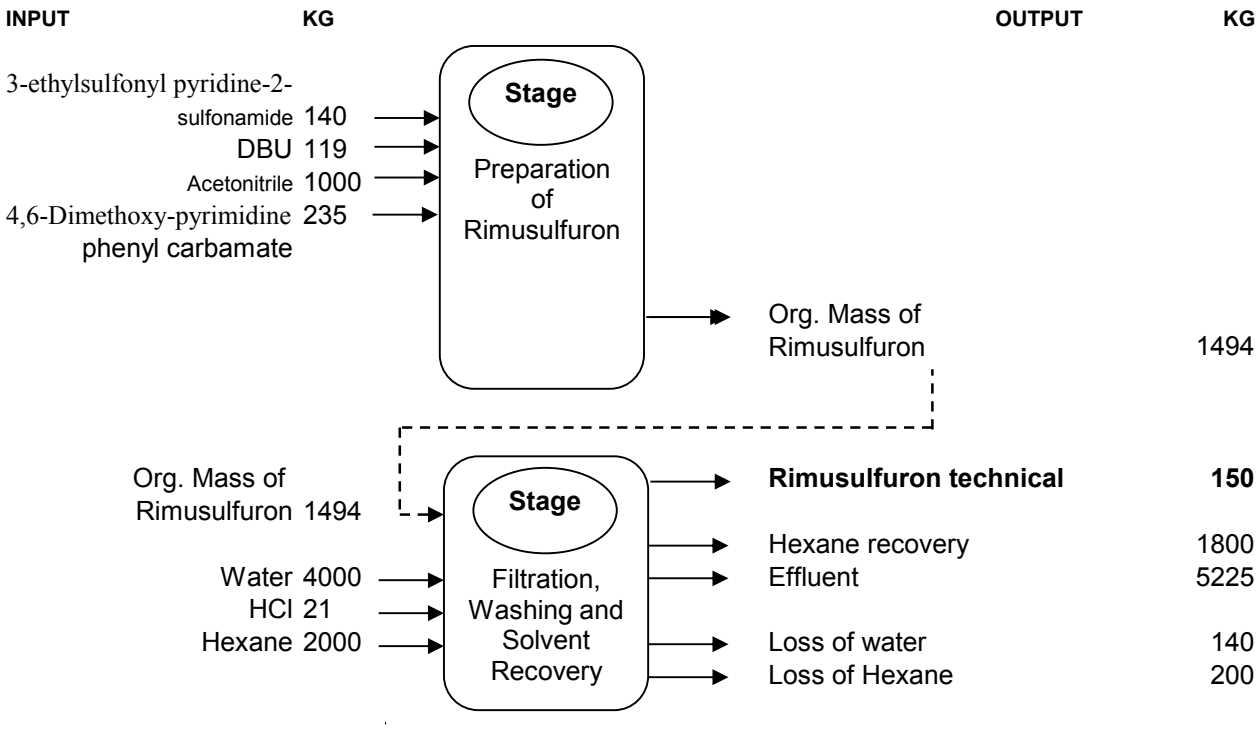
mol.wt.=275.5

mol.wt.=250

Rimsulfuron

Flow diagram & Mass Balance:

Rimusulfuron



(48) Diclofop-methyl (DCFM)

Manufacturing Process:

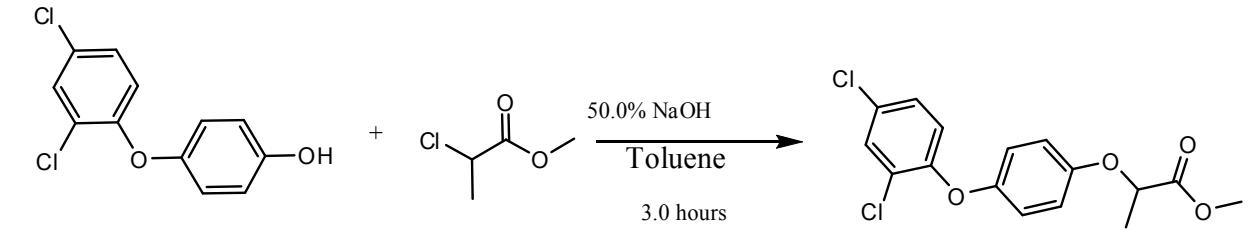
90.0% of 4-(2,4-dichloro phenoxy) phenol, toluene (1500 litre) were charged in 5.0 KL reactor at room temperature. 50% NaOH solution (88.0 Kg) was added to the reaction for 30.0 minutes. During the addition of NaOH solution slight exothermic observed. It was heated to 105 to 107 °C for removal of water azeotropically till the required quantity of water was collected and M.C is less than 0.1%. 98% of 2-chloro-methyl propionate was charged at 105°C and maintained the reaction for 3.0 hours at 105-107°C followed by analysis (HPLC). After completion of the reaction, RM was cooled to room temperature. Water (800.0kg) was added at 25-30 °C and stirred for 15 min at 30 °C. Bottom aqueous layerand top organic layer were seperated. Distilled out organic layer at 50-60°C under vacuum, to get the crude Diclofop-methyl, with HPLC purity, 88.0%).

Crystallization:

Charged the above crude in to the 500.0 litre reactor and then charged 300 litre of n-hexane and ethyl acetate mixture (95%n-hexane and 5% ethyl acetate). Mixture was cooled to 10°C, maintained for 4.0 hours at the same temperature, filtered and dried in vacuum oven at 30°C.

Final compound wt: 230 kg Purity: 97.7% w/w, Yield: 66.0%

Chemical reaction:



4-(2,4-Dichloro-phenoxy)-phenol

$C_{12}H_8Cl_2O_2$
Mol. Wt.: 255.10

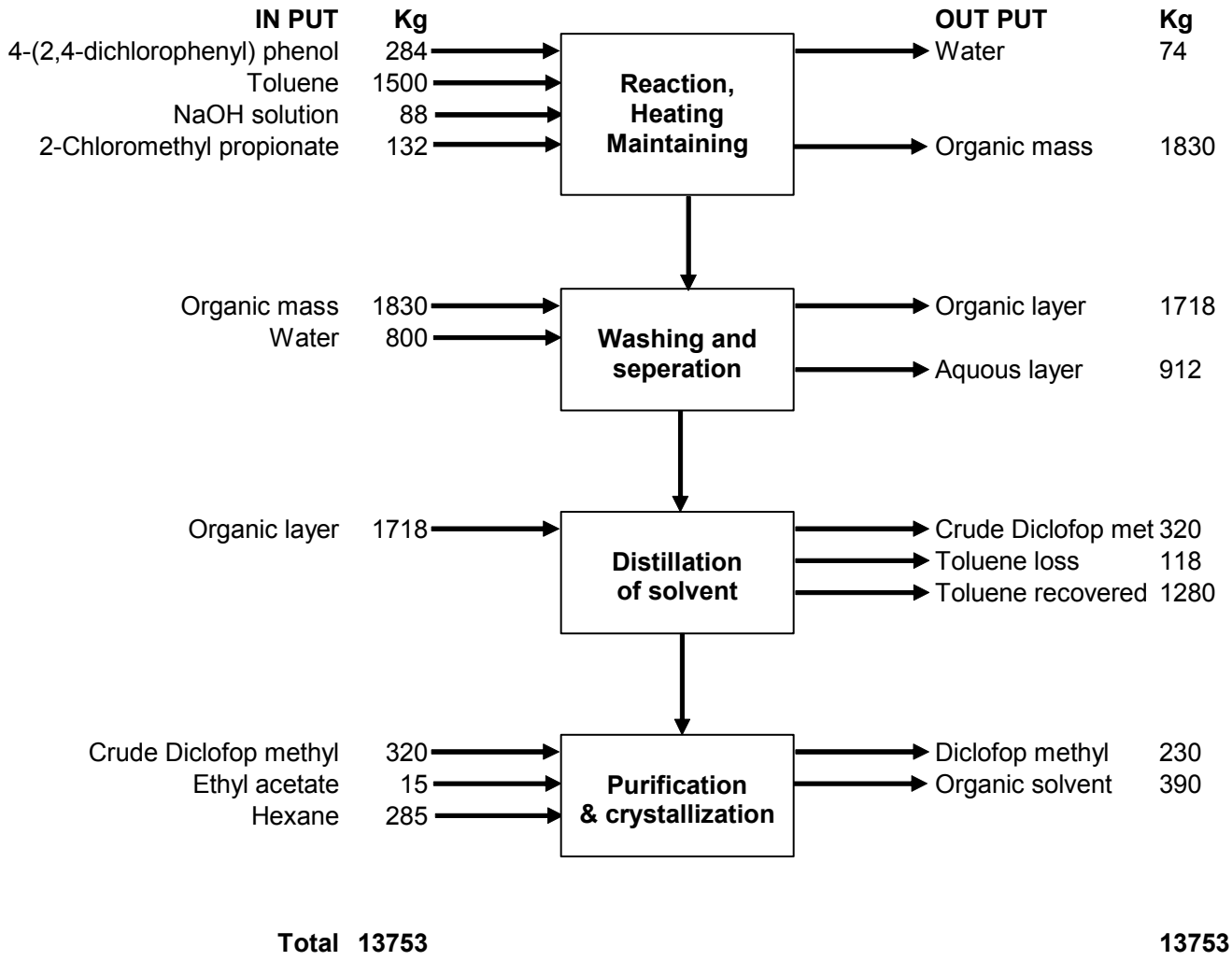
2-Chloro-propionic acid

$C_3H_5ClO_2$
Mol. Wt.: 108.52

Diclofop-methyl

Flow Diagram & Mass Balance:

Mass balance of Diclofop methyl Technical



Total	**13753**		**13753**

(49) Diflufenican

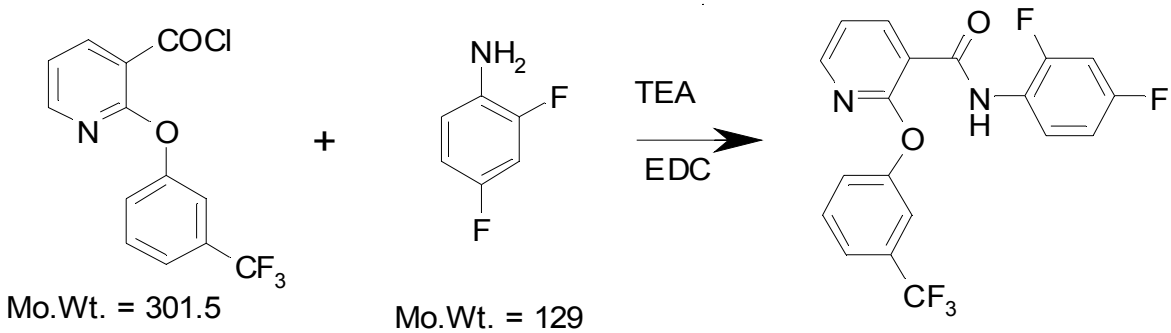
Manufacturing Process:

Charge 2-(3-trifluoromethyl Phenoxy) nicotinyl chloride in a reactor. Dichloroethane and triethyl amine are charged inreactor. Cool the mass at 15^0C for 2 hours. 2,4-difluoroaniline is added slowly over a period of 2 hours at 15^0C temperature. Slowly raise the temperature to 85^0C and reflex for 4 hours. Distilled out EDC and dry light brown solid is obtained.

Charge solid in another reactor and add water, stir for 1 hour. Filter the solid and give three washing with 200 litre of water each. Charge the solid again in the reactor and add 0.2% HCl and stir for 1 hour to dissolve the impurities. Filter the solid and give three washings with 200 litre of water each.

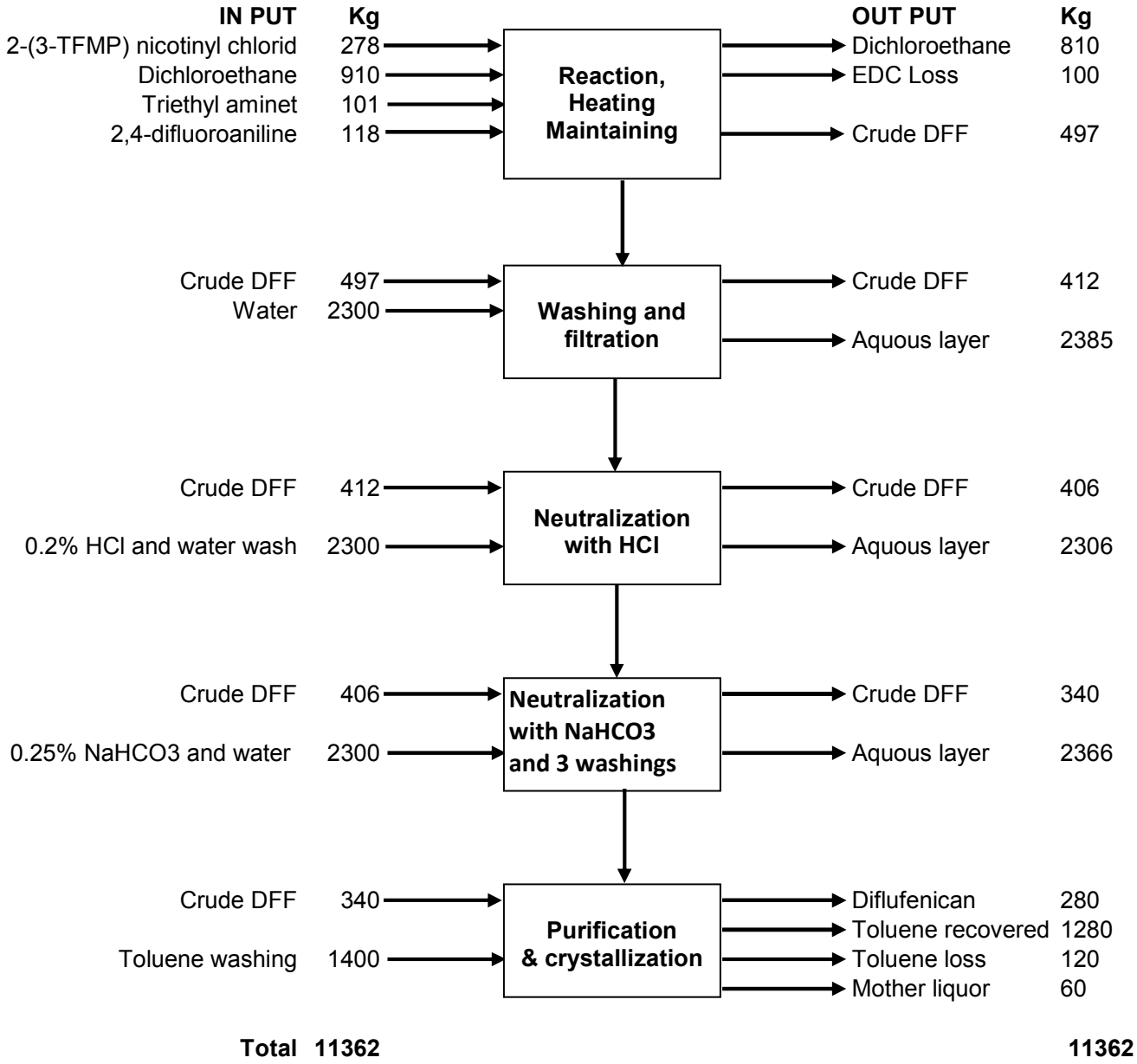
Transfer the solid in the reactor and add 0.25% sodium bicarbonate and stir for 1 hour. Filter the solid and give four washings with 200 litre of water each. Finally charge the solid in the reactor and add toluene and heat to 90^0C temperature. Filter at 85^0C under vacuum and cool gradually to 0 to5^0C over a period of 2 hours. Maintain for 1 hour if required. Filter the final product and give wash with chilled toluene. Dry the solid for 10 hours.

Chemical reaction:



Mo.Wt. = 301.5 Mo.Wt. = 129 Mo.Wt. = 394.5

Flow Diagram & Mass Balance:



(50) Sulcotrione

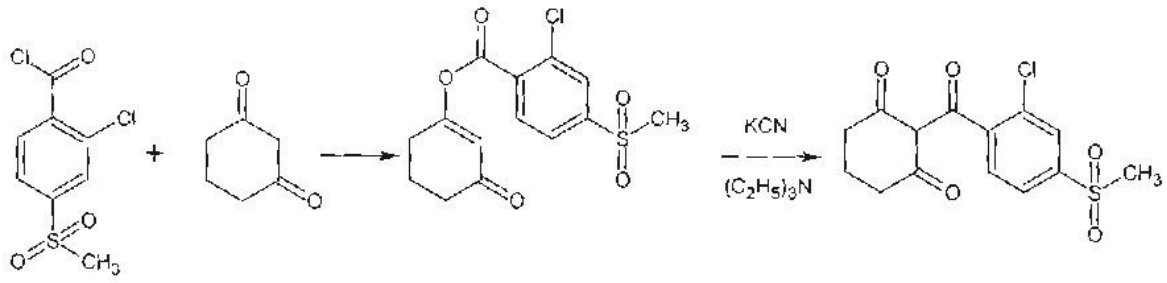
Manufacturing Process:

In a 3000l SS reactor fitted with an anchor rector, 260kg of acid chloride formed above and methylene chloride (1000kg) are charged. In separate feed vessel fitted with an agitator, 114 kg of 1,3-cyclohexanedione and pyridine (88kg) are mixed and the mixture is added to above reactor slowly under stirring at room temperature over a period of 1 hour.

The reaction mixture is washed with Dilute HCl and later by saturated brine and organic layer is dried. Solvent is distilled off to get an oily compound as an intermediate. Oily compound is taken to another reactor Acetonitrile is added followed by an addition of Triethylamine (100kg) and KCN (15kg). The reaction mass is stirred for 10 hours at room temperature. The reaction mass is added to water (1000l) and ethylene dichloride (600kg) is added and the reaction mixture is stirred further for 30 minutes.

The bottom organic layer is separated from aqueous layer and ethylene dichloride solvent is distilled off, to get Sulcotrione Technical as crude product.Sulcotrione is recrystallised using dichloromethane as solvent.

Chemical Reaction:



Flow Diagram & Mass Balance:

Mass balance of Sulcotrione

INPUT	KG		OUTPUT	KG
1,3-cyclohexanedione	114	**Stage 1 Reaction**	Reaction mixture	1462
Pyridine	88			
CMSB acid chloride	260			
Methylene chloride	1000			
Reaction mixture	1462	**Stage 2 Washing and solvent**	Oily intermediate	380
Dilute HCl	600		Methylene chloride	910
			Aquous layer	772
Oily intermediate	380	**Stage 3 Reaction at room temperature**	Reaction mass	1695
Acetonitrile	1200			
Triethyl amine	100			
KCN	15			
Reaction mass	1695	**Stage 4 Washing, seperation and distillation**	Crude Sulcotrione	255
Water	1000		Aquous Layer	2440
Ethylene dichloride	600		DEC recovered	560
			DEC loss	40
Crude Sulcotrione	255	**Stage 5 Purification and distillation**	**Sulcotrione tech**	235
Dichloro methane	1000		Dichloromethane recover	970
			Residue	50
Total	**9769**			**9769**

(51) Clodinafop propargyl

Manufacturing process:

Step-1

Preparation of potassium salt of R(+)-2-[4-{5-chloro-3-fluoropyridin-2-yloxy) phenoxy] propionic acid.

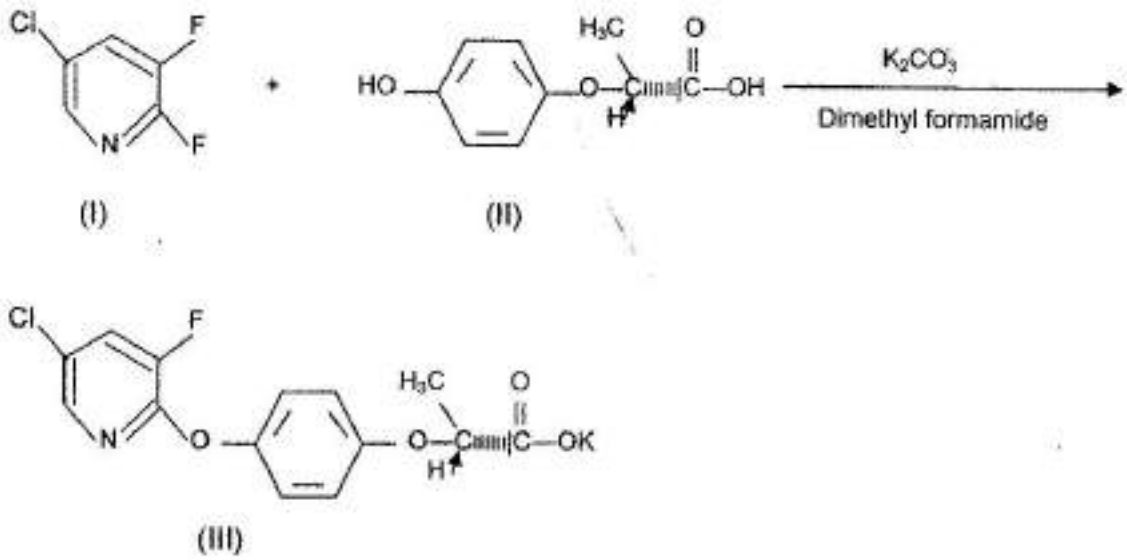
5-Chloro-2, 3-difluoropyridine (I) is reacted with R(+)-2-(4-hydroxy phenoxy) propionic acid (II) in presence of alkali and solvent to yield potassium salt of R(+)-2-[4-(5-chloro-3-fluropyriding-2-yloxy) phenoxy] propionic acid (III).

Step-2

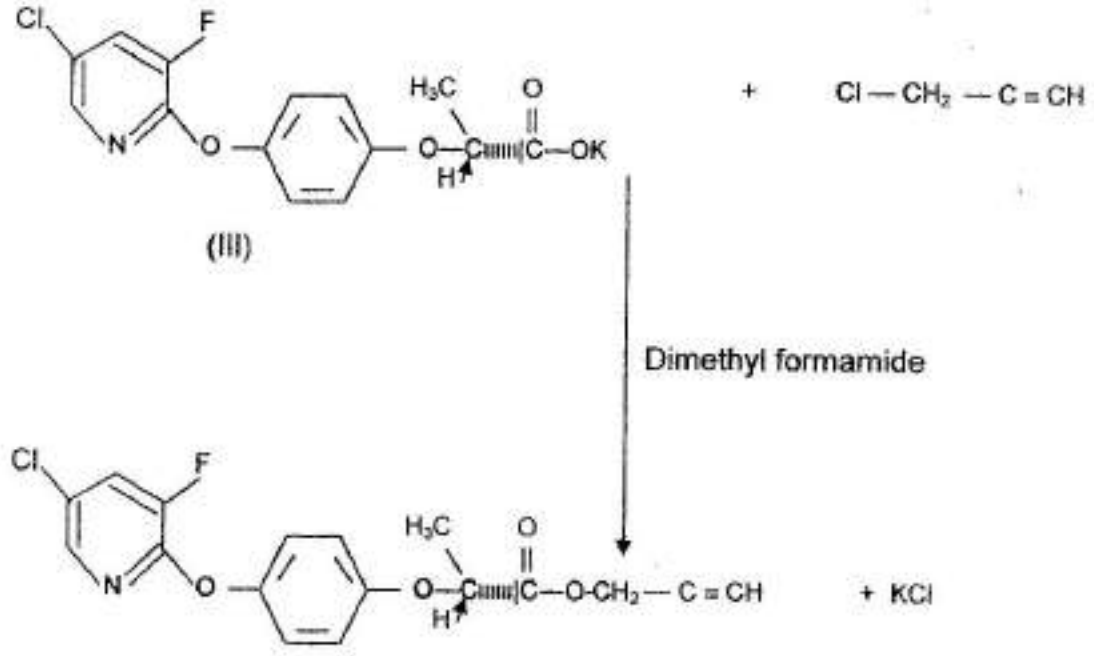
Preparation of propargyl R(+)-2-[4-(5-chloro-3-fluoropyridin-2-yloxy)=phenoxy] propionate (Clodinafop Propargyl)

Potassium salt of R(+)-2-[4-(5-chloro-3-fluoropyridin-2-yloxy)=phenoxy] propionic acid (III) resulted from Step-1 is reacted with propargyl chloride (IV) in solvent to yield and product Propynyl R(+)-2-[4-(5-chloro-3-fluropyridin-2-yloxy) phenoxy] propionate (V). Crude product thus obtained is filtered. Crude product is crystallized by methanol to give Clodinafop Propargyl of 93% minimum purity.

Chemical reaction:



Step2

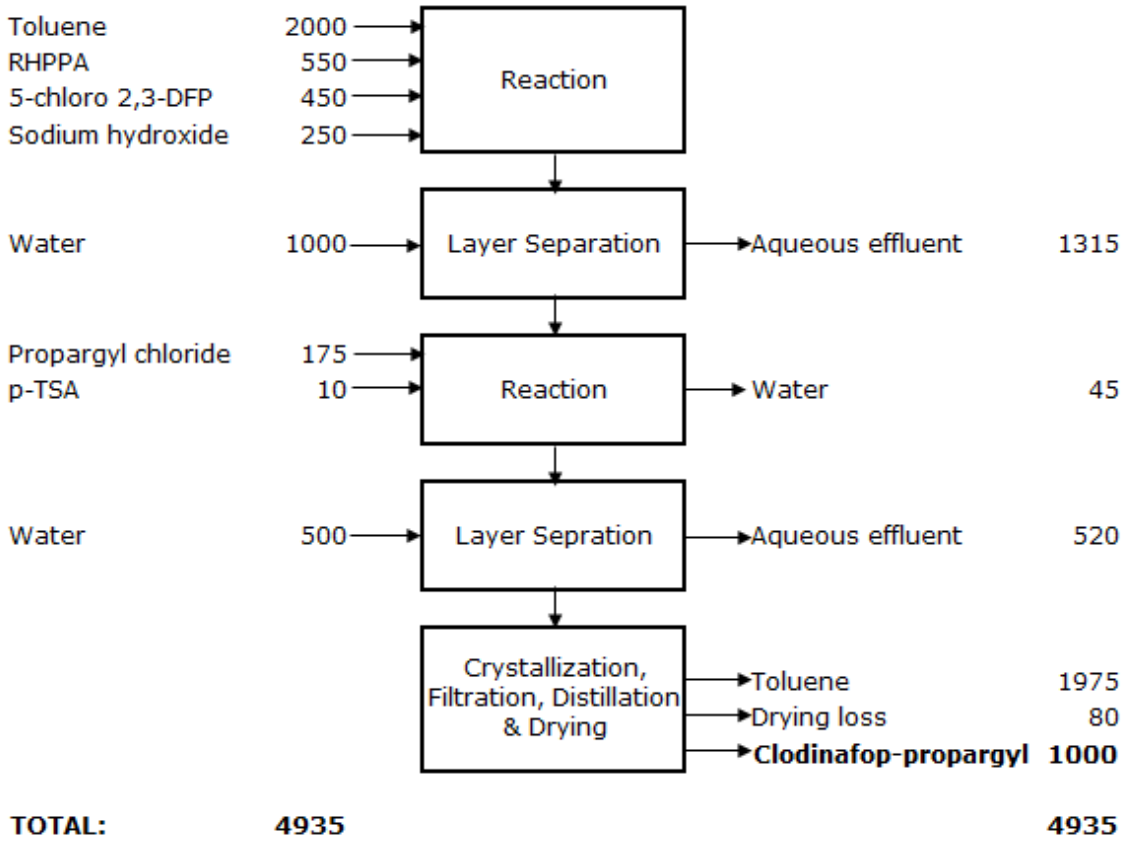


(III)

(V)

Flow diagram & Mass Balance:

Mass balance of Clodinafop-propargyl



TOTAL:	**4935**		**4935**

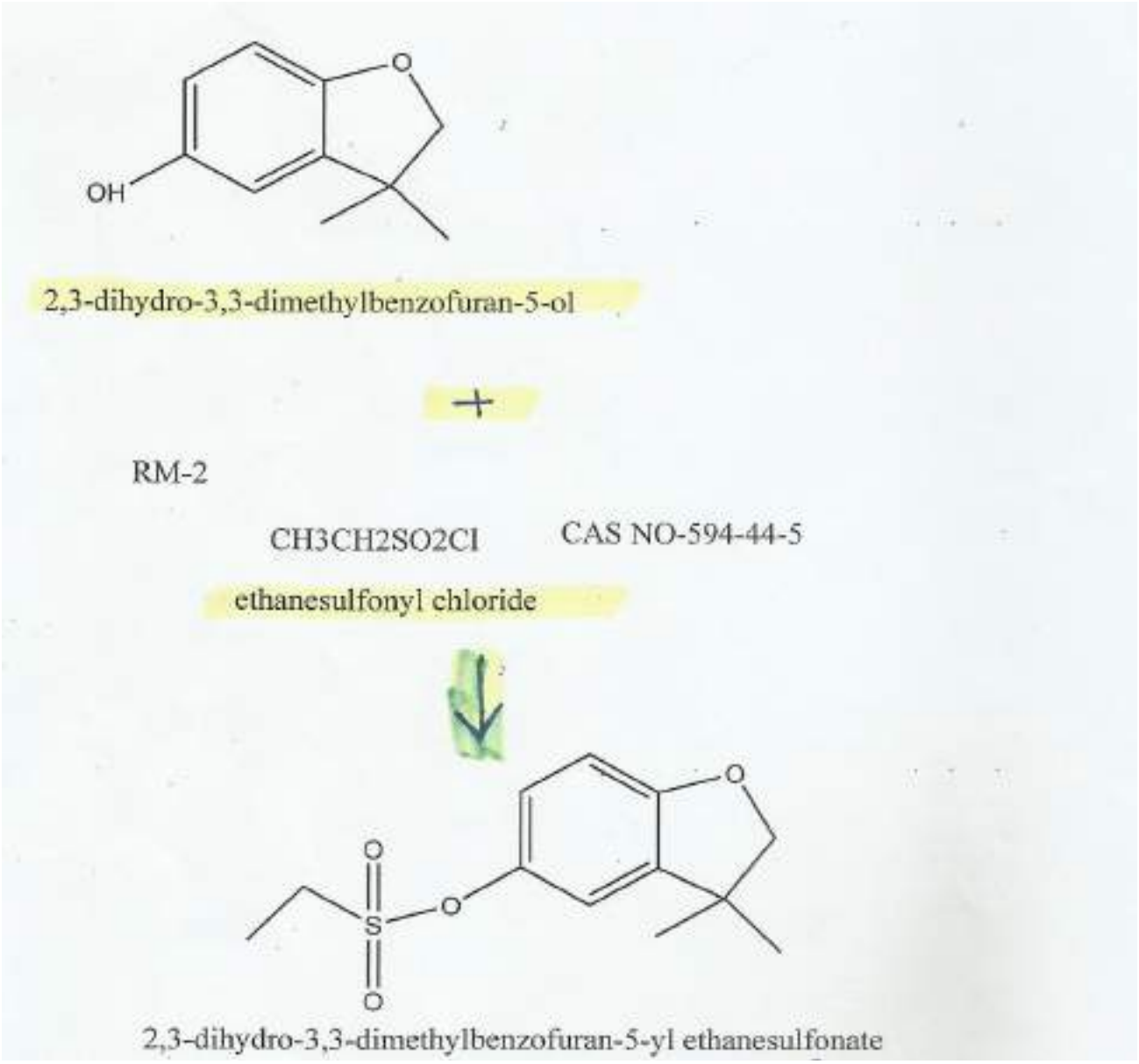
(52) Benfuresate:

Manufacturing process:

Charge 2,3-dihydro-3,3-dimethyl benzofuran-5-ol and toluene in a reactor and reflex for azotropic separation of water. Add ethane sulfonyl chloride and heat at 60-80 degree C. Maintain for 5 to 6 hours. Add dichloroethane, water and 30% hydrochloric acid, mix well and separate the aqueous layer. The organic layer is treated with sodium borohydrate and sulfuric acid in presence of water. Aqueous layer is separated.

The organic layer is transferred to another reactor. And Benfuresate crystallization is done. Dichloriethane is recycled after distillation.

Chemical reaction:



Flow diagram & Mass Balance:

Mass balance of Benfuresate

Input	Kgs	Process	Output	kgs
Toluene	2000	Reaction	Water	75
Morpholine	370			
Isobuteraldehyde	310			
Toluene	910	Reaction		
4-benzoquinone	455			
Ethane sulfonyl chloride	535	Reaction & Distillation	Hydrogen chloride	150
			Toluene	2850
Dichloroethane	2000	Reaction & Separation	Aqueous effluent	1335
Water	500			
HCl 30%	500			
Sodium borohydride	155	Reaction, Separation & Reaction	Aqueous effluent	1250
Water	1000			
Sulfuric acid	100			
		Crystallization, Filtration, Distillation & Drying	Dichloroethane	1960
			Organic residue	40
			Drying loss	175
			Benfuresate	**1000**
TOTAL:	**8835**			**8835**

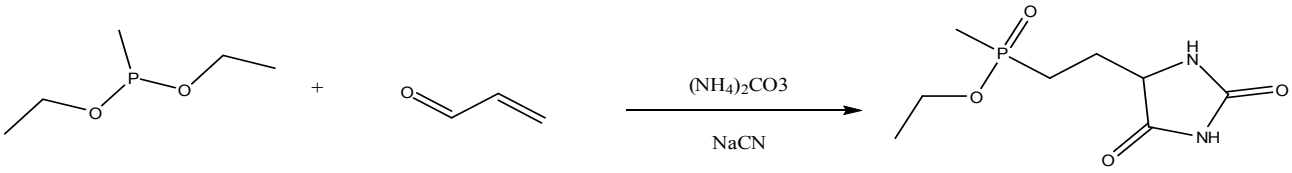
(53) Glufosinate ammonium

Manufacturing Process:

Charge ethanol, acrolein and diethyl methyl phosphonate. Stir for room temperature for 1 hour. Charged sodium cyanide and ammonium carbonate. Reflux for 4 hours and filter. Distil out the solvent to get 5-[2-ethoxy(methyl)phosphinylethyl)hydantoin. Charge barium hydroxide and water. Rise to 60oC and stir for 1 hour. Cool to room temperature and add 30% sulfuric acid to neutralize. Filter and wash with water.

Charge the filtrate and add ammonium hydroxide to pH 12. Filter the slurry to obtain Glufosinate Ammonium.

Chemical Reaction:



diethyl methylphosphonite + prop-2-enal → 5-[2-ethoxy(methyl)phosphinylethyl]hydantoin

Glufosinate

2-amino-4-[hydroxy(methyl) phosphinoyl]butyric acid

Glufosinate Ammonium

2-amino-4-[hydroxy(methyl)phosphinoyl] butyric acid monoammonium salt

Flow diagram & Mass Balance:

Mass balance of Glufosinate ammonium

Input	Kgs	Process	Output	kgs
Ethanol	2000	Reaction		
Acrolein	310			
Diethyl methyl phosphonate	750			
Sodium cyanide	270	Distillation	Ethanol	1900
Ammonium carbonate	530			
Water	500	Reaction		
Barium hydroxide	870	Filter		
Sulfuric acid, 30%	900	Washing	Solid effluents	1050
Water	500			
Ammonium hydroxide, 25%	800	Reaction	Aqueous effluent	3480
		Filtration	Glufosinate Ammonium	1000
TOTAL:	**7430**			**7430**

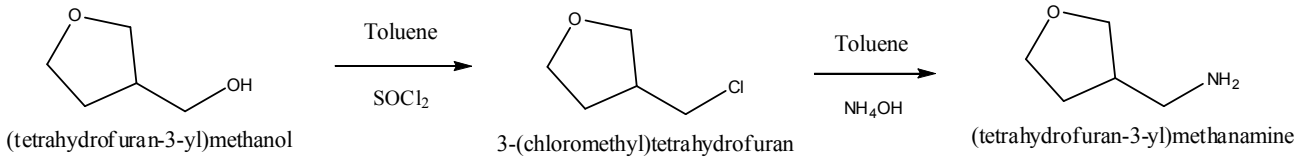
(54) Dinotefuran

Manufacturing Process:

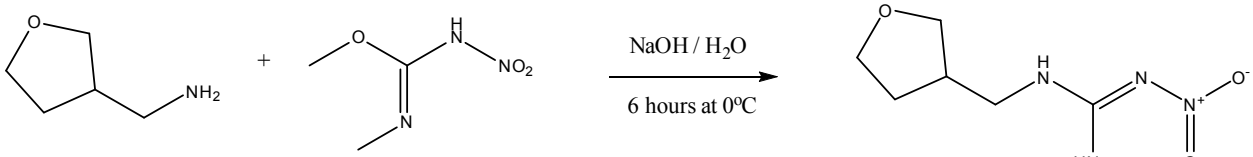
Charge toluene and 3-(hydroxymethyl)tetrahydrofuran. Rise to 50oC and add thionyl chloride. Rise to 75oC and maintain for 4 hours. Distil out toluene partially and cool to 0oC. Add ammonia solution for 4 hours and rise to 30oC. Separate the organic phase and distil out to obtain oily liquid of (tetrahydrofuran-3-yl)methanamine.

Charge oily liquid of (tetrahydrofuran-3-yl)methanamine and water. Cool to 0oC. Add sodium hydroxide solution and methyl-N-methyl-N-nitrocarbamimidate at 0oC. Maintain the reaction for 6 hours at 0oC. Filter the slurry and dry to obtain Dinotefuran Technical.

Chemical Reaction:



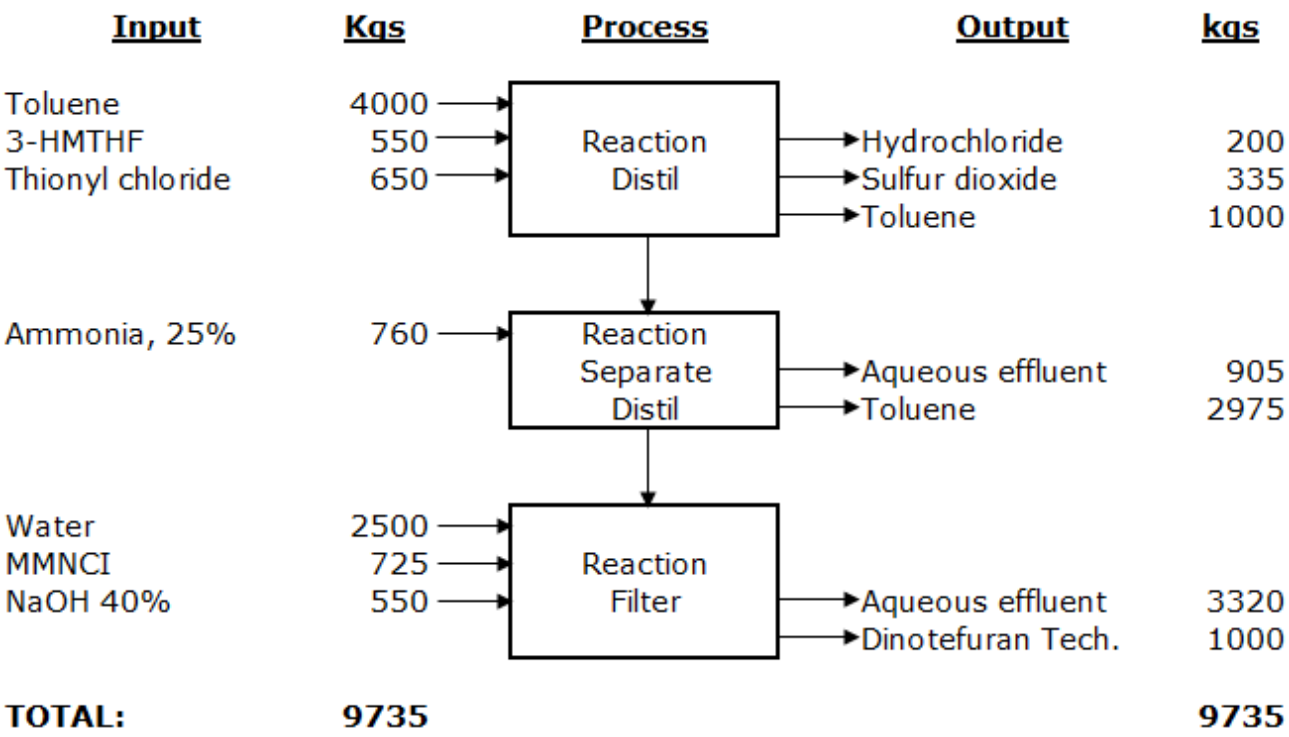
(tetrahydrofuran-3-yl)methanol — 3-(chloromethyl)tetrahydrofuran — (tetrahydrofuran-3-yl)methanamine



(tetrahydrofuran-3-yl) methanamine + methyl *N*'-methyl-*N*-nitrocarbamimidate → DINOTEFURAN

Flow diagram & Mass Balance:

Mass balance of Dinotefuran

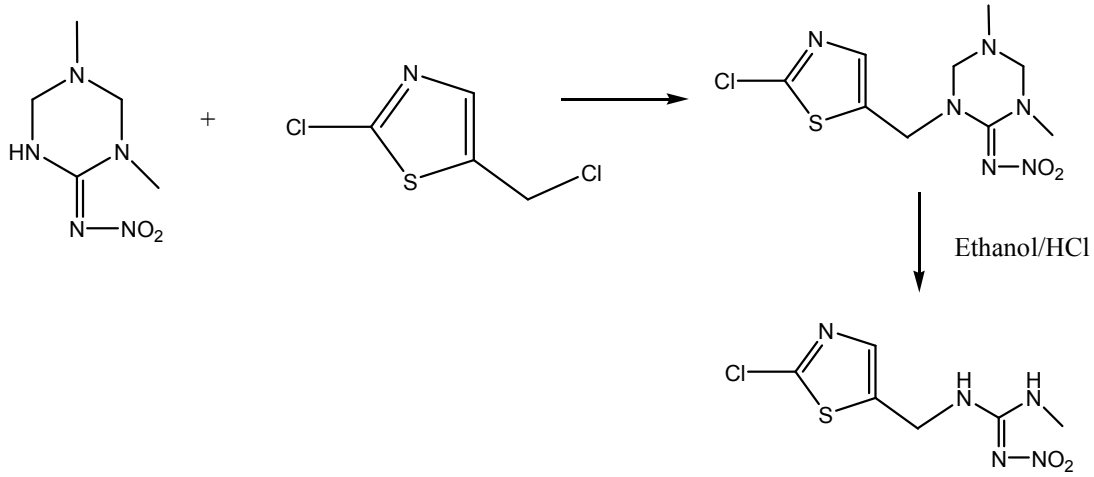


(55) Clothianidin

Manufacturing Process:

1,5-Dimethyl-2-nitroiminohexahydro-1,3,5-triazine is dissolved in dried DMF. Slowly add Sodium hydroxide solution to the mixture with cooling. The mixture is stirred for 1 h at room temperature then the mixture heated with stirring further for 1 h at 50° C. To this mixture, a solution of 2-chloro-5-thiazolymethylchloride in dried DMF added dropwise at 40–50° C. After this addition,the reaction mixture heated with stirring for two hours at 70–80° C. The mixture poured into ice-water and filtered. Take ethanol & hydrochloric acid & add the crude clothianidin andmaintain for 10-12 hours at 75-80°C, after completion of reaction, cool at 20°C and filter. Dry the material to get clothianidin technical.

Chemical Reaction:



Flow diagram & Mass Balance:

Mass balance of Clothianidin

INPUT	KG		OUTPUT	KG
1,5-DMNIHH-1,3,5-triazine	740	→ **Stage 1 Reaction**	→ Reaction mixture	2760
Dimethyl Formamide	1000			
Sodium hydroxide	170			
Water	850			
Reaction mixture	2760	→ **Stage 2 Reaction**	→ Reaction Mixture 2	4475
2-chloro-5-TM chloride	715			
Dimethyl Formamide	1000			
Reaction Mixture 2	4475	→ **Stage 3 Quanching and filtration**	→ Crude Clothianidin	1150
Ice water	5000		Aquous effluents	8325
Crude Clothianidin	1150	→ **Stage 4 Purification and distillation**	→ Clothianidin	1000
Ethanol	3000		Aquous Layer	750
Hydrochloric acid	600		Ethanol recovered	2650
			Ethanol loss	350
Total	**21460**			**21460**

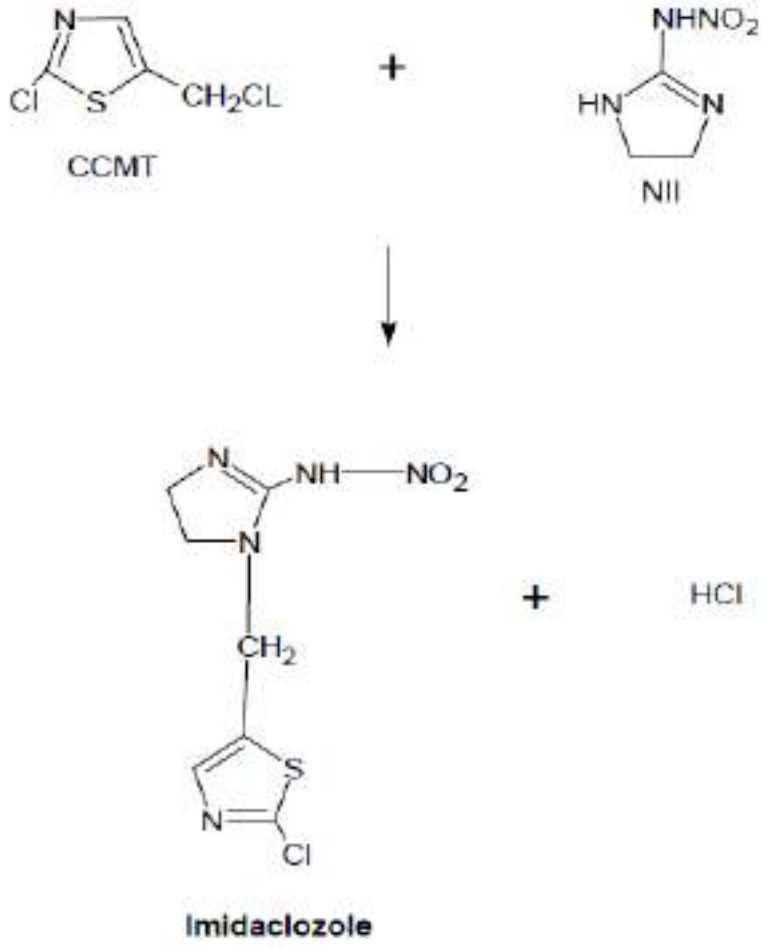
(56) IMIDACLOTHIZ

Manufacturing Process:

Imidaclothiz is synthesized by the reaction of 2-chloro-5-chloromethylthiazole with 2-nitroaminoimidazolidine in the presence of acid binding agent. Crude material is crystallized. Ensure clean and dry reaction setup.

DMF and NaOHare chargedinto a reactor at room temperature. Then NII is added to the reactor at room temperature with agitation. Cool the mixture to 15°C. Prepare solution of CCMT in DMF.Add CCMT solution at 18-20°C in 6-7 hours. Raise the temperature to 50°C and maintain for 3 hours at 50±2°C. Analyze the sample by HPLC. CCMT should be less than 0.5 and NII less than 2%. Cool to 20°C and filter. Wash with DMF. Adjust pH for by HCl. Distilled out DMF under vacuum. Crystallized crude material with methanol Filter and Dry the material upto 75°C.

Chemical Reaction:



Flow diagram & Mass Balance:

Mass balance of Imidaclothiz						
INPUT	**KG**				**OUTPUT**	**KG**
CCMT	700	→	**Stage 1 Condensation & solvent recovery**	→	Organic mass	1450
N-NII	550	→		→	Recovered solvent DMF	2410
DMF	2500	→		→	DMF loss	90
NaOH	200	→				
			↓			
Organic mass	1450	→	**Stage 2 Water wash**	→	Crude Imidacloprid mass	1320
Water	1000	→		→	Aqueous layer	1130
			↓			
Crude Imidacloprid mass	1320	→	**Stage 3 Crystallization, Filtration & Drying**	→	**Imidaclothiz Tech.**	1100
Methanol	1200	→		→	Recovered Methanol	1080
				→	Methanol loss	120
				→	Organic mass	220
Total	**8920**					**8920**

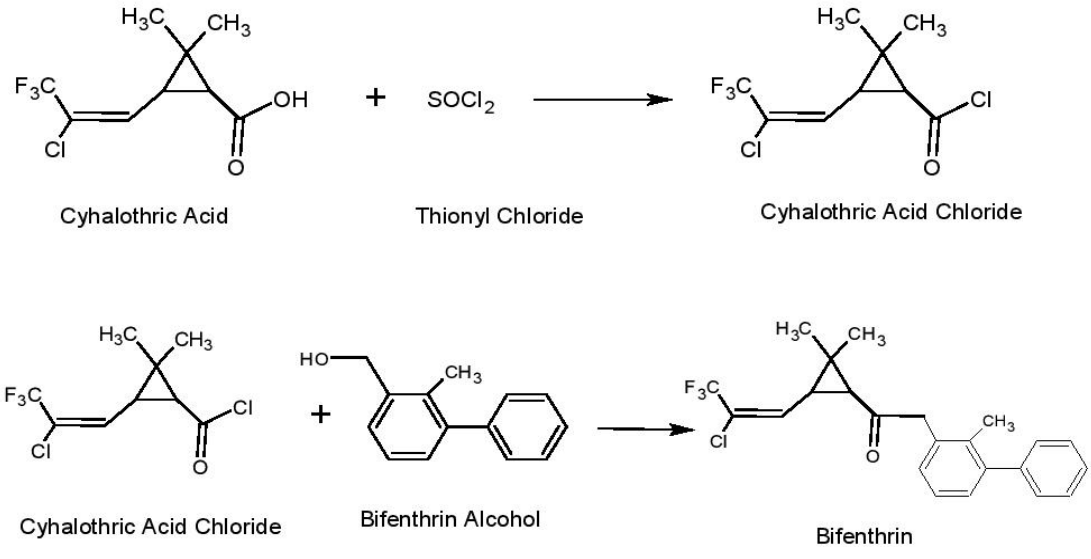
(57) Bifenthrin

Manufacturing Process

Charge lambdacyhalothric acid in a reactor and add thionyl chloride slowly. HCl gas and Sulphur dioxide will pass through the scrubber. Lambdacyhalothric acid chloride is ready for next step. Charge acid chloride in the reactor having scrubber system.Start agitation and raise the temperature to 60°C and agitate for 30 minute. Start adding Bifenthrin alcohol at 62±2°C and complete addition in 8 lots in 3 hours. Maintain the temperature 65±2°C for 3-4 hours. Check the sample, Bifenthrin alcohol should be less than 0.1% and acid chloride should be less than 0.2%. Fine tuning is to be done as per need for getting the above results and sample should be checked after every half an hour.Bring the temperature to 30°C and add hexane and agitate for ½ hour. Give water washing.

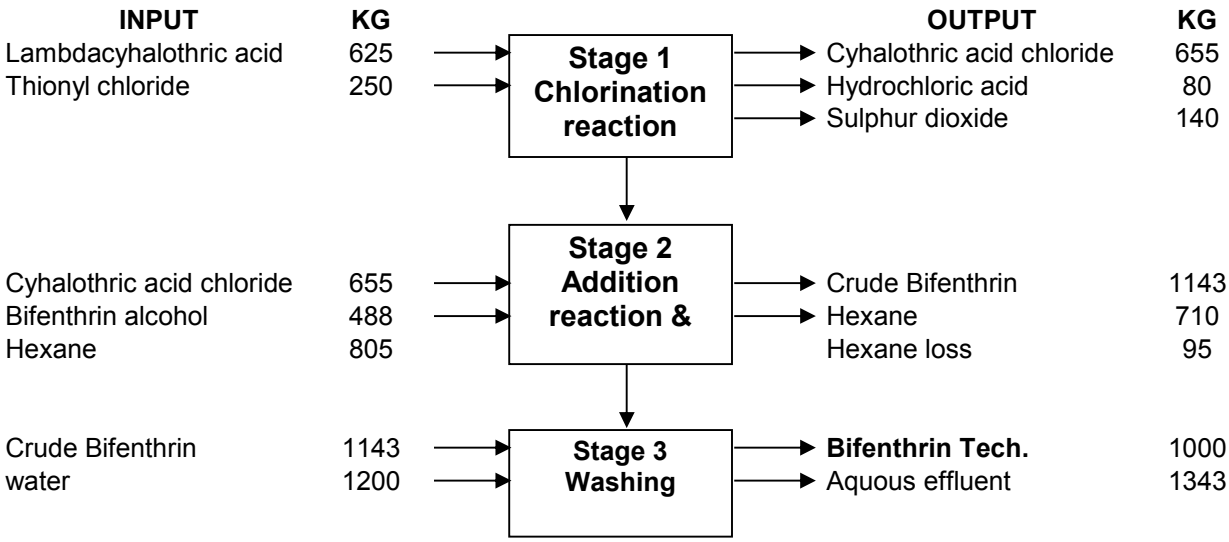
Bring pH 7.5-8.0 by addition of 2% sodium bicarbonate solution (400 ltr) to organic layer at 30-35°C, agitate for 30 minute, settle and remove aqueous layer. Give washing with water to organic layer and check the pH it should be 7.0.Remove aqueous layer. Give washing to organic layer with 0.3% acetic acid solution (250 ltr), separate aqueous layer completely. Distill of the hexane by simple distillation upto 80°C then cool to 40°C and apply vacuum. Take the vacuum upto 740 mm Hg and temperature upto 80°C, maintain for half an hour at 80°C. Check hexane content, it should be less than 0.1%. Drum up Bifenthrin at 60°C – 65°C with filtration by markin cloth.

Chemical reaction



Flow diagram & Mass Balance:

Mass balance of Bifenthrin



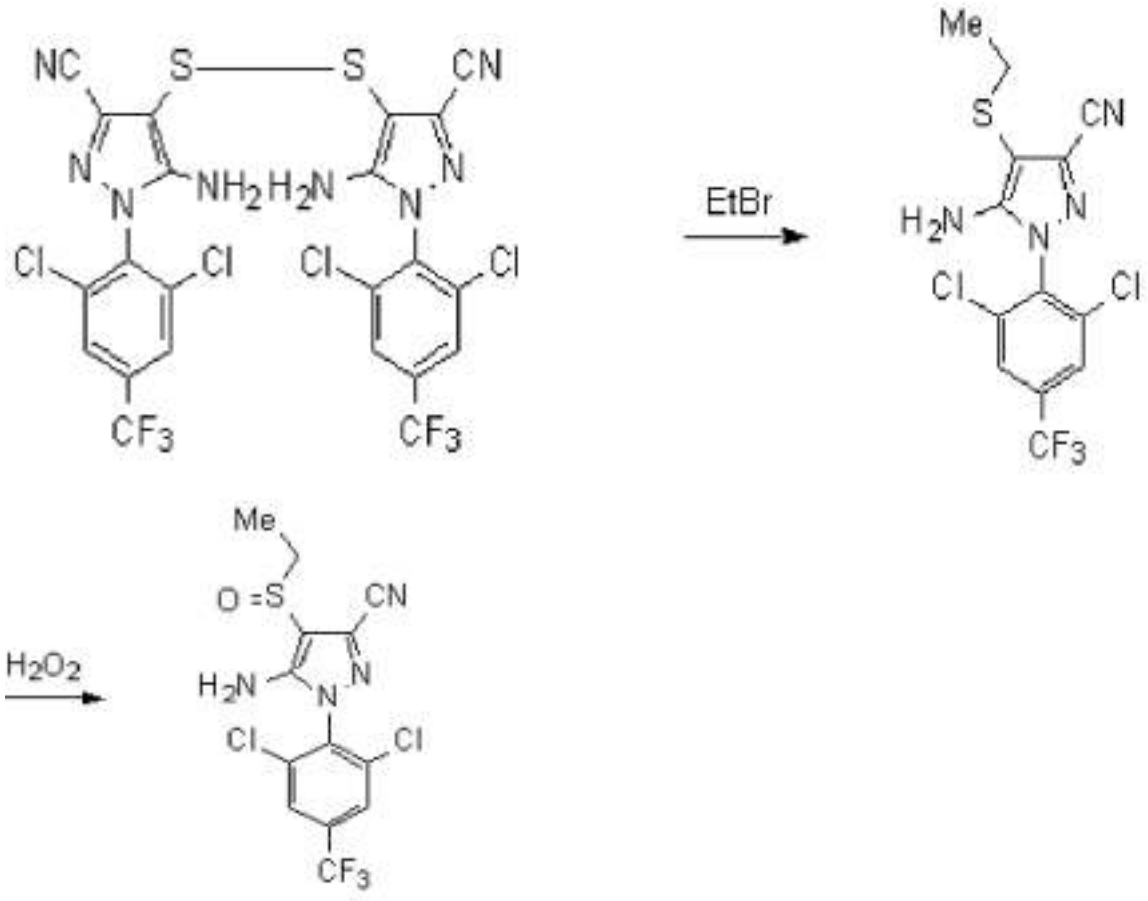
Total	**5166**		**5166**

(58) Ethiprole

Manufacturing Process:

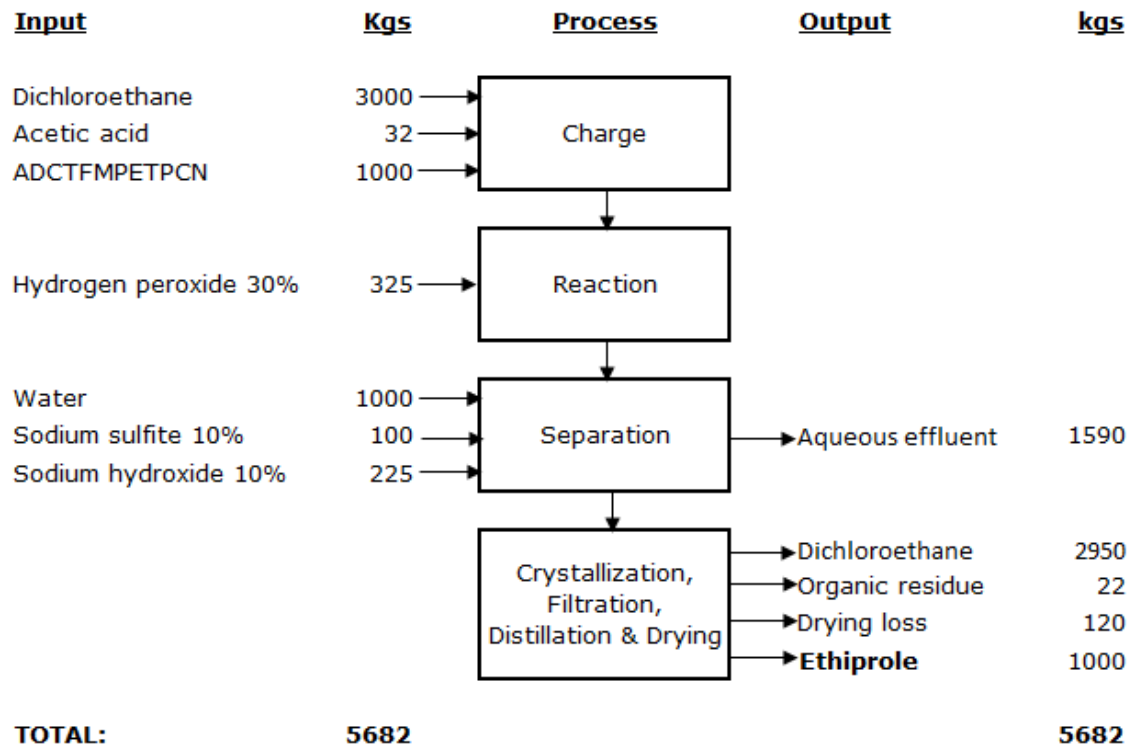
Dichloroethane is taken in the SS reactor and compound A is added at room temperature. Add acetic acid as catalyst. Maintain the mixture at 60-80 degree centigrade for 6-10 hours. Add hydrogen peroxide 30% and stir the mixture for 2-3 hours. Wash this organic layer with 10% sodium sulfite, remove the aqueous layer. Wash with 10% sodium hydroxide. Remove aqueous layer. Crystallize Ethiprole from organic layer and recycle the solvent after distillation.

Chemical reaction:



Flow diagram & Mass Balance:

Mass balance of Ethiprole



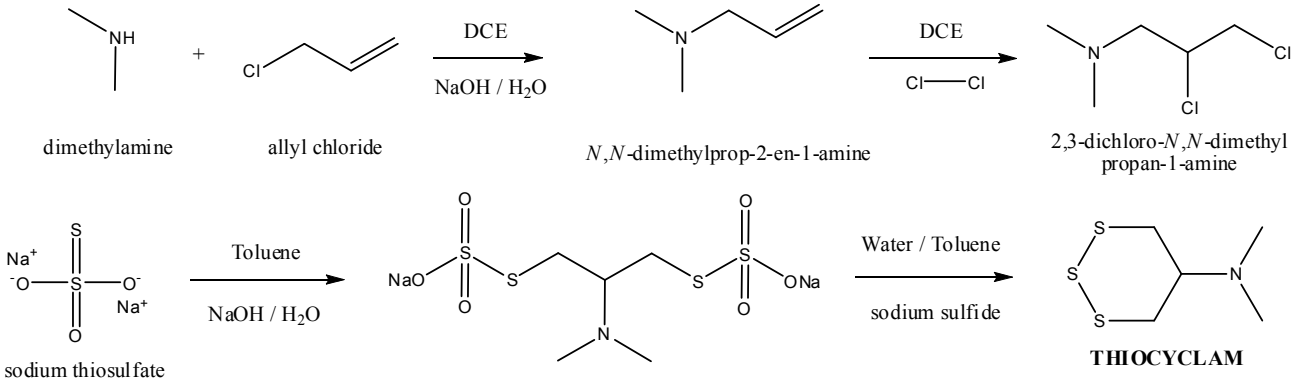
(59) Thiocyclam

Manufacturing Process:

Charge allyl chloride and dichloroethane. Add sodium hydroxide solution and dimethylamine 40% solution. Rise to 50oC and maintain for 4 hours. Cool, settle and separate the organic phase. Take the organic phase rise to 40oC. Pass chlorine and cool to 0oC. Filter the slurry to obtain 2,3-dichloro-N,N-dimethylpropan-1-amine.

Charge 2,3-dichloro-N,N-dimethylpropan-1-amine and toluene. Charge diluted sodium hydroxide solution and sodium thiosulfate. Maintain for 3 hours at 70oC, cool the adduct to -5oC and add sodium sulfide. Separate the organic phase of thiocyclam in toluene. Cool to 0oC and filter the slurry. Dry the wet cake to obtain thiocyclam.

Chemical Reaction:



Flow diagram & Mass Balance:

Mass balance of Thiocyclam

Input	Kgs	Process	Output	kgs
Dichloroethane	3000	Charge Reaction		
Allyl chloride	450			
Sodium hydroxide 48%	490			
Dimethylamine 40%	660	Separate	Aqueous effluent	1000
Chlorine	430	Reaction Filter Distil	Dichloroethane	2980
			Organic effluent	40
Toluene	3000	Reaction		
Sodium hydroxide 48%	975			
Sodium thiosulfate	1850			
Sodium sulfide 60%	760	Reaction Separate Filter Distil	Aqueous effluent	3520
			Thiocyclam Technical	1025
			Toluene	2975
			Organic residue	75
TOTAL:	**11615**			**11615**

(60) Pymetrozine

Manufacturing Process:

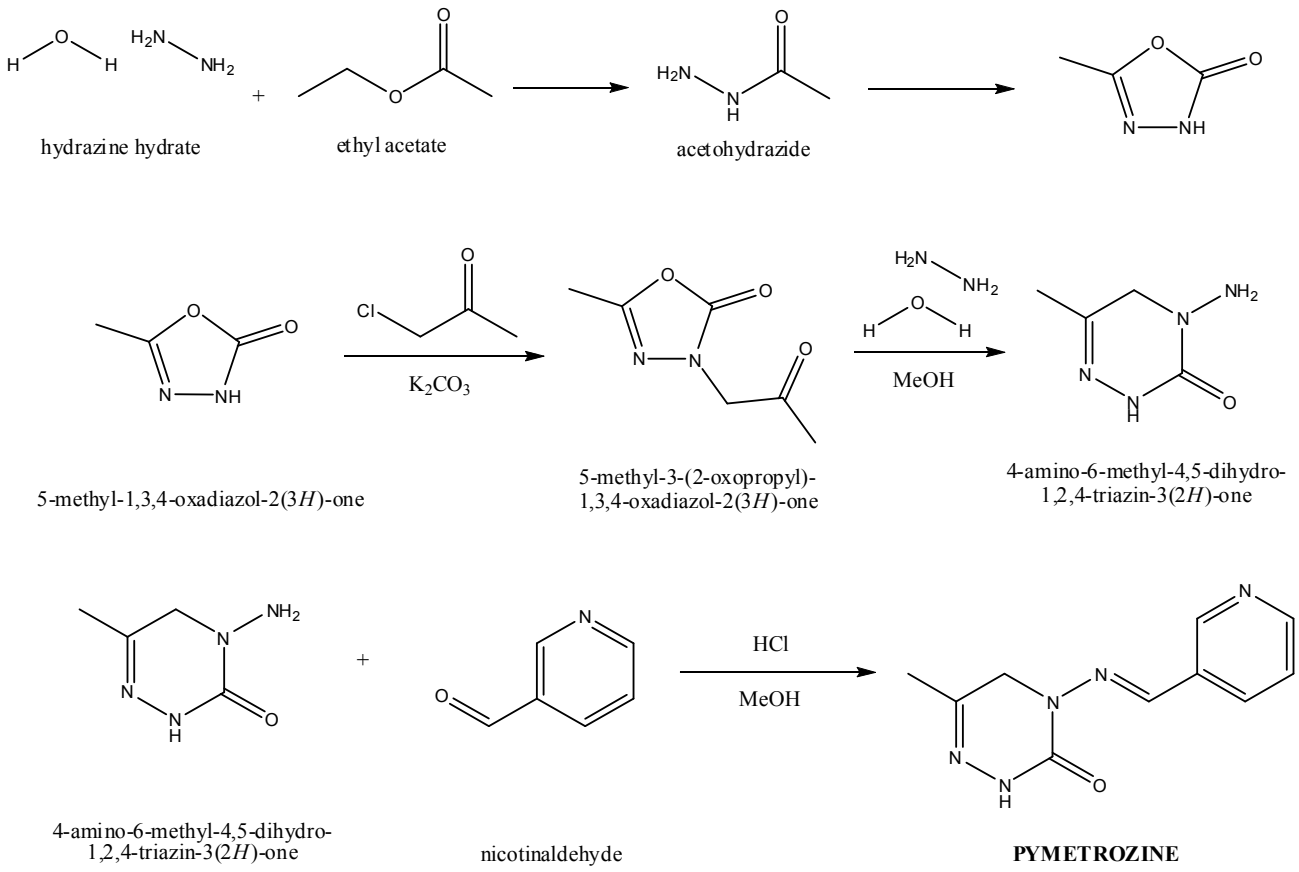
Charge ethyl acetate and hydrazine hydrate in dichloroethane. Reflux for 6 hours and separate the organic phase at 30oC. The organic phase contains acetohydrazide in dichloroethane.

Charge triphosgene to the organic phase and reflux for 6 hours. Hydrogen chloride is liberated and 5-methyl-1,3,4-oxadiazol-2-(3H)-one is obtained. Cool to 30oC.

Charge potassium carbonate to the mass. Add chloroacetone at 50oC and maintain for 3 hours. Cool to 30oC and charge water. Separate the organic phase and cool to 0oC. Filter the slurry to obtain 5-methyl-3-(2-oxopropyl)-1,3,4-oxadiazol-2-(3H)-one.

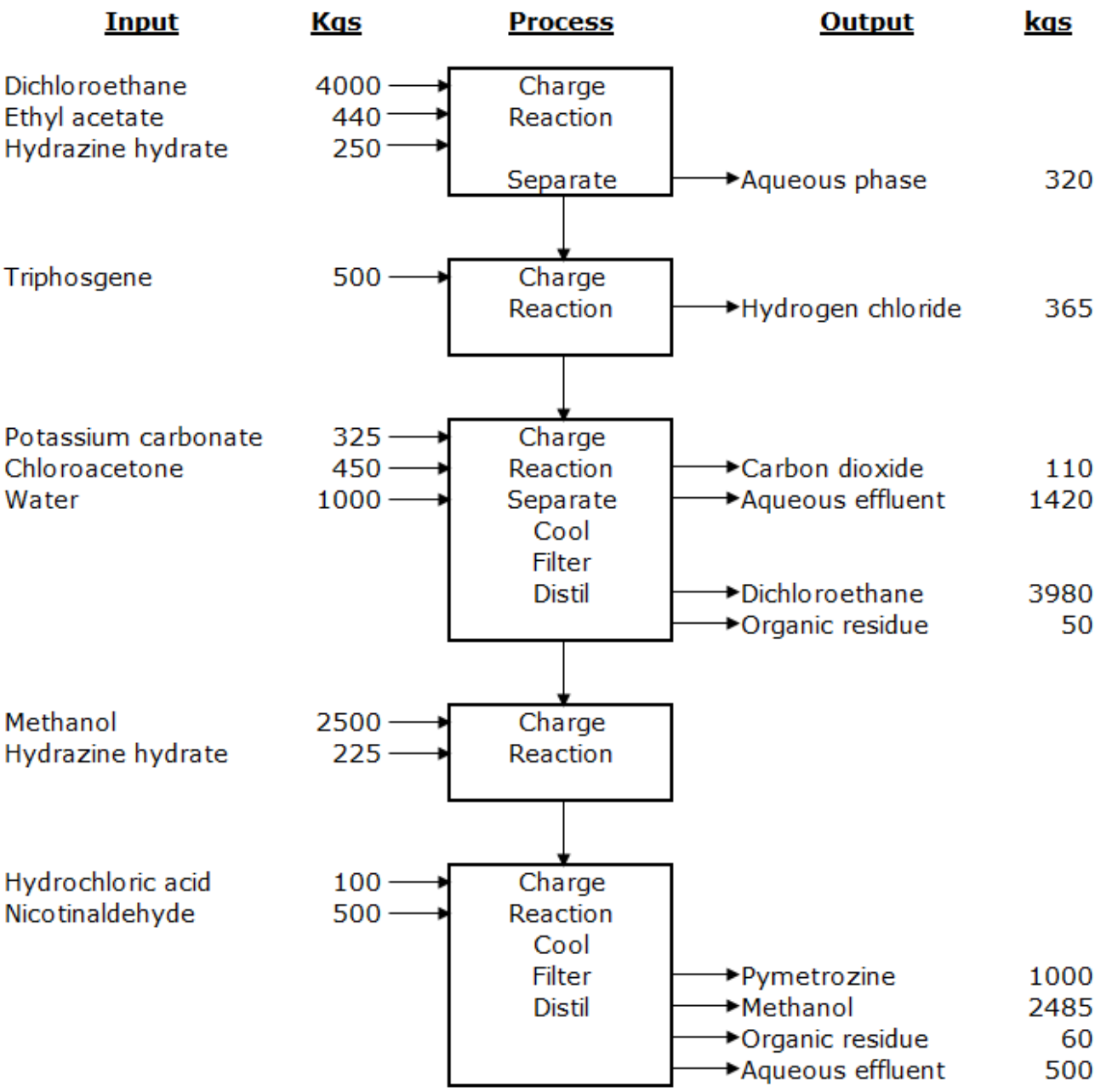
Charge 5-methyl-3-(2-oxopropyl)-1,3,4-oxadiazol-2-(3H)-one and methanol. Add hydrazine hydrate and maintain for 6 hours at 65oC. Cool and add hydrochloric acid and nicotinaldehyde. Maintain at 60oC for 3 hours and cool to 0oC. Filter the slurry and dry to obtain Pymetrozine Technical.

Chemical Reaction:



Flow diagram & Mass Balance:

Mass balance of Pymetrozine

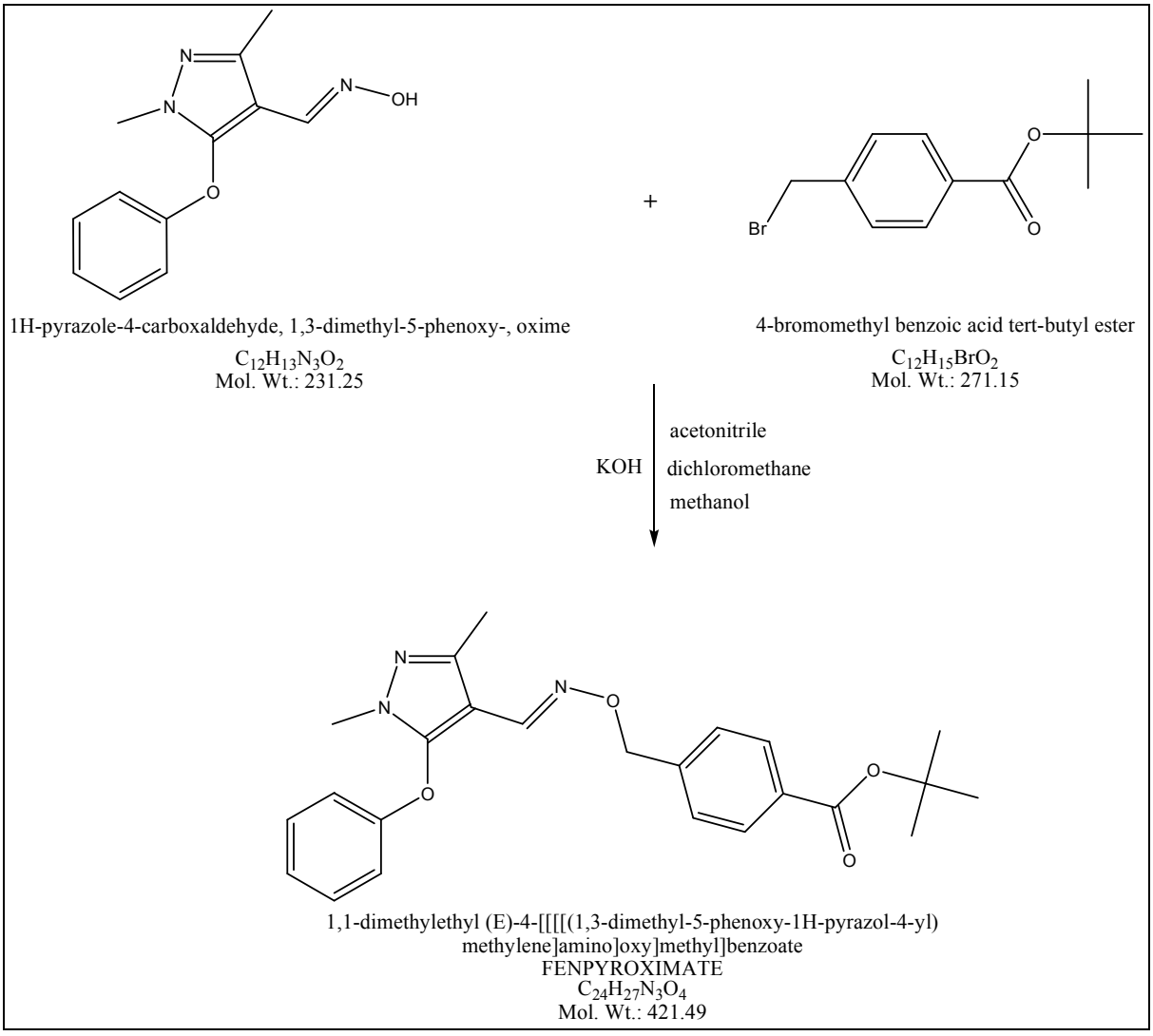


(61) Fenpyroximate

Manufacturing Process:

1H-pyrazole-4-carboxaldehyde 1,3-dimethyl-5-phenoxy-oxime and potassium carbonate are charged in dichloroethane. tert-butyl-4-(chloromethyl)benzoate is charged and maintained the reaction mass at 55-60oC for 4 hours. After completion of the reaction the solvent is distilled out under reduced pressure and then water and dichloromethane are charged. The extracted organic phase is washed with water and the washed organic phase is distilled out to recover dichloromethane. Then methanol is charged for crystallization, refluxed and cooled to 0oC and filtered. The washed cake is dried at 50oC to get Fenpyroximate Technical.

Chemical Reaction:



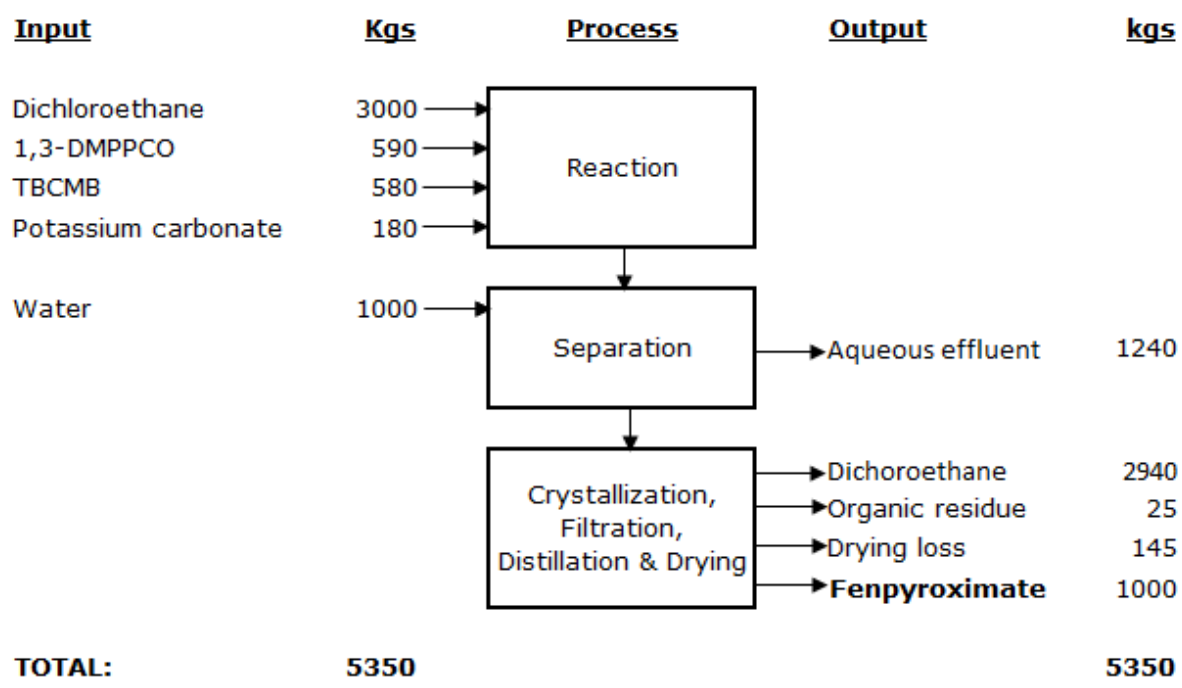
1H-pyrazole-4-carboxaldehyde, 1,3-dimethyl-5-phenoxy-, oxime
$C_{12}H_{13}N_3O_2$
Mol. Wt.: 231.25

4-bromomethyl benzoic acid tert-butyl ester
$C_{12}H_{15}BrO_2$
Mol. Wt.: 271.15

1,1-dimethylethyl (E)-4-[[[[(1,3-dimethyl-5-phenoxy-1H-pyrazol-4-yl) methylene]amino]oxy]methyl]benzoate
FENPYROXIMATE
$C_{24}H_{27}N_3O_4$
Mol. Wt.: 421.49

Flow diagram & Mass Balance:

Mass balance of Fenpyroximate



(62) Pyraclostrobin

Manufacturing Process:

Charge methanol, (4-chlorophenyl)hydrazine and methyl acrylate. Maintain at 80oC for 3 hours. Cool to 30oC to obtain 1-(4-chlorophenyl)pyrazolidin-3-one.

Charge sulfuric acid and pass air at 60oC for 6 hours. Cool to 30oC to obtain 1-(4-chlorophenyl)-1H-pyrazol-3-ol.

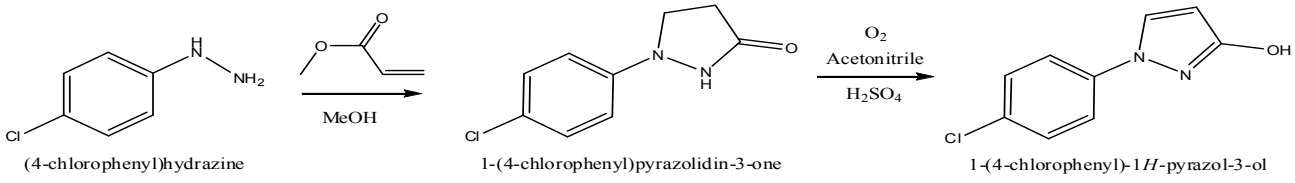
Charge sodium hydroxide and 1-(bromomethyl)-2-nitrobenzene. Maintain at 65oC for 3 hours to obtain 1-(4-chlorophenyl)-3-(2-nitrobenzyloxy)-1H-pyrazole.

Charge ammonium chloride and maintain at 35oC for 4 hours. Distil out to recover methanol under reduced pressure. Add toluene and water. Separate the organic phase of toluene and N-(2-((1-(4-chlorophenyl)-1H-pyrazol-3-yloxy)methyl)phenyl)hydroxylamine.

Charge organic phase and add methyl chloroformate. Maintain at 30oC for 3 hours to obtain methyl 2-((1-(4-chlorophenyl)-1H-pyrazol-3-yloxy)methyl)phenyl(hydroxy) carbamate.

Charged potassium carbonate and add dimethyl sulfate. Maintain at 50oC for 5 hours. Add water and separate the organic phase. Cool the organic phase to obtain slurry. Filter the slurry and dry to obtain Pyraclostrobin Technical.

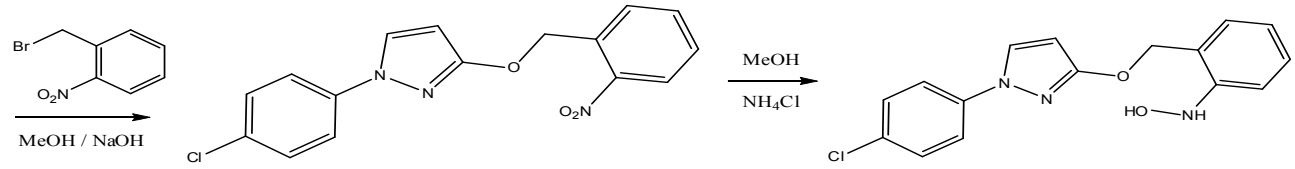
Chemical Reaction:



(4-chlorophenyl)hydrazine

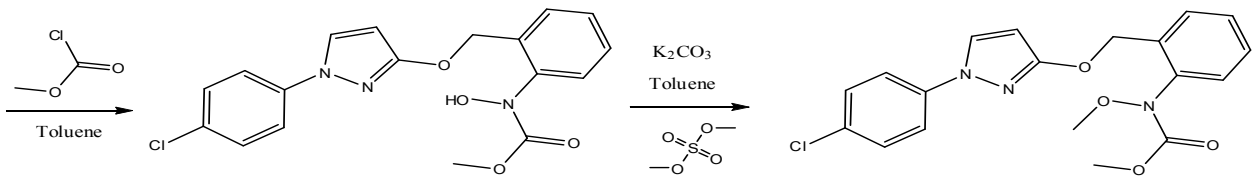
1-(4-chlorophenyl)pyrazolidin-3-one

1-(4-chlorophenyl)-1*H*-pyrazol-3-ol



1-(4-chlorophenyl)-3-(2-nitrobenzyloxy)-1*H*-pyrazole

N-(2-((1-(4-chlorophenyl)-1*H*-pyrazol-3-yloxy)methyl)phenyl)hydroxylamine



methyl 2-((1-(4-chlorophenyl)-1*H*-pyrazol-3-yloxy)methyl)phenyl(hydroxy)carbamate

PYRACLOSTROBIN

Flow diagram & Mass Balance:

Mass balance of Pyraclostrobin

Input	Kgs	Process	Output	kgs
Methanol	3000	Reaction		
(4-chlorophenyl)hydrazine	390			
Methyl acrylate	240			
Sulfuric acid	13	Reaction		
Air (oxygen)	50			
Sodium hydroxide	120	Reaction		
1-(bromomethyl)-2-nitrobenzene	590			
Ammonium chloride	150	Reaction		
		Distil	Methanol	3060
Toluene	4000	Separate	Aqueous effluent	2630
Water	2000			
Methylchloroformate	260	Reaction	Hydrogen chloride	100
Potassium carbonate	200	Charge		
Dimethyl sulfate	350	Reaction		
Water	2000	Cool	Pyraclostrobin	1000
		Filter	Toluene	3975
		Distil	Organic residue	60
			Aqueous effluent	2538
TOTAL:	**13363**			**13363**

(63) Cyazofamid

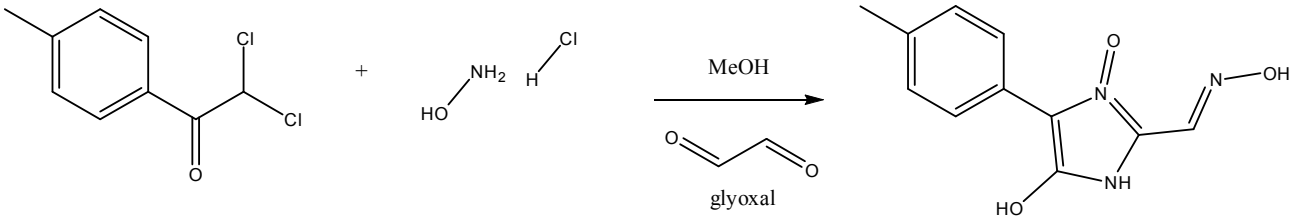
Manufacturing Process:

Charge methanol, 2,2-dichloro-1-p-tolylethanone, glyoxal and hydroxylamine hydrochloride. Rise to 70oC and maintain for 2 hours. Cool and filter to obtain 5-hydroxy-2-(hydroxylimino)methyl)-4-p-tolyl-1H-imidazole-3-oxide.

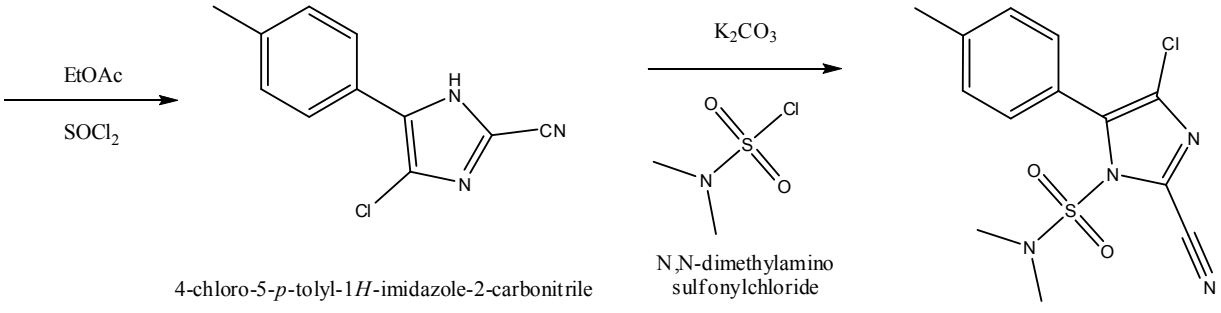
Charge 5-hydroxy-2-(hydroxylimino)methyl)-4-p-tolyl-1H-imidazole-3-oxide and ethylacetate. Add thionyl chloride and reflux for 3 hours. Cool to 30oC to obtain 4-chloro-5-p-tolyl-1H-imidazole-2-carbonitrile.

Charge potassium carbonate and add N,N-dimethylamino sulfonylchloride. Rise to 70oC and maintain for 3 hours. Cool to 30oC and add water. Separate the organic phase and cool to 0oC. Filter the slurry and dry to obtain Cyazofamid Technical.

Chemical Reaction:



2,2-dichloro-1-*p*-tolylethanone hydroxylamine hydrochloride 5-hydroxy-2-((hydroxyimino)methyl)-4-*p*-tolyl-1*H*-imidazole 3-oxide



4-chloro-5-*p*-tolyl-1*H*-imidazole-2-carbonitrile N,N-dimethylamino sulfonylchloride

CYAZOFAMID

Flow diagram & Mass Balance:

Mass balance of Cyazofamid

Input	Kgs	Process	Output	kgs
Methanol	4000	Reaction		
2,2-DC-1-p-TE	660			
Glyoxal 45% solution	420			
Hydroxylamine HCl	700			
		Filter Distil	Methanol	4300
Ethyl acetate	2500	Charge		
Thionyl chloride	390	Reaction	Hydrogen chloride	119
		Liberation	Sulfur dioxide	210
Potassium carbonate	225	Charge		
N,N-DMA SC	470	Reaction		
Water	2000	Separate	Aqueous effluent	3170
		Filter	Cyazofamid Tech.	1000
		Distil	Solid residue	81
			Ethyl acetate	2485
TOTAL:	**11365**			**11365**

(64) Thiamethoxam

Manufacturing process:

Solvent dimethyl formamide is charged in the rector and 200 kg sodium hydroxide is added. After agitation for half an hour, 750 kg of 3-methyl-N-nitroiminoperhydro-1,3,5-oxaxiazine is added at room temperature. Then the temperature is lowered to 20±2ºC.

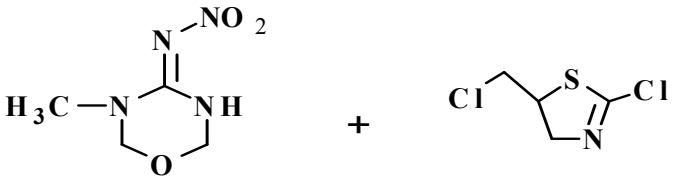
775 Kg of 2-chloro-5-chloromethyl thiazole is taken in solvent DMF and charged in the same rector slowly at 20 to 30ºC in 2 hours. Then temperature is raised to 40±2ºC and maintained for 6 hours. Monitoring of the sample is done and CCMT should be less than 0.5%. If not, fine tuning is done for the same.

The above material is filtered to removed alkali salt and the unreacted alkali. Bring the pH neutral by adding 150 litre of 10% hydrochloric acid. The organic solvent is distilled out by vacuum up to the temperature 85oC. Wash the material with 2000 litre of water. Raise the temperature to 50 to 600C for 1 hour. Material is filtered and washed. Crude Thiamethoxam is obtained.

Crude Thiamethoxam is crystallized by water. Wateris added to the crude Thiamethoxam and the temperature 65-70oC is maintained for 1 hour. Cool to 25oC slowly and maintain for 1 hour. Filter the material.

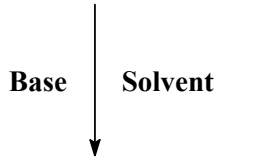
The material is dried in Fluid bed drier up to the temperature 58oC. 970 Kg of Thiamethoxam with purity 98% is obtained.

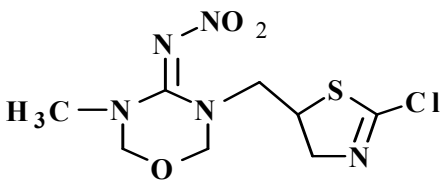
Chemical Reaction:



3-Methyl-4-Nitroimino perhydro-1,3,5-Oxadiazine

2-Chloro-5-Chloromethyl Thiazole





Thiamethoxam

Flow diagram & Mass Balance:

Mass balance of Thiamethoxam

Input	Kgs	Process	Output	kgs
DMF	2500	Reaction		
CCMT	600			
MNIO	575			
Potassium carbonate	250			
Water	1000	Separation	Aqueous effluent	1300
		Crystallization, Filtration, Distillation & Drying	DMF	2460
			Organic residue	30
			Drying loss	135
			Thiamethoxam	1000
TOTAL:	**4925**			**4925**

(65) Penoxsulam

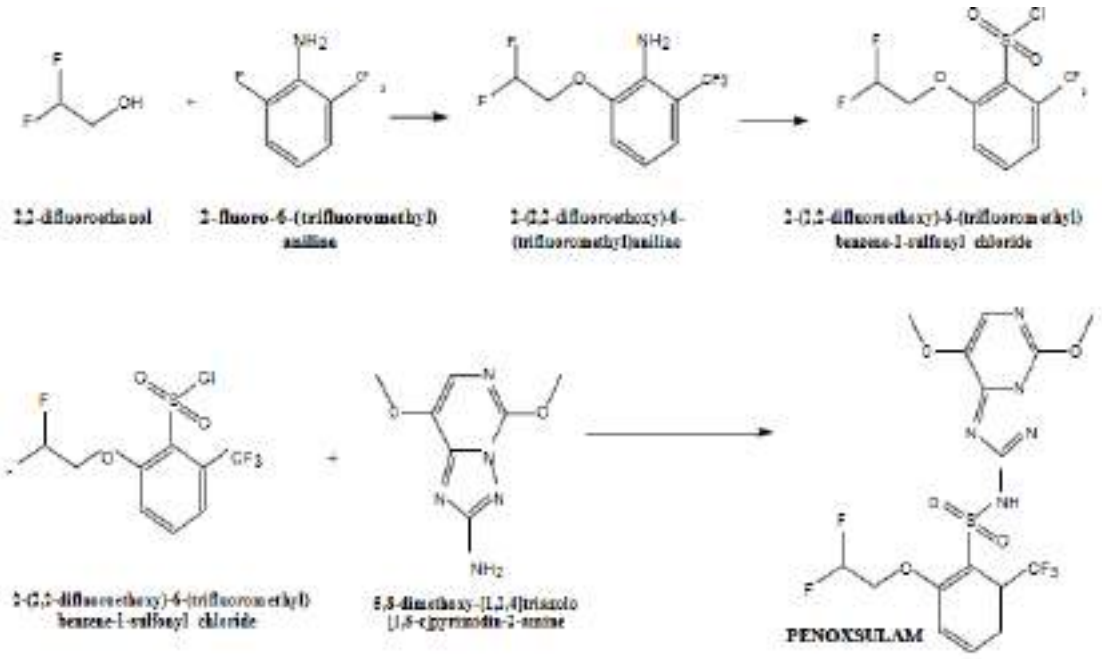
Manufacturing Process:

Charge 2-fluoro-6-(trifluoromethyl) aniline (2-FTFMA), catalyst sodium methoxide and solvent methanol. Rise to 50°C and add 2, 2-difluoro ethanol slowly for 4 hours. Rise to reflux and reflux for 3 hours. Distil out the mass to recover methanol and obtain 2-(2, 2-difluoroethoxy)-6-(trifluoromethyl) aniline (2-DFETFMA).

Charge water, hydrochloric acid and 2-DFETFMA. Cool to 0°C and add sodium nitrite lot-wise. After 2 hours add sodium Sulphite solution at 0°C for 4 hours. Rise to 30°C and maintain for 3 hours. Add Dichloroethane and extract. Separate the aqueous phase. Distil out the organic phase to recover Dichloroethane partially.

Add 5,8-dimethoxy-[1,2,4]-triazolo[1,5-c] pyrimidin-2-amine (5,8-DMTPA) slowly lot-wise at 30°C for 3 hours. Rise to reflux and reflux for 3 hours. Cool to 30°C and add water. Separate the aqueous phase. Cool the organic phase to 0°C and filter the slurry. Dry the wet cake to obtain Penoxsulam Technical.

Chemical Reaction:



Mass Balance:

Mass Balance of Penoxulam

Input	Kg		Output	Kg
Methanol	2000	Reaction		
2-FTFMA	400			
Sodium methoxide	12			
2,2 Difluro ethanol	185			
		Distillation	Methanol	1950
			Residue	50
water	1000	Reaction		
HCl 30%	310			
Sodium nitrite	175			
sodium sulfite	315			
Dichloroethane	3000	Extraction, Separation & Distillation partially	Aqueous effluent	1672
			Dichloroethane	500
			Residue	17
5,8 DMTPA	420	Reaction & Separation	Aqueous effluent	525
water	500			
		Crystallization, Filteration& Distillation	Dichloroethane	2440
			Organic Residue	43
		Drying & Packaging	Drying loss	120
			Penoxulam	**1000**
Total	**8317**			**8317**

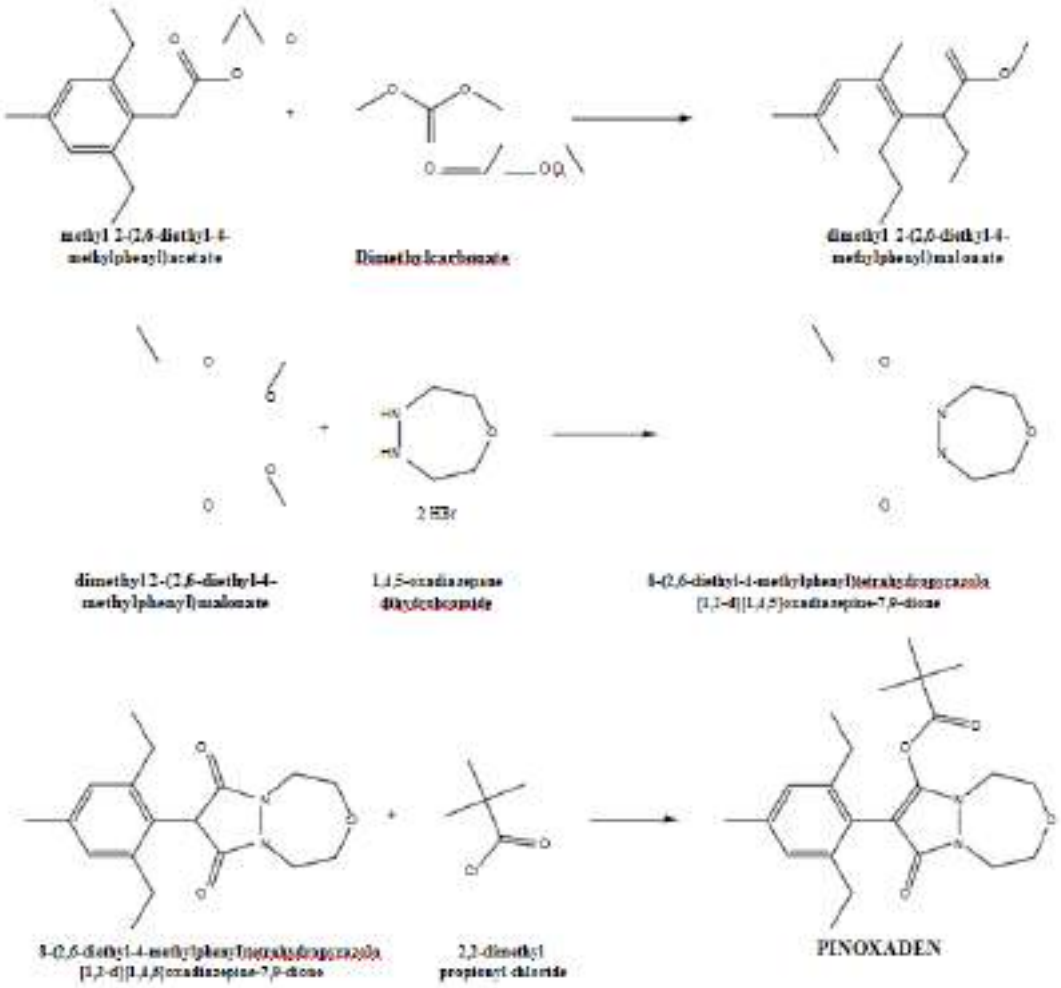
(66) Pinoxaden

Manufacturing Process:

Charge methyl-2-(2, 6-diethyl-4-methylphenyl) acetate (MDEMP acetate), methanol and dimethyl carbonate. Add sodium hydroxide and rise to reflux. Reflux for 12 hours and distil out methanol and cool to 30°C.

Add dichloroethane and 1, 4, 5-oxadiazepane dihydro bromide (1, 4, 5-ODDHB). Rise to reflux and reflux for 4 hours. Cool to 30°C and add water. Separate the aqueous phase and distil out the organic phase to recover dichloroethane partially. Cool to 20°C.Add 2, 2-dimethyl propionyl chloride (2, 2,-DMPC) slowly for 6 hours at 20°C and maintain at 40°C for 3 hours. Add water and separate the aqueous phase. Cool the organic phase to 0°C. Filter the slurry mass and dry to obtain Pinoxaden Technical.

Chemical Reaction:



Mass Balance:

Mass Balance of Pinoxaden

Input	Kg		Output	kg
Methanol	2000	Reaction		
MDEMP acetate	600			
Dimethyl Carbonate	250			
Sodium hydroxide	11			
		Distillation	Methanol	1950
			Residue	50
Dichloroethane	2500	Reaction		
1,2,5-ODDHB	700			
Water	900	Separation & Distillation	Aqueous effluent	1530
			Dichloroethane	500
			Residue	25
2,2-DMPC	325	Reaction & Separation	Aqueous effluent	530
water	500		HCl gas	76
		Crystallization, Filteration& Distillation	Dichloroethane	1925
			Organic Residue	50
		Drying & Packaging	Drying loss	150
			Pinoxaden	**1000**
Total	**7786**			**7786**

(67) Propanil

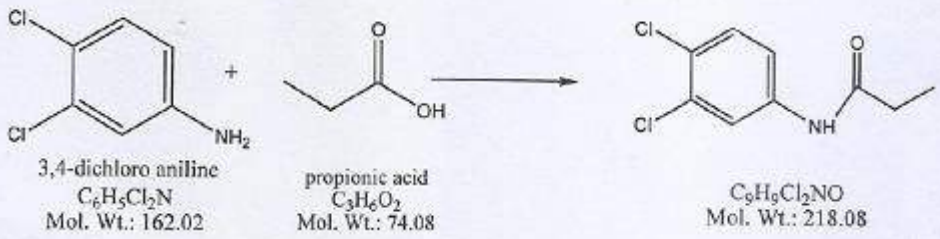
Manufacturing Process:

This is one step reaction wherein condensation reaction is carried out between amine and acid.

Take 3,4-Dichloro aniline and add propionic acid slowly. The material is reflexed at reflux temperature for 12 hrs. The condensation reaction is completed, and unreacted propionic acid is recovered under vacuum. Reaction mass is cooled down at 20-30°C.

Wash the organic mass with water and neutralize with soda ash solution. Cool the mass at 15-20°C for 1.0 hr and filter the solid mass. Give two washings with water and dry the mass to get propanil technical.

Reaction flow diagram:



3,4-dichloro aniline
$C_6H_5Cl_2N$
Mol. Wt.: 162.02

propionic acid
$C_3H_6O_2$
Mol. Wt.: 74.08

$C_9H_9Cl_2NO$
Mol. Wt.: 218.08

Mass Balance:

Mass balance of Propanil

INPUT	KG		OUTPUT	KG
3,4dichloro aniline	810	Stage 1 Condensation reflexation, vacuum	Organic mass	1090
Propionic acid	592		Recovered propionic acid	222
			Water	90
Organic mass	1090	Stage 2 Neutralization	Crude Propanil	1030
Water	2000		Aqueous effluent	2220
Soda ash	160			
Crude Propanil	1030	Stage 3 Cool, Filtration wash & Drying	Propanil Tech.	1000
Water	2000		Aqueous effluent	2030
Total	7682			7682

(68) Tembotrione

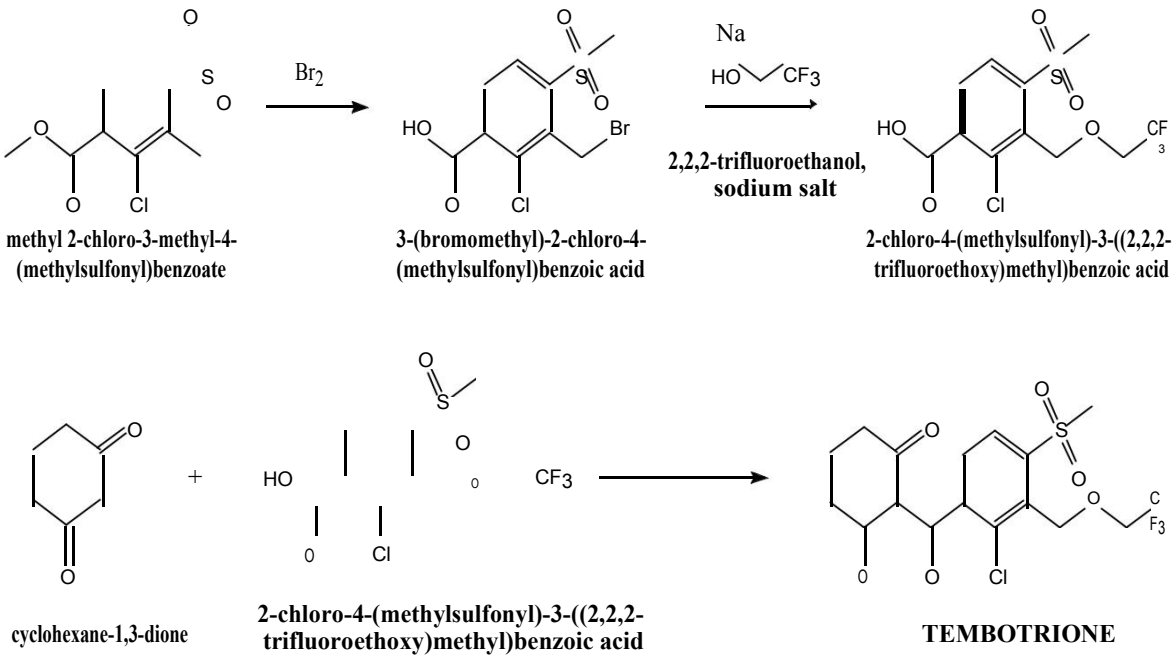
Manufacturing Process:

Charge methyl 2-chloro-3-methyl-4-(methyl sulfonyl) benzoate (MCMMSB) in solvent chloro benzene. Cool to 0oC and add bromine for 6 hours. Rise to room temperature and add water. Separate the organic phase.

Charge organic phase and add sodium salt of 2,2,2-trifluoro ethanol (SS of 2,2,2-TFE) lot-wise and rise to reflux. Reflux for 10 hours and cool to 30oC. Add hydrochloric acid to pH 2-3. Separate the organic phase.

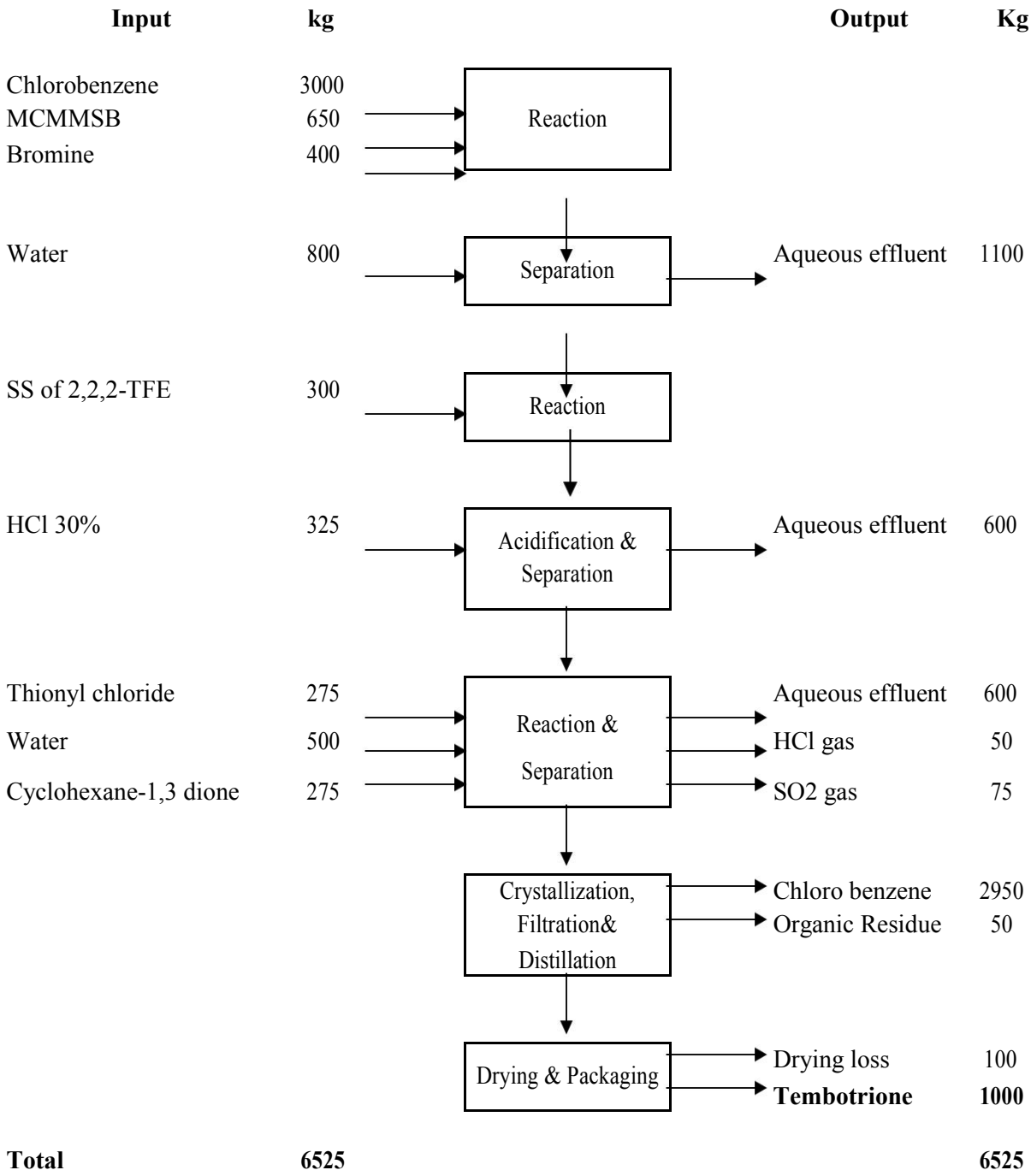
Charge organic phase and add thionyl chloride at 60oC. Rise to reflux and reflux for 4 hours and cool to 50oC. Add cyclohexane-1, 3-dione at 50oC and reflux for 6 hours. After completion of the reaction add water and separate the organic phase. Cool the organic phase to 0oC. Filter the slurry and dry to obtain Tembotrione Technical.

Chemical Reaction:



Mass Balance:

Mass Balance of Tembotrione



(69) Metofluthrin

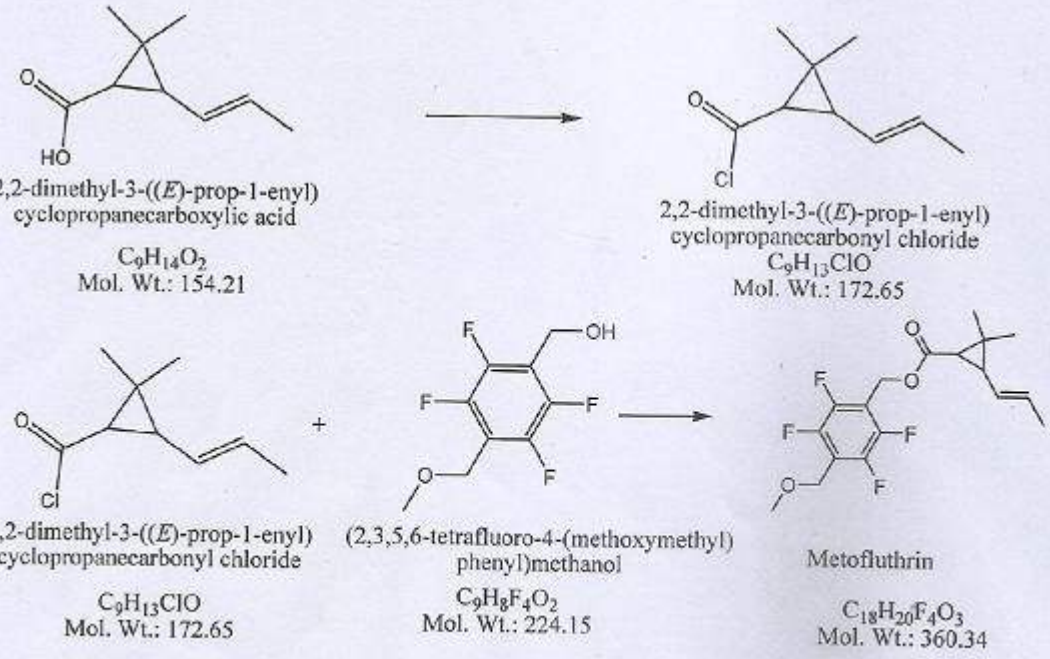
Manufacturing Process:

This is two step reaction wherein first step organic acid is converted into acid chloride and in second step there is esterification reaction.

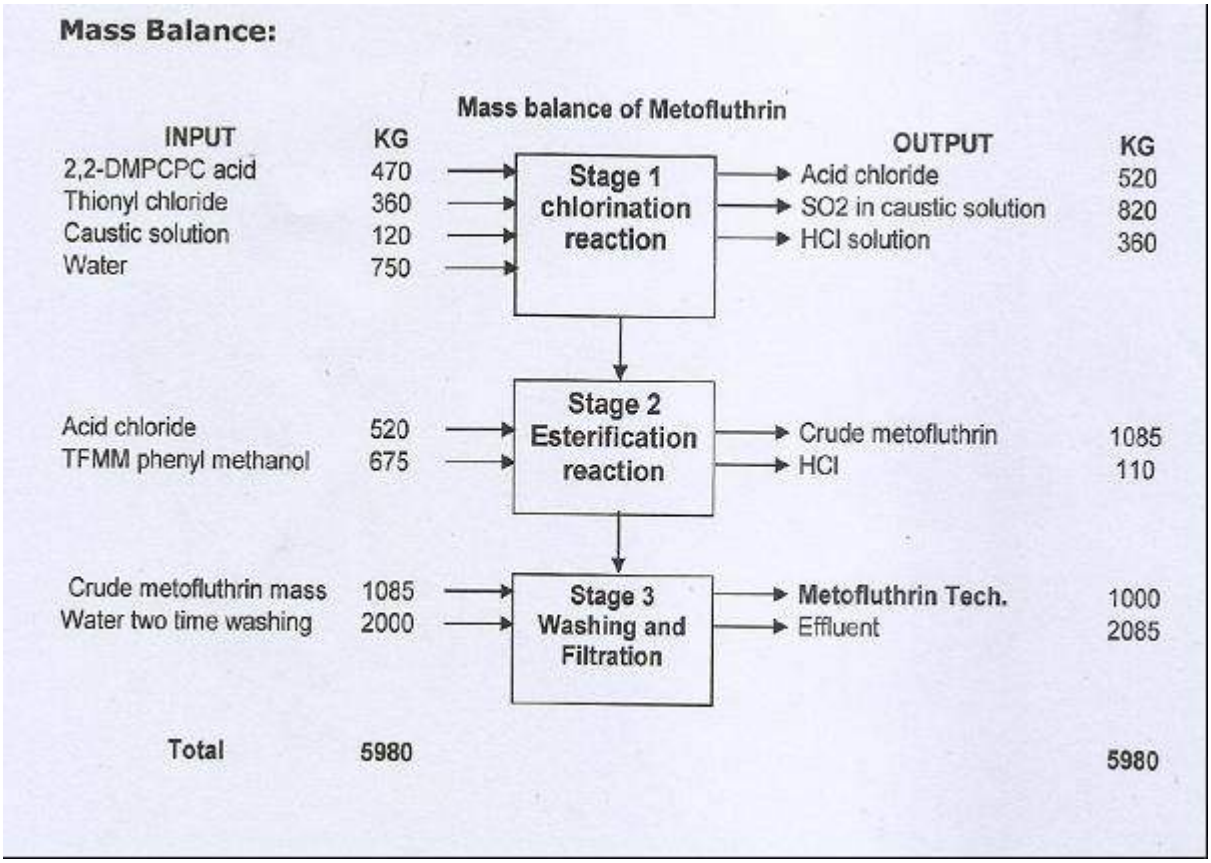
STEP I: 2,2-dimethyl-3-((E)-prop-1-enyl) cyclopropane carboxylic acid reacts with thionyl chloride to give its acid chloride. After degassing of excess thionyl chloride, the intermediate is used in second step.

STEP II: (2,3,5,6-tetrafluoro-4-(methoxymethyl)phenyl) methanol reacts with step- I acid chloride in presence of soda ash as acid binding agent and toluene as solvent to give esterification reaction. Crude metofluthrin product is synthesized. After completion of reaction, the product is washed with water twice to remove inorganic impurities. Then toluene is distilled out to obtain a pale-yellow liquid metofluthrin.

Reaction flow diagram:



Mass Balance:

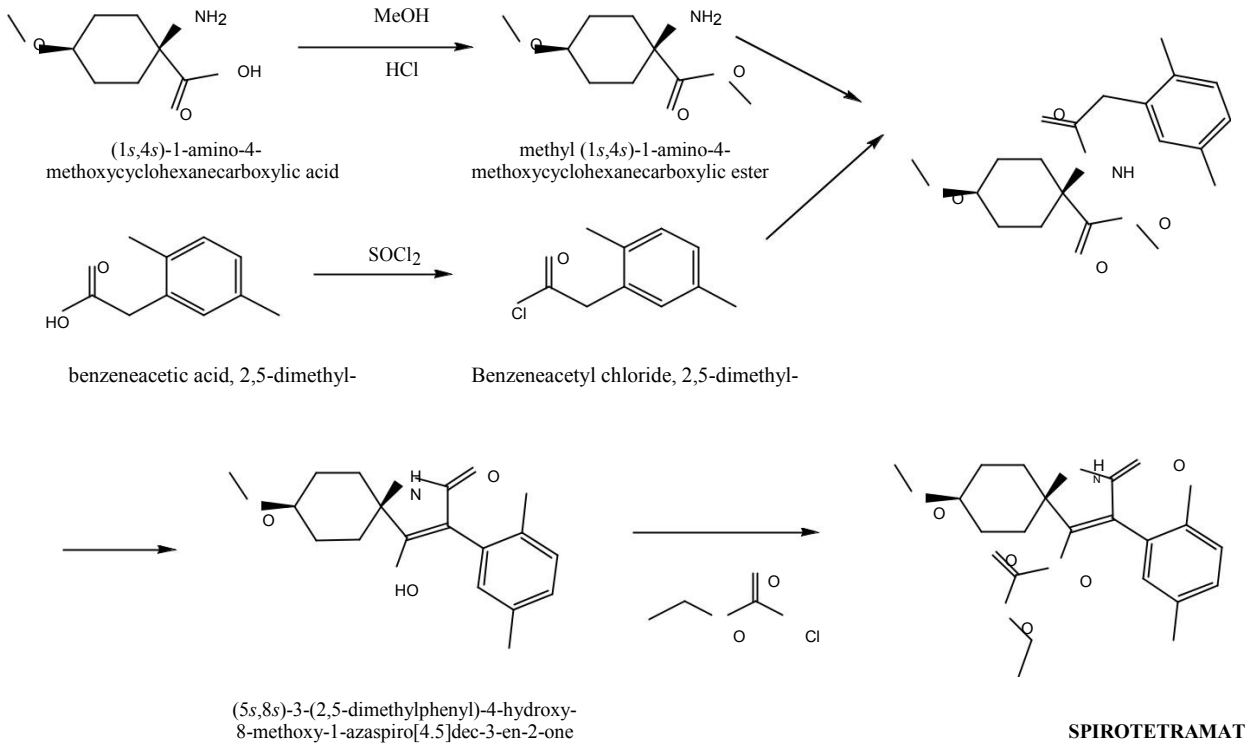


(70) Spirotetramat

Manufacturing Process:

Charge benzene acetic acid, 2,5-dimethyl (2,5-DMBAA) and dichloroethane. Rise to 60°C and add thionyl chloride for 2 hours. Rise to reflux and reflux for 4 hours. Cool the acid chloride mass to 30°C, say Mass 1. Charge dichloroethane, methanol, hydrochloric acid and (1s,4s)-1-amino-4-methoxycyclohexanecarboxylic acid (1s,4s-1AMCHCA). Rise to reflux and remove water azeotropically. Cool to 50°C and add Mass 1 slowly for 3 hours. Rise to 100°C and maintain for 4 hours. Cool to 60°C. Charge potassium carbonate lot-wise for 3 hours at 60°C and maintain for 3 hours. Cool to 30°C, add water and hydrochloric acid to pH 2-3. Separate the aqueous phase and organic phase. Charge organic phase and rise to 50°C. Add ethoxy formyl chloride (EFC) for 2 hours and rise to reflux. Reflux for 4 hours and cool to 20°C. Add water and separate the aqueous phase. Cool the organic phase to 10-15°C and filter the slurry. Dry the wet cake to obtain Spirotetramat technical.

Chemical Reaction:



Mass Balance:

Mass Balance of Spirotetramat

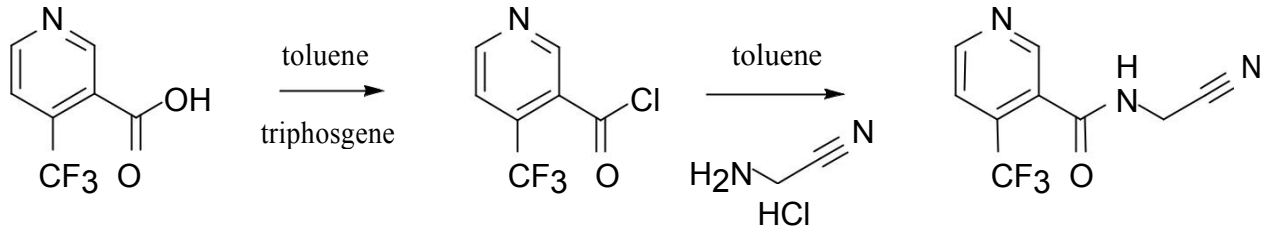
Input	kg		Output	Kg
Dichloroethane	1500	Reaction	HCl gas	100
2,5 DMBAA	475		SO2 gas	175
thionyl chloride	350			
		Mass 1		
Dichloroethane	1500	Reaction	Aqueous effluent	50
Methanol	100			
HCl 30%	10			
1s, 4s-1 AMCHCA	500			
		Reaction	HCl gas	100
Potassium carbonate	400	Reaction & Separation	Aqueous effluent	1800
Water	1000			
HCl 30%	375			
Water	1000	Reaction & Separation	Aqueous effluent	1160
Ethoxy Formyl chloride	310			
		Crystallization, Filteration& Distillation	Dichloroethane	2950
			organic residue	50
		Drying & Packaging	Drying loss	135
			Spirotetramat	**1000**
Total	**7520**			**7520**

(71) Flonicamid

Manufacturing Process:

Charge dichloroethane, 4-(trifluoromethyl) nicotinic acid (4-TFMNA) and 2-aminoacetonitrile hydrochloride (2-AAN HCl). Cool the mass to 0°C and add triphosgene lot-wise for 6 hours. Rise to 30°C and maintain for 4 hours. Add water and separate the aqueous phase. Cool the organic phase to 0-5°C and filter the slurry. Dry the wet cake to obtain Flonicamid Technical.

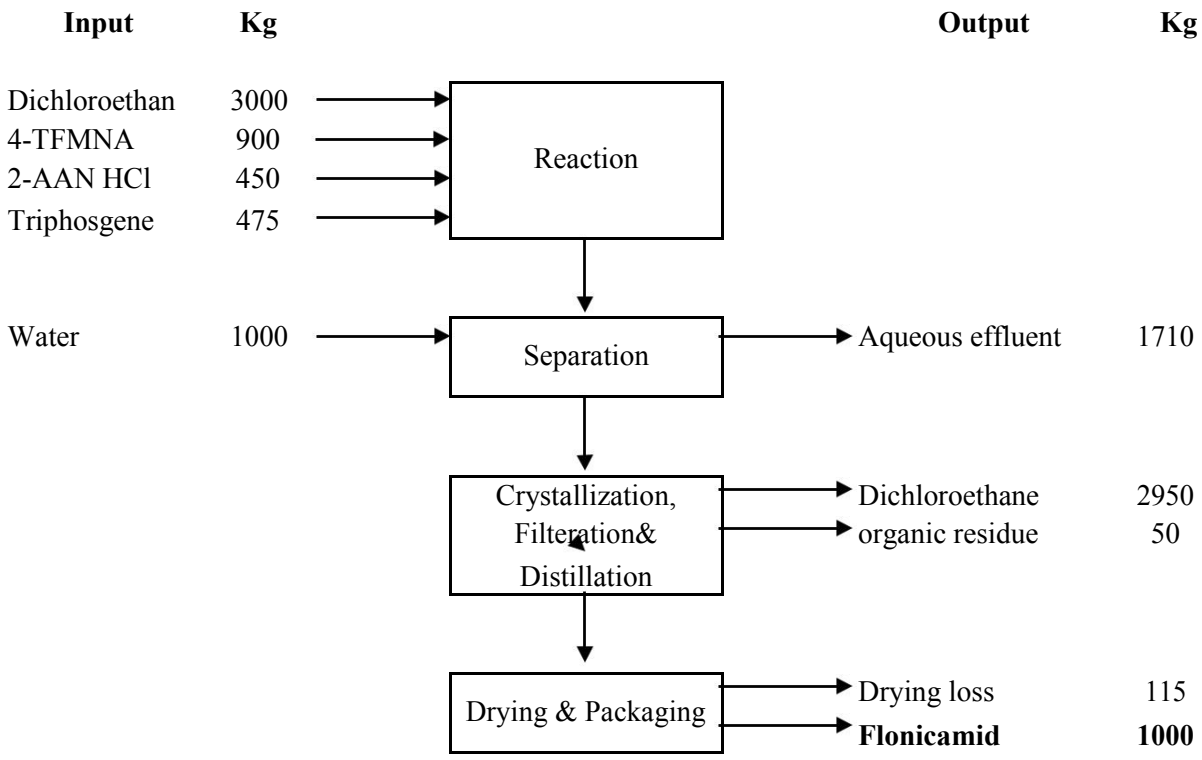
Chemical Reaction:



4-(trifluoromethyl) nicotinic acid | 4-(trifluoromethyl) nicotinoyl chloride | 2-aminoacetonitrile Hydrochloride | **FLONICAMID**

Mass Balance:

Mass Balance of Flonicamid

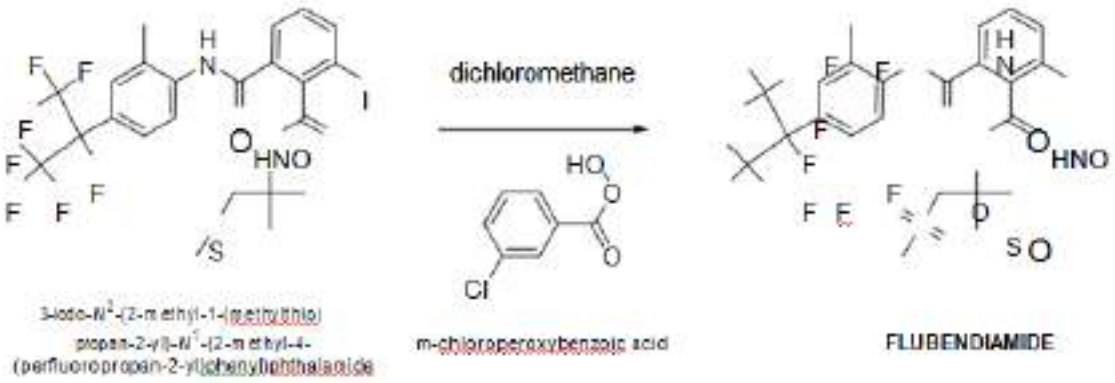


(72) Flubendiamide

Manufacturing Process:

Charge 3-iodo-N^2-(2-methyl-1-(methylthio) propan-2-yl)-N^1-(2-methyl-4-(perfluoropropan-2-yl)phenyl)phthalamide (IMMTPMPFPPP) and dichloromethane. Add 3-chloro peroxy benzoic acid (m-CPBA) lot-wise slowly for 6 hours and maintain for 4 hours. After completion of the reaction add water and separate the aqueous phase. Cool the organic phase to 0-5°C and filter the slurry. Dry to obtain Flubendiamide technical.

Chemical Reaction:



Mass Balance:

Mass Balance of Flubendiamide

Input	Kg		Output	Kg
Dichloromethane	3000	→ Reaction		
IMMTPMPFPPP	1000	→ Reaction		
m-CPBA	550	→ Reaction		
Water	1000	→ Separation	Aqueous effluent	1450
		→ Crystallization, Filteration& Distillation	Dichloromethane	2950
		→ Crystallization, Filteration& Distillation	organic residue	50
		→ Drying & Packaging	Drying loss	100
		→ Drying & Packaging	**Flubendiamide**	**1000**
Total	**5550**			**5550**

(73) Probenazole

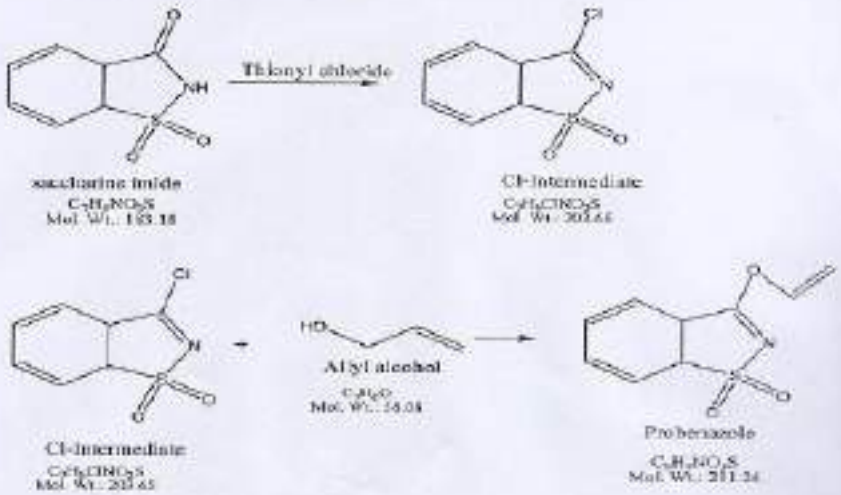
Manufacturing Process:

This is two step reaction wherein first step chlorination is done with thionyl chloride and in second step there is addition of allyl group to get final product.

STEP I: Take saccharine imide and add toluene as solvent. Heat the mixture to 50°C for 1.0 hour to dissolve completely. Cool at 0-5°C and slowly add thionyl chloride in 2-3 hour. Then maintain the temperate of mass for 5hrs @35-40°C. After completion of reaction, toluene is recovered from the mass. Cl intermediate is obtained.

STEP II: Take crude Cl-Intermediate in dichloromethene as solvent and slowly add allyl alcohol at 20-25°C in 2 hrs, Maintain the mass for 10-12 hrs at reflux temperature. Recover dichloromethane solvent, add water and slowly add soda ash solution to neutralize mass, cool at 10°C and filter.

Reaction flow diagram:



Mass Balance:

Mass balance of Probenazole

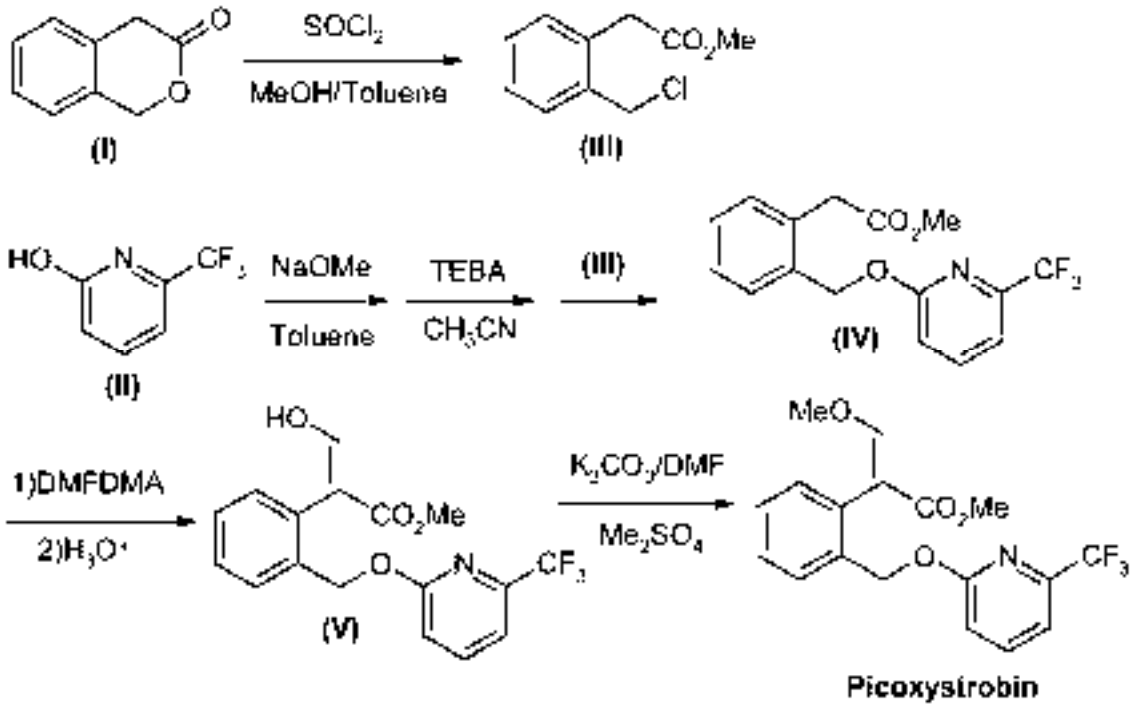
INPUT	KG		OUTPUT	KG
Saccharine imide	915	Stage 1 Chlorination reaction reflexation,	Cl intermediate	995
Toluene	2500		Recovered toluene	2250
Thionyl chloride	620		toluene loss	250
			HCl	200
			SO2	340
Cl intermediate	995	Stage 2 Allyl group additionn	Crude Probenazole	1090
Dichloromethane	2500		Recovered DCM	2220
Allyl alcohol	290		DCM loss	280
			HCl	195
Crude Probenazole	1090	Stage 3 Cool, Filtration wash & Drying	Probenazole tech.	1000
Water	2000		Aqueous effluent	2250
Soda ash	160			
Total	11070			11070

(74) Picoxystrobin

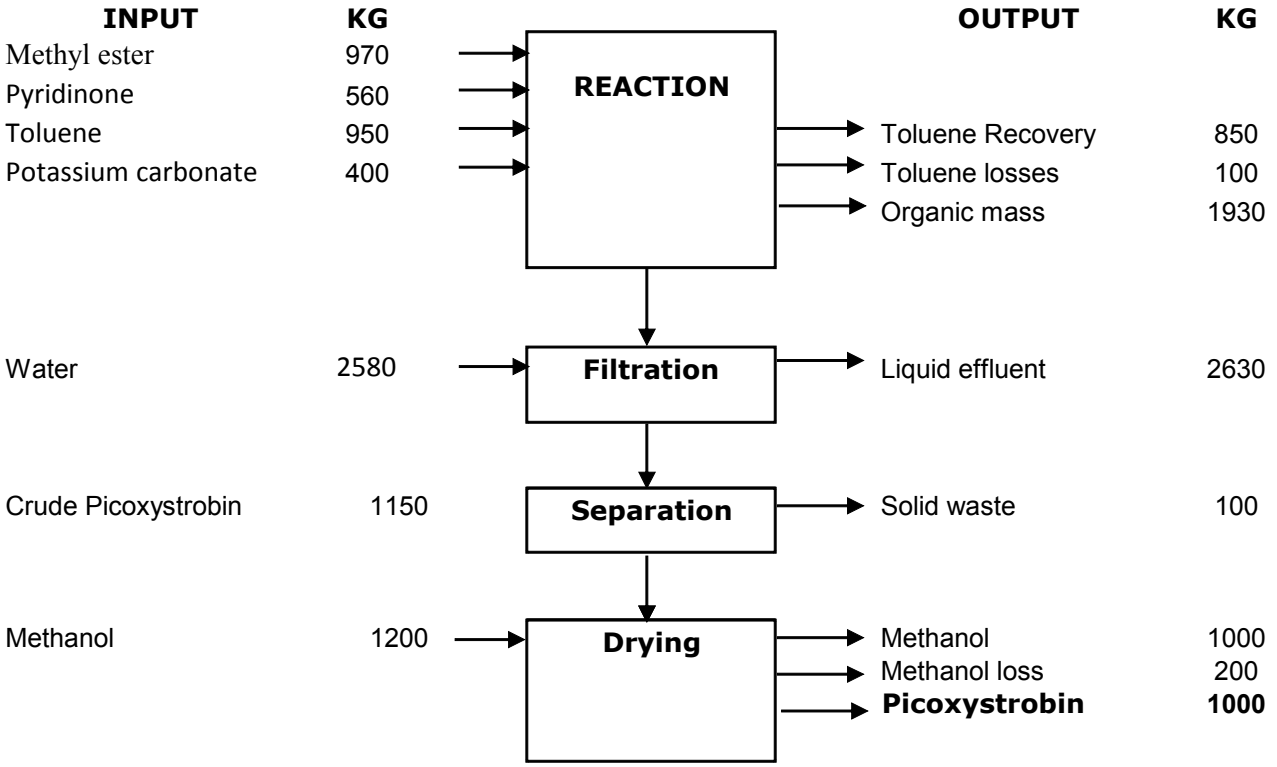
Manufacturing Process

The present invention discloses a method for preparing a picoxystrobin, 1) the compound (I) 3- isochromanone first dissolved in methanol and an inert solvent, after the reaction to obtain (III) (2- halomethyl benzene yl) acetate; 2) (II) 6- trifluoromethyl-2-hydroxypyridine into sodium salt, is reacted with a quaternary ammonium salt in a polar solvent, followed by addition of (III) (2- haloformate phenyl) acetate, to give (IV) 2- [2 '- (6'- trifluoromethyl-pyridin-2-yloxy) methyl] phenyl acetate; 3) (IV) 2- [2 '- (6'-trifluoromethyl-pyridin-2-yloxy) methyl] phenyl acetate and acetal carboxamides of hydrolysis (V) 2- [2' - (6 ' - trifluoromethyl-pyridin-2-yloxy) methyl] -3-hydroxy-phenyl methacrylate; 4) (V) 2- [2 '- (6'- trifluoromethyl-pyridin-2-yloxy) methyl] -3-hydroxy-phenyl acrylate obtained picoxystrobin with a base and a methylating reagent.

Chemical Reaction



Flow diagram & Mass Balance:



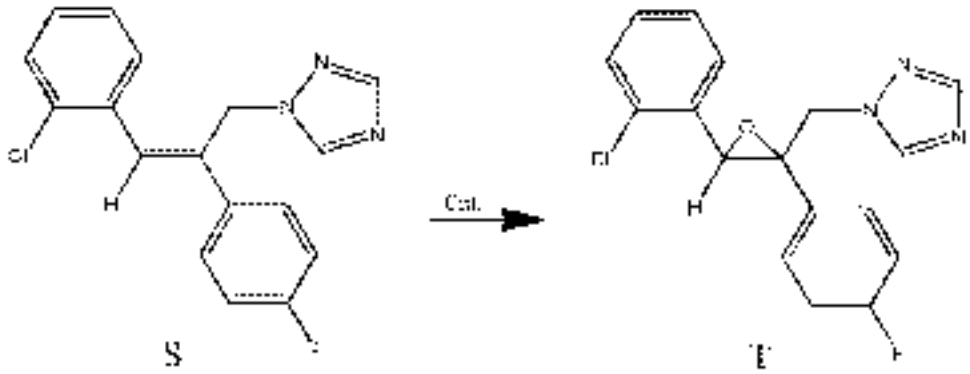
(75) Epoxiconazole

Manufacturing Process

An efficient and facile procedure for the synthesis of epoxiconazole from (Z)-3-(1H-1,2,4-triazole)-2-(4-fluorophenyl)-1-(2-chlorophenyl)propene was reported. An overall yield up to 80% can be achieved in the presence of pyridine-2-carboxylic acid manganese (□) complex as catalyst and 30% mass fraction of hydrogen peroxide as terminal oxidant.

Chemical Reaction

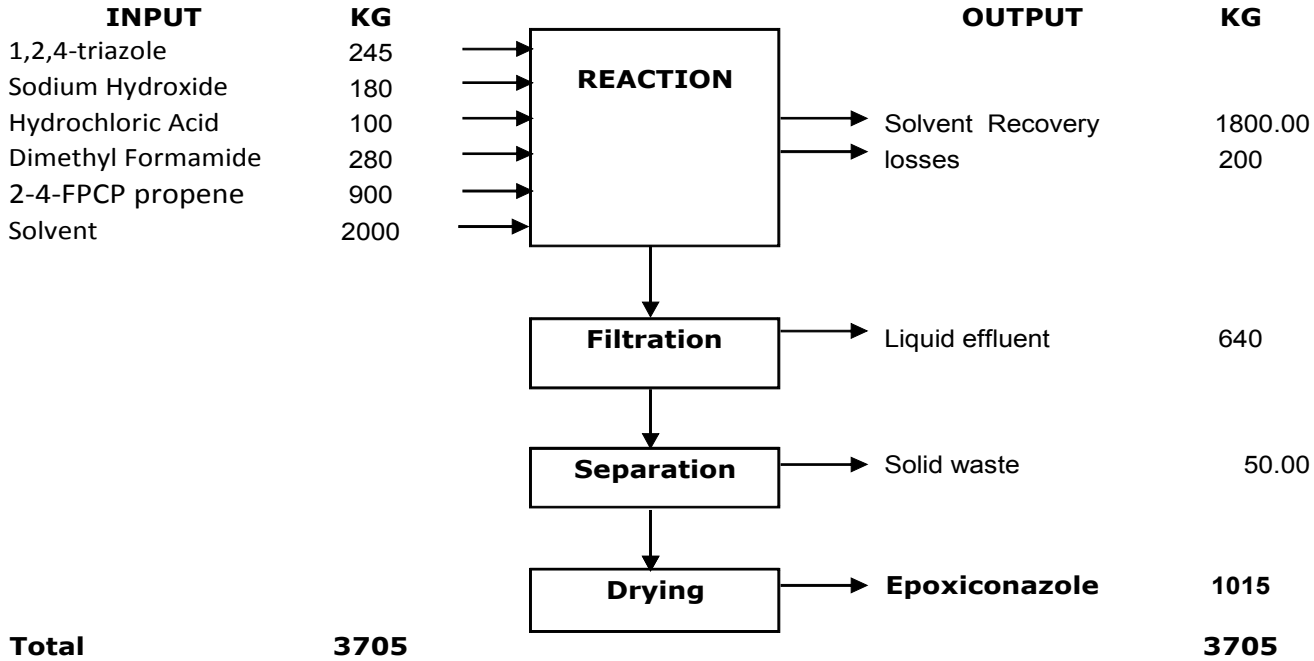
Final Step:



(Z)-3-(1H-1,2,4-triazole)-2-(4-fluorophenyl)-1-(2-chlorophenyl)propene

Epoxiconazole

Flow diagram & Mass Balance:



(76) Prothioconazole

Manufacturing Process

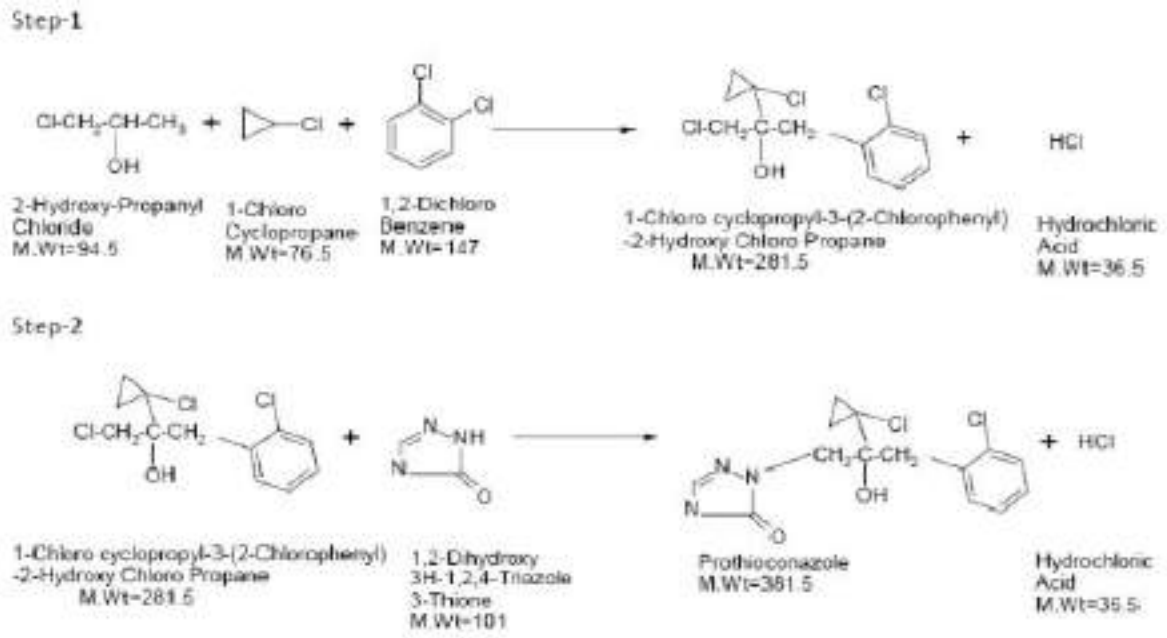
Step – 1

1,2 Dichloro Benzene reacts with 1-Chloro Cyclo Propane & 2-Hydroxy Propanyl Chloride in presence of Solvent Xylene and Catalyst to give Intermediate (A) 1-Chlorocyclopropyl-3-(2-Chlorobenzyl)-2-Hydroxy Chloro Propane.

Step – 2

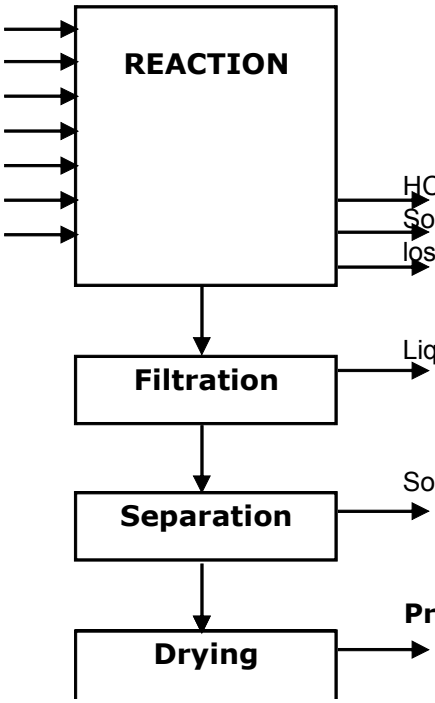
Intermediate (A) when reacts with 1,2 Dihydro 3H – 1,2,4 Triazole 3-Thione in presence of Solvent & Catalyst to give the final product Prothioconazole.

Chemical Reaction



Flow diagram & Mass Balance:

INPUT	KG
1,2 Dichloro benzene	455
Chloro cyclopropane	235
2-hydroxy propanil chlori	295
Xylene	2000
1,2,4-triazole 5-thione	315
K2CO3	40
Water	1500
Total	**4840**



OUTPUT	KG
HCl 30% liquid	715
Solvent Recovery	1800.00
losses	200
Liquid effluent	1060
Solid waste	50.00
Prothioconazole	**1015**
	4840

2.10 Water Requirement, Wastewater Generation and Management

2.10.1 Assessment of source of the water supply with adequacy of the same to meet with the requirements for the project. Permission obtained from the concern authority for supply of raw water.

Total water requirement will be 188.0 KL/day which will be met through RIICO water supply and re-use.

Permission obtained from the concern authority for supply of raw water

RIICO

Rajasthan State Industrial Development & Investment Corporation Ltd.
(A Rajasthan Government Undertaking)
CIN : U13100RJ1969SGC001263
GSTIN: 08AABCR4695JIZW
UNIT-II, Rest House Road, RIICO Chowk, Bhiwadi, Distt. Alwar Rajasthan (INDIA)
PIN : 301019.
Telephone : 01493-220811 Fax-220728
Email : bhiwadi2@riico.co.in
No. : 3585
Date : 31-12-19

By Regd. A.D. Post

M/s Insecticides (India) Ltd.
Plot No. E-442, RIICO Industrial Area
Chopanki, Teshsil- Tijara, Distt- Alwar
Rajasthan

Subject: Application for Supply of 70 KLD Water from RIICO Water Supply scheme to M/s Insecticides (India) Ltd. Plot No. E-442, Industrial Area Chopanki, Tehsil- Tijara, Distt- Alwar, Raj.

Sir,

Kindly refer your application dated 26.12.2019 for supply of 70 KLD Water. In this regard you are hereby informed that the Corporation will supply water as per availability of water under complete water supply scheme of Industrial area as per norms of the corporation.

Thanking you,
Yours Faithfully,

Unit Head
RIICO Ltd., Bhiwadi-II

2.10.2 Undertaking stating that no bore well shall be dug within the premises (If project is located within the Industrial estate).

Undertaking

Date: 07/07/2019

M/s. Insecticides India Limited undertakes that Company will not dig any bore well within the premises.

For INSECTICIDES INDIA LIMITED

AUTHORIZED SIGNATORY

2.10.3 Water and Wastewater

Total raw water requirement will be is 188.0 KL/day (Industrial: 170 KL/Day + Domestic: 8 KL/Day + Gardening: 10 KL/Day) which will be met through RIICO water supply and recycling. Total waste water generation will be 136 KL/Day (Industrial: 129 KL/Day + Domestic: 7 KL/Day). Out of 129 KL/Day industrial effluent, effluent from processes, scrubber and lab (49 KL/Day) will be sent to Stripper and 47.75 KL/Day to MEE and MEE condensate (40 KLD) will be sent to ETP for further treatment. Total effluent (127 KL/Day) from septic tank, utilities, washing and MEE Condensate will be sent to ETP and 126 KL/Day final treated effluent will be recycled for industrial operations. Domestic wastewater (7 KL/Day) will be sent to septic tank and then mixed with industrial effluent in ETP for further treatment.

TABLE 2.4

WATER CONSUMPTION & WASTE WATER GENERATION

EXISTING :-

WATER CONSUMPTION AND WASTEWATER GENERATION			
SR. NO.	**SECTION**	**(KL/day)**	
		WATER CONSUMPTION	**WASTE WATER GENERATION**
1.	Domestic	6	5.4
2.	Industrial		
	Process & Washing	5.4	5
	Boiler	10	2
	Cooling & Chilling	3	0.4
3.	Gardening	5	--
	Total Industrial	**18.4**	**7.4**
	Grand Total	**29.4**	**12.8**

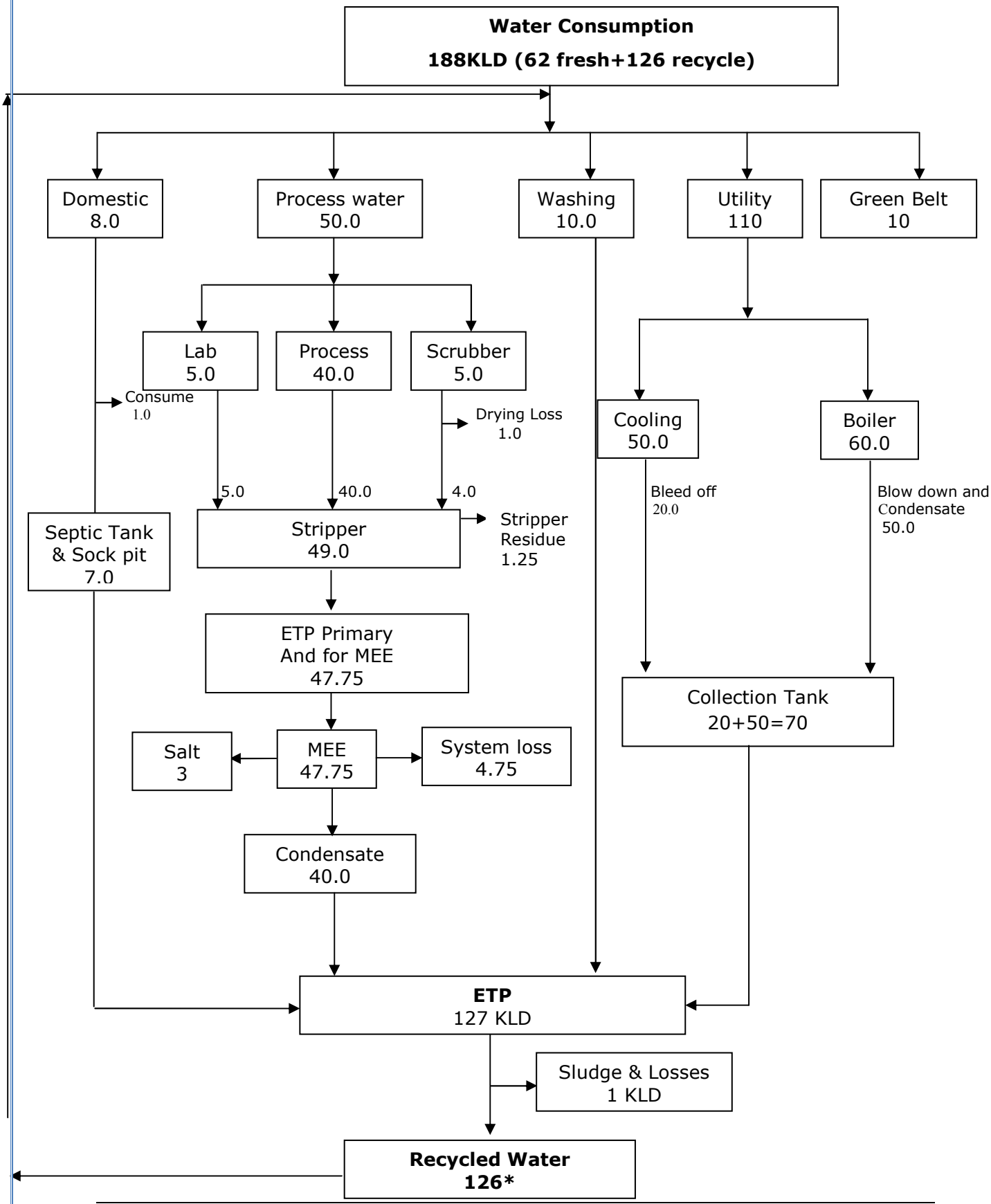
TOTAL PROPOSED :-

WATER CONSUMPTION AND WASTEWATER GENERATION			
SR. NO.	SECTION	(KL/day)	
		WATER CONSUMPTION	WASTE WATER GENERATION
1.	**Domestic**	8	7
2.	**Green Belt**	10	0
3.	**Industrial**		
A.	Process	40	40
B.	Lab	5	5
C.	Scrubber	5	4
D.	Cooling	50	20
E.	Boiler	60	50
F.	Washing	10	10
Total Industrial		**170**	**129**
Total (1+2+3)		**188**	**136**
Recycle Water		**126**	**--**
Fresh Water Requirement		**62**	**--**

Note: Total waste water generation will be 136 KL/Day (Industrial: 129 KL/Day + Domestic: 7 KL/Day). Out of 129 KL/Day industrial effluent, effluent from processes, scrubber and lab (49 KL/Day) will be sent to Stripper and 47.75 KL/Day to MEE and MEE condensate (40 KLD) will be sent to ETP for further treatment. Total effluent (127 KL/Day) from septic tank, utilities, washing and MEE Condensate will be sent to ETP and 126 KL/Day final treated effluent will be recycled for industrial operations. Domestic wastewater (7 KL/Day) will be sent to septic tank and then mixed with industrial effluent in ETP for further treatment.

WATER BALANCE DIAGRAM:

Total after Proposed Expansion



2.10.4 Capacity of ETP in KL/day. Details of ETP including dimensions of each unit along with schematic flow diagram. Inlet, transitional and treated effluent qualities with specific efficiency of each treatment unit in reduction in respect of all concerned/regulated environmental parameters. Inlet effluent quality should be based on worst case scenario considering production of most polluting products that can be manufactured in the plant concurrently.

1. ETP physio-chemical treatment is being operated in batch mode whereas biological treatment is being done continuously.
2. ETP operation is being done 24 hours a day, 365 days a year. Aeration system is being operated continuously whereas physio-chemical treatment is done in batches of 20 kl each (10 kl+10 kl).
3. Cycle time of each batch preparation is 4.5 hours out of which 45 minutes is pumping time and 3.75 hours is reaction time.
4. Flow rate of ETP biological treatment is being maintained between4-5 kl/hr which gives a capacity to treat between 96 to 120 kl of effluent per day.
5. The collection tanks are divided into two parts of 35 kl and 31 kl respectively. The 35 kl part acts as Collection Tank-1 for high COD effluent and 31 kl part as Collection Tank-2 for Low COD effluent.
6. The effluent after collecting in collection tanks (through Oil Skimmer), is transferred to two Reaction Tanks RT-1 and RT-2 in parallel for mixing of H2O2 in presence of Ferrous sulphate in acidic medium
7. The effluent is then pumped to Reaction Tank RT-3 for precipitation and coagulation of sludge containing iron.
8. The effluent next moves to Flocculation Tank FT-1 for flocculation of sludge.
9. Effluent moves on to Tube Settler TS for settling of sludge.
10. Effluent flows to Reaction Tank RT-4 for precipitation and coagulation process.
11. The effluent next moves to Flocculation Tank FT-2 for flocculation of sludge.
12. Effluent moves on to Primary Tube Settler PTS for settling of sludge.
13. The effluent overflows to a Pre-aeration tank of capacity 20 kl and Pre-Aeration Tower.

14. The effluent after treatment in Pre-Aeration Tower reaches Aeration Tank AT-1 for aeration with help of free floating media.
15. Effluent is then settled in Aeration Settler STS-1 for recirculation and wasting.
16. The effluent after treatment in AT-1 and STS-1 will pass on to Aeration Tank AT-2 for aeration with help of free floating media.
17. Effluent is then settled in Aeration Settler STS-2 for recirculation and wasting.
18. The effluent after treatment in AT-2 and STS-2 will pass onto the Aeration Tank AT-3 for aeration with help of free floating media.
19. Effluent is then settled in Aeration Settler STS-3 for recirculation and wasting.
20. The effluent from STS-3 will pass onto the Underground Holdingtank of capacity 13.5 KL.
21. The effluent is next transferred to Media Filter and Activated Carbon filter for polishing of effluent.

DETAILS OF UNITS OF ETP

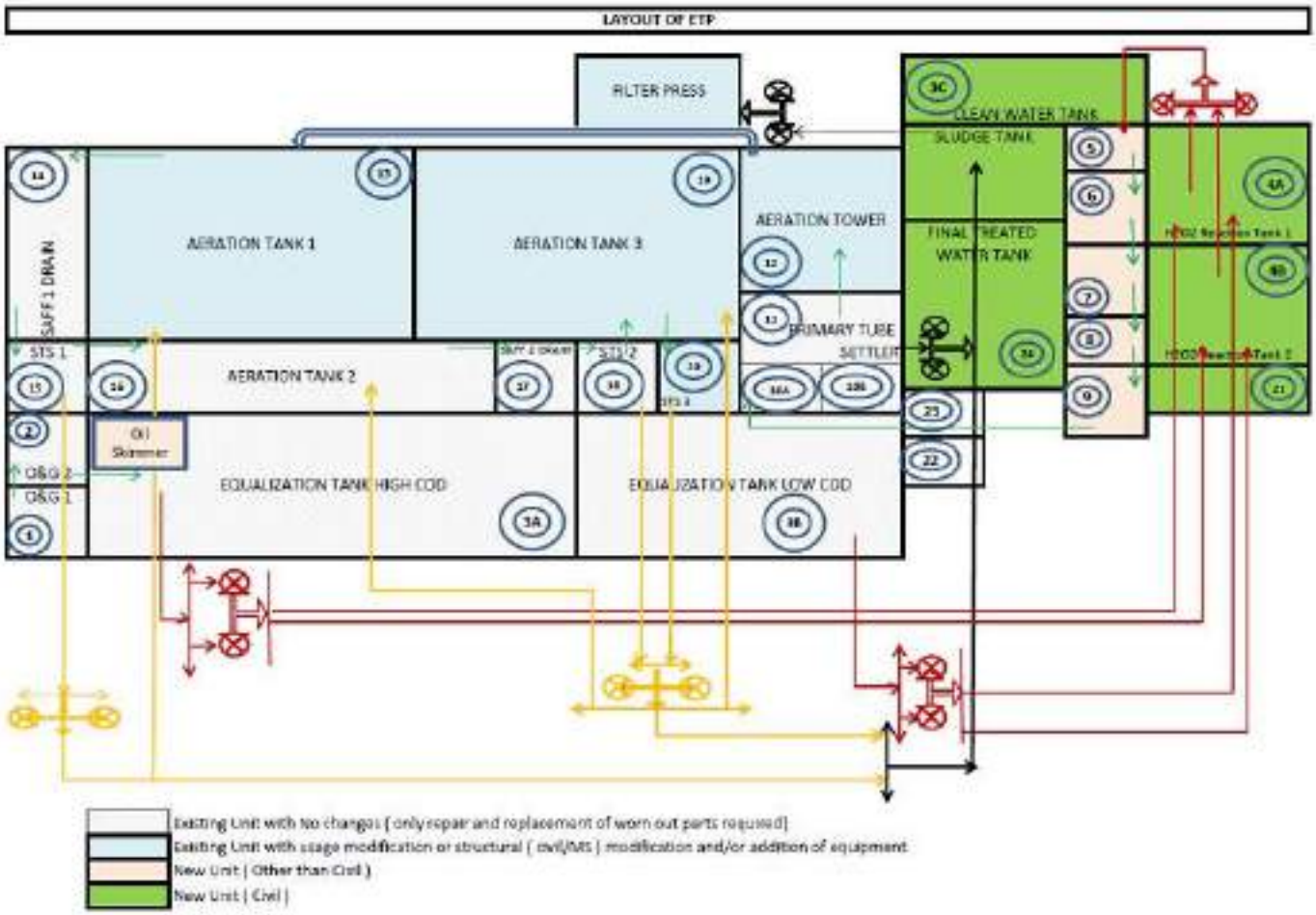
		Dimensions (meters)			
	Description	**Length**	**Width**	**Height/Depth**	**Volume (KL)**
1	Oil & Grease Chamber 1	1.000	0.800	1.900	1.520
2	Oil & Grease Chamber 2	1.000	0.800	1.900	1.520
3	Effluent Collection Tank	5.050	1.900	3.700	35.502
4	Neutralization Tank	4.450	1.900	3.700	31.284
5	Flash Mixer A	0.825	0.595	1.805	0.886
6	Flash Mixer B	0.825	0.595	1.805	0.886
7	Primary Tube Settler	1.980	1.720	2.820	9.604
8	SAFF 1	10.500	6.000	4.550	286.650
9	SAFF 1 Drain	6.000	0.800	4.550	21.840
10	Secondary Tube Settler 1	1.770	1.090	2.300	4.437
11	SAFF 2	5.850	1.770	4.550	47.113
12	SAFF 2 Drain	0.580	1.770	4.550	4.671
13	Secondary Tube Settler 2	1.770	1.200	3.210	6.818
14	CC Tank	1.770	1.770	4.550	14.255
15	Treated Water Storage Tank/Aeration Tower	5.000	1.720	2.430	20.898

	Aeration Tank 1	6	4.875	4.550	133.088
	Aeration Tank 2	5.850	1.770	4.550	47.113
	Aeration Tank 3	6	4.875	4.550	133.088

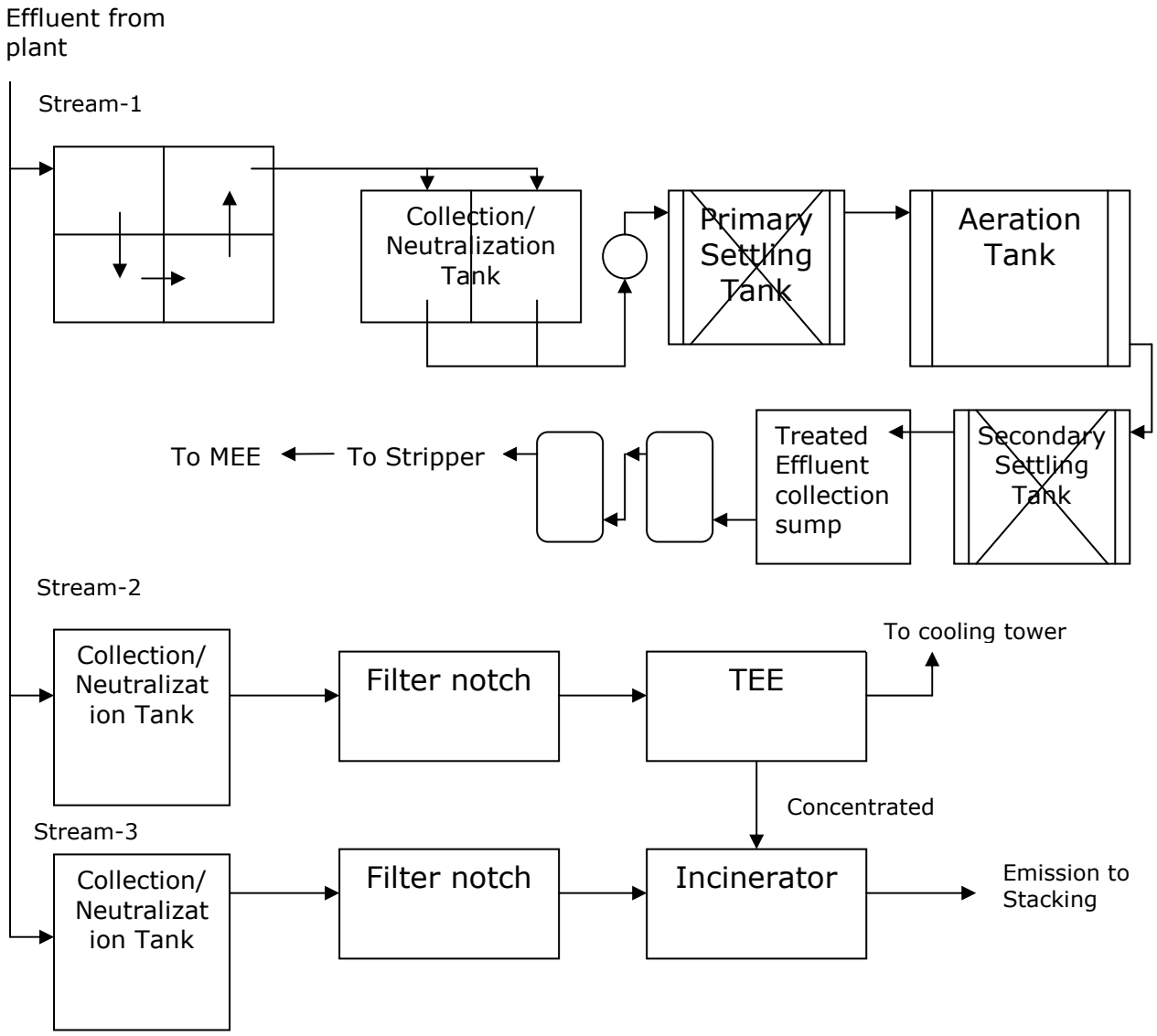
Characteristics of Waste Water

Sr. No.	Parameters	Unit	Results	
			Before treatment	After treatment
1	pH	--	2-11	6.5-8.5
2	BOD_3	mg/l	100-1200	20-30
3	TSS	mg/l	600-900	50-100
4	O&G	mg/l	10-15	2-10
5	COD	mg/l	3000-3500	100-250
6	TDS	mg/l	15000-40000	300-400
7	Phenolic Compound	mg/l	5-6	0.5-1.0
8	Ammonical Nitrogen	mg/l	70-80	25-30

ETP DIAGRAM



PROCESS FLOW DIAGRAM



BASIS FOR DESIGN OF STRIPPER

Type of System	:	Packed Bed type stripping system
CAPACITY		
Organics	:	(187.5 kg/hr Organics +187.5 kg/hr Water)
Feed Rate	:	6250 Kg/hr
Capacity Evaporation	:	5875 Kg/Hr
FEED PROPERTIES		
Organics	:	375 Kg/hr Solvents
Water	:	375 Kg/hr Water
Specific Gravity	:	1.1 app.
COD	:	3 % W/W
Temperature	:	60°C
PRODUCT FROM Stripper		
Organics	:	(187.5 kg/hr Organics +187.5 kg/hr Water)
Temperature	:	65-75°C
OPERATING CONDITIONS		
Steam	:	393 kg/hr @ 3 bar pressure
Cooling Water at 30°C	:	38 m3/hr
Stripper Power	:	7 KW (Installed) / 5.6 KW (Absorbed)
Inlet electricity	:	415 V, 50 Hz
MATERIAL OF CONST.		
All contact parts	:	SS 316L
Vapor / Condensate	:	SS 304

BASIS OF DESIGN FOR EVOPARATOR

Type of System	:	**Four effect Force circulation evaporator**
CAPACITY (Evaporation Plant)		
Evaporation Rate	:	4781 kg/hr
Feed Rate	:	5875 Kg/hr (TDS :7.45 %w/w)
Concentrate Material from MEE	:	1094 kg./hr (40 %w/w solids)
FEED PROPERTIES		
Solid Content Range (w/w)	:	7.45 % w/w
Form	:	Clear Solution with totally dissolved solids
Solvent	:	Water
Specific Gravity & PH	:	1.1 & Min. 6.5 and Max. 7.5
Viscosity		4-6 cp (assumed)
Temperature	:	60°C
OPERATING CONDITIONS		
Mode of Heating	:	Dry Saturated Steam at 3 kg/cm2 (g)
MATERIAL OF CONST.	:	
Feed/ Product	:	SS 316L
Vapor Liquid Separators	:	SS 316L
Non contact parts	:	SS 304

BASIS OF DESIGN FOR AGITATED THIN FILM DRYER

Type of System	:	**ATFD.**
Evaporation Rate	:	608 Kg/hr
Feed Rate	:	1094 Kg/hr @ 40 %
Product	:	486 kg/hr
FEED PROPERTIES		
Solid Content Range	:	40 % w/w
Solvent	:	Water
OPERATING CONDITIONS		
Mode of Heating	:	Steam
MATERIAL OF ONSTRUCTION	:	
Feed/ Product	:	SS 316 L
Vapor / Condensate	:	MS
Vapor Liquid Separators	:	SS 316 L

2.10.5 Economical and technical viability of treatment of effluent

The comprehensive effluent treatment and management system for the proposed project will comprises of Primary, Secondary ETP followed by MEE.

The capital cost and recurring cost of the effluent treatment system summarized as under…

The capital cost of the proposed project is Rs. 45.67 Crores.

Total Quantity of waste water generation = 136.0 KL/Day

Total Liters= 1,27,000 Liters

Treatment Cost in MEE 47,750*25*1.5 = Rs. 17,90,625 /-

Treatment Cost in ETP = 1,27,000*25*0.5 = Rs. 15,87,500/-

Total effluent Treatment Cost= Rs. 17,90,625/- + Rs. 15,87,500/-

= Rs. 33,87,125/-

Min. Cost of Product= 300 Rs./Kg

Total Production = 779.1 MT/Month= 779100 Kg/Month

Total turnover of Plant = 23,37,30,000 Rs./Month

Approx.

Min. Profit= 20 % of total turnover of the plant= Rs. 4,67,46,000/-

Hence, It is viable.

2.10.6 Explore the possibilities for Zero Liquid Discharge (ZLD) option for the proposed project.

Total waste water generation will be 136 KL/Day (Industrial: 129 KL/Day + Domestic: 7 KL/Day). Out of 129 KL/Day industrial effluent, effluent from processes, scrubber and lab (49 KL/Day) will be sent to Stripper and 47.75 KL/Day to MEE and MEE condensate (40 KLD) will be sent to ETP for further treatment. Total effluent (127 KL/Day) from septic tank, utilities, washing and MEE Condensate will be sent to ETP and 126 KL/Day final treated effluent will be recycled for industrial operations. Domestic wastewater (7 KL/Day) will be sent to septic tank and then mixed with industrial effluent in ETP for further treatment.

2.10.7 Plans for management, collection and disposal of waste streams to be generated from spillage, leakages, vessel washing, used container washing etc. Measures proposed for preventing effluent discharge during unforeseen circumstances.

- All major chemical handling is done through closed system.
- All reaction vessels are connected to scrubber system.
- Ammonia Detection System: The gas leakage Alarm gets activated by automatic detection device installed at Ice plants at site.
- Smoke & fire detection system installed at ware house.
- Spillage of any chemical will be avoided to the maximum extent by closed circuit system i.e. day tanks are provided with an overflow line having bigger diameter than that of inlet of the pipe diameter. Standard operating procedures are available to handle spillage and leakage.

2.10.8 Undertaking stating that a separate electric meter will be provided for the waste water treatment system viz. ETP, RO, MEE, Spray dryer, etc.

ISO 9001, 14001 & OHSAS 18001
CERTIFIED COMPANY

Technical Plant : E-442, Riico Industrial Area
Chopanki (Bhiwadi) 301707 (Raj.)
Telefax : 01493 - 298189 - 91
insecticides (INDIA) LIMITED

Date: 25/05/2019

M/s. Insecticides India Limited undertakes that Company will provide separate electric meter for the waste water treatment system viz. ETP.

For INSECTICIDES INDIA LIMITED

AUTHORIZED SIGNATORY

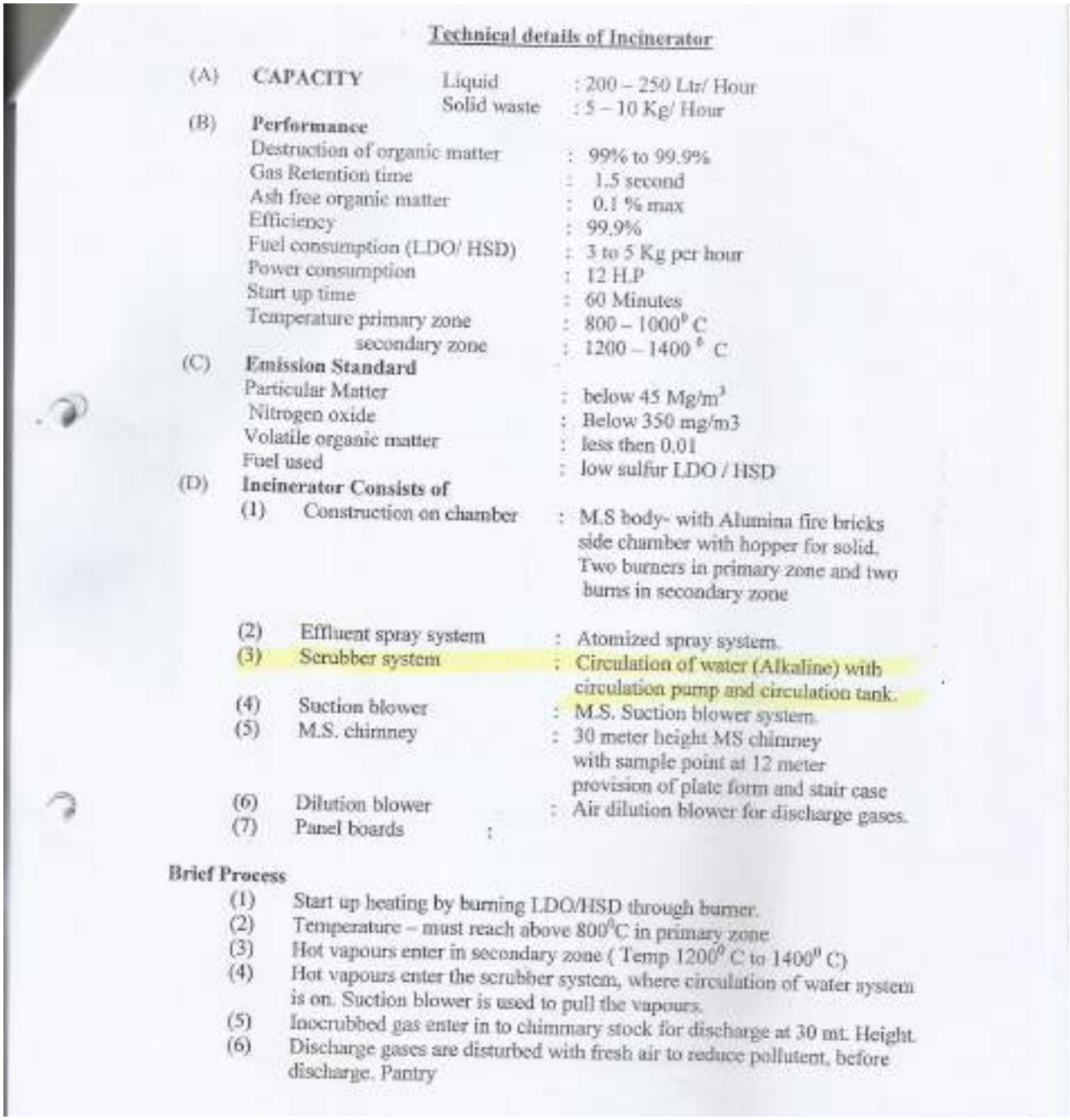
2.11 AIR POLLUTION AND CONTROL SYSTEM

2.10.1 Process gas emission

SR. NO.	PROCESS STACK ATTACHED TO	HEIGHT (m)	DIAMETER (m)	AIR POLLUTION CONTROL SYSTEM	EXPECTED POLLUTANTS
1	Process Vent	10	0.15	Scrubber	SO_2
2	Process Vent	10	0.15	Water Scrubber	HCl
3	Process Vent	10	0.15	Scrubber	HBr

2.11.2 Air pollution Control Measures (APCM) proposed for process gas emission.

Details of Scrubber system with incinerator



Technical details of Incinerator

(A) CAPACITY
Liquid : 200 – 250 Ltr/ Hour
Solid waste : 5 – 10 Kg/ Hour

(B) Performance
Destruction of organic matter : 99% to 99.9%
Gas Retention time : 1.5 second
Ash free organic matter : 0.1 % max
Efficiency : 99.9%
Fuel consumption (LDO/ HSD) : 3 to 5 Kg per hour
Power consumption : 12 H.P
Start up time : 60 Minutes
Temperature primary zone : 800 – 1000° C
secondary zone : 1200 – 1400 ° C

(C) Emission Standard
Particular Matter : below 45 Mg/m³
Nitrogen oxide : Below 350 mg/m3
Volatile organic matter : less then 0.01
Fuel used : low sulfur LDO / HSD

(D) Incinerator Consists of
(1) Construction on chamber : M.S body- with Alumina fire bricks side chamber with hopper for solid. Two burners in primary zone and two burns in secondary zone
(2) Effluent spray system : Atomized spray system.
(3) Scrubber system : Circulation of water (Alkaline) with circulation pump and circulation tank.
(4) Suction blower : M.S. Suction blower system.
(5) M.S. chimney : 30 meter height MS chimney with sample point at 12 meter provision of plate form and stair case
(6) Dilution blower : Air dilution blower for discharge gases.
(7) Panel boards :

Brief Process
(1) Start up heating by burning LDO/HSD through burner.
(2) Temperature – must reach above 800°C in primary zone
(3) Hot vapours enter in secondary zone (Temp 1200° C to 1400° C)
(4) Hot vapours enter the scrubber system, where circulation of water system is on. Suction blower is used to pull the vapours.
(5) Inocrubbed gas enter in to chimmary stock for discharge at 30 mt. Height.
(6) Discharge gases are disturbed with fresh air to reduce pollutent, before discharge. Pantry

2.11.3 Details of the utilities required.

SR NO.	MACHINERY	CAPACITY	EXISTING NOS	PROPOSED NOS
1	Cooling Tower	500 TR	3	1
2	Boiler (gas fired/agro waste/ briquette) (I.B.R)	2 MT	1	0
3	Boiler (gas fired/agro waste/ briquette) (I.B.R)	5 MT	0	1
4	Incinerator	25 Kg/hr	1	0
5	Scrubbing system	NA	1	4
6	Chilling system	30-50 MT	3	2
7	Nitrogen plant	55 CFM	1	0
8	Storage tank SS	12 KL	5	2
9	Storage tank MS	20 KL	5	1
10	Storage tank MS	10 KL	1	0
11	Goods Lift	1 TON	1	0
12	Fork Lift	1 TON	1	0
13	D.G SET	500 KVA	1	1
14	D.G SET	380 KVA	1	0
15	Effluent treatment plant	NA	1	0
16	MEE / spray drier	NA	0	1
17	Compressor	NA	2	1
18	DM water plant	5 KL	1	0

2.11.4 Type and quantity (MT/hr & MT/Day) of fuel to be used for each utility.

- **Power Requirement**

Sr. No.	Description	Requirement (KW)	Source
1.	Process Plant technical	290	JVVNL, Jaipur, Rajasthan
2.	Process plant formulation	40	JVVNL, Jaipur, Rajasthan
3.	Process Packing Plant	50	JVVNL, Jaipur, Rajasthan
4.	Utility technical plant	210	JVVNL, Jaipur, Rajasthan
5.	Boiler and DM plant	20	JVVNL, Jaipur, Rajasthan
6.	Effluent treatment plant	40	JVVNL, Jaipur, Rajasthan
7.	Pilot Plant	100	JVVNL, Jaipur, Rajasthan
8.	Quality control Laboratory	20	JVVNL, Jaipur, Rajasthan
9.	Office and street light	20	JVVNL, Jaipur, Rajasthan
10.	R&D Centre	40	JVVNL, Jaipur, Rajasthan
11.	Utility formulation plant	30	JVVNL, Jaipur, Rajasthan
		860	

- **Fuel Requirement**

Sr. No.	Fuel	Requirement (MT/Hr)	
1	Diesel	50 litre/Hr	Generator
2	Diesel	35 litre/Hr	Incinerator
3	Wood	3 MT/Hr	Boiler
4	Briquettes	12 MT/Day	Boiler

2.11.5 Flue gas emission rate emission from each utility

SR. NO.	STACKS ATTACHED TO	HEIGHT FROM GROUND LEVEL (m)	FUEL	CONSUMPTION OF FUEL	DIAMETER (m)	EXPECTED POLLUTANTS	APCM
1	Boiler (2 TPH) (Existing)	30	Wood/ Briquettes	6 MT/Day/ 6 MT/Day	1	SPM	Adequate Stack Height
2	DG set (380 KVA) (Existing)	6	Diesel	15 litre/hr	0.15	SPM, SO_2, NOx,	Adequate Stack Height
3	DG set (500 KVA)	7		25 litre/hr	0.15	SPM, SO_2, NOx,	Adequate Stack Height
4	DG set (125 KVA)	5.5		10 litre/hr	0.15	SPM, SO_2, NOx,	Adequate Stack Height
5	Incinerator (Existing)	30	Diesel	35 litre/hr	1	SPM, SO_2, HCl, CO	Adequate Stack Height
6	Boiler (4TPH) (Proposed)	30	Briquettes	12 MT/Day	1	SPM	Multi-cyclone separator with bag filter and scrubber

Note:- We have applied for usage of Briquettes as fuel because of non-availability of Natural Gas in Chopanki area and will provide adequate APCM for control of flue gas emission.

2.11.6 Provision of CEMS (Continuous Emission Monitoring system)

CEMS System has installed CEMS for Boiler and also installed TOC analyzer, pH meter & flow meter for waste water.

2.11.7 List the project specific sources of fugitive emission along with its quantification and proposed measures to control it.

The emissions are normally defined as emissions to the atmosphere resulting from leaking piping sources and equipments such as valves, flanges, pump seals, connections, and compressor seals open end lines and pressure relief valves. The emissions are not visually observed but can be measured in relatively low concentration at each area of source.

Fugitive emissions will be expected to be generated during construction and operation stages of the proposed project. During construction stage, main source of fugitive emission will be dust which is expected mainly due to movement of vehicles carrying construction material and vehicles used for construction. During operation stage, leakage through valves, pumps, emission from open drum containing chemicals, open feeding; storage tanks, etc. will be the major sources of fugitive emissions of organic chemicals and VOCs. Adequate dust collector will be installed for control of fugitive emission during loading of raw material and product. Condensers will be provided to trap VOC. All the Flange joints of the pipe lines which carry solvents will be covered with flange guards. All the rotating equipments like pumps will be installed with Mechanical Seals to arrest any sort of emissions. VOC detectors will be installed at various places to identify any fugitive emissions. Proper gland packing will be always maintained for pumps and valves and to the extent possible pumps will be with mechanical seal. A regular preventive maintenance schedule is in place to replace or rectify all gaskets and joints etc as a part of ISO systems to ensure no fugitive emissions takes place.

Following measures will be adopted to prevent and control fugitive emissions:

1. Airborne dust at all transfers operations/ points will be controlled either by spraying water or providing enclosures.
2. Adequate ventilation will be provided.
3. Regular maintenance of valves, pumps, flanges, joints and other equipment will be done to prevent leakages and thus minimizing the fugitive emissions of VOCs.

4. Entire process will be carried out in the closed reactors with proper maintenance of pressure and temperature.
5. Periodic monitoring of work area will be carried out to check the fugitive emission.
6. To eliminate chances of leakages from glands of pumps, mechanical seal will be provided at all solvent pumps.
7. Stand by pumps will be provided on all scrubbers. Besides, scrubbers will be equipped with on-line pH meter with hooter system for better operational control.
8. Close feeding system will be provided for centrifuges. Centrifuge and filtrate tank vents will be connected to vent chillers.
9. Minimum number of flanges, joints and valves in pipelines.
10. Regular inspection of floating roof seals and proper preventive maintenance of roofs and seals for tanks.
11. Fugitive emission over reactors, formulation areas, centrifuges, chemical loading, transfer area will be collected through hoods and ducts by induced draft and controlled by scrubber/ dust collector.
12. Dedicated scrubber will be provided are used for fugitive emissions to control.
13. For dust emissions bag filter will be provided.
14. Enclosures to chemical storage area, collection of emission from loading of raw materials in particular solvents through hoods and ducts by induced draft, and control by scrubber / dust collector to be ensured.

2.12 Hazardous Waste Generation And Management

2.12.1 Management plan for hazardous/Solid waste including storage, handling, utilization and safe disposal as per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules 2016. CPCB guidelines in respect of specific treatment, such as solar evaporation, incineration, etc., need to be followed.

TABLE 2.5

DETAILS OF HAZARDOUS WASTE AND ITS DISPOSAL

Sr. No.	Description of Waste	Category of Waste	Existing	Additional	Total	Mode of Disposal
			Quantity (MT/ Annum)			
1	ETP Sludge	35.3	7.5	300	307.5	Collection, Storage Transportation, Disposal at approved TSDF site of UCCI, Udaipur
2	Process Residue	29.1	189.3	210	399.3	Collection, Storage, Transportation & Incineration within premises or sent to CHWIF of UCCI, Udaipur
3	MEE Salt	35.3	Nil	1080	1080	Collection, Storage Transportation, Disposal at approved TSDF site of UCCI, Udaipur
4	Used Lubricating Oil	5.1	0.45	1.0	1.45	Collection, Storage Transportation, Disposal by selling to registered Recyclers or use for lubrication of machines.
5	Drums & Containers, Bags & Liners	33.1	Nil	21	21	Collection Storage, Decontamination and finally sold to approved vendors.
6	Incineration Ash	37.2	6	10	16	Collection, Storage Transportation, Disposal at approved TSDF site of UCCI, Udaipur
7	Stripper Sludge	35.3	0	412.5	412.5	Collection, Storage, Transportation & Incineration within premises or sent to CHWIF of UCCI, Udaipur

2.12.2 The manual handling of the hazardous wastes and Methodology of de-contamination and disposal of discarded containers and its record keeping.

- The solid waste generated form ETP is filled in the big bag and handled by forklift for internal transportation and truck filling for disposal.

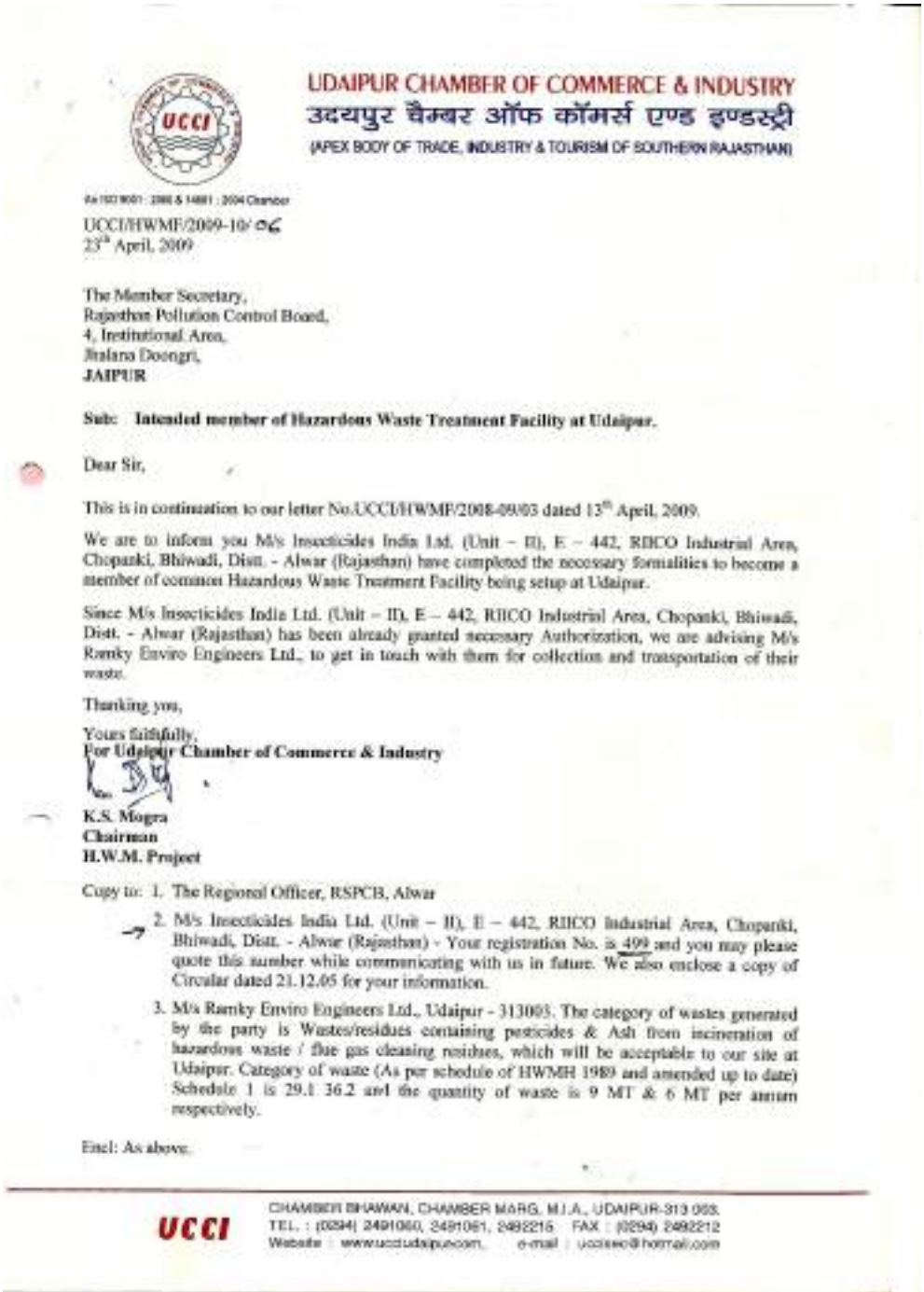
- Discarded containers/bags/liners etc. are being stored at designated place and given to authorized decontamination facility for recycle & reuse.

- All waste disposal record is being maintained at site and data also available on RSPCB XGN.

2.12.3 Management of by-products which fall under the purview of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules 2016 as per the said rules and necessary permissions from the concern authority.

There will be no generation of by - products from process.

2.12.4 Membership of Common Environmental Infrastructure like TSDF, Common Incineration Facility (CHWIF), MEE, Spray dryer etc. (UCCI MEMBERSHIP CERTIFICATE)



UDAIPUR CHAMBER OF COMMERCE & INDUSTRY
उदयपुर चैम्बर ऑफ कॉमर्स एण्ड इण्डस्ट्री
(APEX BODY OF TRADE, INDUSTRY & TOURISM OF SOUTHERN RAJASTHAN)

UCCI/HWMF/2009-10/ ०८
23rd April, 2009

The Member Secretary,
Rajasthan Pollution Control Board,
4, Institutional Area,
Jhalana Doongri,
JAIPUR

Sub: Intended member of Hazardous Waste Treatment Facility at Udaipur.

Dear Sir,

This is in continuation to our letter No.UCCI/HWMF/2008-09/03 dated 13th April, 2009.

We are to inform you M/s Insecticides India Ltd. (Unit – II), E – 442, RIICO Industrial Area, Chopanki, Bhiwadi, Distt. - Alwar (Rajasthan) have completed the necessary formalities to become a member of common Hazardous Waste Treatment Facility being setup at Udaipur.

Since M/s Insecticides India Ltd. (Unit – II), E – 442, RIICO Industrial Area, Chopanki, Bhiwadi, Distt. - Alwar (Rajasthan) has been already granted necessary Authorization, we are advising M/s Ramky Enviro Engineers Ltd., to get in touch with them for collection and transportation of their waste.

Thanking you,

Yours faithfully,
For Udaipur Chamber of Commerce & Industry

K.S. Mogra
Chairman
H.W.M. Project

Copy to: 1. The Regional Officer, RSPCB, Alwar

2. M/s Insecticides India Ltd. (Unit – II), E – 442, RIICO Industrial Area, Chopanki, Bhiwadi, Distt. - Alwar (Rajasthan) - Your registration No. is 499 and you may please quote this number while communicating with us in future. We also enclose a copy of Circular dated 21.12.05 for your information.

3. M/s Ramky Enviro Engineers Ltd., Udaipur - 313003. The category of wastes generated by the party is Wastes/residues containing pesticides & Ash from incineration of hazardous waste / flue gas cleaning residues, which will be acceptable to our site at Udaipur. Category of waste (As per schedule of HWMH 1989 and amended up to date) Schedule 1 is 29.1 36.2 and the quantity of waste is 9 MT & 6 MT per annum respectively.

Encl: As above.

UCCI CHAMBER BHAWAN, CHAMBER MARG, M.I.A., UDAIPUR-313 003.
TEL. : (0294) 2491060, 2491061, 2492215 FAX : (0294) 2492212
Website : www.uccidaipur.com e-mail : uccisec@hotmail.com

UDAIPUR CHAMBER OF COMMERCE & INDUSTRY
उदयपुर चैम्बर ऑफ कॉमर्स एण्ड इण्डस्ट्री
(APEX BODY OF TRADE, INDUSTRY & TOURISM OF SOUTHERN RAJASTHAN)
An ISO-9001 Chamber

UCCI/GD-4/2005-06/250
26th August, 2005.

The Member Secretary,
Rajasthan Pollution Control Board,
4, Institutional Area,
Jhalana Doongri,
JAIPUR.

Sub: Intended members of Hazardous Waste Treatment Facility at Udaipur.

Dear Sir,

In continuation to our letter No.UCCI/GD-4/2005-06/181 dated 22nd August, 2005, we are to inform you that M/s Insecticides (India) Limited, E-443-444, RIICO Industrial Area, Chopanki, (Bhiwadi) – 301 707, Dist. Alwar, have completed the necessary formalities to become a member of common Hazardous Waste Treatment Facility to be setup at Udaipur.

We request you to kindly consider M/s. Insecticides (India) Limited, Chopanki (Bhiwadi), Alwar, for granting necessary authorization.

Thanking you,

Yours faithfully,
For Udaipur Chamber of Commerce & Industry

K.S. Mogra
Chairman
Sub-Committee – HWM Facility

Cc to : a) The Regional Officers, RSPCB, Bhiwadi.

b) M/s. Insecticides (India) Limited, E-443-444, RIICO Industrial Area, Chopanki, (Bhiwadi) – 301 707, Dist. Alwar.

-Your registration No. is **239** and you may please quote this number while communicating with us in future. You are also required to submit us a monthly waste generation report by 7th of every month in the enclosed format.

UCCI
CHAMBER BHAWAN, CHAMBER MARG, M.I.A., UDAIPUR-313 003.
TEL. : (0294) 2491060, 2491061, 2492215 FAX : (0294) 2492212
Website : www.uccidaipur.com, e-mail : ucciseo@hotmail.com

2.13 NOISE LEVEL AND CONTROL SYSTEM

Extensive oiling and lubrication and preventive maintenance shall be carried out to reduce noise generation at source to the permissible limit. Acoustic enclosures provided for DG set. The Noise level is within the prescribed limit. At noisy area, adequate preventive & control measures are taken. There is no significant noise, vibration or emission of light & heat from the unit.

CHAPTER – 3:

BASELINE ENVIRONMENTAL STATUS

3.1 INTRODUCTION

The baseline status of environmental quality in the vicinity of project site serves as the basis for identification, prediction and evaluation of impacts. The baseline environmental quality is assessed through field studies within the impact zone for various components of the environment, viz. air, noise, water, land and socio-economic. The baseline environmental quality has been assessed in the summer season of December, 2018 to February, 2019 in a study area of 10 km radial distance from the project site.

The existing environmental setting is considered to establish the baseline conditions which are described with respect to following:

- Land environment
- Land Use Pattern
- Water Environment
- Air Environment
- Meteorology
- Noise Environment
- Ecology
- Topography
- Demography and Socio-economic Environment

3.2 METHODOLOGY

Following the guidelines of MoEFCC, the baseline environmental study was conducted. The details of the study period, frequency of sampling & method of environmental sampling & analysis are shown below in succeeding paragraphs under respective titles.

3.2.1 Study Period & Frequency of Sampling

The period of study determined was December, 2018 to February, 2019. The frequency of various environmental sampling & analysis was determined following the guidelines provided by MoEFCC in online EIA Manual. The details of frequency of environmental sampling considered for the study are illustrated in Table – 3.1.

Table 3.1

Frequency of Environmental Monitoring

Attributes	Sampling	
	Locations	**Frequency**
A. Air Environment		
Meteorological	Project Site	1 hourly continuous for Study Period
Ambient Air Quality	9 locations in the study area (10 km radius from project site)	24 hourly twice a week during study period
B. Noise	Various Locations within the study area (10 Km radius from project site)	Once during Study Period
C. Water		
Ground Water	Grab samples from 9 Locations from Study Area (10 km radius from project site)	Once during Study Period
Surface Water	Grab samples from 1 Locations (10 km radius from project site)	Once during Study Period
D. Soil Quality	Soil samples from 9 locations within study area	Once during Study Period
E. Land Use & Land Cover	Study area (10 km from Project Site)	Once during Study Period
F. Ecological Data	Study area (10 km from Project Site)	Once during Study Period
G. Socioeconomic Data	Study area (10 km from Project Site)	Once during Study Period

3.2.2 Method of Environmental Sampling & Analysis

The method adopted for environmental sampling & analysis is illustrated in following Table - 3.2.

Table 3.2

Method of Environmental Sampling & Analysis

Attributes	Method	
	Sampling / Preservation	**Analysis**
A. Air Environment 1) Micro meteorological data 2) Ambient Air Quality	Mechanical/automatic 1) Spectrum weather station & IMD 2) 2.5 Micron dust samplers & RSPM samplers having the facility to collect the gaseous samples	-- IS 5182 & CPCB
B. Noise	Instrument : Noise level meter	--
C. Water & Waste Water 1) Ground Water 2) Surface Water	Standard Methods for Examination of Water and Wastewater Analysis, published by APHA 22nd edition, 2012	Standard Methods for Examination of Water and Wastewater Analysis, published by APHA 22nd edition, 2012
D. Soil Quality	Laboratory Guide for Conducting Soil Test & Plant Analysis, by J. Benton Jones, Jr.	Laboratory Guide for Conducting Soil Test & Plant Analysis, by J. Benton Jones,
E. Land Use & Land Cover	Satellite Imageries (1:25,000), Secondary data from EIC, Delhi	As Secondary data-analysis by EIC, Delhi
F. Geology & Geo-Hydrology	Secondary data from EIC, Delhi	Secondary data from EIC, Delhi
G. Ecological Data	Secondary data from EIC, Delhi	Secondary data from EIC, Delhi
H. Socioeconomic Data	Secondary data from EIC, Delhi	Secondary data from EIC, Delhi

3.2.3 Baseline Environmental Status

The baseline environmental study was carried out for Ambient Air, Water, Land, Noise, Biological & Socioeconomic environment. The study period was December, 2018 to February, 2019. The environmental samples were collected from the selected location of the study area. The scenario of environmental condition of the area revealed from the sample & data analysis is described below in subsequent paragraphs.

3.3 MICROMETEOROLOGY

The micrometeorological data like wind speed, wind direction, temperature, relative humidity and Environmental Impact assessment of proposed expansion project of technical grade pesticides at Chopanki, Dist: Alwar, Rajasthan atmospheric pressure were collected for the study period.

(Courtesy: Environmental Information Centre, New Delhi)

3.3.1 Temperature Details

Minimum, Maximum and Average Temperatures for Alwar District of the year 2018 are given in Table 3.3.

Table 3.3

Temperature Data

Month (2016)	Minimum Temperature (^{0}C)	Maximum Temperature (^{0}C)	Average Temperature (^{0}C)
January	9	24	15
February	14	29	20
March	20	34	26
April	25	38	31
May	30	42	37
June	33	41	36
July	29	36	32
August	28	34	32
September	25	33	28
October	26	35	30
November	21	32	25
December	15	25	21

3.3.2 Relative Humidity (RH)

Minimum, Maximum and Average Monthly Relative Humidity for Alwar District of the year 2018 is given in Table 3.4.

Table 3.4

Relative Humidity Data

Month (2018)	Minimum R.H.%	Maximum R.H.%	Average R.H.%
January	6	55	38
February	6	84	36
March	6	82	23
April	6	70	19
May	6	69	16
June	11	77	32
July	19	94	56
August	23	100	65
September	16	100	60
October	6	97	28
November	6	39	29
December	6	39	34

3.3.3 Rainfall

Rainfall data for Alwar District of the year 2018 is presented in Table 3.5.

Table 3.5

Rainfall Data

Month (2018)	Monthly Total (mm)	Numbers of Rainy Days
January	0	0
February	3.9	1
March	0.62	2
April	6.33	10
May	6.02	2
June	35.99	8
July	147.46	21
August	103.46	22
September	49.88	14
October	0	0
November	0	0
December	4.4	1
Total	**358.06**	**81**

Total rainfall, during the monsoon period, has been recorded as 358.06 mm.

3.3.4 Wind Speed

Wind speed for Alwar District of the year 2018 is given in Table 3.6.

Table 3.6

Wind Speed Data

Sr. No.	Month (2018)	Average Wind speed (KMPH)
1.	January	6.1
2.	February	6.9
3.	March	8
4.	April	8.3
5.	May	9
6.	June	10.1
7.	July	8.6
8.	August	8.1
9.	September	8.8
10.	October	5.4
11.	November	6
12.	December	4.7
Average		**7.5**

3.3.5 Temperature, Relative Humidity & Wind Speed

The site specific data were collected for December, 2018 to February, 2019. Data are tabulated in Table 3.7.

Table - 3.7

Site Specific Meteorological Data (Period: Dec., 2018 to Feb., 2019)

METEOROLOGICAL PARAMETER	MONTH		
	DECEMBER, 2018	JANUARY, 2019	FEBRUARY, 2019
Temperature (^{0}C)			
Min.	15.6	11.1	13.5
Max.	26.9	20.4	22.2
Avg.	20.4	15.2	17.8
Relative Humidity (%)			
Min.	6.0	6.9	8.1
Max.	72.1	76.8	78.2
Avg.	34.5	46.1	51.1
Wind Speed (km/h)			
Min.	0	0	0
Max.	10.2	11.7	13.7
Avg.	4.8	6.2	7.1

3.3.6 Wind Rose

Wind rose is a graphical representation of the magnitude and direction of wind speed considering all the directions. With the help of wind rose diagram one can easily predict the direction and extent of spreading of the gaseous and particulate matter from the source. Wind rose diagrams & stability class distribution are prepared for the study area and presented in Figures - 3.1A & 3.1B respectively.

Figures - 3.1A

Wind Rose Diagram

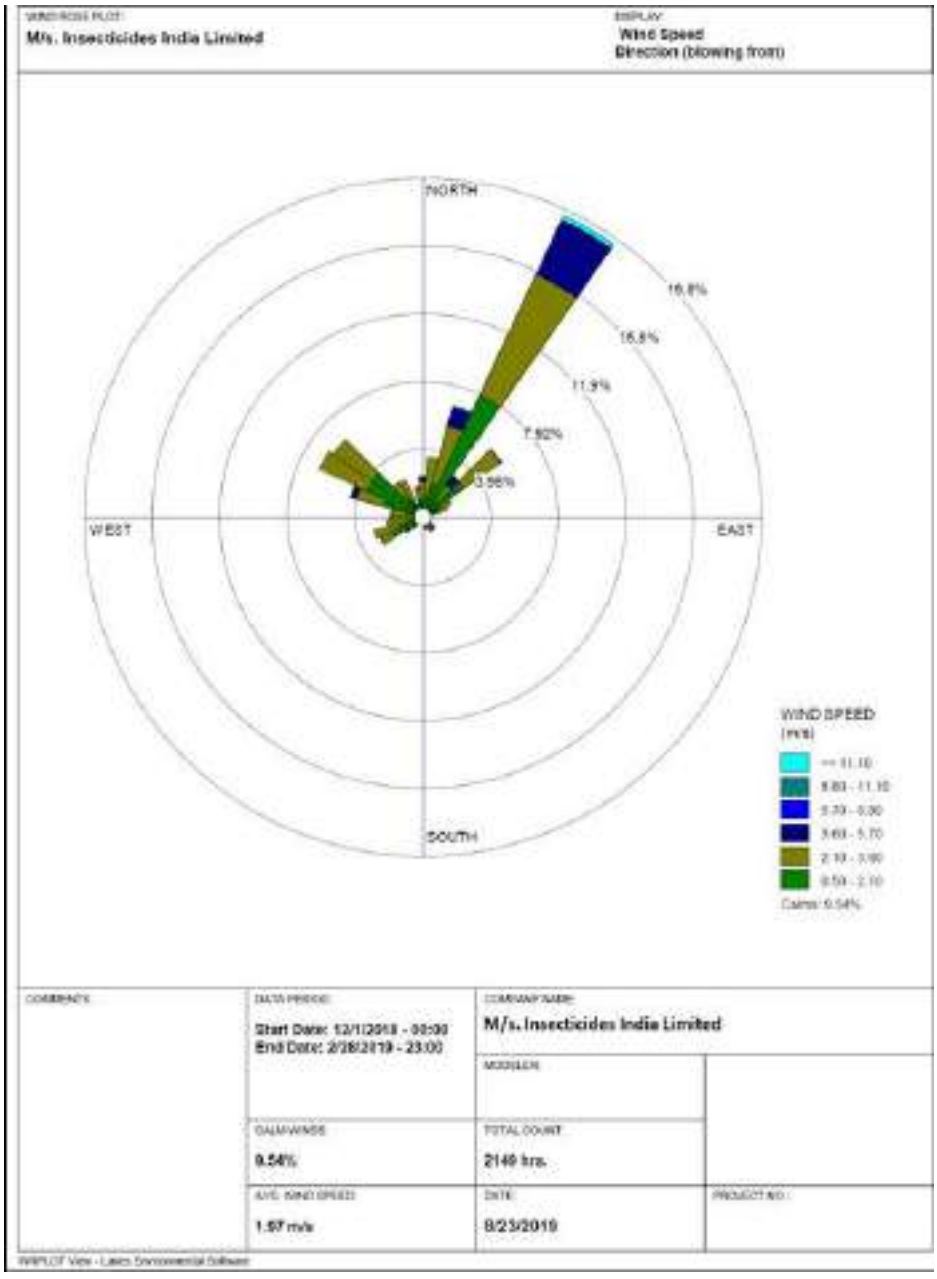
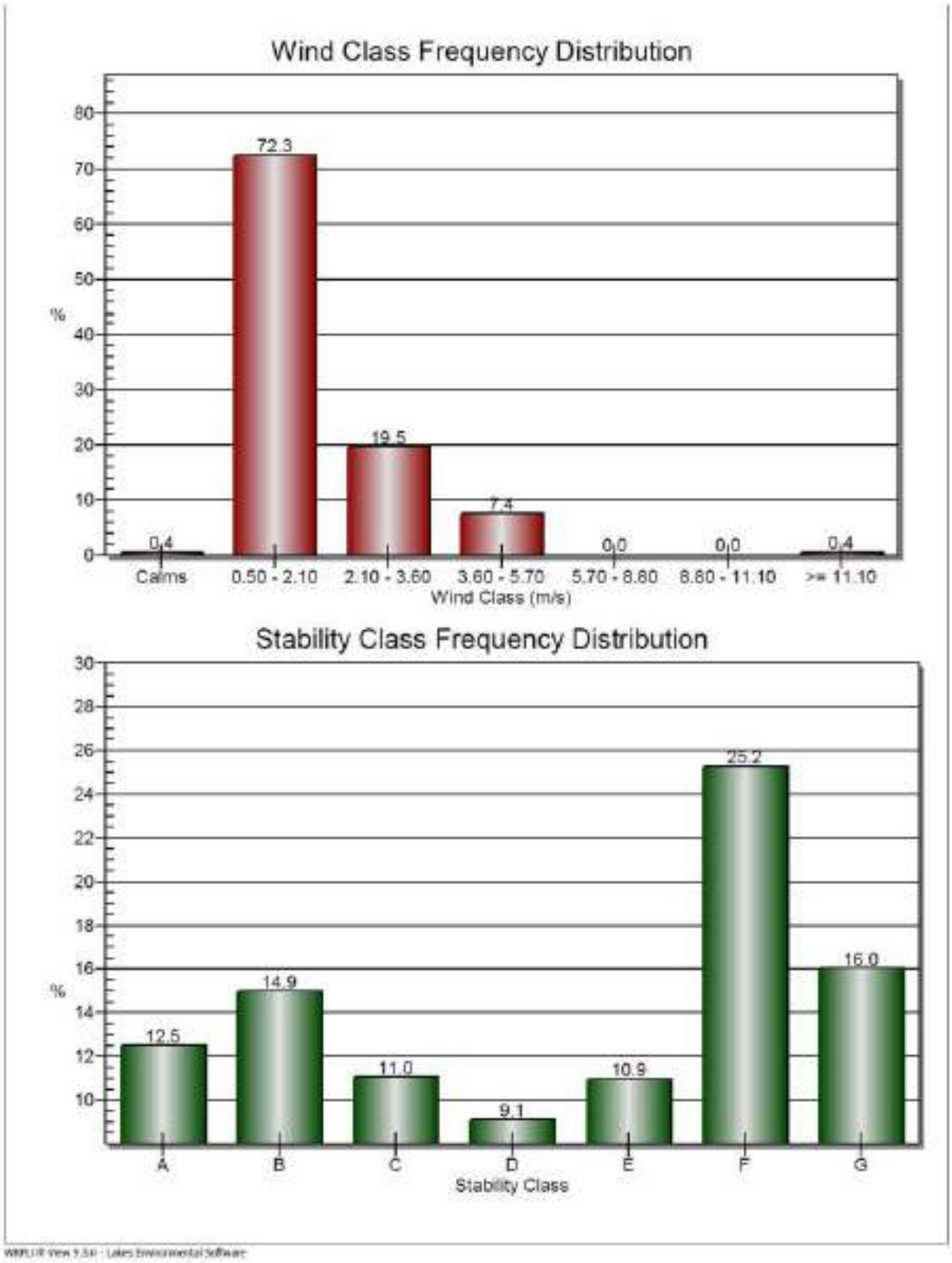


Figure-3.1B

Stability Class Distribution



3.4 AIR ENVIRONMENT

3.4.1 DESIGN OF NETWORK FOR AMBIENT AIR QUALITY MONITORING LOCATIONS

The air quality status in the impact zone is assessed through a network of ambient air quality monitoring locations. The tropical climatic conditions mainly control the transport and dispersion of air pollutant emissions during various seasons.

The baseline studies for air environment include identification of specific air pollutants prior to implementation of the project. The Environmental Impact Assessment (EIA) study requires monitoring of baseline ambient air quality during one season. Accordingly, ambient air quality monitoring was carried out in the winter season from December 1, 2018 to February 28, 2019 was collected. The main sources of air emissions in the study area are industrial operations, vehicular emission, dust from paved and unpaved tracks, fuel burning for domestic purpose, and wind blown dust from open land.

Nine Ambient Air Quality Monitoring (AAQM) locations were selected based on guidelines of ambient air quality network siting criteria of CPCB. All AAQM locations were selected within the study area of 10 km radial distance from the project site covering all zones i.e. industrial, residential, rural & other area as per NAAQS and keeping in mind local topography and meteorology of the area.

3.4.2 METHODOLOGY FOR AMBIENT AIR QUALITY MONITORING

The ambient air quality monitoring was carried out in accordance with National Ambient Air Quality Standards (NAAQS) of CPCB. Ambient Air Quality Monitoring (AAQM) was carried out at nine locations during the study period. The locations of the different stations with respect to its distance and direction from project site are shown in Table-3.8 and Figure-3.2 respectively.

The conventional and project specific parameters such as Suspended Particulate Matter, Respirable Suspended Particulate Matter (RSPM-PM_{10}), Respirable Suspended Particulate Matter (RSPM-$PM_{2.5}$), Sulphur Dioxide (SO_2), Oxides of Nitrogen (NOx), Ozone (O_3), Lead (Pb), Carbon Monoxide (CO), Ammonia (NH_3), Benzene (C_6H_6), Benzo (a) Pyrene (BaP), Arsenic (AS), Nickel (Ni), Chlorine (Cl_2), HCl, HF, NH_3 , Br_2 & VOCs were monitored at site.

The values for mentioned concentrations of various pollutants at all the monitoring locations were processed for different statistical parameters like arithmetic mean, minimum concentration, and maximum concentration and percentile values. The existing baselines levels of Suspended Particulate Matter, Respirable Suspended Particulate Matter (RSPM-PM_{10}), Respirable Suspended Particulate Matter (RSPM-$PM_{2.5}$), Sulphur Dioxide (SO_2), Oxides of Nitrogen (NOx), Ozone (O_3), Lead (Pb), Carbon Monoxide (CO), Ammonia (NH_3), Benzene (C_6H_6), Benzo (a) Pyrene (BaP), Arsenic (AS), Nickel (Ni), Chlorine (Cl_2)), HCl, HF, NH_3 , Br_2 & VOCs are expressed in terms of various statistical parameters as given in Tables-3.9

Table - 3.8

Locations of the Ambient Air Quality Monitoring Stations

SR. NO.	NAME OF VILLAGE	BEARING W.R.T. PROJECT SITE	APPROXIMATE RADIAL DISTANCE FROM PROJECT SITE (KM)	TYPE OF AREA	LATITUDE - LONGITUDE
1.	Project site (A1)	--	--	Industrial	28°09'09.00" N 76°52'42.00" E
2.	Karenda (A2)	NE	2.8	Residential	28°10'10.29" N 76°53'58.08" E
3.	Bandapur (A3)	ENE	0.38	Residential	28°09'13.14" N 76°52'55.85" E
4.	Chaupanki (A4)	SE	1.58	Residential	28°08'27.58" N 76°53'11.60" E
5.	Godhan (A5)	NW	3.48	Residential	28°09'56.67" N 76°50'46.23" E
6.	Banban (A6)	WNW	3.33	Residential	28°09'20.12" N 76°50'40.92" E
7.	Jhiwana (A7)	SW	3.35	Residential	28°08'33.99" N 76°50'46.14" E
8.	Bhoodli (A8)	NW	1.20	Residential	28°09'39.41" N 76°52'14.38" E
9.	Bahadari (A9)	NE	2.08	Residential	28°10'08.54" N 76°53'18.01" E

Figure - 3.2

Locations of the Ambient Air Quality Monitoring Stations

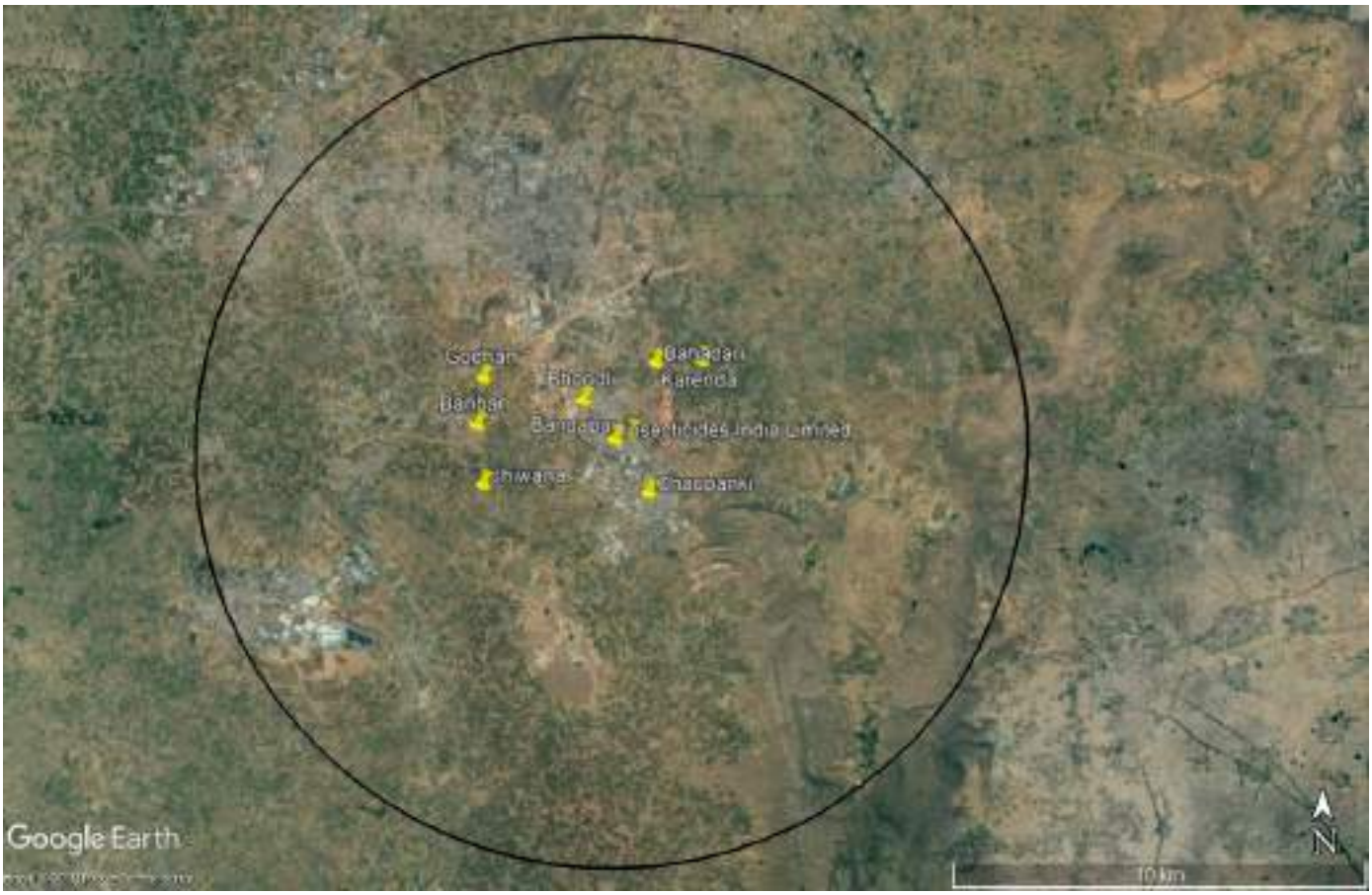


Table - 3.9

Ambient Air Quality Status (Dec, 2018 to Feb, 2019)

SR. NO.	SAMPLING LOCATION	SAMPLING DURATION	SPM	PM_{10}	$PM_{2.5}$	SO_2	NO_x	NH_3	O_3
			$\mu g/m^3$						
1.	Project site: (A1)	24 hours	402	99.18	58.33	11.09	15.59	BDL	12.34
2.	Karenda (A2)	24 hours	239	71.57	36.92	6.30	6.81	BDL	15.54
3.	Bandapur (A3)	24 hours	241	69.40	38.77	8.35	13.76	BDL	20.85
4.	Chaupanki (A4)	24 hours	388	84.39	47.88	10.30	11.69	BDL	19.88
5.	Godhan (A5)	24 hours	199	62.12	39.77	6.39	8.89	BDL	20.48
6.	Banban (A6)	24 hours	288	72.65	43.38	6.09	7.12	BDL	21.95
7.	Jhiwana (A7)	24 hours	211	67.35	41.46	6.85	7.19	BDL	17.28
8.	Bhoodli (A8)	24 hours	307	75.57	48.33	7.59	14.86	BDL	16.39
9.	Bahadari (A9)	24 hours	297	65.21	44.42	7.82	8.42	BDL	18.22
NAAQS			**500**	**100**	**60**	**80**	**80**	**400**	**100**

SR. NO.	SAMPLING LOCATION	Pb	As	Ni	C_6H_6	Cl_2	CO	VOC	HBr	HCl
		$\mu g/m^3$	ng/m^3	ng/m^3	$\mu g/m^3$	ppm	mg/m^3	ppm	$\mu g/m^3$	ppm
1.	Project site: (A1)	BDL	BDL	BDL	BDL	BDL	0.62	BDL	BDL	BDL
2.	Karenda (A2)	BDL	BDL	BDL	BDL	BDL	0.11	BDL	BDL	BDL
3.	Bandapur (A3)	BDL	BDL	BDL	BDL	BDL	0.53	BDL	BDL	BDL
4.	Chaupanki (A4)	BDL	BDL	BDL	BDL	BDL	0.41	BDL	BDL	BDL
5.	Godhan (A5)	BDL	BDL	BDL	BDL	BDL	0.21	BDL	BDL	BDL
6.	Banban (A6)	BDL	BDL	BDL	BDL	BDL	0.13	BDL	BDL	BDL
7.	Jhiwana (A7)	BDL	BDL	BDL	BDL	BDL	0.15	BDL	BDL	BDL
8.	Bhoodli (A8)	BDL	BDL	BDL	BDL	BDL	0.31	BDL	BDL	BDL
9.	Bahadari (A9)	BDL	BDL	BDL	BDL	BDL	0.10	BDL	BDL	BDL
	NAAQS	**1**	**6**	**20**	**5**	**300**	**2**	**--**	**--**	**--**

Note: BDL = Below Detectable Limit

Note:

Parameter	Min. Detectable Limit	Test Method	NABL OR NON NABL
Suspended Particulate Matter (SPM)	3.0 µg/Nm^3	IS 5182 (PART 4): 1999	Aqua-Air-NABL
Particulate Matter (PM_{10})	5.0 µg/Nm^3	IS 5182 (PART 23):2006 (Cyclonic Flow Technique) Gravimetric	Aqua-Air-NABL
Particulate Matter ($PM_{2.5}$)	2.0 µg/Nm^3	Gravimetric Method Guideline for Manual Sampling & Analysis Vol.I (May-2011): CPCB (MoEF,Govt. of India) Contents Sr. no. (4), P.g.no.15-30.	Aqua-Air-NABL
Sulphur Dioxide (SO_2)	1.6 µg/Nm^3	IS 5182 (PART-2):2001	Aqua-Air-NABL
Oxides of Nitrogen (NO_x)	5.0 µg/Nm^3	IS 5182 (PART-6):2006	Aqua-Air-NABL
Ozone (O_3)	0.001 ppm OR 2.14 µg/Nm^3	IS 5182 (PART-9) :1974	Aqua-Air-NABL
Ammonia (NH_3)	1.0 µg/Nm^3	Indophenol Blue Method	Aqua-Air-NABL
Chlorine (Cl_2)	5.0 µg/m^3	IS:5182:(PART-19):1982	Aqua-Air-NABL
*Carbon Monoxide (CO)	1.14 mg/Nm^3	Digital CO Analyzer	Aqua-Air-Non NABL
*VOC	0.001 ppm (1 ppb)	Portable VOC Analyser (TIGER handheld (VOC detector)) (PTXSLBME-0004) 0.001 ppm (1 ppb) TO 20,000 ppm (20,000 mg/m^3)	Aqua-Air-Non NABL
*Lead (Pb)	0.5 µg/Nm^3	AAS APHA 3030 E	Aqua-Air-Non NABL
*Arsenic (As)	2 ng/Nm^3	AAS APHA 3114 B- C	Aqua-Air-Non NABL
*Nickel (Ni)	10 ng/Nm^3	AAS APHA 3030 E	Aqua-Air-Non NABL
**Benzene (C_6H_6)	2 µg/Nm^3	Adsorption extraction followed by GC/GCMS	Pollucon-Non NABL
**Hydrogen Bromide (HBr)	5.0 µg/m^3	NIOSH Manual of Analytical Methods – 7907 Ion Chromatography (IC) with conductivity detection	Pollucon-Non NABL
**Hydro Carbon (HC)	1 ppm	Digital Gas Analyzer	Pollucon-Non NABL

*Not in our NABL Scope, **Analysed by Sub Contractor (Not in our NABL Scope)

3.4.3 SUMMARY:

The statistical interpretation of observed ambient air quality concentrations is presented in Table- 3.9. They represent the cross sectional distribution of the baseline air quality status of the study region.

Sr. No.	Criteria Pollutants	Unit	Maximum Value	Minimum Value	98 Percentile Value	Prescribed Standard
1.	PM_{10}	$\mu g/m^3$	99.18	62.12	95.19	100
2.	$PM_{2.5}$	$\mu g/m^3$	58.33	36.92	52.61	60
3.	SO_2	$\mu g/m^3$	11.09	6.09	9.28	80
4.	NO_x	$\mu g/m^3$	15.59	6.81	13.92	80

The PM_{10} and $PM_{2.5}$ concentrations at all the AAQM locations were primarily caused by local phenomena including industrial & vehicular activities and natural dust getting air borne due to manmade activities and blowing wind. PM_{10} and $PM_{2.5}$ concentrations were observed below stipulated standards of CPCB for Industrial, Residential, Rural and Other Area at all air quality monitoring locations during the monitoring period. Results of all parameters are found within limit.

3.5 NOISE ENVIRONMENT

The objective of the noise level survey around the project site was to identify existing noise sources and to measure background noise levels. Major noise sources in the study area are industries, commercial, and vehicular movements. Major human settlement in the study area is Bhiwadi which is about 6 km away from project site. The noise monitoring locations are given in Table - 3.8 and shown in Figure - 3.2 while the results of noise monitoring are given in Table - 3.10.

3.5.1 Methodology for Noise Monitoring

The noise monitoring was carried out at nine locations in day time during (6 am to 10 pm) and at night time (10 pm to 6 am) in the study area covering all the areas i.e. industrial, commercial, residential and silence zones as mentioned in Noise (Pollution and Control) Rules, 2000. CPCB Recommendations for community noise exposure are attached as Annexure – 2. Hourly Equivalent noise levels Leq (day) and Leq (night) were measured at each monitoring locations. One day monitoring ranging from December 18st, 2018 to December 21st, 2018 during day and night time was carried out at all the locations.

The noise level measured in study area at different locations is given in Table 3.10. The noise sources identified around the site are vehicular traffic, industrial and commercial activities. The noise levels were below the stipulated standards of CPCB.

Noise levels due to transportation were also measured at different locations. The communities close to the project site are not exposed to major noise sources. The commercial activities and transport apart from natural sources contribute to community noise levels.

INDIAN STANDARDS FOR NOISE LEVEL

Sr. No.	Locations	Noise Level in Day Time dB(A)	Noise Level in Night Time dB(A)
1	Industrial Area	75	65
2	Commercial Area	65	55
3	Residential Area	55	45
4	Silence Zone i.e. Hospital, Educational institute etc.	50	45

Table - 3.10 (A)

Details of Ambient Noise Quality Monitoring Locations

SR. NO.	NAME OF VILLAGE	BEARING W.R.T. PROJECT SITE	APPROXIMATE RADIAL DISTANCE FROM PROJECT SITE (KM)
1.	Project site (N1)	--	--
2.	Village: Karenda (N2)	NE	2.8
3.	Village: Bandapur (N3)	ENE	0.38
4.	Village: Chaupanki (N4)	SE	1.58
5.	Village: Godhan (N5)	NW	3.48
6.	Village: Banban (N6)	WNW	3.33
7.	Village: Jhiwana (N7)	SW	3.35
8.	Village: Bhoodli (N8)	NW	1.20
9.	Village: Bahadari (N9)	NE	2.08

Figure - 3.3

Locations of the Ambient Noise Level Monitoring Stations

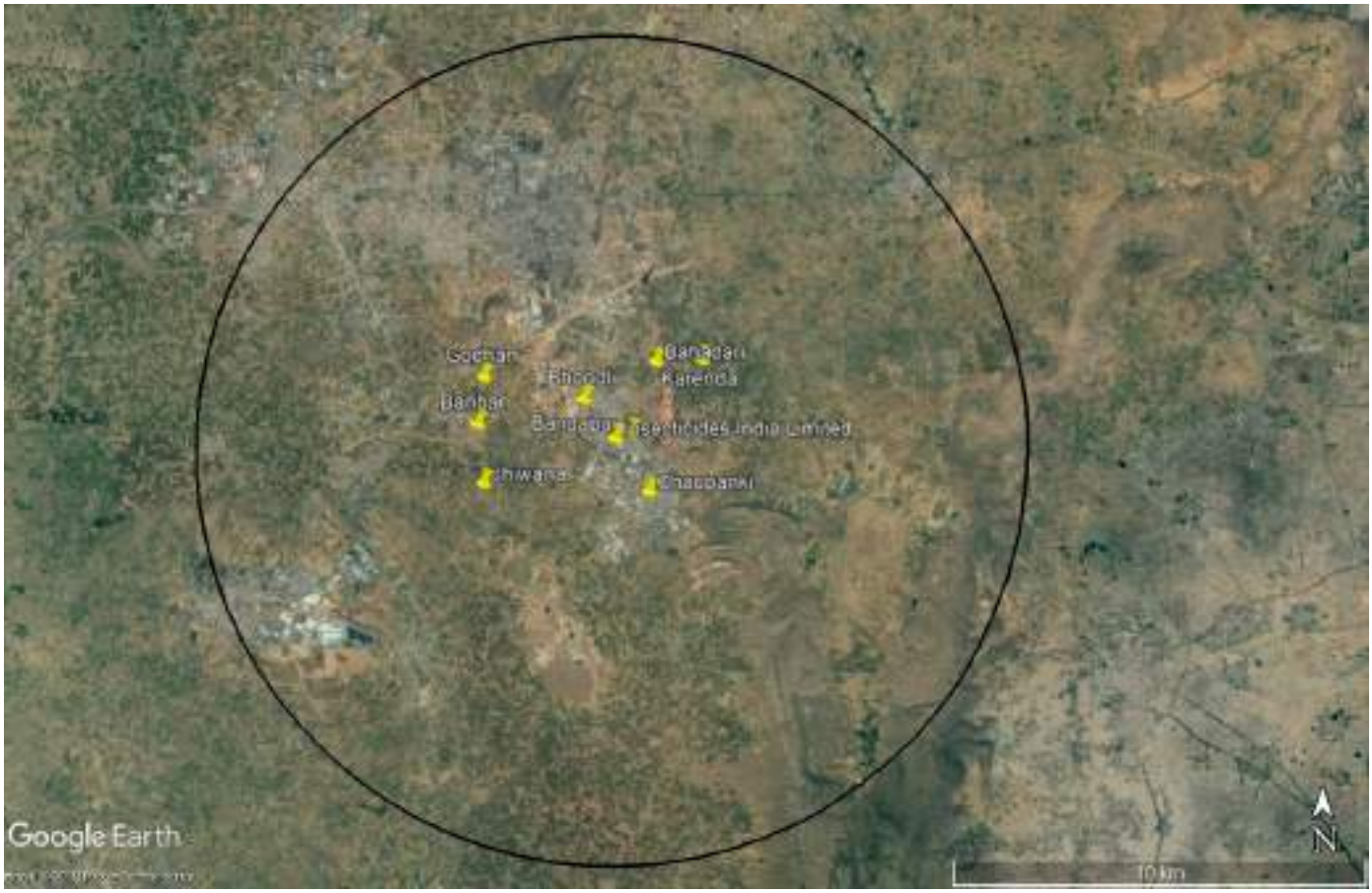


Table - 3.10 (B)

Background Noise Levels

SR. NO.	LOCATION	NOISE LEVEL IN dB(A)	TIME
	A) RESIDENTIAL AREA		
1	Project site (N1)	67.8 – 74.9 62.7 – 64.8	Day Night
2.	Karenda (N2)	48.3 – 52.9 38.3 – 41.4	Day Night
3.	Bandapur (N3)	48.4 – 50.2 37.6 – 41.5	Day Night
4.	Chaupanki (N4)	46.5 – 48.7 35.2 – 37.7	Day Night
5.	Godhan (N5)	46.7 – 48.3 31.1 – 35.6	Day Night
6.	Banban (N6)	47.8 – 51.6 39.4 – 44.9	Day Night
7.	Jhiwana (N7)	49.4 – 51.6 36.2 – 40.8	Day Night
8.	Bhoodli (N8)	47.2 – 52.9 37.2 – 43.2	Day Night
9.	Bahadari (N9)	47.1 – 49.2 32.4 – 36.1	Day Night
	B) COMMERCIAL AREA (TRANSPORTATION)		
11.	Nr. Bandapur Chowkdi	59.3 – 61.9 51.8 – 53.3	Day Night
12.	Nr. Chaupanki Chowkdi	58.2 – 60.2 47.2 – 50.1	Day Night
13.	Nr. Pathredi Chowkdi	48.8 – 51.3 49.2 – 52.3	Day Night
14.	Nr. Bhoodli Chowkdi	60.9 – 62.5 40.4 – 42.7	Day Night
15.	Nr. Bahadari Chowkdi	60.3 – 62.2 50.2 – 53.5	Day Night
16.	Nr. Gandhola By Pass Road	56.2 – 59.8 48.3 – 51.5	Day Night
17.	Nr. Karenda By Pass Road	55.8 – 58.8 48.9 – 51.5	Day Night
18.	Nr. Jhiwana Chowkdi	58.7 – 61.2 50.2 – 53.7	Day Night

3.6 WATER ENVIRONMENT

The annual rainfall in the region was 358.06 mm. The baseline water quality status in the region is established by analyzing surface water and ground water. Water requirement at site would be met through RIICO water supply.

3.6.1 Methodology for Water Quality Monitoring

9 nos. of ground water were collected from the study area. These samples were analyzed for physic-chemical parameters to ascertain the baseline status in the existing surface water and ground water bodies. Samples were collected during the study period of February 12 & 13, 2019 and analyzed as per the Standard Methods of Water and Wastewater Analysis (APHA).

Table - 3.11

Details of Water Quality Monitoring Locations

SR. NO.	NAME OF VILLAGE	BEARING W.R.T. PROJECT SITE	APPROXIMATE RADIAL DISTANCE FROM PROJECT SITE (KM)
1.	Project site (GW1)	--	--
2.	Village: Karenda (GW2)	NE	2.8
3.	Village: Bandapur (GW3)	ENE	0.38
4.	Village: Chaupanki (GW4)	SE	1.58
5.	Village: Godhan (GW5)	NW	3.48
6.	Village: Banban (GW6)	WNW	3.33
7.	Village: Jhiwana (GW7)	SW	3.35
8.	Village: Bhoodli (GW8)	NW	1.20
9.	Village: Bahadari (GW9)	NE	2.08

Figure - 3.4

Locations of the Water Quality Monitoring Stations

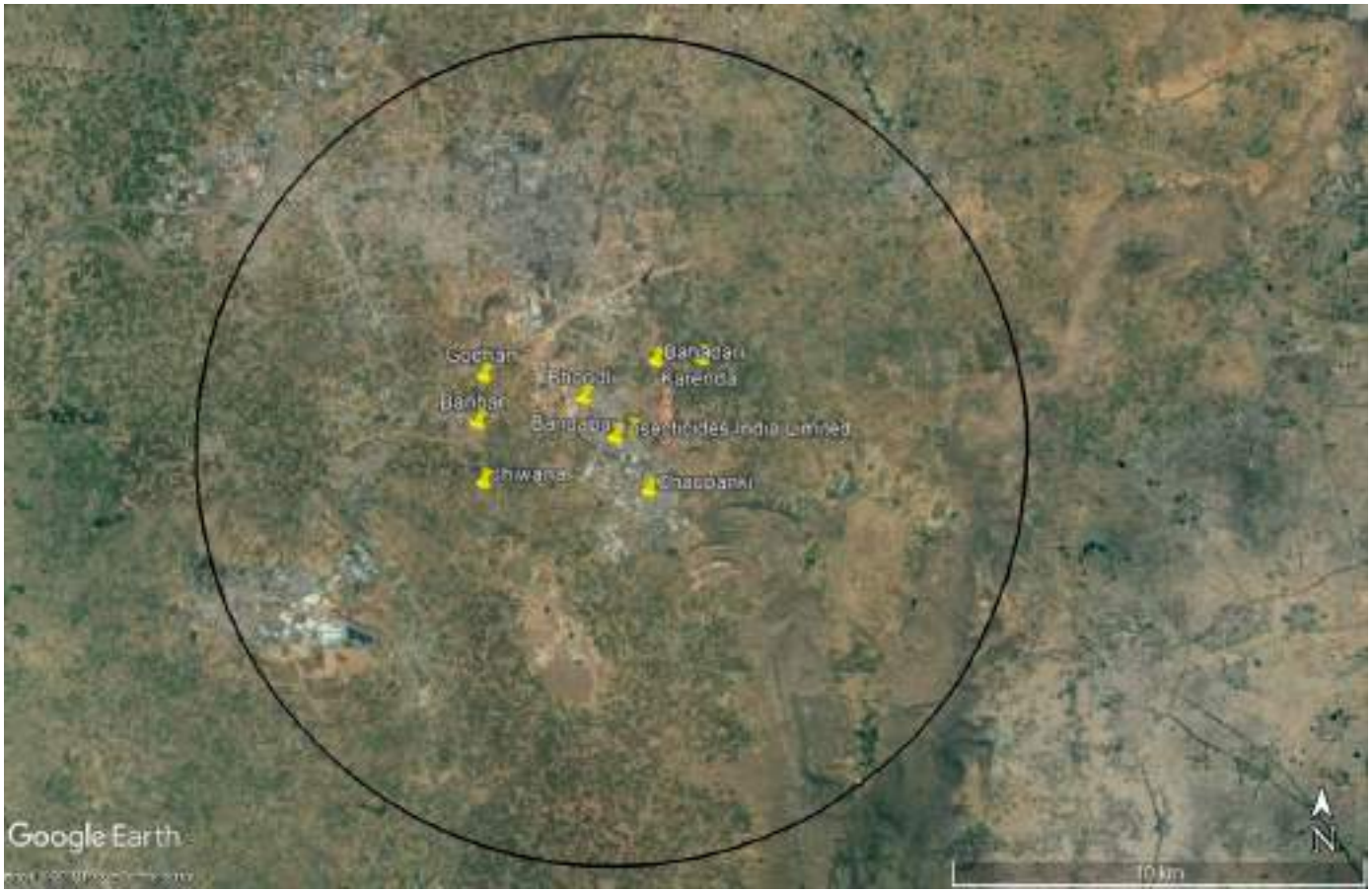


TABLE - 3.12

GROUND WATER QUALITY

SR. NO.	PARAMETER	UNIT	LOCATION/LAB ID					TEST METHOD
			Karenda/ GW_2	Bandapur/ GW_3	Chaupanki / GW_4	Godhan/ GW_5	Banban/ GW_6	
			RESULTS					
1.	pH	--	7.28	7.51	7.48	7.69	7.11	IS:3025 (P-11):1983
2.	Temperature	^oC	31.0	31.0	31.0	30.0	30.0	IS:3025 (P-9):1984
3.	Salinity	ppt	0.15	0.11	0.22	0.08	0.03	Electrometric Method (Instrumental) & Operational Manual
4.	Electrical Conductivity	mS/ cm	0.982	1.058	1.470	0.712	0.712	IS:3025 (P-14):1984
5.	Turbidity	NTU	0.26	0.87	0.71	0.52	2.09	IS:3025 (P-10):1984
6.	Dissolved Oxygen	mg/L	3.6	3.0	2.8	2.7	3.4	IS:3025 (P-38):1989
7.	Total Dissolved Solids (TDS)	mg/L	662	714	946	484	480	IS:3025 (P-16):1984
8.	Total Suspended Solids (TSS)	mg/L	4	19	12	9	19	IS:3025 (P-17):1984
9.	Total Solids (as TS)	mg/L	666	733	958	493	733	IS:3025 (P-15):1984
10.	Chemical Oxygen Demand (COD)	mg/L	28	22	11	30	11	APHA & AWWA.22nd Ed.5220-B.(5-17)
11.	Biochemical Oxygen Demand (BOD_3^{27})	mg/L	8	8	3	11	BDL	IS:3025 (P-44):1993
12.	Chlorides (as Cl^-)	mg/L	84	64	124	45	18	IS:3025 (P-32):1988
13.	Sulphates (as SO_4^{-2})	mg/L	11.70	17.51	21.73	19.27	5.78	APHA & AWWA. 22nd Ed.-4500-SO_4^{2-}-E.(4-190)
14.	Total Alkalinity (as $CaCO_3$)	mg/L	336	388	464	240	306	IS:3025 (P-23):1986
15.	Total Hardness (as $CaCO_3$)	mg/L	312	244	328	120	258	IS:3025 (P-21):1983
16.	Calcium (as Ca)	mg/L	80	57.6	64	38.8	81.6	APHA & AWWA.22nd Ed.3500 Ca-B (3-67)
17.	Magnesium (as Mg)	mg/L	26.8	24	40.3	5.7	12.96	APHA & AWWA.22nd Ed. 3500 Mg-B (3-84)
18.	Ammonical Nitrogen (as NH_3-N)	mg/L	2.95	4.38	3.14	2.95	2.90	APHA & AWWA.22nd Ed.4500-NH_3 B & C.(4-110,111,112)
19.	Copper (as Cu)	mg/L	BDL	BDL	BDL	BDL	BDL	APHA & AWWA.22nd Ed.3500-Cu B.(3-74)
20.	Fluoride (as F^-)	mg/L	BDL	BDL	BDL	BDL	BDL	APHA & AWWA.22nd Ed.4500-F^--B & D.(4-84,87)
21.	Total Iron (as Fe)	mg/L	BDL	0.14	BDL	BDL	0.56	IS:3025 (P-53):2003
22.	Phenol (as C_6H_5OH)	mg/L	BDL	BDL	BDL	BDL	BDL	APHA & AWWA.22nd Ed.5530-B.5-47 & D.(5-49)
23.	Oil & Grease	mg/L	BDL	BDL	BDL	BDL	BDL	IS:3025 (P-39):1991
24.	Hexavalent Chromium (as Cr^{+6})	mg/L	BDL	BDL	BDL	BDL	BDL	APHA & AWWA.22nd Ed.3500-Cr.-B (3-69)
25.	Nickel (as Ni)	mg/L	BDL	BDL	BDL	BDL	BDL	IS:3025 (P-54):2003
26.	**Total Chromium (as Cr^{+3})	mg/L	BDL	BDL	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.3111. B-AAS
27.	**Zinc (as Zn)	mg/L	BDL	BDL	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.-3111. B-AAS
28.	**Lead (as Pb)	mg/L	BDL	BDL	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.-3111. B-AAS
29.	**Sodium (as Na)	mg/L	92	126	184	102	27.02	APHA & AWWA. 22nd Ed.-3111. B-AAS
30.	**Potassium (as K)	mg/L	3.6	1.6	1.5	1.7	2.6	APHA & AWWA.22nd Ed.3500 K B-Flame Photometer
31.	**Arsenic (as As)	mg/L	BDL	BDL	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.-3112. B-AAS
32.	**Cadmium (as Cd)	mg/L	BDL	BDL	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.-3111. B-AAS
33.	Cyanide (as CN)	mg/L	BDL	BDL	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.-3111.

SR. NO.	PARAMETER	UNIT	LOCATION/LAB ID				TEST METHOD
			Jhiwana/ GW_7	Bhoodli/ GW_8	Bahadari/ GW_9	Rajasthan RIICO Water/GW_1	
			RESULTS				
1.	pH	--	7.44	6.93	7.55	7.56	IS:3025 (P-11):1983
2.	Temperature	^oC	31.0	31.0	30.0	30.0	IS:3025 (P-9):1984
3.	Salinity	ppt	0.15	0.11	0.17	0.42	Electrometric Method (Instrumental) & Operational Manual
4.	Electrical Conductivity	mS/ cm	1.060	1.052	1.083	1.234	IS:3025 (P-14):1984
5.	Turbidity	NTU	1.19	0.14	1.02	0.42	IS:3025 (P-10):1984
6.	Dissolved Oxygen	mg/L	3.8	3.6	3.1	2.5	IS:3025 (P-38):1989
7.	Total Dissolved Solids (TDS)	mg/L	718	710	732	830	IS:3025 (P-16):1984
8.	Total Suspended Solids (TSS)	mg/L	25	<2	22	9	IS:3025 (P-17):1984
9.	Total Solids (as TS)	mg/L	743	710	754	920	IS:3025 (P-15):1984
10.	Chemical Oxygen Demand (COD)	mg/L	16	25	22	22	APHA & AWWA.22nd Ed.5220-B.(5-17)
11.	Biochemical Oxygen Demand (BOD_3^{27})	mg/L	4	7	6	6	IS:3025 (P-44):1993
12.	Chlorides (as Cl^-)	mg/L	86	64	96	234	IS:3025 (P-32):1988
13.	Sulphates (as SO_4^{-2})	mg/L	13.01	11.28	10.36	30.39	APHA & AWWA. 22nd Ed.-4500-SO_4^{2-}-E.(4-190)
14.	Total Alkalinity (as $CaCO_3$)	mg/L	370	374	364	264	IS:3025 (P-23):1986
15.	Total Hardness (as $CaCO_3$)	mg/L	292	256	296	428	IS:3025 (P-21):1983
16.	Calcium (as Ca)	mg/L	72.8	66.4	70.4	104	APHA & AWWA.22nd Ed.3500 Ca-B (3-67)
17.	Magnesium (as Mg)	mg/L	26.4	21.6	28.8	40.3	APHA & AWWA.22nd Ed. 3500 Mg-B (3-84)
18.	Ammonical Nitrogen (as NH_3-N)	mg/L	2.89	3.12	3.56	2.68	APHA & AWWA.22nd Ed.4500-NH_3 B & C.(4-110,111,112)
19.	Copper (as Cu)	mg/L	BDL	BDL	BDL	BDL	APHA & AWWA.22nd Ed.3500-Cu B.(3-74)
20.	Fluoride (as F^-)	mg/L	BDL	BDL	BDL	BDL	APHA & AWWA.22nd Ed.4500-F^--B & D.(4-84,87)
21.	Total Iron (as Fe)	mg/L	0.16	0.09	0.15	BDL	IS:3025 (P-53):2003
22.	Phenol (as C_6H_5OH)	mg/L	BDL	BDL	BDL	BDL	APHA & AWWA.22nd Ed.5530-B.5-47 & D.(5-49)
23.	Oil & Grease	mg/L	BDL	BDL	BDL	BDL	IS:3025 (P-39):1991
24.	Hexavalent Chromium (as Cr^{+6})	mg/L	BDL	BDL	BDL	BDL	APHA & AWWA.22nd Ed.3500-Cr.-B (3-69)
25.	Nickel (as Ni)	mg/L	BDL	BDL	BDL	BDL	IS:3025 (P-54):2003
26.	**Total Chromium (as Cr^{+3})	mg/L	BDL	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.3111. B-AAS
27.	**Zinc (as Zn)	mg/L	BDL	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.-3111. B-AAS
28.	**Lead (as Pb)	mg/L	BDL	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.-3111. B-AAS
29.	**Sodium (as Na)	mg/L	120	124	126	128	APHA & AWWA. 22nd Ed.-3111. B-AAS
30.	**Potassium (as K)	mg/L	3.7	2.1	3.6	3.2	APHA & AWWA.22nd Ed.3500 K B-Flame Photometer
31.	**Arsenic (as As)	mg/L	BDL	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.-3112. B-AAS
32.	**Cadmium (as Cd)	mg/L	BDL	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.-3111. B-AAS
33.	Cyanide (as CN)	mg/L	BDL	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.-3111.

The Minimum Detectable Limits for various parameters are as below:

Parameters	Value	Parameters	Value	Parameters	Value
Phenol as C_6H_5OH	0.01 mg/L	Total Iron as Fe	0.01 mg/L	Nickel as Ni	0.03 mg/L
Total Phosphorus as P	0.01 mg/L	Copper as Cu	0.05 mg/L	Hexavalent Chromium as Cr^{+6}	0.01 mg/L

SUMMARY

The statistical interpretation of observed ground water & surface water quality is presented in Table-3.11.

3.6.2 BASELINE GROUND WATER QUALITY

Sr. No.	Criteria Pollutants	Unit	Maximum Value	Minimum Value	Desirable Limit	Maximum Permissible Limit
1.	pH	pH Scale	7.69	6.93	6.5-8.5	No Relaxation
2.	Total Suspended Solids	mg/l	25	<2	50	100
3.	Total Hardness	mg/l	428	120	300	600
4.	Fluoride	mg/l	BDL	BDL	1	1.5
5.	Total Dissolved Solids	mg/l	946.0	480.0	500	2000
6.	Chlorides	mg/l	234.0	18.0	250	1000
7.	Zinc	mg/l	BDL	BDL	5	15

3.7 LAND ENVIRONMENT

3.7.1 Methodology for Soil Monitoring

Soil samples were collected from nine locations during January 21 & 22, 2019 within the study area to assess its physico-chemical characteristics. The analysis results of soil samples are given in Table 3.14.

Table - 3.13

Details of Soil Sampling Locations

SR. NO.	NAME OF VILLAGE	BEARING W.R.T. PROJECT SITE	APPROXIMATE RADIAL DISTANCE FROM PROJECT SITE (KM)
1.	Project site (S1)	--	--
2.	Village: Karenda (S2)	NE	2.8
3.	Village: Bandapur (S3)	ENE	0.38
4.	Village: Chaupanki (S4)	SE	1.58
5.	Village: Godhan (S5)	NW	3.48
6.	Village: Banban (S6)	WNW	3.33
7.	Village: Jhiwana (S7)	SW	3.35
8.	Village: Bhoodli (S8)	NW	1.20
9.	Village: Bahadari (S9)	NE	2.08

Figure - 3.5

Locations of the Soil Sampling Stations

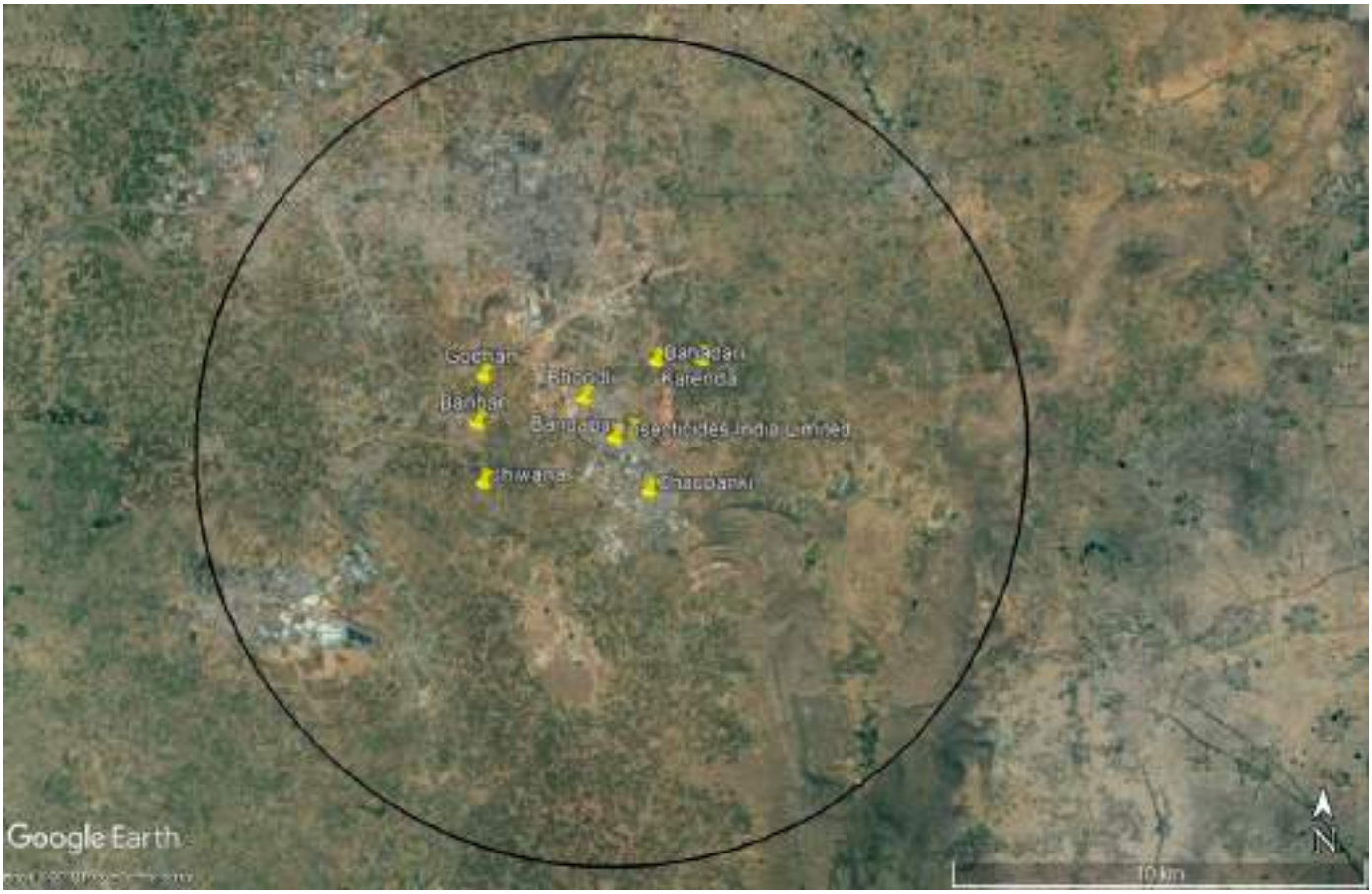


TABLE – 3.14

PHYSICO-CHEMICALS CHARACTERISTICS OF SOIL

SR. NO.	PARAMETER	UNIT	LOCATION/LAB ID						TEST METHOD
			PROJECT SITE/S_1	KARENDA /S_2	BANDAPUR /S_3	CHAUPANKI /S_4	GODHAN/S_5	BANBAN/S_6	
1.	Moisture Content	%	5.48	8.08	10.82	8.09	9.33	10.4	IS:2720(P-2)1973
2.	pH	--	7.32	8.57	8.65	8.06	8.48	8.34	IS:2720 (P-26)
3.	Temperature	^oC	30.0	30.0	30.0	30.0	30.0	30	
4.	Bulk Density	gm/cm^3	1.40	1.37	1.32	1.41	1.45	1.37	IS:2720(P-29)1975
5.	Porosity	%	44.22	43.15	46.12	43.82	42.0	44.30	Soil manual of India
6.	Water Holding Capacity (WHC)	%	30.70	52.14	53.26	37.54	30.43	53.83	Soil manual of India
7.	*Specific Gravity	--	2.51	2.41	2.45	2.51	2.50	2.46	IS:2720 (P-3/S-1):1980
8.	Electrical Conductivity	mS/cm	0.112	0.351	0.470	0.254	0.349	0.415	USDA Method - 2014
9.	Calcium (as Ca^{+2})	gm/Kg	0.042	0.096	0.084	0.044	0.038	0.078	Soil manual of India
10.	Magnesium (as Mg^{+2})	gm/Kg	0.069	0.039	0.033	0.060	0.045	0.039	Soil manual of India
11.	Chlorides (as Cl^-)	gm/Kg	0.039	0.084	0.039	0.079	0.027	0.029	Soil manual of India
12.	Total Phosphorus	%	1.01	0.88	1.07	1.25	2.67	0.9	IS 5305-2015
13.	Available Phosphorus	gm/Kg	0.00043	0.00002	0.0002	0.0019	0.0004	0.0007	Soil manual of India
14.	Organic Matter (OM)	%	0.23	0.65	0.53	0.75	0.62	0.67	Soil manual of India
15.	*Total Alkalinity (as $CaCO_3$)	gm/Kg	0.105	0.325	0.28	0.115	0.28	0.285	IS:3025 (P-23):1986
16.	Total Nitrogen	%	0.92	0.30	0.21	2.25	0.49	1.43	IS 14684 : 2014
17.	*Nitrate Nitrogen (as NO_3)	gm/Kg	0.023	0.0037	0.0031	0.0098	0.0046	0.0079	Soil manual of India
18.	*Sulphates (as SO_4^{-2})	gm/Kg	0.135	0.091	0.093	0.110	0.102	0.116	IS:2720 (P-27)
19.	*Total Iron (as Fe)	gm/Kg	11.86	2.95	11.53	12.86	12.34	11.31	USEPA 3050 B
20.	*Copper (as Cu)	gm/Kg	0.010	0.011	0.010	0.020	0.010	0.009	USEPA 3050 B
21.	*Nickel (as Ni)	gm/Kg	0.040	0.049	0.033	4.47	0.040	0.041	USEPA 3050 B
22.	**Lead (as Pb)	gm/Kg	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	USEPA 3050 B
23.	**Arsenic (as As)	gm/Kg	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	USEPA 3050 B
24.	**TOC	%	0.13	0.38	0.31	0.43	0.36	0.39	IS 2720 (P-2) 2015
25.	**Color	--	Brown	Brown	Brown	Brown	Brown	Brown	Soil manual of India
26.	**Sodium (as Na)	gm/Kg	0.216	0.43	0.325	0.534	0.39	0.309	IS 9497-2015
27.	**Potassium (as K)	gm/Kg	1.62	1.74	1.44	1.69	1.78	1.66	IS 9497-2015
28.	**Cadmium (as Cd)	gm/Kg	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	USEPA 3050 B
29.	**Permeability	cm/sec	$3.09x10^{-5}$	$3.08x10^{-5}$	$3.06x10^{-5}$	$3.06x10^{-5}$	$3.09x10^{-5}$	$3.09x10^{-5}$	ASTMD 2424 test 68
30.	**Grain Size Analysis:**								
	Clay	%	9	20	17	10	14	18	Soil manual of India
	Silt	%	83	36	38	19	25	14	
	Sand	%	8	44	45	71	61	68	

SR. NO.	PARAMETER	UNIT	LOCATION/LAB ID			TEST METHOD
			JHIWANA/S_7	BHOODLI/S_8	BAHADARI/S_9	
1.	Moisture Content	%	13.59	12.62	11.03	IS:2720(P-2)1973
2.	pH	--	8.53	8.44	8.66	IS:2720 (P-26)
3.	Temperature	^oC	30	30	30	
4.	Bulk Density	gm/cm^3	1.46	1.43	1.49	IS:2720(P-29)1975
5.	Porosity	%	41.6	42.57	40.40	Soil manual of India
6.	Water Holding Capacity (WHC)	%	45.43	43.42	43.44	Soil manual of India
7.	*Specific Gravity	--	2.50	2.49	2.50	IS:2720 (P-3/S-1):1980
8.	Electrical Conductivity	mS/cm	0.242	0.195	0.213	USDA Method - 2014
9.	Calcium (as Ca^{+2})	gm/Kg	0.074	0.062	0.068	Soil manual of India
10.	Magnesium (as Mg^{+2})	gm/Kg	0.048	0.039	0.048	Soil manual of India
11.	Chlorides (as Cl^-)	gm/Kg	0.025	0.022	0.034	Soil manual of India
12.	Total Phosphorus	%	2.99	0.72	2.54	IS 5305-2015
13.	Available Phosphorus	gm/Kg	0.00008	0.0011	0.00017	Soil manual of India
14.	Organic Matter (OM)	%	0.40	0.40	0.55	Soil manual of India
15.	*Total Alkalinity (as $CaCO_3$)	gm/Kg	0.295	0.255	0.26	IS:3025 (P-23):1986
16.	Total Nitrogen	%	1.83	2.20	2.91	IS 14684 : 2014
17.	*Nitrate Nitrogen (as NO_3)	gm/Kg	0.0034	0.0023	0.0033	Soil manual of India
18.	*Sulphates (as SO_4^{-2})	gm/Kg	0.91	0.112	0.101	IS:2720 (P-27)
19.	*Total Iron (as Fe)	gm/Kg	10.96	10.36	9.38	USEPA 3050 B
20.	*Copper (as Cu)	gm/Kg	0.008	0.01	0.012	USEPA 3050 B
21.	*Nickel (as Ni)	gm/Kg	0.042	0.019	0.034	USEPA 3050 B
22.	**Lead (as Pb)	gm/Kg	BDL*	BDL*	BDL*	USEPA 3050 B
23.	**Arsenic (as As)	gm/Kg	BDL*	BDL*	BDL*	USEPA 3050 B
24.	**TOC	%	0.69	0.23	0.32	IS 2720 (P-2) 2015
25.	**Color	--	Brown	Brown	Brown	Soil manual of India
26.	**Sodium (as Na)	gm/Kg	0.316	0.364	0.270	IS 9497-2015
27.	**Potassium (as K)	gm/Kg	1.73	0.929	1.35	IS 9497-2015
28.	**Cadmium (as Cd)	gm/Kg	BDL*	BDL*	BDL*	USEPA 3050 B
29.	**Permeability	cm/sec	$3.07x10^{-5}$	$3.10x10^{-5}$	$3.08x10^{-5}$	ASTMD 2424 test 68
30.	**Grain Size Analysis:					
	Clay	%	13	15	11	Soil manual of India
	Silt	%	28	78	60	
	Sand	%	59	7	29	

Note: BDL = Below Detectable Limit

The Minimum Detectable Limits for various parameters are as below:
Detectable Limit of Instrument:
Copper: 0.05 mg/kg
Phenol: 0.1 mg/kg
Iron: 0.01 mg/kg
Phosphorus: 0.1 mg/kg
Nickel: 0.03 mg/kg

3.7.2 SUMMARY OF SOIL QUALITY

Parameters like Porosity, Water Holding Capacity, Bulk Density, etc. were considered.

Based on the soil analysis report, the following can be concluded:

Sr. No.	Criteria Pollutants	Unit	Maximum Value	Minimum Value
1.	pH	pH Scale	8.66	7.32
2.	Nitrogen (N)	gm/kg	0.023	0.0023
3.	Phosphorus (P)	gm/kg	0.0019	0.00002
4.	Potassium (K)	gm/kg	1.78	0.929
5.	Electric Conductivity	mS/cm	0.470	0.112

3.8 GEOLOGICAL & HYDROLOGICAL DATA

3.8.1 Method of Preparation

The geological classification map has been prepared by extracting the areas under different geological classification from the 1:2 million scale maps prepared by Geological Survey of India (GSI) for the State of Rajasthan. The map text has been modified in consultations with the Department of Geology, University of Delhi. The project area, towns and village locations have been added for ease of spatial reference. Locations of towns and villages have been extracted from CoI maps, SoI topographical maps and confirmed with satellite data.

3.8.2 Description of Geological Classification and Area under Different Formations

The Aravalli mountain range which exposes principally rocks of the Delhi Supergroup comprises alternating hill ranges and valleys extending from Delhi on the NE to the plains of north Gujarat on the SW for a distance of about 650 km. The entire hill range can broadly be divided into: (i) The north eastern hill range to the northwest of Jaipur district with an average height of 550-650 m (Alwar hills) and intermittent wide valleys; (ii) The central Aravalli hill range comprising hills of Shekhawati and Marwar region with an average height of 400 m (Shekhawati hills); (iii) The Mewar hills covering the area of Udaipur, Dungarpur and Sirohi districts with the relief varying from a plateau between Kumbhalgarh and Gogunda to uniformly rolling country on the south-central part and (iv) The Mt. Abu hill range, with an average 1,200 m height, constituted by the Abu batholith of the Erinpura Granite. The highest peak called Guru Shikhar, 1,727 m above MSL, is situated on the Mount Abu.

Delhi Supergroups (forming the Aravalli-Delhi Province), and an arcuate belt of low grade metamorphosed volcano-sedimentaries. The North Delhi Fold Belt (NDFB) in Alwar, Dausa, Jaipur, Bharatpur, Sikar and Jhunjhunu districts and the South Delhi Fold Belt (SDFB) in Ajmer, Pali, Rajsamand, Udaipur and Sirohi districts.

The Delhi 'System' as occurring in two sectors, viz. in Alwar-Bayana-Khetri region and along a narrow linear belt forming the rib of the Aravalli Mountain range in Central and south western Rajasthan and northern Gujarat. The Alwar series rests unconformable over the limestone and quartzite of the Raialo 'Series', which was assigned a post-Aravalli and pre-

Delhi status. The Raialo 'Series' as spanning the Eparchaean unconformity between the Delhis and the Aravallis.

Asbestos has been reported from Palpur, Dhalawas and Ghazi-ka- Thana and from a number of other localities. The occurrences are, however, too small to be of any commercial importance.

The Baryte deposits of this district, contributing 90% production of the State, fall in two distinct zones known as the Rajgarh belt and the Alwar belt passing from Bhagat-ka-Bas and the other from sainpuri to Akbarpur, respectively. The geological setting in both the zones is identical.

In Alwar district dolomitic marble deposits occur at Jhiri, Rajgarh, Kho, Sarer and Gordhanpur.

Slate finds its use as material for roofing, paving and shelves. Slate deposits are found mainly in the Delhi and Aravalli rocks in parts of Ajmer, Alwar, Bharatpur, Bundi, Pali, Sawai Madhopur, Tonk, Udaipur and Chittaurgarh districts. Quarries in Jaipur, Udaipur, Alwar, Dungarpur and Banswara are providing schists and phyllities as roofing material. Alwar slate has acquired a reputation in the world market for its quality and has left China and Spain far behind in the international market. Alwar district has enormous reserves of slates and has mono polised the Indian export. Alwar slates are used in the preparation of school slates, as roof tiles, and table top of the Billiard table.

Rajasthan contributes about 50% production of china clay, 40% of ball clay and 10% of fire clay in the country. China clay is found to occur in Bhilwara, Bundi, Chittaurgarh, Jaipur, Jhalawar, Sawai Madhopur, Sikar, Pali districts etc. Ball clay occurs in Alwar, Bikaner and Bundi districts. Clay is reported near Rajgarh, Phargoli, Mudali and Kalgaon. It is greyish-white in colour and slightly iron stained. The clay is moderately plastic with the water of plasticity 15.99%.

Alwar Copper Belt

Bhagoni deposit: A large number of old shafts and slag heaps are seen scattered about a km north of Bhagoni indicating thriving mining activity in the past. Exploratory drilling conducted so far reveals that the mineralized zones are 5-30 m (average 7 m) in width and extend over a strike length of 1,500 m. Mineralization is localized along zones of bedding shears between amphibolites and biotite-quartz schists of the Ajabgarh Group. Chalcopyrite, pyrrhotite and pyrite are the primary sulphides which occur as disseminations, coarse to medium in size and also as fracture and cleavage-fillings. Reserves of about 5.22 million tonnes of copper ore with 1% Cu are estimated down to a depth of 250 m. Kho-Dariba: The deposit, located at a distance of about 42 km to the west of Rajhgarh was investigated in detail by the IBM during 1956-63. Copper mineralization in the area is found in the rocks of the Alwar Group of the Delhi Super group. Phyllites, to which the mineralization is essentially confined, occur as minor intercalated bands in the arkosic quartzites. The chief copper mineral is chalcopyrite associated with cubanite and pyrrhotite. The mineralization in quartzite bands and lenses is mostly of disseminated type with occasional clusters and patches of chalcopyrite. The replacement-type mineralization is confined to the southern portion of the lodes. The total strike length of the deposit is 3.3 km consisting of two main blocks viz., Dariba mine and Dariba nala blocks. The estimated reserves (in both the blocks) are about 0.56 million tonnes of an average grade of 2.46% Cu over a width of 6.7 m.

The deposits of dolomite occur around Jhiri, Dhani, Nizra and Devimata localities. The reserves are placed at 360 thousand tonnes. Dolomite has saccharide texture and is white to dark grey in colour. The Jhiri deposit which is 60 m wide extends over a strike length of about 360 m. This dolomite is used as marble.

In Rajasthan, feldspar occurrences have been reported from Ajmer, Alwar, Jaipur, Pali and Sikar districts. The reserves of Alwar are placed at 9.50 million tonnes. Out of these 1.52 million tonnes are of pottery grade, 7.96 million tonnes are of unclassified grade and 18,225 tonnes fall under not-known category. The prominent deposits are located around Mindani Tilana Sokalia; Jalia Pithawas Dhuni Kala-Khera Thuni thaki Jawaja; Chawandiya; Sindari-

Sandolia; Dantli Deranthu Dhal Loharwara Gangapur; Samod Usmadhal; Kabri; Dabrelia Piproli Mundot.

Pegmatite veins near Khairtal yield a small quantity of fluorite. A thin band of graphite with steatite occurs near Jaloli, 6-8 km southeast of Rajgarh.

The study area also have some portion of Mahendragarh District of Haryana state. The area forms the part of Indo-Gangetic plains and has vast alluvial and sandy tracts. It is interspersed with strike ridges which are occasionally covered by blown sands. South- western part of the district is occupied by blown sand and alluvium. The hill ranges are marked features of the district and are part of great Aravalli chain. The Dhosi hill touches the height of 7090m amsl. The master slope of the area is north ward. Light colored arid soils are found in the major part of the district. These soils are calcareous and have lime nodules in the subsurface horizons. Most of the soils in district are medium textured. Loamy sand is the average texture in all the blocks of the district.

The district is underlain by alluviam and blown sand of Recent to sub recent age which are overlying the rocks of post Delhi and Delhi system. The alluviam in the area belongs to older alluviam stage comprising of sand, silt, clay and calcareous nodules. The alluviam is the fresh water deposits of Indo- Gangetic River System.

Gurgaon district of Haryana State is third district which occupies some portion in the 10km aerial radius from site location.

The Gurgaon district is occupied by Quaternary alluvium and Pre-Cambrian meta-sediments of Delhi Super Group. The alluvium comprises of thick beds of fine to coarse-grained sand with alternating layers of thin clays. Delhi super group is represented by Alwar quartizites, mica schists and pegmatite intrusives of the Alwar series and slates of phyllites and quartzites of the subrecent alluvium and sand dunes.

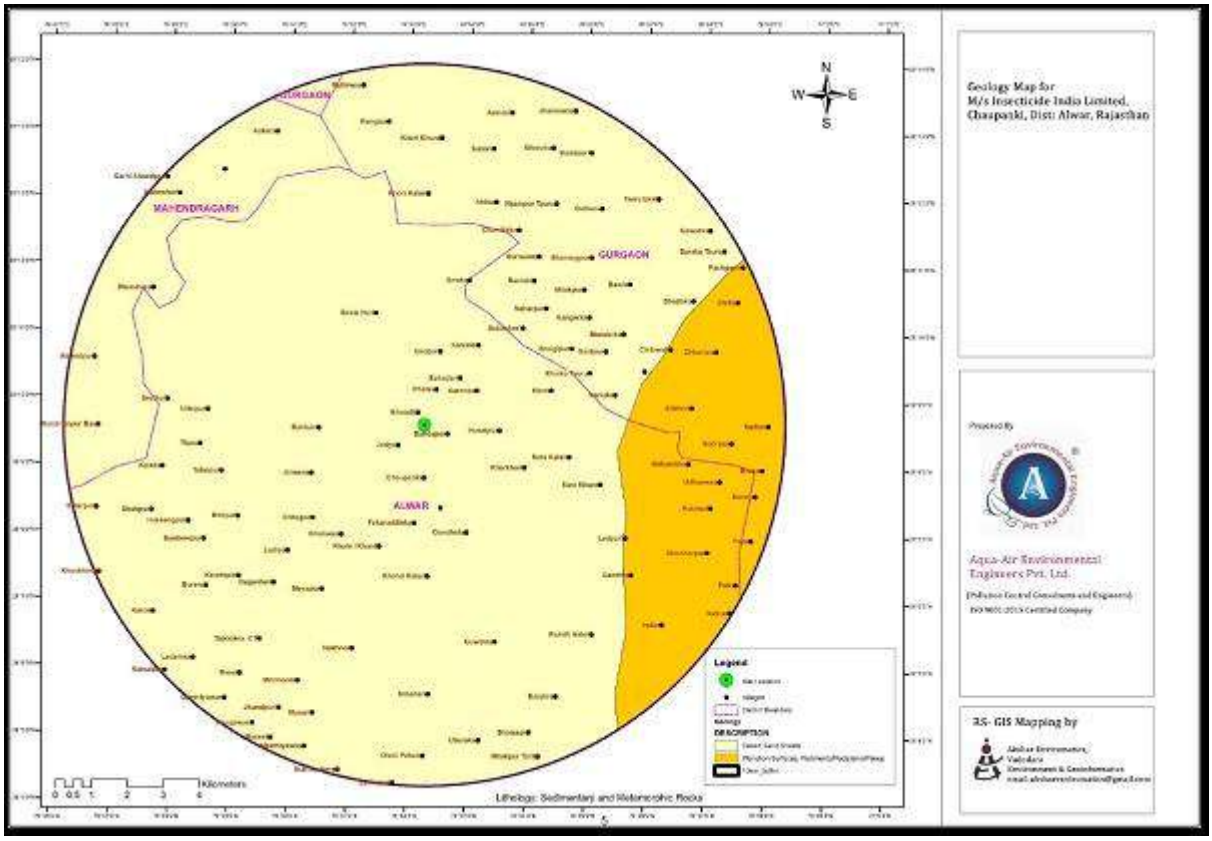
The area is conspicuously flat topography, however, in the north-eastern part small isolated hillocks of Pre-Cambrian rocks are exposed. The alluvial plain is formed by the Sahibi River which is tributary of River Yamuna.

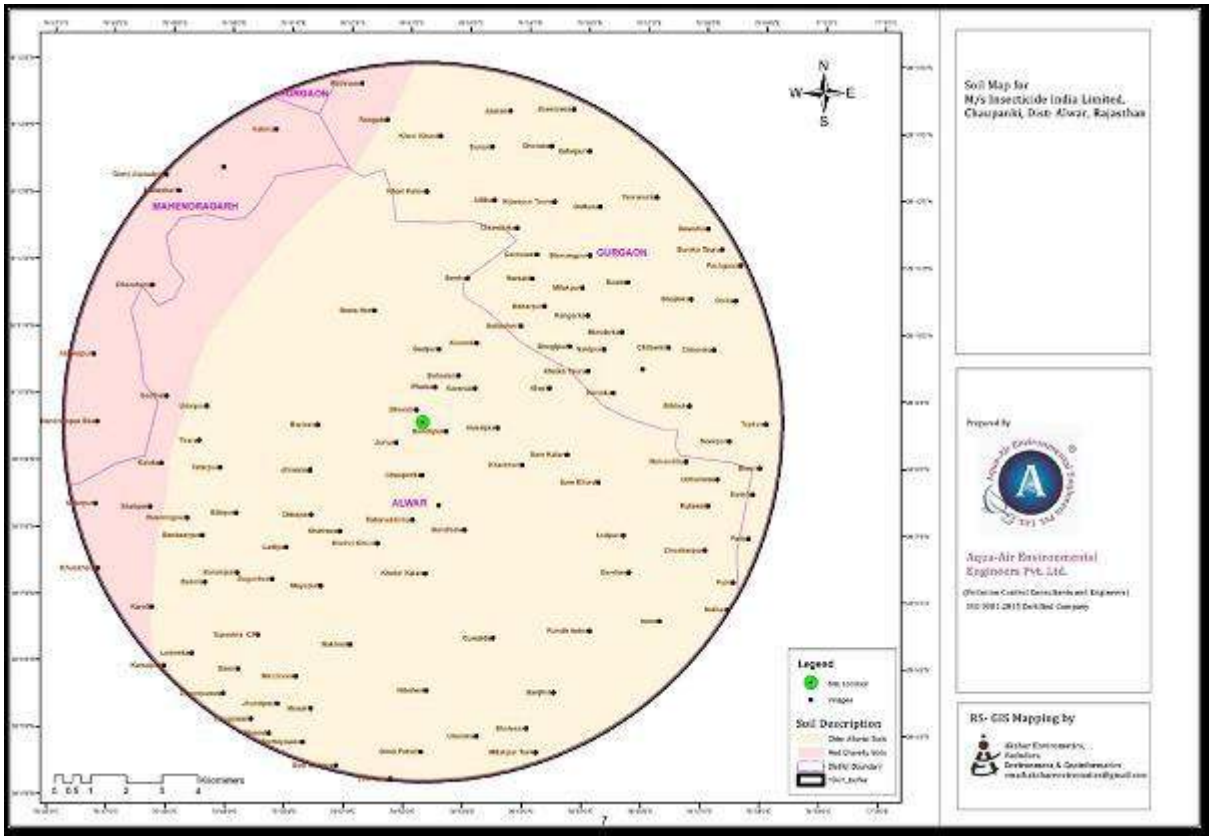
3.8.3 Geological Map

A map depicting the major geological features in the project area is presented in Figure 3.6. The map also marks the area within 10 km with project site as a centre. Town and village locations are also depicted to facilitate ease of reference.

Figure-3.6

Major Geological Features




Soil Map for
M/s Insecticide India Limited,
Chauparki, Dist- Alwar, Rajasthan
Prepared by
Aqua-Air Environmental
Engineers Pvt. Ltd.
RS- GIS Mapping by
N
W
E
S
GURGAON
MAHENDRAGARH
ALWAR
Legend
Soil Description

3.8.4 HYDROLOGY

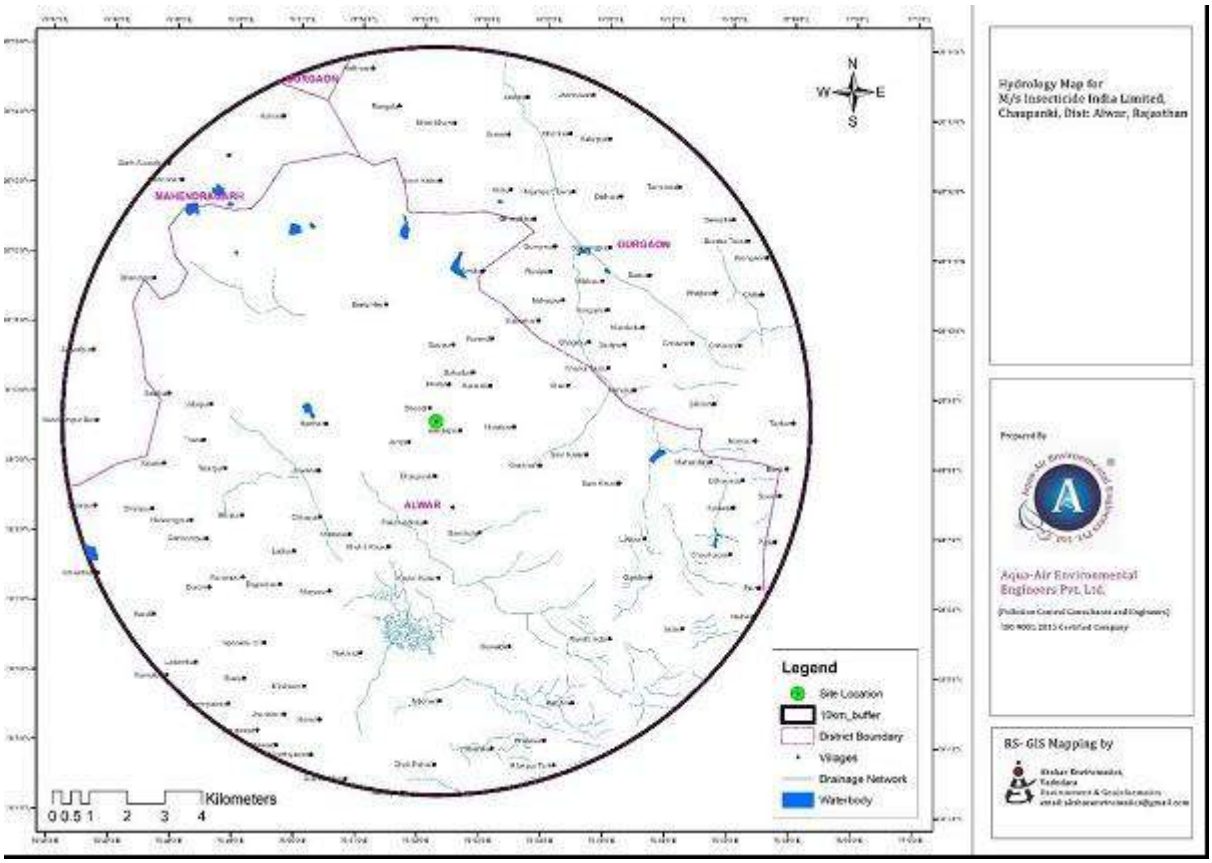
There is no natural lake in the district. However, there are few talab/bunds in the district used for irrigation if water is available. Bunds/talabs dried up during summer period and water are not available for irrigation during khareef cultivation.

The study area also have some portion of Mahendragarh district of Haryana State. The main streams of this district are Dohan & Krishnawati which flow from south to north. These streams are known to carry copious supply of water to inundate large part of the district during monsoon and remain dry for major part of the year. The alluviam is the fresh water deposits of Indo-Gangetic River System. Both these seasonal river shows dendritic drainage pattern. These rivers originate from western slope of Aravalli hills situated in Alwar and Sikar ditrict of Rajasthan. After flowing North-East these rain fed streams enter Haryana at Hamindpur and Dostpur villages respectively.

The third district of the study area Gurgaon comprises of hills on the one hand and depressions on the other, forming irregular and diverse nature of topography. Two ridges: Firojpur Jhirka – Delhi ridge forms the western boundary and Delhi ridge forms the eastern boundary of the district. These hills are northern continuation of Aravalli hills. The northwestern part of the district is covered with sand dunes lying in the westerly direction due to south western winds. The extension of the Aravalli hills and the presence of sand dunes collectively form the diverse physiography of the district. The drainage of the district are typical of arid and semiarid areas. It comprises of large depressions and seasonal streams. Important depressions of the district are Khalilpur lake, Chandani lake, Sangel – Ujhina lake, Kotla dhar lake and Najafgarh lake. Sahibi and Indrani are two important seasonal streams of the district.

FIGURE – 3.7

HYDROGEOLOGICAL MAP



3.8.5 DRAINAGE PATTERN

The streams emanating from the north and northeast of Udaipur flow into the Banas River through its tributaries. The Sahibi River drains the northern parts of the State and ultimately disappears in the plains of Haryana State. The Banganga River drains the areas in Alwar and Jaipur districts and flows through a large part of Bharatpur district, before joining the Jamuna River.

There is no perennial river in the district. The seasonal rivers, which flow through the district and carry the runoff from the hills are Sabi (Sahibi), Ruparail (Barah), Chuhar Sidh and Landoha. Several of these rivers and their tributaries have been impounded at suitable sites and the water is used for irrigation if remains available.

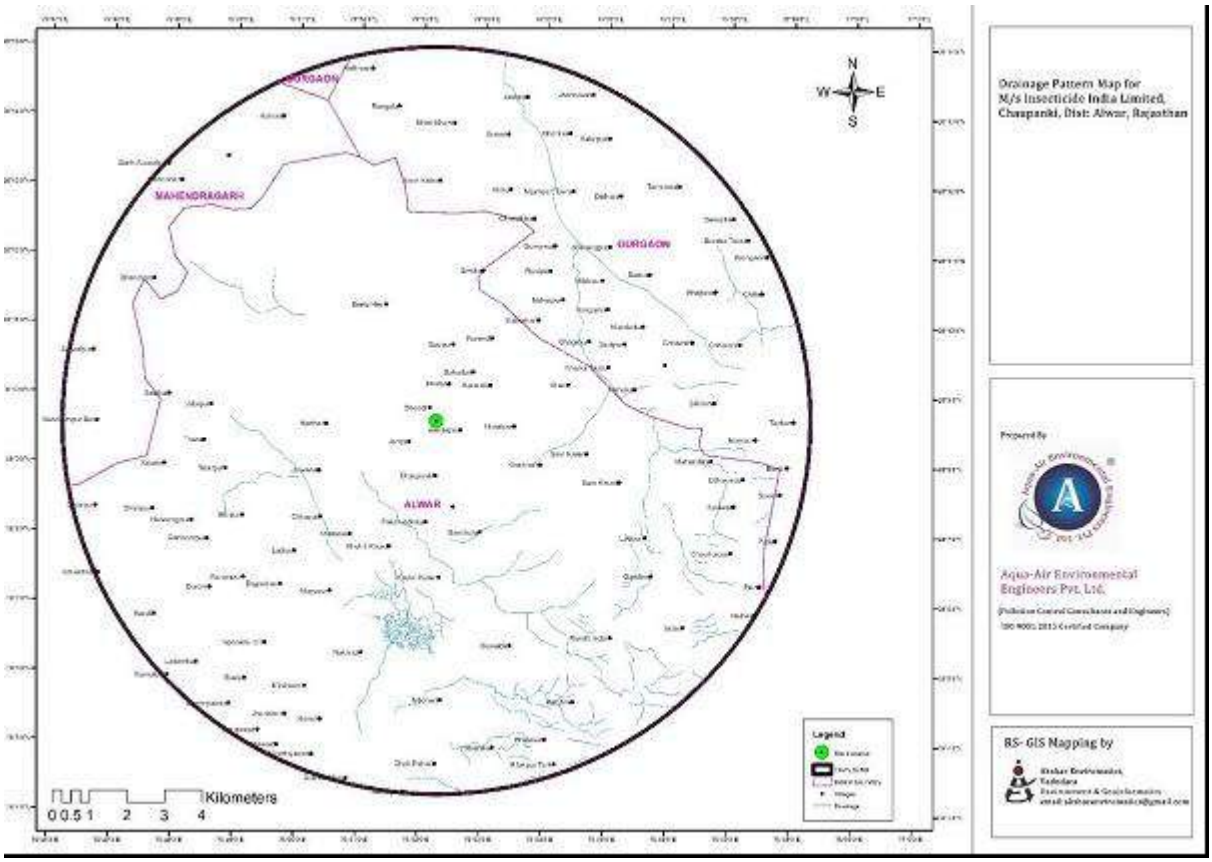
The study area also have some portion of Gurgaon and Mahendragarh district of Haryana State. The main streams of this district are Dohan & Krishnawati which flow from south to north. These streams are known to carry copious supply of water to inundate large part of the district during monsoon and remain dry for major part of the year.

Sahibi (Sota River, Kotkasim drain and Indori River) like its origin State Rajasthan, Sahibi River has turned a monsoonal river in Haryana. In lower parts, many small towns including millennium city Gurugram discharges volume of pollution in the river. The streams joining the river are also ecologically dead..

Krishnavati (Dohan) Krishnavati and Dohan rising from Aravali hills, Rajasthan do enter the Haryana state. Where the already dry courses of both rain fed streams soon become invisible. These streams were believed to be part of Saraswati.

Figure – 3.8

Drainage Pattern



3.9 LAND USE PATTERN

The land use - land cover map of the study area shows that major area of it is under Agriculture practices. The major crops practiced in Agriculture is mainly wheat and Bajra which is depended upon favorable climatic conditions as there is no any perennial water resource present in the region. Built up area which are settlements is second major class under which majority of the land is occupied. Presence of a many industry in Northern, South-Western and Central parts of the study area as well as a dedicated industrial area forms continuous occupancy of land under this class. South western part of the study area is having forest region. Forest present in this area is mainly mixture of Dry deciduous along with Thorny bush. Apart from these classes there are scattered scrublands occur in the region.

3.9.1 METHOD OF DATA PREPARATION

The land use / land cover has been presented in the form of a map prepared by using IRS P6 LISS-III and procured from the National Remote Sensing Agency (NRSA), Hyderabad. The satellite data has been processed using ERDAS Imagine software supported with ground checks and ground truth verification. Area and distance calculations have been carried out using GIS software after geo- referencing the interpreted data with the help of Survey of India (SoI) topographical maps of the scale 1:50,000.

A map depicting major land use/ land cover classes comprising lands under agriculture, allow land, open/degraded vegetation; lands falling under water bodies, scrub and lands under inhabitations is presented at Figure 3.6. The map also marks the area within 10 km of the project site as the area of interest.

Figure – 3.9

Process Methodology

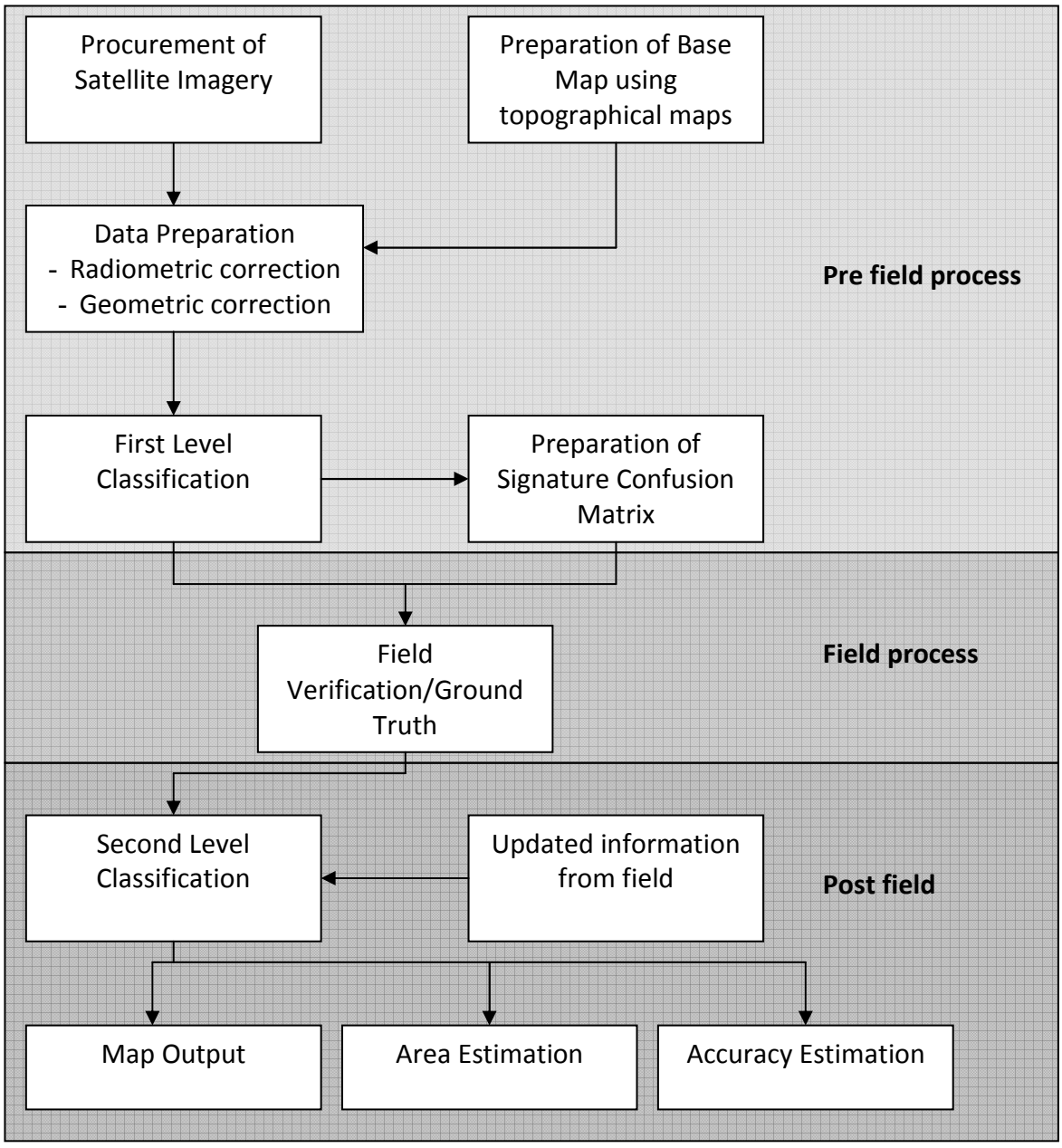


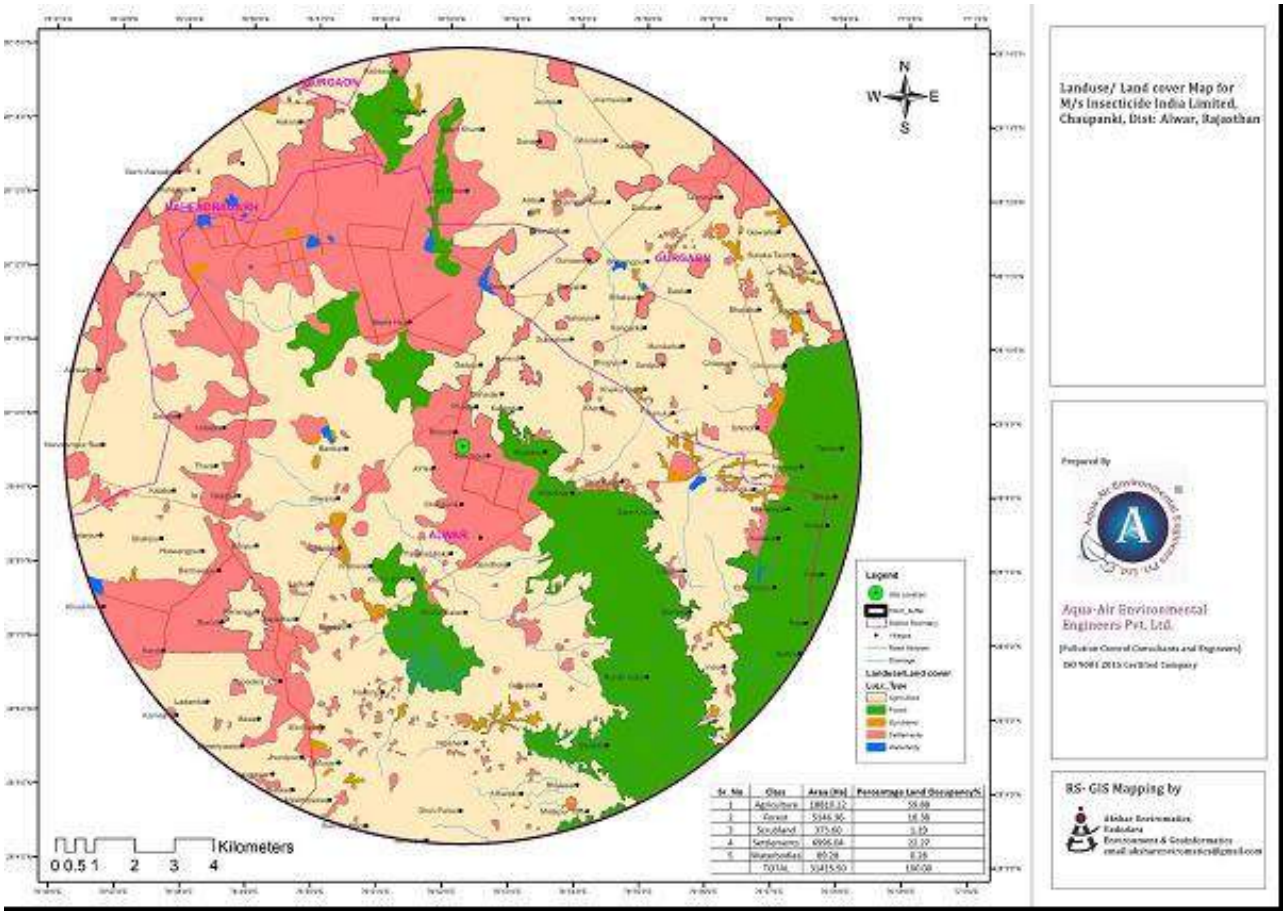
Table – 3.15

Areas Under Different Land use

Sr. No.	Land Use Classification	Area (Ha)	Percentage Land Occupancy %
1	Agriculture	18810.22	59.88
2	Forest	5146.36	16.38
3	Scrubland	373.60	1.19
4	Settlements	6996.04	22.27
5	Water bodies	89.28	0.28
	Total	**31415.50**	**100.00**

Figure – 3.10

Land use / Land cover



3.11 ECOLOGICAL INFORMATION

Introduction

Ecology and Biodiversity of any region is very important aspect which play vital role to form a healthy environment. In present study area there are mainly three ecosystem were observed: Agro Ecosystem, Terrestrial Ecosystem and Forest Ecosystem. Our teams of subject experts have thoroughly surveyed key habitats presents in the area which can represent the entire region by their abundance in biodiversity. Forest area occur in Eastern side and Southern side where as Agriculture areas all over in study area along with Scrubland and built up regions also provide an environment for survival of variety of floral as well as faunal specie.

3.11.1 FLORA

The detail of Flora and Fauna observed and recorded in the region is as given below.

Table – 3.16

List of Flora

Sr. No.	Botanical	Family	Local Name
		Trees	
1	Crateva magna	Capparidaceae	Barna
2	Bombax ceiba	Bombacceae	Semal
3	Sterculia urens	Sterculiaceae	Kadaya
4	Grewia tilifolia	Tiliaceae	Dhaman
5	Feronia limonia	Rutaceae	Kaith
6	Balanites aegyptiaca	Balanitaceae	Thingot
7	Boswellia serrata	Burseraceae	Salar
8	Commiphora wightii	Burseraceae	Gugal
9	Azadirachta indica	Meliaceae	Neem
10	Zizyphus xyloporus	Rahmnaceae	Ghat ber
11	Zizyphus mauritiana	Rahmnaceae	Ber
12	Lannea coromandelica	Anacardiaceae	Goorjan
13	Moringa oleifera	Moringaceae	Saijna
14	Butea monosperma	Fabaceae	Palash, Chila
15	Dalbergia paniculata	Fabaceae	Roban
16	Dalbergia sissoo	Fabaceae	Sisam
17	Bauhinia racemosa	Caesalpiniaceae	Kachnar
18	Acacia catechu	Mimosaceae	Kala Kher, Kaththa

19	Acacia laucophloea	Mimosaceae	Rojhda, Roonjh
20	Acacia nilotica	Mimosaceae	Babool
21	Acacia tortilis	Mimosaceae	Babool
22	Acacia Senegal	Mimosaceae	Kumta
23	Prosopis cineraria	Mimosaceae	Khejdi
24	Prosopis juliflora	Mimosaceae	Vilayati Babool
25	Anogeissus pendula	Combretaceae	Dhonk
26	Mitragyna parviflora	Rubiaceae	Kadam
27	Salvadora oleoides	Salvadoraceae	Pilu
28	Wrightia tinctoria	Apocyanaceae	Khirni
29	Ehretia laevis	Ehretiaceae	Tamboliya
30	Diospyros melanoxylon	Ebenaceae	Bistendu, Kendu
31	Tecomella undulate	Bignoniaceae	Rothida
32	Nyctanthes arbortristis	Verbenaceae	Thar Singaar
33	Holoptelea integrifolia	Ulmaceae	Papdi
34	Phoenix sylvestris	Palmaceae	Khajoor
	Shrubs		
1	Capparis decidua	Capparidaceae	Ker
2	Capparis sepiaria	Capparidaceae	Jaal
3	Grewia abutifolia	Tiliaceae	
4	Grewia flavescens	Tiliaceae	Chapan
5	Grewia tenax	Tiliaceae	Ganger
6	Maytenus emarginatus	Celastraceae	Malkangni, Kankeda
7	Zizyphus nummularia	Rhamnaceae	Zadi Ber
8	Rhus mysurensis	Anacardiaceae	Dasariya
9	Dichrostachys cinerea	Mimosaceae	Goya Kher
10	Mimosa hamata	Mimosaceae	
11	Lycium barbarum	Solanaceae	Kanteda
12	Clerodendrum phlomidis	Verbenaceae	Arni
13	Euphorbia caducifolia	Euphorbiaceae	Thor
	Climbers		
1	Cocculus hirsutus	Menispermaceae	Chireta
2	Tinospora cordifolia	Menispermaceae	Nim Gilol
3	Cissampelos pareira	Menispermaceae	Pahad Bel, Jal Jamni
4	Cocculus pendulus	Menispermaceae	Pilvaan
5	Maerua arenaria	Capparidaceae	Orapa
6	Cayratia trifoliate	Vitaceae	Chaar, Katumba
7	Cardiospermum halicacabum	Sapindaceae	
8	Abrus precatorius	Fabaceae	Rati
9	Coccinia grandis	Cucurbitaceae	Gol, Kundru
10	Melothria moderaspatana	Cucurbitaceae	Annkh Futni ki Bel
11	Momordica dioica	Cucurbitaceae	Jungli Karela
12	Citrullus colocynthis	Cucurbitaceae	Garmunda

13	Ichnocarpus frutescens	Apocyanaceae	Dudha bel
14	Cryptostegia grandiflora	Periplocaceae	Rabad ki Bel
15	Ipomoea dichroa	Convolvulaceae	
16	Merremia aegyptia	Convolvulaceae	
17	Rivea hypocrateriformis	Convolvulaceae	
18	Ipomoea muricata	Convolvulaceae	
19	Ipomoea pestigridis	Convolvulaceae	Ghia Bati
20	Ipomoea nil	Convolvulaceae	Nilkalmi
21	Convolvulus microphyllus	Convolvulaceae	Shankhpushpi
22	Asparagus racemosus	Liliaceae	Shatavari
Hanging from Rocks			
1	Sarcostemma viminale	Asdepiadaceae	
2	Kickxia ramosissima	Scrophulariaceae	
Parasitic Species			
1	Antirrhinum orontium	Scrophulariaceae	
2	Cuscuta reflexa	Cuscutaceae	Amar Bel
3	Dendrophthoe falcate	Loranthaceae	Bandaa
Herbs			
1	Abutilon indicum	Malvaceae	Tara Kanchi
2	Abutilon ramosum	Malvaceae	Pithariya
3	Hibiscus lobatus	Malvaceae	
4	Hibiscus ovalifolius	Malvaceae	Okada
5	Sida cordata	Malvaceae	
6	Sida ovate	Malvaceae	Khariti
7	Sida orientalis	Malvaceae	
8	Melhania futteyporensis	Sterculiaceae	
9	Melochia corchorfolia	Sterculiaceae	
10	Waltheria indica	Sterculiaceae	
11	Corchorus aestuans	Tiliaceae	
12	Triumfetta rhomboidea	Tiliaceae	
13	Tribulus terrestris	Zygophyllaceae	Chhota Gokhru
14	Alysicarpus vaginalis	Fabaceae	
15	Desmodium repandum	Fabaceae	
16	Desmodium gangeticum	Fabaceae	Sal Palmi
17	Indigofera cordifolia	Fabaceae	Bekar
18	Indigofera linnei	Fabaceae	
19	Indigofera trita	Fabaceae	
20	Indigofera tinctoria	Fabaceae	Nil
21	Tephrosia purpurea	Fabaceae	Jhojhru
22	Tephrosia strigosa	Fabaceae	
23	Tephrosia pumila	Fabaceae	
24	Tephrosia uniflora	Fabaceae	
25	Tephrosia villosa	Fabaceae	

26	Zornia gibbosa	Fabaceae	
27	Cassia absus	Caesalpiniaceae	
28	Cassia pumila	Caesalpiniaceae	
29	Cassia tora	Caesalpiniaceae	Pawar
30	Spermacoce pusilla	Rubiaceae	
31	Opuntia elatior	Coctaceae	Nagfan
32	Glinus lotoides	Molluginaceae	
33	Dicoma tomentosa	Asteraceae	Vajradanti
34	Acanthospermum hispidum	Asteraceae	
35	Artemesia scoparia	Asteraceae	Bano, Barna
36	Bidens biternata	Asteraceae	
37	Blainvillea acmella	Asteraceae	
38	Blumea mollis	Asteraceae	
39	Eclipta alba	Asteraceae	Bhargraaj
40	Laggera aurita	Asteraceae	
41	Launaea nudicaulis	Asteraceae	Gobi
42	Sclerocarpus africanus	Asteraceae	
43	Tridax procumbens	Asteraceae	
44	Vernonia cinerea	Asteraceae	
45	Cotula anthemoides	Asteraceae	
46	Oligochaeta ramose	Asteraceae	Rissa
47	Dyerophytum indicum	Plumbaginaceae	
48	Catharanthus pusilus	Apocyanaceae	Sadabahar
49	Calotropis procera	Asclepiadeceae	Aank
50	Leptadenia pyrotechnica	Asclepiadeceae	Khip
51	Trichodesma amplexicaule	Boraginaceae	
52	Arnebia hispidissima	Boraginaceae	
53	Sericostoma pauciflorum	Boraginaceae	
54	Evolvulus alsinoides	Convolvulaceae	Shankhpushpi
55	Physalis minima	Solanaceae	Papotan
56	Solanum indicum	Solanaceae	Bhata Kateri
57	Solanum xanthocarpum	Solanaceae	Nilikateri
58	Lindenbergia indica	Solanaceae	
59	Sesamum indicum	Pedaliaceae	Til
60	Adhatoda zeyanica	Acanthaceae	Aadusa, Vasak
61	Barleria prionitis	Acanthaceae	Kala Bansaa
62	Blepharis maderaspantensis	Acanthaceae	
63	Dipteracanthus patulus	Acanthaceae	
64	Dipteracanthus prostates	Acanthaceae	
65	Elytraria acaulis	Acanthaceae	
66	Indoneesiella echioides	Acanthaceae	
67	Lepidagathis trinervis	Acanthaceae	Paththar Fod, Unt Kateli
68	Lepidagathis cristata	Acanthaceae	Aaval Kangio

69	Lantana wightiana	Verbenaceae	Lantaana
70	Nyctanthes arbortristis	Verbenaceae	Thar Singaar
71	Anisochilus carnosus	Lamiaceae	Parnajari
72	Leucas urticaefolia	Lamiaceae	Gumma, Goma
73	Ocimum canum	Lamiaceae	Van Tulsi
74	Peristrophe paniculata	Lamiaceae	
75	Leucas aspera	Lamiaceae	Gofa
76	Rungia pectinata	Lamiaceae	
77	Justicia procumbens	Lamiaceae	
78	Salvia aegyptiaca	Lamiaceae	
79	Boerhavia diffusa	Nyctaginaceae	Punarnava, Santhi
80	Aerva tomentosa	Amarantaceae	Bui
81	Achyranthes aspera	Amarantaceae	Lat Jira, Chirchita
82	Puppalia lappacea	Amarantaceae	Din ka Tara
83	Acalypha ciliate	Euphorbiaceae	
84	Euphorbia hirta	Euphorbiaceae	Dudhi bel
85	Phyllanthus fraternus	Euphorbiaceae	Dhandhan
86	Phyllanthus simplex	Euphorbiaceae	
87	Euphorbia parviflora	Euphorbiaceae	Doodhi
88	Polygonum plebeium	Polygonaceae	Machechi
89	Commelina benghalensis	Commelinaceae	Kankavva
90	Commelina forskalaei	Commelinaceae	Kankavva
91	Commelina kurzii	Commelinaceae	
92	Cyanotis cristata	Commelinaceae	
93	Cyanotis arachnoids	Commelinaceae	
94	Cyperus compressus	Cyperaceae	
95	Cyperus iria	Cyperaceae	
96	Cyperus kyllingia	Cyperaceae	
97	Cyperus niveus	Cyperaceae	
98	Cyperus triceps	Cyperaceae	
Grasses			
1	Alloteropsis cimicina	Poaceae	
2	Apluda aristata	Poaceae	Polad
3	Aristida adscensionis	Poaceae	Lapla
4	Bothriochloa pertusa	Poaceae	
5	Brachiaria ramose	Poaceae	Makda Ghas
6	Cenchrus biflorus	Poaceae	
7	Cenchrus setigerus	Poaceae	Buratiya
8	Cenchrus ciliaris	Poaceae	Anjan
9	Chloris dolicostachya	Poaceae	Vajan
10	Chloris virgata	Poaceae	
11	Chrysopogon polyphyllus	Poaceae	
12	Cynodon dactylon	Poaceae	Dub Ghaas

13	Dendrocalamus strictus	Poaceae	Baans
14	Dactyloctenium aegyptium	Poaceae	Makda Ghas
15	Dichanthium annulatum	Poaceae	Karaad
16	Digitaria adscendens	Poaceae	Apaang
17	Digitaria longiflora	Poaceae	
18	Eremopogon flaveolatus	Poaceae	Jhaarga
19	Eragrostiella bifaria	Poaceae	
20	Eragrostis ciliaris	Poaceae	Pan Ghaas
21	Eleusine indica	Poaceae	Gada Ghaas
22	Eleusine verticillata	Poaceae	Makda Ghas
23	Heteropogon controtus	Poaceae	Sukhala
24	Iseilema laxum	Poaceae	
25	Melanocenchris jacquemontii	Poaceae	
26	Oplismenus composites	Poaceae	
27	Oropetium thomaeum	Poaceae	Chataan Ghaas
28	Perotis indica	Poaceae	
29	Poa annua	Poaceae	
30	Saccharum spontaneum	Poaceae	Munj
31	Setaria glauca	Poaceae	
32	Setaria tomentosa	Poaceae	
33	Setaria verticillata	Poaceae	Laptuna
34	Tetrapogon tenelus	Poaceae	
35	Tragus biflorus	Poaceae	

Source: Vegetation survey and data from State Forest Dept. Alwar Rajasthan

Anogeissus pendula

Balanites aegyptiaca

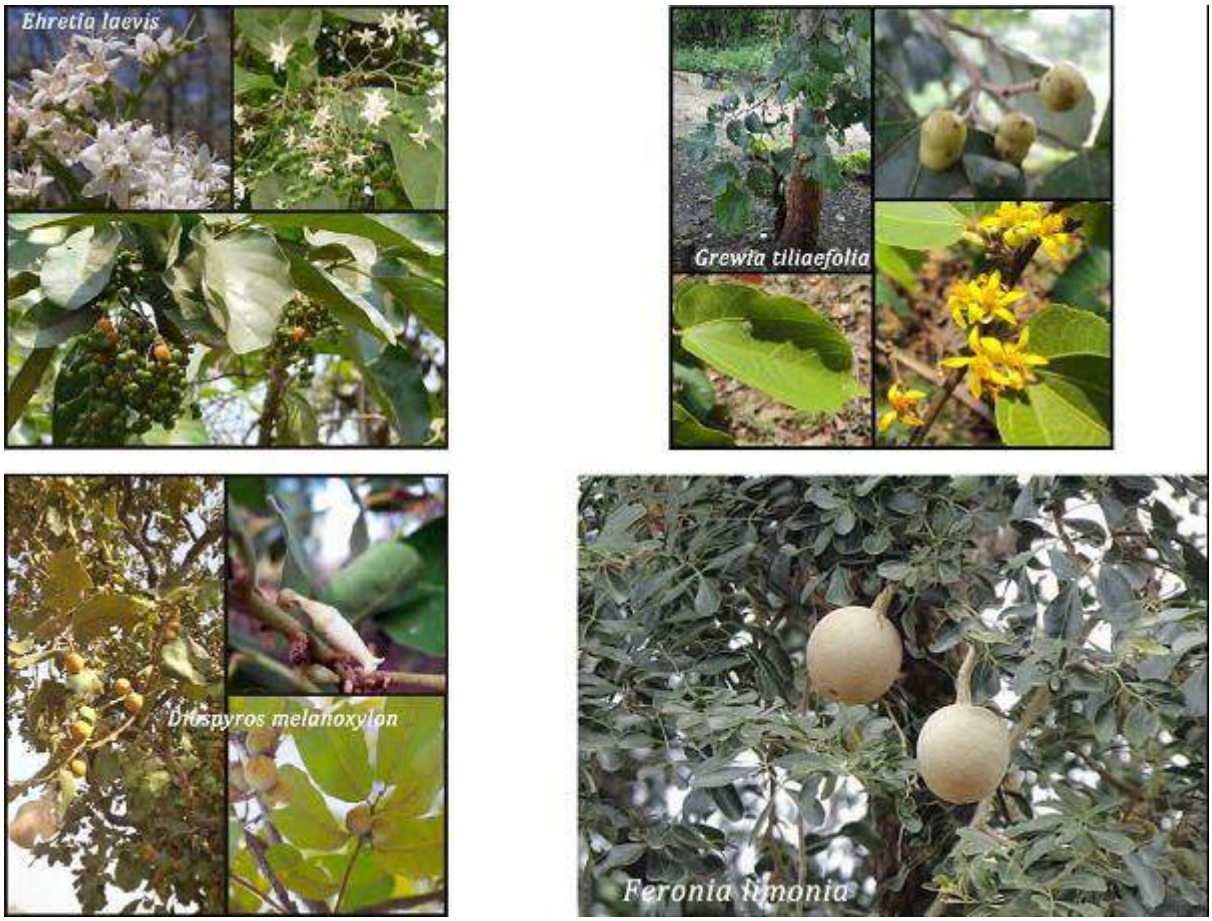
Acacia tortilis

Azadirachta indica

Capparis decidua

Bauhinia racemosa

Boswellia serrata



3.11.2 FAUNA

Table – 3.17

List of Fauna

Sr. No.	Common Name	Scientific Name	Local Name	IUCN Status
Mammals				
1	Rhesus macaque Monkey	Macaca mulatta	Bandar	LC
2	Gray langur	Semnopithecus entellus	Langoor	LC
3	Leopard	Panthera pardus	Baghera, Tendua	VU
4	Jungle Cat	Felis chaus	Jangali Billi	LC
5	Indian Gray mongoose	Herpestes edwerdsii	Nevla	LC
6	Small Indian mongoose	Herpestes auropunctatus	Nevla	LC
7	Golden Jackal	Canis aureus	Siyaar, Gidad	LC
8	Indian Fox or Common Fox	Vulpes bengalensis	Lomdi	LC
9	Striped Hyaena	Hyaena hyaena	Jharakh	NT
10	Asian Palm Civet	Paradoxurus Hermaphrodites	Bijju	LC

11	Blue Bull or Nilgai	Boselaphus tragocamelus	Rojhda, Nilgaay	LC
12	Indian Wild Boar	Sus Scrofa	Jangali Suvar	LC
13	Northern Palm Squirrel	Funambulus pennanti	Gilhari	LC
14	Common House Rat	Rattus rattus	Chuha	LC
15	Indian Gerbil	Tatera indica	Chuha	LC
16	Indian porcupine	Hystrix indica	Sehi	LC
17	Indian Hare	Lepus nigricollis	Khargosh	LC
18	Grey Musk Shrew	Suncus murinus	Chhachhoondar	LC
19	Indian Field Mouse	Mus booduga	Chhota chuha	LC
20	Indian False Vampire Bat	Megaderma lyra	Chamgaadad	LC
21	Lesser Mouse tailed bat	Rhinopoma hardwickii	Chamgaadad	LC
22	Greater Mouse tailed bat	Rhinopoma microphyllum	Chamgaadad	LC
23	Naked rumped Tomb bat	Taphozous nudiventris	Chamgaadad	LC
24	Indian pipistrelle	Pipistrellus coromandra	Chamgaadad	LC
25	Black bearded tomb bat	Taphozous melanopogon	Chamgaadad	LC
26	Indian Flying fox	Pteropus giganteus	Chamgaadad	LC
27	Short nosed fruit bat	Cynopterus sphinx	Chamgaadad	LC
28	Black Buck	Antilope cervicapra	Kala Hiran	LC
29	Indian gazelle OR Chinkara	Gazella bennettii	Chinkara	LC
30	Four horned antelope	Tetracerus quadricornis	Bhedal	VU
31	Indian Wolf	Canis lupus	Bhediya	LC
32	Long eared Hedge hog	Hemiechinus auritus	Jhau Chuha	LC
33	Indian Hedge Hog	Paraechinus micropus	Jhau Chuha	LC
Birds				
1	Gharelu Batasi	Little swift	Apus affinis	LC
2	Taadi Batasi	Palm swift	Cypsiurus parvus	LC
3	Badi Batasi	Alpine swift	Tachymarptis melba	LC
4	Chhipak, Chapak	Indian Nightjar	Caprimulgus asiaticus	LC
5	Pipi, Kura ii	Bronzewinged Jacana	Metopidius indicus	LC
6	Pih, Pihuya	Pheasant tailed Jacana	Hydrophasianus chirurgus	LC
7	Tingur, Gajpaav	Black winged stitt	Himantopus himantopus	LC
8	Kavnik Barsiri	Stone curlew	Burhinus oedcnemus	LC
9	Bhartiya Shiprachala, Nuki	Indian courser	Cursorius coromandelicus	LC
10	Andha Bagla	Pond Heron	Ardeola grayii	LC
11	Karachiya Bagla	Little egret	Egretta garzetta	LC
12	Surkhiya Bagla	Cattle Egret	Bubulcus ibis	LC
13	Laglag	Black headed Ibis	Threskiornis melanocephalus	NT
14	Baaj, Kala Baaj	Red naped Ibis	Pseudibis papillosa	LC
15	Koryal	Pied kingfisher	Ceryle rudis	LC
16	Chota Kilkila	Small blue kingfisher	Alcedo atthis	LC
17	Kilkila	White-breasted Kingfisher	Haleyon smyrnensis	LC
18	Laghu Harit Patringa	Small Green Beeeater	Merops orientalis	LC

19	Bada Patringa	Blue tailed Bee Eater	Merops philippinus	LC
20	Nilkanth	Roller or Blue Jay	Coracias benghalensis	LC
21	Hudhud	Hoopeo	Upupa epops	LC
22	Bhat Titar	Chestnut-bellied Sandgrous	Pterocles exustus	LC
23	Pahadi Bhat Titar	Painted Sand grouse	Pterocles Indicus	LC
24	Hariyal	Yellow footed Green pigeon	Treron phoenicoptera	LC
25	Kabootar	Blue Rock Pigeon	Columba livia	LC
26	Saroti	Red turtle Dove	Streptopelia traquebarica	LC
27	Chitrak, Fakhata	Spotted Dove	Streptopelia chinensis	LC
28	Parki, Panduk	Ring Dove	Strenptopelia decaocto	LC
29	Chhoti Fakhta	Little Brown Dove	Streptopelia senegalensis	LC
30	Papiha	Brain fever Bird	Cuculus varius	LC
31	Koyal, Kokil	Koel	Eudynamys scolopacea	LC
32	Mahok, Kuk	Coucal	Centropus sinensis	LC
33	Raj Giddh	King vulture	Targes calvus	LC
34	Giddh, Bangali Giddh	White backed vulture	Gyps bengalensis	CR
35	Safe Giddh	White Scavenger Vulture	Neophron percnopterus	EN
36	Laggar	Laggar-Falcon	Falco juggar	NT
37	Mor, Mayur	Common Pea	Pavo cristatus	LC
38	Laal Van Kukut	Red Junglefowl	Gallus gallus	LC
39	Jangli Murgi	Grey jungle fowl	Gallus sonneratii	LC
40	Kala Titar	Black partridge	Francolinus francolinus	LC
41	Safed Titar	Grey partridge	Francolinus pondicerianus	LC
42	Bater	Common Quail	Coturnix coturnix	LC
43	Chanak Bater	Rain Quail	Coturnix coromandelica	LC
44	Lavva Kshuk Bater	Bush Quail	Perdicula asiatica	LC
45	Shwet Vaksh Jal Kukuti	White breasted waterhen	Amaurornis phoenicurus	LC
46	Jalmurgi, Bodar	Indian Moorhen	Gallinula chloropus	LC
47	Saras	Sarus crane	Grus antigone	LC
48	Bharat	Small Indian Skylark	Alauda gulgula	LC
49	Chandul	Crested Lark	Galerida cristata	LC
50	Jangli Agiya	Red winged bush lark	Mirafra erythro-ptera	LC
51	Bavabil Bhandik	Common Swallow	Hirundo rustica	LC
52	Masjid ababil	Redrumped swallow	Hirundo daurica	LC
53	Lishra Ababil	Wiretailed swallow	Hirundo smithii	LC
54	Safed Latora	Grey Shrike	Lanius excubitor	LC
55	Chhota Latora	Baybacked shrike	Lanius vittatus	LC
56	Matiya Latora	Ruffous backed shrike	Lanius schach	LC
57	Jangli Kasiya	Cuckoo shrike	Coracina melanoptese	LC
58	Pilak	Golden Oriole	Oriolus oriolus	LC
59	Krushna shish pilak	Black headed Oriole	Oriolus xanthornus	LC
60	Bhujanga	Black Drongo	Dicrurus adsimilis	LC

61	Pahadi Bhujanga	White bellied Drongo	Dicrurus caerulescens	LC
62	Bhimraj	Racket tailed Drongo	Dicrurus paradiseus	LC
63	Tilyar	Rosy starling	Pastor roseus	LC
64	Ghusat Shirsh Mena	Grey headed Myna	Stuirnus malabaricus	LC
65	Bamni Mena	Brahminy Myna	Sturnus pagodarum	LC
66	Desi Mena	Common Myna	Acridotheres tristis	LC
67	Ganga Mena	Bank Myna	Acridotheres ginginianus	LC
68	Jungli Mena	Jungle Myna	Acridotheres fuscus	LC
69	Desi Kauva	House crow	Corvus splendens	LC
70	Jangli kauva	Jungle crow	Corvus macrorhynchos	LC
71	Maha Latmata	Tree Pie	Dendrocitta vagabunda	LC
72	Bulbul, Guldum	Red vented bulbul	Pycnonotus cafer	LC
73	Bhoho vali bulbul	White checked bulbul	Pycononotus luteolus	LC
74	Jard Bulbul	Black Headed Yellow bulbul	Pycononotus meanicterus	LC
75	Ghughoi, Kachpachiya	Large Grey Babbler	Turdoides malcolmi	LC
76	Satbhai, Ghonghai	Jungle Babbler	Turdoides striatus	LC
77	Dungari, Chilchil	Common Babbler	Turdeides caudatus	LC
78	Nil Makshikanch	Blue Flycatcher	Muscicapa tickelliae	LC
79	Shah Bulbul	Paradise Flycatcher	Terpsiphone paradise	LC
80	Nachan	White browed fantailflycatcher	Rhipidura aureola	LC
81	Ghas ki futki	Streaked Fantail warbler	Cisticola juncidis	LC
82	Kalchuri	Indian Robin	Saxicoloides fulicata	LC
83	Dayyera, Dayya	Magpie-Robin	Copsychus saularis	LC
84	Pitak pol balguli	Yellowwcheeked Tit	Parus xanthogenys	LC
85	Bhartiya lulika	Paddyfield Pipit	Anthus rufulus	LC
86	Pilak	Yellow wagtail	Motacilla flava	LC
87	Pilkiya	Grey wagtail	Motacilla caspica	LC
88	Gagula	Large pied Wagtail	Motacilla maderaspatensis	LC
89	Ghobal	White Wagtail	Motacilla alba	LC
90	Sakkarkhora	Purple sunbird	Nectarinia asiatica	LC
91	Jangli chiddi	Yellow throated sparrow	Petronia xanthocollis	LC
92	Gaureruya	House sparrow	Passer domesticus	LC
93	Sarvovaya, Shorbaya	Black breasted weaver bird	Ploceus benghalensis	LC
94	Baya	Common weaver	Ploceus philippinus	LC
95	Hari muniya	Green munia	Estrilda Formosa	LC
96	Charchara, Sar Muniya	White throated munia	Lonchura malabarica	LC
97	Gandam	Black headed bunting	Emberiza melanocephala	LC
98	Paththar chiriya	Crested Bunting	Melophus lathami	LC
99	Pan kauva, Manhit	Little cormorant	Phalacrocorax niger	LC
100	Kath Fodatra	Pied woodpacker	Picoides mahrattensis	LC
101	Kathfoda	Glodenbacked wood pecker	Dinopium benghalense	LC

102	Hiraman tota	Large Indian Parakeet	Psittacula eupatria	LC
103	Laybar Tota	Roseringed Parakeet	Psittacula krameri	LC
104	Tuia tota	Blossomheaded Parakeet	Psittacula cyanocephala	LC
105	Kuraiya	Screech Owl	Tyto alba	LC
106	Ghugghu	Indian Eagle owl	Bubo bengalensis	LC
107	Khusat, Chuggad	Spotted owlet	Athene brama	LC
108	Basanta	Coppersmith barbet	Megalaima haemacephala	LC
109	Sarp Bhakshi Garud	Short-toed snake eagle	Circaetus gallicus	LC
110	Kapasi	Black-shouldered kite	Elanus axillaris	LC
111	Madhu Baaj	Oriental honey buzzard	Pernis ptilorhynchus	LC
112	Desi Latora	Common woodshrike	Tephrodornis pondicerianus	LC
113	Shaubigi	Common iora	Aegithina tiphia	LC
114	Bulbul	White-eared bulbul	Pycnonotus leucotis	LC
115	Turra	Red-throated flycatcher	Ficedula albicilla	LC
116	-	Grey-headed canaryflycatcher	Culicicapa ceylonensis	LC
117	Kali Phutki	Ashy prinia	Prinia socialis	LC
118	Darji Pakshi	Common tailorbird	Orthotomus sutorius	LC
119	-	Great tit	Parus major	LC
120	Shakkarkhora	Purple sunbird	Cinnyris asiaticus	LC
121	Jangli chidiya	Yellow-throated sparrow	Petronia xanthocollis	LC
122	Laal Munia	Red munia	Amandava amandava	LC
123	Abla ki mena	Pied Starling	Lamprotornis bicolor	LC
Reptiles				
1	Kachhuva Talabka	Indian mud turtle	Lissemys punctata	LC
2	Kachhuva Bhumika	Starred tortoise	Geochelone elegans	LC
3	Chhipkali	Northern house geiko	Hemidactylus flaviviridis	LC
4	Chhipkali	Fat tailed gecko	Eublepharis macularius	LC
5	Girgit	Common garden lizard	Calotes versicolor	LC
6	Halniya	Indian chameleon	Chameleon zeylanica	LC
7	Goh	Common indian monitor	Varanus bengalensis	LC
8	Du moohi	Johr's earth boa	Eryx johnii	LC
9	Ajgar	Indian python	Python molurus	LC
10	Dhaman	Common rat snake	Ptyas mucosa	LC
11	Karayat	Common indian krait	Bungarus caeruleus	LC
12	Naag	Indian cobra	Naja naja	LC
13	Chitti	Russell's viper	Vipera russelli	LC
14	Sanda	Spiny tailed lizard	Saara hardwickii	LC
15	Vaaipar	Saw Scale Viper	Echis carinatus	LC
16	Chhipkali	Brooke's house gecko	Hemidactylus brookii	LC
17	Chhipkali	Bark gecko	Hemidactylus leschenaultii	LC

18	Girgit	Fan-throated lizard	Sitana ponticeriana	LC
19	Ajgar jesa Saap	Rough-tailed sand boa	Gongylophis conicus	LC
20	Saap	Common Indian bronzeback	Dendrelaphis tristis	LC
21	Saap	Indian wolf snake	Lycodon aulicus	LC
Amphibians				
1	Mendhak	Common Indian Toad	Duttaphrynus melanostictus	LC
2	Mendhak	Marbled Toad	Bufo stomaticus	LC
3	Menda detka	Indian Bull Frog	Hoplobatrachus tigerinus	LC
4	Menda detka	Burrowing Frog	Sphaerotheca breviceps	LC
5	Menda detka	Indian cricket frog	Fejervarya limnocharis	LC
Sr. No.	**Local Name**	**Common Name**	**Scientific Name**	**IUCN Status**
Insects				
1	-	Silverfish	Lepisma species	LC
2	-	Damselfly	Ceriagrion coromandelianum	LC
3	-	Katydid	Microcentrum rhombifolium	LC
4	-	Field cricket	Gryllus domesticus	LC
5	-	Mole cricket	Gryllotalpa orientalis	LC
6	-	Grasshopper	Schistocerca gregaria	LC
7	-	Painted grasshopper	Poekilocerus pictus	LC
8	-	Stick insect	Megaphasma species	LC
9	-	Earwig	Labia minor	LC
10	-	Cockroach	Periplaneta Americana	LC
11	-	Praying mantis	Hierodula unimaculata	LC
12	-	Termite	Odontotermes obesus	LC
13	-	Cicada	Platypleura octoguttata	LC
14	-	Ground beetle	Calosoma orientalis	LC
15	-	Long-horned beetle	Batocera rufomaculata	LC
16	-	Ladybird beetle	Coccinella septempunctata	LC
17	-	Dung beetle	Heliocopris bucephalus	LC
18	-	Blister beetle	Mylabris pustulata	LC
19	-	Mosquito	Aedes species	LC
20	-	Mosquito	Anopheles species	LC
21	-	Long-legged flies	Condylostylus species	LC
22	-	Flower fly	Sphaerophoria scutellaris	LC
23	-	Blow fly	Lucilia illustris	LC
24	-	House fly	Musca domestica	LC
25	-	Hawk moth	Acherontia styx	LC
26	-	Moth	Syntomis passalis	LC

27	-	Common rose	Pachliopta aristolochiae	LC
28	-	Lemon butterfly	Papilio demoleus	LC
29	-	Mottled emigrant	Catopsilia pyranthe	LC
30	-	Small grass yellow	Eurema brigitta	LC
31	-	Plain tiger	Danaus chrysippus	LC
32	-	Common tiger	Danaus genutia	LC
33	-	Common Indian crow	Euploea core	LC
34	-	Paper wasp	Ropalidia variegate	LC
35	-	Thread-waisted wasp	Sphex lobatus	LC
36	-	Carpenter bee	Xylocopa virginica	LC
37	-	Leafcutting bee	Megachile lanata	LC
38	-	Honey bee	Apis dorsata	LC
39	-	Honey bee	Apis florae	LC
40	-	Black ant	Camponotus compressus	LC
41	-	Weaver ant	Oecophylla smaragdina	LC
42	-	Ant	Crematogaster soror	LC
43	-	Tree ant	Tetraponera rufonigra	LC
44	-	Tent-weaver spider	Cyrtophora citricola	LC
45	-	Orb-web spider	Argiope anasuja	LC
46	-	Spiny-backed spider	Thelacantha brevispina	LC
47	-	Gray wall spider	Menemerus bivittatus	LC
48	-	Social spider	Stegodyphus sarasinorum	LC
49	-	Scorpion	Orthochirus flavescens	LC
50	-	Centipede	Scolopendra cingulata	LC
51	-	Earthworm	Pheretima posthuma	LC

Source: Survey of Avifauna under the study area.

Black Buck
Photo by: Pritesh Patel

White rumped Vulture
Photo by: Pritesh Patel

Indian Toad
Photo by: Pritesh Patel

Chinkara
Photo by: Sachi Rana

Fan Throat Lizard
Photo by: Sachi Rana

Habitat

Details of Presence of Schedule-I species

Study Area: M/s. Insecticide India Limited, RIICO Ind. Area, Chaupanki, Dist: Alwar, Rajasthan

a) Whether there is presence of schedule-I species?

The Schedule- I species as per Wildlife Protection Act -1972 are:

Mammals					
Sr No	**Common Name**	**Scientific Name**	**Local Name**	**IUCN Status**	**WPA Schedule**
1	Leopard	Pantherapardus	Baghera, Tendua	VU	I
2	Black Buck	Antilopecervicapra	Kala Hiran	LC	I
3	Indian gazelle OR Chinkara	Gazellabennettii	Chinkara	LC	I
4	Four horned antelope	Tetracerusquadricornis	Bhedal	VU	I
Birds					
1	Raj Giddh	Red – Headed Vulture	Sarcogypscalvus	CR	I
2	Giddh, BangaliGiddh	White backed vulture	Gyps bengalensis	CR	I
3	Mor, Mayur	Indian Peafowl	Pavocristatus	LC	I
4	SarpBhakshiGarud	Short-toed snake eagle	Circaetusgallicus	LC	I
5	Kapasi	Black-shouldered kite	Elanusaxillaris	LC	I
6	MadhuBaaj	Oriental honey buzzard	Pernisptilorhynchus	LC	I
Reptiles					
1	KachhuvaTalabka	Indian mud turtle	Lissemyspunctata	LC	I
2	Ajgar	Indian python	Python molurus	LC	I

b) Whether conservation plan for schedule-I species has been prepared?

Conservation Plan for Schedule – I species documented from project site

Introduction

A detailed field survey was carried out for complete documentation of floral as well as faunal biodiversity for the core zone which is at Project site and the buffer zone which is 10 km aerial circular area from the project site. White Backed Vulture and Indian Peafowl were recorded from the study area belongs to Schedule – I of the Wildlife Protection Act – 1972. Following are species wise conservation plans and also generalized measures for their conservation.

- **Leopard (Pantherapardus)**

Scientific classification

Kingdom:	Animalia
Phylum:	Chordata
Class:	Mammalia
Order:	Carnivora
Suborder:	Feliformia
Family:	Felidae
Subfamily:	Pantherinae
Genus:	*Panthera*
Species:	***P. pardus***

Binomial name

Pantherapardus

- **General Description of the species**

The **leopard** or **panther** (*Pantherapardus*) is one of the five extant species in the genusPanthera, a member of the Felidae.[It occurs in a wide range in sub-Saharan Africa, in small parts of Western and Central Asia, on the Indian subcontinent to Southeast and East Asia. It is listed as Vulnerable on the IUCN Red List because leopard populations are threatened by habitat loss and fragmentation, and are declining in large parts of the global range.

Compared to other wild cats, the leopard has relatively short legs and a long body with a large skull. Its fur is marked with rosettes. It is similar in appearance to the jaguar, but has a smaller, lighter physique, and its rosettes are generally smaller, more densely packed and without central spots. Both leopards and jaguars that are melanistic are known as black panthers. The leopard is distinguished by its well-camouflaged fur, opportunistic hunting behaviour, broad diet, strength, and its ability to adapt to a variety of habitats ranging from rainforest to steppe, including arid and montane areas. It can run at speeds of up to 58 kilometres per hour (36 mph).

- **Life Cycle of the species**

Depending on the region, leopards may mate all year round.The Estrous cycle lasts about 46 days and the female usually is in heat for 6–7 days. Gestation lasts for 90 to 105 days. Cubs are usually born in a litter of 2–4 cubs. Mortality of cubs is estimated at 41–50% during the first year.

Females give birth in a cave, crevice among boulders, hollow tree, or thicket to make a den. Cubs are born with closed eyes, which open four to nine days after birth. The fur of the young tends to be longer and thicker than that of adults. Their pelage is also grey in colour with less defined spots. Around three months of age, the young begin to follow the mother on hunts. At one year of age, leopard young can probably fend for themselves, but remain with the mother for 18–24 months.

The average typical life span of a leopard is between 12 and 17 years.

- **Behaviour of the Species**

The leopard is a solitary and territorial animal. Adults associate only in the mating season. Females continue to interact with their offspring even after weaning, and have been observed sharing kills with their offspring when they cannot obtain any prey. They produce a number of vocalisations, including growls, snarls, meows and purrs. The roaring sequence in leopards consists mainly of grunts and is also called "sawing", having been described as resembling the sound of sawing wood. Cubs are known to call their mother with an urr-urr sound.

The whitish spots on the back of their ears are thought to play a role in communication. It has been hypothesized that the white tips of their tails may function as a 'follow-me' signal in intraspecific communication. However, no significant association were found between a conspicuous colour of tail patches and behavioural variables in carnivores.

Leopards are active mainly from dusk till dawn and rest for most of the day and for some hours at night in thickets, among rocks or over tree branches. Leopards have been observed walking 1–25 km (0.62–15.53 mi) across their range at night; they may even wander up to 75 km (47 mi) if disturbed. In some regions, they are In western African forests, they have been observed to be largely diurnal and hunting during twilight, when their prey animals are active; activity patterns varies between seasons.

Leopards can climb trees very skilfully, often rest on tree branches and descend from trees headfirst. They can run at over 58 km/h (36 mph), leap over 6 m (20 ft) horizontally, and jump up to 3 m (9.8 ft) vertically.

- **Food Habits**

The leopard depends mainly on its acute senses of hearing and vision for hunting. It primarily hunts at night in most areas.Leopards usually hunt on the ground.

The leopard is a carnivore that prefers medium-sized prey with a body mass ranging from 10–40 kg. Prey species in this weight range tend to occur in dense habitat and to form small herds. Species that prefer open areas and developed significant anti-predator strategies are less preferred. More than 100 prey species were recorded. The most significantly preferred species are ungulates; impala, bushbuck, and chital. Primate species. Average daily consumption rates of 3.5 kg were estimated for males and of 2.8 kg for femalesthey drink water every two to three days, and feed infrequently on moisture-rich plants. The leopard stalks its prey and tries to approach as close as possible, typically within 5 m (16 ft) to the target, and finally pounces on it and kills it by suffocation. It kills small prey with a bite on the back of the neck, but holds larger animals by the throat and strangles them.

- **Conservation and Its relationship with Humans**

Leopards have been known to humans throughout history, and have featured in the art, mythology, and folklore of many countries where they have historically occurred, such as ancient Greece, Persia, and Rome, as well as some where they have not existed for several millennia, such as England. The modern use of the leopard as an emblem for sport or a coat of arms is much more restricted to Africa, though numerous products worldwide have used

the name. During the Benin Empire, the leopard was commonly represented on engravings and sculptures and was used to symbolise the power of the king or *oba*; since the leopard was considered the king of the forest. Leopards were also kept and paraded as mascots, totems and sacrifices to deities. As a result of their association with kings in Africa, the leopard's pelt is often seen today as a symbol of aristocratic rank, chiefs using it as a part of their traditional regalia. Leopard domestication has also been recorded—several leopards were kept in a menagerie established by King John at the Tower of London in the 13th century; around 1235, three of these animals were given to Henry III by Holy Roman Emperor Frederick II

Most leopards avoid people, but humans may occasionally be targeted as prey. Most healthy leopards prefer wild prey to humans, but injured, sickly, or struggling cats or those with a shortage of regular prey may resort to hunting humans and become habituated to it. Although usually slightly smaller than a human, an adult leopard is much more powerful and easily capable of killing one. Two extreme cases occurred in India: the first leopard, "the Leopard of Rudraprayag", killed more than 125 people; the second, "the Panar Leopard", was believed to have killed more than 400. Both were killed by the renowned hunter and conservationist Jim Corbett. Man-eating leopards are considered bold and difficult to track and may enter human settlements for prey, more so than lions and tigers. Author and big game hunter Kenneth Anderson had first-hand experience with many man-eating leopards, and described them as far more threatening than tigers.

As this species belongs to big cats present in the state as well as in nation, it is given special attention for its conservation. Government of India has given special conservation importance to this species by including it into Schedule – I of Wildlife Protection Act, 1972. In the study area region this species is well conserved and given importance by the government authorities. Poaching and any such kind of harm to the species is strictly prohibited. Harassment and killing of this animal is taken as punishable act.

Conservation status

Vulnerable (IUCN 3.1)

- **Probable Threats to the species**

This species of big cat prefers forest and woodland areas as their suitable habitat so the probable threats are:

- Habitat loss, due to rapid growth of development in rural as well as agricultural sector results in the shortage of forests as well as tall trees in and around the villages which plays essential role for suitable habitat for the species.
- Decrease in the number of Herbivore population which directly affects the food chain of such species.
- Illegal hunting by some communities In the study area, all the villages surveyed are against hunting or poaching of the people and not found any such activity promoted in this region.

- **Conservation Measures**

Direct and indirect approach is required to provide effective conservation, which is recommended as under:

1. Increasing the tree cover in the study area which will provide shelter and hide outs to the Leopards. This can be achieved by planting of trees (a group of trees that grow close together, generally without many bushes or other plants) in buffer area. By encouraging people for plantation of some local species such as Neem, Shirish, Khakhro, Haldu, Amli, Banyan, Peepal and Peeper or other *Ficus sp.* Vacant places such as Forest areas, Edges of agricultural fields, village Gauchar, Panchayat's common land, neighbourhood of people inhibiting, road side avenue tree plantation, open scrubs, ravines, school compounds can be selected for practicing the plantation activity.
2. Awareness programmes (community and school level) for conservation of leopards in the study area and also through organizing competitions during "Wildlife Week" and "Van Mahotsav" celebrations by active involvement of local community.
3. Some provision of rewards to informers for the control of poaching and illegal trade in wildlife.
4. Carrying out census and research projects to know the potential threats and population status of the species in collaboration of local schools, colleges, panchayats and forest department.
5. Suggest strategies to minimize negative impacts of changing environment in nearby area of leopard populations and to promote conservation of its habitats.
6. Another way to help preserve the endangered species is to create society dedicated to ecological ethics. All the conservation measures will be implemented with the help of and in the consultation of the district forest department.

With the objective of effectively protecting the wild life and to control poaching, smuggling and illegal trade in wildlife and its derivatives, the Government of India enacted Wild Life (Protection) Act 1972. The Act was amended in January 2003 and punishment and penalty for offences under the Act have been made more stringent.

- **Black Buck (Antilopecervicapra)**

Scientific classification

Kingdom: Animalia
Phylum: Chordata
Class: Mammalia
Order: Artiodactyla
Family: Bovidae
Subfamily: Antilopinae
Genus: Antilope
Pallas, 1766
Species: *A. cervicapra*
Binomial name
Antilopecervicapra

- **General Description of the species**

The blackbuck (Antilopecervicapra), also known as the Indian antelope, is an antelope found in India, Nepal, and Pakistan. The blackbuck is the sole extant member of the genusAntilope.

It stands up to 74 to 84 cm (29 to 33 in) high at the shoulder. Males weigh 20–57 kg, an average of 38 kilograms. Females are lighter, weighing 20–33 kg or 27 kg on average. The long, ringed horns, 35–75 cm (14–30 in) long, are generally present only on males, though females may develop horns, as well. The white fur on the chin and around the eyes is in sharp contrast with the black stripes on the face. The coats of males show two-tone colouration; while the upper parts and outsides of the legs are dark brown to black, the underparts and the insides of the legs are all white. However, females and juveniles are yellowish fawn to tan.

The blackbuck is a diurnal antelope (active mainly during the day). Three kinds of groups, typically small, are the female, male, and bachelor herds. Males often adopt lekking as a strategy to garner females for mating. While other males are not allowed into these territories, females often visit these places to forage.

The blackbuck inhabits grassy plains and slightly forested areas. Due to their regular need of water, they prefer areas where water is perennially available.

- **Life Cycle of the species**

As herbivores, blackbuck graze on low grasses, occasionally browsing, as well. Females become sexually mature at 8 months old, but mate no earlier than 2 years. Males mature later, at 1 1/2 years. Mating takes place throughout the year. Gestation is typically 6 months long, after which a single calf is born. The lifespan is typically 10 to 15 years.Newborn are a light yellow; infant males may have a black patch on the head and the neck. Young are precocial - they can stand on their own soon after birth. Females can mate again after a

month of parturition. Juveniles remain active and playful throughout the day. Juvenile males turn black gradually, darkening notably after the third year.

- **Behaviour of the Species**

The blackbuck is a diurnal antelope (active mainly during the day), though activity slows down at noon as days grow hotter toward summer. Three kinds of typically small groups – the female herds, territorial males and bachelor males. A study discovered that group sizes often fluctuate; membership is often dictated by availability of forage and the nature of the habitat. Large herds have an edge over smaller ones in that danger can be detected faster, though individual vigilance is lower in the former. Greater time is spent in feeding by large herds. A disadvantage for large herds, however, is that traveling requires more resources. A study found that herd size reduces in summer. Fast animals, the blackbuck can run at as high as 80 kilometres per hour (50 mph).

- **Food Habits**

Being herbivores, blackbuck graze on low grasses, occasionally browsing as well. They prefer sedges, fall witchgrass, mesquite, and live oak. They have occasionally been observed browsing on acacia trees. A study in the Velavadar Black Buck Sanctuary (Gujarat, India) showed that *Dichanthiumannulatum* comprised 35 percent of their diet. Digestion of nutrients, especially crude proteins, was poor in summer, but more efficient in the rainy and winter seasons. Consequently, crude protein intake in summer was very low, even below the recommended value. Blackbuck had a lower food consumption in summer. The fruits of *Prosopisjuliflora* are often eaten, and blackbuck may play a role in their dispersal. *Prosopis* becomes a significant food item if grasses are scarce. Water is a daily requirement of the blackbuck.

- **Conservation and Its relationship with Humans**

The blackbuck has associations with the Indian culture. The antelope might have been a source of food in the Indus Valley civilisation (3300–1700 BCE); bone remains have been discovered in sites such as Dholavira and Mehrgarh. The blackbuck is routinely depicted in miniature paintings of the Mughal era (16th to 19th centuries) depicting royal hunts often using cheetahs.Villagers in India and Nepal generally do not harm the blackbuck. Tribes such as the Bishnois revere and care for most animals including the blackbuck. The blackbuck has been declared as the state animal of Andhra Pradesh.

The animal is mentioned in Sanskrit texts as the krishnamrig. According to Hindu mythology, the blackbuck draws the chariot of Lord Krishna. The blackbuck is considered to be the vehicle of Vayu (the wind god) and Chandra (the moon god). In Rajasthan, the goddess Karni Mata is believed to protect the blackbuck.

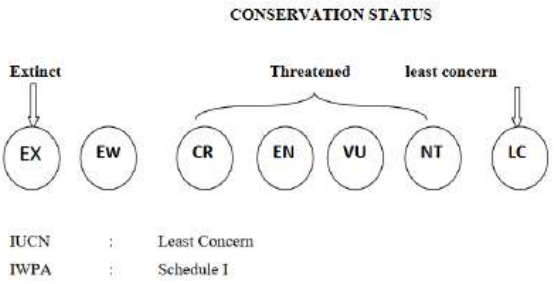
In the YājñavalkyaSmṛti, Sage Yagyavalkya is quoted stating "in what country there is black antelope, in that Dharma must be known", which is interpreted to mean that certain

religious practices including sacrifices were not to be performed where blackbuck did not roam.

Blackbuck meat is highly regarded in Texas. In an analysis, blackbuck milk was found to have 6.9% protein, 9.3% fat, and 4.3% lactose.

In some agricultural areas in northern India, the blackbuck are found in large numbers and raid crop fields. However, the damage caused by blackbuck is far lower than that caused by the Nilgai.

The blackbuck is listed under Appendix III of CITES. In India, hunting of blackbuck is prohibited under Schedule I of the Wildlife Protection Act of 1972. It inhabits several protected areas of India



- **Probable Threats to the species**

During the 20th century, blackbuck numbers declined sharply due to excessive hunting, deforestation and habitat degradation. Some blackbucks are killed illegally especially where the species is sympatric with nilgai.

Until India's independence in 1947, blackbuck and chinkara were hunted in many princely states with specially trained captive Asiatic cheetahs. By the 1970s, blackbuck was locally extinct in several areas. Nevertheless, populations in India have increased from 24,000 in the late 1970s to 50,000 in 200.

This species inhibits mainly in grassland and open scrub. Continuous decline in natural grassland and open scrub areas results a habitat loss for such species.

- **Conservation Measures**

Direct and indirect approach is required to provide effective conservation, which is recommended as under:

1. Conservation of Natural grasslands and open scrub of the study area by its protection and plantation of small shrubs as well as suitable grass species.
2. Awareness programmes (community and school level) for conservation of blackbucks in the study area and also through organizing competitions during “Wildlife Week” and “Van Mahotsav” celebrations by active involvement of local community.

3. Some provision of rewards to informers for the control of poaching and illegal trade in wildlife.
4. Carrying out census and research projects to know the potential threats and population status of the species in collaboration of local schools, colleges, panchayats and forest department.
5. Suggest strategies to minimize negative impacts of changing environment in nearby area of black buck populations and to promote conservation of its habitats.
6. Another way to help preserve the endangered species is to create society dedicated to ecological ethics. All the conservation measures will be implemented with the help of and in the consultation of the district forest department.

With the objective of effectively protecting the wild life and to control poaching, smuggling and illegal trade in wildlife and its derivatives, the Government of India enacted Wild Life (Protection) Act 1972. The Act was amended in January 2003 and punishment and penalty for offences under the Act have been made more stringent.

- **Indian Gazelle or Chinkara (Gazellabennettii)**

Scientific classification

Kingdom:	Animalia
Phylum:	Chordata
Class:	Mammalia
Order:	Artiodactyla
Family:	Bovidae
Subfamily:	Antilopinae
Genus:	*Gazella*
Species:	***G. bennettii***

Binomial name
Gazellabennettii

General Description of the species

The **chinkara** (*Gazellabennettii*), also known as the **Indian gazelle**, is a gazellespecies native to Iran, Afghanistan, Pakistan and India.

It stands at 65 cm (26 in) tall and weighs about 23 kg. It has a reddish-buff summer coat with smooth, glossy fur. In winter, the white belly and throat fur is in greater contrast. The sides of the face have dark chestnut stripes from the corner of the eye to the muzzle, bordered by white stripes. Its horns reach over 39 cm.

Life Cycle of the species

Chinkaras mate once a year. Males compete for access to females.

Behaviour of the Species

Chinkara live in arid plains and hills, deserts, dry scrub and light forests. They inhabit more than 80 protected areas in India. Chinkaras are shy and avoid human habitation. They can go without water for long periods and can get sufficient fluids from plants and dew. Although most are seen alone, they can sometimes be spotted in groups of up to four animals. They share their habitat with several other herbivores, such as nilgai, blackbuck, chausingha, wild goat, and wild boar.

Chinkaras are preyed upon by leopards, Bengal tigers, Asiatic lions and dholes. The chinkara was a common prey of the Asiatic cheetah in India alongside blackbucks. Outside protected areas they may be attacked by pariah dogs, and both wolves and golden jackals are also known to hunt them.

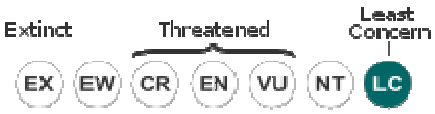
Food Habits

Chinkara is mainly a grassland animal and prefers grass species in its diet. They often migrate one place to another in search of food especially grasses.

Conservation and Its relationship with Humans

The Chinkara occurs in over 80 protected areas in India. And in India it is included as Schedule – I Species for conservation under Wildlife protection Act -1972.

Conservation status



Least Concern (IUCN 3.1)

Probable Threats to the species

The chinkara is threatened by extensive hunting for meat and trophies in Afghanistan, Iran and Pakistan. Other threats include habitat loss due to agricultural and industrial expansion. The status in these countries is unclear. Around 1,300 individuals occur in Iran. However, the situation in India is not so grim; in 2001, populations were estimated at over one million in the country, of which nearly 80,000 occur in the Thardesert, with a stable population trend.

Conservation Measures

Direct and indirect approach is required to provide effective conservation, which is recommended as under:

1. Conservation of Natural grasslands and open scrub of the study area by its protection and plantation of small shrubs as well as suitable grass species.
2. Awareness programmes (community and school level) for conservation of Chinkara in the study area and also through organizing competitions during "Wildlife Week" and "Van Mahotsav" celebrations by active involvement of local community.
3. Some provision of rewards to informers for the control of poaching and illegal trade in wildlife.
4. Carrying out census and research projects to know the potential threats and population status of the species in collaboration of local schools, colleges, panchayats and forest department.
5. Suggest strategies to minimize negative impacts of changing environment in nearby area of Chinkara populations and to promote conservation of its habitats.
6. Another way to help preserve the endangered species is to create society dedicated to ecological ethics. All the conservation measures will be implemented with the help of and in the consultation of the district forest department.

With the objective of effectively protecting the wild life and to control poaching, smuggling and illegal trade in wildlife and its derivatives, the Government of India enacted Wild Life (Protection) Act 1972. The Act was amended in January 2003 and punishment and penalty for offences under the Act have been made more stringent.

- **Four Horned Antelope (*Tetracerusquadricornis*)**

Scientific classification

Kingdom: Animalia
Phylum: Chordata
Class: Mammalia
Order: Artiodactyla
Family: Bovidae
Subfamily: Bovinae
Genus: *Tetracerus* Leach, 1825
Species: ***T. quadricornis***

Binomial name
Tetracerusquadricornis

General Description of the species

The **four-horned antelope** (*Tetracerusquadricornis*), or ***chousingha***, is a small antelope found in India and Nepal. This antelope has four horns, which distinguish it from most other bovids, which have two horns (sparing a few such as the Jacob sheep).

The four-horned antelope stands nearly 55–64 centimetres (22–25 in) at the shoulder and weighs nearly 17–22 kilograms (37–49 lb). Slender with thin legs and a short tail, the four-horned antelope has a yellowish brown to reddish coat. One pair of horns is located between the ears, and the other on the forehead. The posterior horns are always longer than the anterior horns, which might be mere fur-covered studs. While the posterior horns measure 8–12 centimetres (3.1–4.7 in), the anterior ones are 2–5 centimetres (0.79–1.97 in) long.

The four-horned antelope is diurnal (active mainly during the day). Though solitary by nature, four-horned antelopes may form loose groups of three to five –with one or more adults, sometimes accompanied by juveniles. This elusive antelope feeds on grasses, herbs, shrubs, foliage, flowers and fruits. It needs to drink water frequently; as such it stays in places near water sources

Life Cycle of the species

Breeding behaviour of the four-horned antelope has not been well studied. The age at which sexual maturity is gained is doubted; two captive females had their first parturition at less than two years. The male approaches the female in a relaxed gait, giving out low coughs. The two may kneel and push against each other with the necks intertwined. The male makes a few short mounting attempts; the female may be foraging all the while without any reaction. Gestation lasts about eight months, followed by the birth of one or two calves. The new born has a head-and-body length of 42 to 46 centimetres (17 to 18 in), and weighs 0.7 to 1.1 kg (1.5 to 2.4 lb). Juveniles are kept concealed for the first few weeks of birth. Juveniles remain with their mothers for about a year.

Behaviour of the Species

The four-horned antelope is diurnal (active mainly during the day), though it mainly rests or ruminates in dense undergrowth at noon. Though solitary by nature, the four-horned antelope may form loose groups of three to five. Groups consist of one or more adults, sometimes accompanied by juveniles. Males and females hardly interact, except in the mating season.

The antelope is shy and elusive. When alarmed, it stands motionless and may nervously leap away from the danger or even sprint. It often conceals itself in tall grasses to escape predators. The use of alarm calls to alert others is not common because the antelope tries to avoid the attention of predators. However, in extreme cases, these calls may be used to warn predators that they have been identified. Adults mark vegetation in their territories

with a colourless secretion of preorbitalglands that soon condenses to form a white film. They maintain multiple latrine sites where piles of their pellet droppings are formed by regular use. Latrine sites can be confused with those of the barking deer but the pellets are longer and larger in four-horned antelopes. Submissive display consists of shrinking the body, lowering the head and pulling the ears back. Predators of four-horned antelopes include tigers, leopards, and dholes.

Food Habits

The four-horned antelope feeds on grasses, herbs, shrubs, foliage, flowers and fruits. A study in Mudumalai National Park (Tamil Nadu, India) showed that the antelope prefers grass species of the family Cyperaceae; genera *Axonopus*, *Cynodon*, *Digitaria*, *Echinochloa*, *Panicum*, *Sehima* and *Sporobolus*; and the species *Imperatacylindrica*, *Ottochloanodosa*, *Pseudanthistriaumbellata* and *Themedacymbaria*. The shrub *Grewiahirsuta* is frequently eaten. Preferred herbs include *Helichrysum*, *Indigofera* and *Tinospora* species and *Leucasaspera*. The four-horned antelope feeds on the leaves of trees such as *Cordiawallichii*, *Emblicaofficinalis*, *Randiadumetorum* and *Zizyphusxylopyrus*. Grasses comprise nearly 29 percent of the diet, followed by foliage from trees (nearly nine percent). Grass and browse were consumed in nearly equal proportions. A study in the Panna National Park (Madhya Pradesh, India) showed preference for *Zizyphusmauritiana*, *Acacia nilotica*, *A. leucophloea* and *A. catechu*. Babool flowers were frequently eaten. The antelope often associates with langurs under fruiting trees, just as chital frequently do. Interaction with chital, a sympatric species, was infrequent. The antelope is wary when feeding, often raising its head and looking about its vicinity. The four-horned antelope needs to drink water frequently; as such it stays in places near water sources.

Threats and Conservation

The four-horned antelope is threatened by the loss of its natural habitat due to agricultural expansion. Moreover, the unusual four-horned skull and the horns have been a popular target for trophy hunters. In India, the species is protected under Schedule I the Wildlife Protection Act of 1972 and the Nepalese population is listed in CITES Appendix III. The four-horned antelope is classified as Vulnerable by the International Union for the Conservation of Nature and Natural Resources (IUCN).

Conservation status

Vulnerable (IUCN 3.1)

Major protected areas across India where four-horned antelopes occur include: Gir National Park (Gujarat); Bandhavgarh National Park, Bori Wildlife Sanctuary, Kanha National Park, Pachmarhi Biosphere Reserve, Panna Tiger Reserve, Pench Tiger Reserve, Sanjay National Park, Satpura National Park (Madhya Pradesh); TadobaAndhari Reserve (Maharashtra); Kumbhalgarh Wildlife Sanctuary, Ranthambore National Park, Rangayyanadurga wildlife sanctuary (Karnataka), and Sariska Tiger Reserve (Rajasthan).

Conservation Measures

Direct and indirect approach is required to provide effective conservation, which is recommended as under:

1. Conservation of Natural grasslands and open scrub of the study area by its protection and plantation of small shrubs as well as suitable grass species.
2. Awareness programmes (community and school level) for conservation of Four Horned Antelope in the study area and also through organizing competitions during "Wildlife Week" and "Van Mahotsav" celebrations by active involvement of local community.
3. Some provision of rewards to informers for the control of poaching and illegal trade in wildlife.
4. Carrying out census and research projects to know the potential threats and population status of the species in collaboration of local schools, colleges, panchayats and forest department.
5. Suggest strategies to minimize negative impacts of changing environment in nearby area of Four Horned Antelope populations and to promote conservation of its habitats.
6. Another way to help preserve the endangered species is to create society dedicated to ecological ethics. All the conservation measures will be implemented with the help of and in the consultation of the district forest department.

With the objective of effectively protecting the wild life and to control poaching, smuggling and illegal trade in wildlife and its derivatives, the Government of India enacted Wild Life (Protection) Act 1972. The Act was amended in January 2003 and punishment and penalty for offences under the Act have been made more stringent.

White Rumped Vulture (*Gyps bengalensis*)

Scientific classification

Kingdom: Animalia
Phylum: Chordata
Class: Aves
Order: Accipitriformes
Family: Accipitridae
Genus: *Gyps*
Species: ***G. bengalensis***

Binomial name

Gyps bengalensis

General Description of the species

The White-rumped vulture (Gyps bengalensis) is an Old World vulture native to South and Southeast Asia. It has been listed as Critically Endangered on the IUCN Red List since 2000, as the population severely declined. White-rumped vultures die of renal failure caused by diclofenac poisoning. In the 1980s, the global population was estimated at several million individuals, and it was thought to be "the most abundant large bird of prey in the world". As of 2016, the global population was estimated at less than 10,000 mature individuals.

The White-rumped vulture is a typical, medium-sized vulture, with an un-feathered head and neck, very broad wings, and short tail feathers. It is much smaller than the Eurasian Griffon. It has a white neck ruff. The adult's whitish back, rump, and underwing coverts contrast with the otherwise dark plumage. The body is black and the secondaries are silvery grey. The head is tinged in pink and bill is silvery with dark ceres. The nostril openings are slit-like. Juveniles are largely dark and take about four or five years to acquire the adult plumage. In flight, the adults show a dark leading edge of the wing and has a white wing-lining on the underside. The under tail coverts are black.

This is the smallest of the Gyps vultures, but is still a very large bird. It weighs 3.5-7.5 kg. Measures 75–93 cm in length, and has a wingspan of 1.92–2.6 m (6.3–8.5 ft).

This vulture builds its nest on tall trees often near human habitations in northern and central India, Pakistan, Nepal, Bangladesh and Southeast Asia, laying one egg. Birds form roost colonies. The population is mostly resident.

Like other vultures it is a scavenger, feeding mostly from carcasses of dead animals which it finds by soaring high in thermals and spotting other scavengers. They often fly and sit in flocks. At one time, it was the most numerous of the vultures in India.

Behaviour of the Species

White-rumped vultures usually become active when the morning sun is warming up the air so that thermals are sufficient to support their soaring. They were once visible above Calcutta in large numbers. Where water is available they bathe regularly and also drink water. A pack of vultures was observed to have cleaned up a whole bullock in about 20 minutes.Trees on which they regularly roost are often white from their excreta, and this acidity often kills the trees. This made them less welcome in orchards and plantations.

Food Habits

When they find a carcass, they quickly descend and feed voraciously. They perch on trees nearby and are known to sometimes descend also after dark to feed. They swallow pieces of old, dry bones such as ribs and of skull pieces from small mammals. They sometimes feed on dead vultures.

Reproduction

The preferred nesting trees were Banyan, Peepal, Arjun, and Neem. The main nesting period was November to March with eggs being laid mainly in January. Several pairs nest in the vicinity of each other and isolated nests tend to be those of younger birds. Nests are nearly 3 feet in diameter and half a foot in thickness, and are lined with green leaves. The male initially brings twigs and arranges them to form the nest. During courtship the male bills the female's head, back and neck. The female invites copulation, and the male mounts and hold the head of the female in his bill. Usually, the female lays a single egg, which is white with a tinge of bluish-green. Female birds destroy the nest on loss of an egg. They are usually silent but make hissing and roaring sounds at the nest or when jostling for food. The eggs hatch after about 30 to 35 days of incubation. The young chick is covered with grey down. The parents feed them with bits of meat from a carcass. The young birds remain for about three months in the nest.

Status and Conservation

Conservation status

Schedule –I (Wildlife Protection Act – 1972)

Critically Endangered (IUCN)

The white-rumped vulture was originally very common especially in the Gangetic plains of India, and often seen nesting on the avenue trees within large cities in the region.Before the 1990s they were even seen as a nuisance, particularly to aircraft as they were often involved

in bird strikes. This species has suffered a 99% population decrease in Indiaand nearby countries. Since the early 1990s. The decline has been widely attributed to poisoning by diclofenac, which is used as veterinary non-steroidal anti-inflammatory drug (NSAID), leaving traces in cattle carcasses which when fed on leads to kidney failure in birds.Diclofenac was also found to be lethal at low dosages to other species in the genus *Gyps*.Other NSAIDs were also found to be toxic, to *Gyps* as well as other birds such as storks. It was shown between 2000-2007 annual decline rates in India averaged 43.9% and ranged from 11-61% in Punjab. Organochlorine pesticide residues were found from egg and tissue samples from around India varying in concentrations from 0.002 µg/g of DDE in muscles of vulture. Dieldrin varied from 0.003 and 0.015 µg/g. These pesticide levels have not however been implicated in the decline.

It has been suggested that Meloxicam (another NSAID) as a veterinary substitute that is harmless to vultures would help in the recovery. Campaigns to ban the use of diclofenac in veterinary practice have been underway in several South Asian countries.

Conservation measures have included reintroduction, captive-breeding programs and artificial feeding or "vulture restaurants".

Probable Threats to the species

- Habitat loss, due to rapid growth of development in rural as well as agricultural sector results in the shortage of natural habitats especially big trees as the bird itself is very huge and need huge trees to build nest for reproduction, now a days big trees are decreasing as well.
- The decline has been widely attributed to poisoning by diclofenac, which is used as veterinary non-steroidal anti-inflammatory drug (NSAID), leaving traces in cattle carcasses which when fed on leads to kidney failure in birds.
- Trees on which they regularly roost are often white from their excreta, and this acidity often kills the trees. This made them less welcome in orchards and plantations.

Conservation Measures

Direct and indirect approach is required to provide effective conservation, which is recommended as under:

1. Increasing the tree cover in the study area which will provide habitat and roosting and nesting the vulture and it require big trees so the conservation of such big trees is also equally essential.
2. This can be achieved by planting of trees (a group of trees that grow close together, generally without many bushes or other plants) in buffer area. By encouraging people for plantation of some local species such as Neem, Shirish, Khakhro, Haldu, Amli, Banyan, Peepal and Peeper or other *Ficus sp.* Vacant places such as edges of agricultural fields, village Gauchar, Panchayat's common land, neighbourhood of

people inhibiting, road side avenue tree plantation, open scrubs, ravines, school compounds can be selected for practicing the plantation activity.

3. Awareness programmes (community and school level) for conservation of Vulture in the study area and also through organizing Presentations, competitions during "Wildlife Week" and "Van Mahotsav" celebrations by active involvement of local community. People should make aware of benefits of vulture as it act as natural cleaner as it feed on dead Caracas. People also should make aware of negative effects of uses of Diclofenac as veterinary treatments and It has been suggested that Meloxicam (another NSAID) as a veterinary substitute that is harmless to vultures would help in the recovery.
4. Some provision of rewards to informers for the control of poaching and illegal trade in wildlife.
5. Carrying out census and research projects to know the potential threats and population status of the species in collaboration of local schools, colleges, panchayats and forest department.
6. Provision of veterinary care and Rescue for the species when it comes with direct encounter to community inhibiting nearby especially during the Uttarayan festival during which many birds get injured by sharp thread of kites.
7. Another way to help preserve the endangered species is to create society dedicated to ecological ethics. All the conservation measures will be implemented with the help of and in the consultation of the district forest department.
8. With the objective of effectively protecting the wild life and to control poaching, smuggling and illegal trade in wildlife and its derivatives, the Government of India enacted Wild Life (Protection) Act 1972. The Act was amended in January 2003 and punishment and penalty for offences under the Act have been made more stringent.

The proponent has proposed a sum of Rs. 282500/-for the "Vulture" conservation plan under the following heads:

S. No	Work or Activity	Approximate Cost. Rs.
1	Plantation-350 tree plants (5 feet heightas per the plant species-Cost of sapling will be changed per year)	52,500/-(@ 150/-per plant)
2	Small water tank or tanka –20 in number @ 5000/- per tank	1,00,000/-
3	Five awareness programme for "Vulture" conservation	20,000/ Program =1,00,000/-
4	3 cash prizes @ 10000 in a year will be awarded to the informer of poachers.	30,000/-
	TOTAL	**282500/-**

- **Indian Peafowl (*Pavocristatus*)**

Classification

Kingdom	: Animalia
Phylum	: Chordata
Class	: Aves
Order	: Galliformes
Family	:Phasianidae
Genus	: Pavo
Species	: Pavocristatus
Common Name	: Indian Peafowl
Vernacular Name	: Mor

General Description of the species

Peacock or Indian peafowl (*Pavocristatus*) is a familiar and universally known large pheasant. It is the **National Bird of India**. The term "Peacock" is commonly used to refer to birds of both sexes. Technically, only males are Peacock, females are Peahens and together they are called Peafowl. The male has a spectacular glossy green long tail feathers that may be more than 60 percent of the bird's total body length. These feathers have blue, golden green and copper coloredocelli (eyes). The long tail feathers are used for mating rituals like courtship displays. The feathers are arched into a magnificent fan shaped form across the back of the bird and almost touching the found on both sides. Females do not have these graceful tail feathers. They have the fan like crest with whitish face and throat, chestnut brown crown and hind neck, metallic green upper breast and mantle, white belly and brown back rump and tail. Their primaries are dark brown.

Life Cycle of the species

Call: Kee-ow, Kee- ow, Kee-ow, Ka- an, Ka- an, Ka- an, Kok- kok, Kok- kok, cain- kok

Breeding: April – September

Nest site: On ground in undergrowth (wild) on buildings by semi- feral birds in villages, they also prefer Old Houses, Kachcha Houses

Average Body length: 180-230 cm

Average Weight: 2750-6000 gm

Habitat: Agricultural fields, Rural Settlements, Ravines, Tall trees for Roosting, Open Scrubs

Behaviour of the Species

Peacocks are gregarious by nature. In the breeding season they are usually seen in small parties of one male with three to five females whereas in the non-breeding season they remain in separate parties of adult males and females with juveniles. Peacocks roost in tall trees and emerge from the dense thickets to feed in fields and openings in forests and fields.

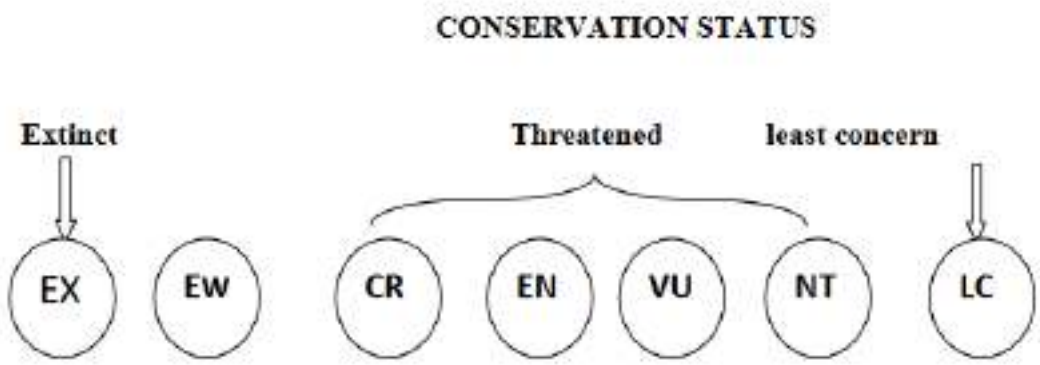
Food Habits

Peacocks are ground feeders and omnivores in nature. Indian peafowl's do most of their foraging early in the morning and shortly before sunset. They retreat to the shade and security of the trees for the hottest portion of the day. They make a meal of grains, berries drupes wild figs and some cultivated crops. They can also eat insects, reptiles especially snakes and small mammals.

Present study area have open agriculture fields surrounded with rural settlements where peafowl can easily find the seeds such as grains, pulses etc. as well as plant parts, flower petals, seed heads, insects and other arthropods, reptiles and amphibians very easily and due to this easy availability of food they inhibits in the region and also reproduces easily.

Conservation and Its relationship with Humans

Indian peafowl is a very common and popular throughout the region due to its beautiful appearance so as its popularity and so Indian peafowl has ensured its protection through most of its native ranges. Having an importance as National Bird this species is well conserved throughout the region. The Indian peafowl is prominent in the Indian mythology and folklore of the Indian people. The majority of the people inhibiting are belongs to Hindu religion in which the bird is considered sacred because of its association with Lord Krishna as their identical feature of appearance was from Peacock feather Crown (MorMokut). It is also associated with the God Kartikeya, Son of the Lord Shiva and Parvati and brother of Lord Ganesh who was having Indian Peafowl as his own vehicle (Vahan).



IUCN : Least Concern
IWPA : Schedule I

Present survey of the peafowl in the buffer zone of the project site cleared that; peafowl is using both, village adjacent habitats, agricultural habitats, scrub-forest habitats of the buffer zone as well as the study area. However, the following points can give an insight on the overall status of peafowl in the study area and thereby plan for better management strategies related to proposed project activities. People of the surveyed villages were well aware of the habits and habitats of peafowl in the study area. Moreover, local people are against to hunting and poaching of the peacocks. In the buffer zone, peafowl uses agriculture (adjacent to village) and scrubland-forest habitats as a feeding and breeding ground. Some of the peacocks are taking shelter in the inside of the village as well as adjacent habitats. It clearly indicated that, peafowl normally uses human associated and natural habitats. Form above study, it has been visualized that, the proposed project will not have any significant impact on peacock in terms of their normal movements and other activities as the species is familiar among the people in the region and the status of it is increasing eventually. However, it is necessity to take some management optionslike habitat improvement in the villages located in the vicinity of the project site. So, habitat improvement programme (plantation of local plant species) will be undertaken indifferent villages located in the close vicinity of the project area. Under this programme saplings will be distributed in the nearby villages with the consultation of the local forest department. This program will provide trees for shelter to the species in near future which will contribute for effective species conservation.

Probable Threats to the species

- Habitat loss, due to rapid growth of development in rural as well as agricultural sector results in the shortage of tall trees in and around the villages which plays essential role for roosting for the species. They also plays vital role by providing shelter during hot summer months.
- Shortage of drinking water for the birds during the hot summer days. As there are very few perennial water resources present in the study area.
- Casualties' causes by eating chemically treated as well as contaminated agricultural crop seeds.
- Illegal hunting by some communities In the study area, all the villages surveyed are against hunting or poaching of the people and not found any such activity promoted in this region.
- Peacock conservation plan has to address above listed threats.

Conservation Measures

Direct and indirect approach is required to provide effective conservation, which is recommended as under:

1. Increasing the tree cover in the study area which will provide shelter and roosting to the peacocks. This can be achieved by planting of trees (a group of trees that grow close together, generally without many bushes or other plants) in buffer area. By encouraging

people for plantation of some local species such as Neem, Shirish, Khakhro, Haldu, Amli, Banyan, Peepal and Peeper or other *Ficus sp.* Vacant places such as edges of agricultural fields, village Gauchar, Panchayat's common land, neighbourhood of people inhibiting, road side avenue tree plantation, open scrubs, ravines, school compounds can be selected for practicing the plantation activity.

2. Awareness programmes (community and school level) for conservation of peacocks in the study area and also through organizing competitions during "Wildlife Week" and "Van Mahotsav" celebrations by active involvement of local community.
3. Some provision of rewards to informers for the control of poaching and illegal trade in wildlife.
4. Carrying out census and research projects to know the potential threats and population status of the species in collaboration of local schools, colleges, panchayats and forest department.
5. Provision of veterinary care and cages for injured or sick deformed birds especially during 'Uttarayan' – A Kite flying festival where the birds are prone to thread injuries.
6. Suggest strategies to minimize negative impacts of changing environment in nearby area of peacock populations and to promote conservation of peacock habitats.
7. Another way to help preserve the endangered species is to create society dedicated to ecological ethics. All the conservation measures will be implemented with the help of and in the consultation of the district forest department.
8. With the objective of effectively protecting the wild life and to control poaching, smuggling and illegal trade in wildlife and its derivatives, the Government of India enacted Wild Life (Protection) Act 1972. The Act was amended in January 2003 and punishment and penalty for offences under the Act have been made more stringent.

The proponent has proposed a sum of Rs. 202500/-for the "Peacock" conservation plan under the following heads:

S. No	Work or Activity	Approximate Cost. Rs.
1	Plantation-350 tree plants (5 feet heightas per the plant species-Cost of sapling will be changed per year)	52,500/-(@ 150/-per plant)
2	Small water tank or tanka –20 in number @ 5000/- per tank	1,00,000/-
3	One awareness programme for "Peacock" conservation	20,000/-
4	3 cash prizes @ 10000 in a year will be awarded to the informer of poachers.	30,000/-
	TOTAL	**202500/-**

Total Budgetary Allocation

1.	"Vulture" Conservation Plan	Rs. 2,82,500 /-
2.	"Peacock" Conservation Plan	Rs. 2,02,500 /-
	Total Budget	**Rs. 4,85, 000/-**

Red- Headed Vulture

(*Sarcogypscalvus*)

Scientific classification

Kingdom: Animalia
Phylum: Chordata
Class: Aves
Order: Accipitriformes
Family: Accipitridae
Genus: *Sarcogyps*
Lesson, 1842
Species: ***S. calvus***

Binomial name
Sarcogypscalvus

General Description of the species

The Red-headed vulture (*Sarcogypscalvus*), also known as the Asian king vulture, Indian black vulture or Pondicherry vulture, is an Old World vulture mainly found in the Indian subcontinent, with small disjunct populations in some parts of Southeast Asia. The red-headed vulture has started becoming more harder to come by as it is being hunted down.There has been evidenced compiled that showed hunters have started " the use of poisons in hunting practices"(Loveridge), which has led to the population analysis showing "that since 2010 populations of the White-rumped Vulture Gyps bengalensis and Red-headed Vulture Sarcogypscalvus have declined, while the Slender-billed Vulture Gyps tenuirostris may also have started to decline since 2013" (Loveridge). ==Description== It is a medium-sized vulture of 76 to 86 cm (30 to 34 in) in length, weighing 3.5–6.3 kg (7.7–13.9 lb) and having a wingspan of about 1.99–2.6 m (6.5–8.5 ft). It has a prominent naked head: deep-red to orange in the adult, paler red in the juvenile. It has a black body with pale grey band at the base of the flight feathers. The sexes differ in colour of the iris: males have a paler, whitish iris, whilst in females it is dark brown.

Behaviour of the Species

Red-headed vultures usually become active when the morning sun is warming up the air so that thermals are sufficient to support their soaring. Where water is available they bathe regularly and also drink water. A pack of vultures was observed to have cleaned up a whole bullock in about 20 minutes.Trees on which they regularly roost are often white from their excreta, and this acidity often kills the trees. This made them less welcome in orchards and plantations.

Food Habits

When they find a carcass, they quickly descend and feed voraciously. They perch on trees nearby and are known to sometimes descend also after dark to feed. They swallow pieces of old, dry bones such as ribs and of skull pieces from small mammals. They sometimes feed on dead vultures.

Reproduction

The preferred nesting trees were Banyan, Peepal, Arjun, and Neem. The main nesting period was November to March with eggs being laid mainly in January. Several pairs nest in the vicinity of each other and isolated nests tend to be those of younger birds. Nests are nearly 3 feet in diameter and half a foot in thickness, and are lined with green leaves. The male initially brings twigs and arranges them to form the nest. They are usually silent but make hissing and roaring sounds at the nest or when jostling for food. The eggs hatch after about 30 to 35 days of incubation. The young chick is covered with grey down. The parents feed them with bits of meat from a carcass. The young birds remain for about three months in the nest.

Status and Conservation

Conservation status

Schedule –I (Wildlife Protection Act – 1972)

Critically Endangered (IUCN)

The red-headed vulture used to be declining, but only slowly; in 2004 the species was uplisted to near threatened from least concern by the IUCN. The widespread use of the NSAIDdiclofenac in veterinary medicine in India has caused its population to collapse in recent years, however. Diclofenac is a compound now known to be extremely poisonous to vultures. The red-headed vulture population has essentially halved every other year since the late 1990s, and what once was a plentiful species numbering in the hundreds of thousands has come dangerously close to extinction in less than two decades. Consequently, it was uplisted to critically endangered in the 2007 IUCN Red List.

Several NSAIDs have been found to be harmful to scavenging birds. Diclofenac, carprofen, flunixin, ibuprofen and phenylbutazone were associated with mortality. Meloxicam has thus far been found to be "Vulture-Safe" and its use in veterinary treatment of livestock is being encouraged.

Probable Threats to the species

- Habitat loss, due to rapid growth of development in rural as well as agricultural sector results in the shortage of natural habitats especially big trees as the bird itself is very huge and need huge trees to build nest for reproduction, now a days big trees are decreasing as well.
- The decline has been widely attributed to poisoning by diclofenac, which is used as veterinary non-steroidal anti-inflammatory drug (NSAID), leaving traces in cattle carcasses which when fed on leads to kidney failure in birds.
- Trees on which they regularly roost are often white from their excreta, and this acidity often kills the trees. This made them less welcome in orchards and plantations.

Conservation Measures

Direct and indirect approach is required to provide effective conservation, which is recommended as under:

9. Increasing the tree cover in the study area which will provide habitat and roosting and nesting the vulture and it require big trees so the conservation of such big trees is also equally essential.
10. This can be achieved by planting of trees (a group of trees that grow close together, generally without many bushes or other plants) in buffer area. By encouraging people for plantation of some local species such as Neem, Shirish, Khakhro, Haldu, Amli, Banyan, Peepal and Peeper or other *Ficus sp.* Vacant places such as edges of agricultural fields, village Gauchar, Panchayat's common land, neighbourhood of people inhibiting, road side avenue tree plantation, open scrubs, ravines, school compounds can be selected for practicing the plantation activity.
11. Awareness programmes (community and school level) for conservation of Vulture in the study area and also through organizing Presentations, competitions during "Wildlife Week" and "Van Mahotsav" celebrations by active involvement of local community. People should make aware of benefits of vulture as it act as natural cleaner as it feed on dead Caracas. People also should make aware of negative effects of uses of Diclofenac as veterinary treatments and It has been suggested that Meloxicam (another NSAID) as a veterinary substitute that is harmless to vultures would help in the recovery.
12. Some provision of rewards to informers for the control of poaching and illegal trade in wildlife.
13. Carrying out census and research projects to know the potential threats and population status of the species in collaboration of local schools, colleges, panchayats and forest department.
14. Provision of veterinary care and Rescue for the species when it comes with direct encounter to community inhibiting nearby especially during the Uttarayan festival during which many birds get injured by sharp thread of kites.

15. Another way to help preserve the endangered species is to create society dedicated to ecological ethics. All the conservation measures will be implemented with the help of and in the consultation of the district forest department.
16. With the objective of effectively protecting the wild life and to control poaching, smuggling and illegal trade in wildlife and its derivatives, the Government of India enacted Wild Life (Protection) Act 1972. The Act was amended in January 2003 and punishment and penalty for offences under the Act have been made more stringent.

Oriental Honey Buzzard (*Pernisptilorhynchus)*

Scientific classification

Kingdom: Animalia
Phylum: Chordata
Class: Aves
Order: Accipitriformes
Family: Accipitridae
Genus: *Pernis*
Species: ***P. ptilorhynchus***

Binomial name

Pernisptilorhynchus

General Description of the species

Despite its name, this species is not related to Buteobuzzards, and is taxonomically closer to the kites. It appears long-necked with a small head (resembling that of a pigeon), and soars on flat wings. The head lacks a strong superciliary ridge, giving it a facial appearance very unlike a raptor. It has a long tail and a short head crest. It is brown above, but not as dark as European honey buzzard, and paler below. A dark throat stripe is present. Unusually for a large bird of prey, the sexes can be distinguished. The male has a blue-grey head, while the female's head is brown. She is slightly larger and darker than the male. The male has a black tail with a white band. It is larger and longer-winged than its western counterpart, the European honey buzzard, *Pernisapivorus*.

Breeding of the species

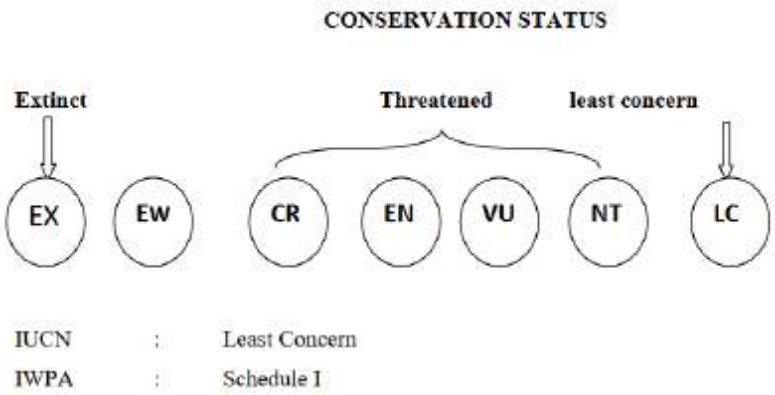
It breeds in Asia from central Siberia east to Japan. It is a summer migrant to Siberia, wintering in tropical Southeast Asia. Elsewhere, it is more-or-less resident.

Food Habits&Behaviour of the Species

It is a specialist feeder, living mainly on the larvae of social bees and wasps, and eating bits of comb and honey. It takes other small insect prey such as cicadas. The crested honey buzzard breeds in woodland, and is inconspicuous except in the spring, when the mating display includes wing-clapping. The display of roller-coasting in flight and fluttering wings at the peak of the ascent are characteristic of the genus Pernis.

Conservation and Its relationship with Humans

In Rajasthan State it is very common bird of prey and can be easily seen everywhere. It have very good adaptability to every ecosystems such as Agro, Urban, Rural, Forest and Wetlands. As it prefers the larvae of social bees and wasps, and eating bits of comb and honey. It takes other small insect prey such as cicadas as food and so it is very much associated to humans. But in this study area neither any such threat to the species observed nor any harm by humans practiced. The species is well associated with human habitations without any problem.



IUCN	:	Least Concern
IWPA	:	Schedule I

Probable Threats to the species

- This is large bird of prey and it prefers large trees for roosting and nesting so decreasing amount of such trees is kind of direct threat to the species.
- It prefers social bees and wasps for food as well as bits of honey comb so the indirect loss of such species can disturb the food availability of Honey buzzard. It also prey upon small insects such as cicadas so application of various pesticides can indirectly harm the species.
- Global Warming and Air pollution can harm this species in seasonal migration and the health of the species.

Conservation Measures

Direct and indirect approach is required to provide effective conservation, which is recommended as under:

- Increasing the tree cover in the study area which will provide shelter and roosting to the Honey Buzzard. This can be achieved by planting of trees (a group of trees that grow close together, generally without many bushes or other plants) in buffer area. By encouraging people for plantation of some local species such as Neem, Shirish, Khakhro, Haldu, Amli, Banyan, Peepal and Peeper or other *Ficus sp.* Vacant places such as edges of agricultural fields, village Gauchar, Panchayat's common land, neighbourhood of people inhibiting, road side avenue tree plantation, open scrubs, ravines, school compounds can be selected for practicing the plantation activity.
- Awareness programmes (community and school level) for conservation of Bird of Preys in the study area as well as negative effects of Chemical pesticide and how it is harmful to the food chain of such species is very essential and the same can be achieved through organizing competitions during "Wildlife Week" and "Van Mahotsav" celebrations by active involvement of local community.
- Some provision of rewards to informers for the control of poaching and illegal trade in wildlife.
- Carrying out census and research projects to know the potential threats and population status of the species in collaboration of local schools, colleges, panchayats and forest department.
- Provision of veterinary care and cages for injured or sick deformed birds especially during 'Uttarayan' – A Kite flying festival where the birds are prone to thread injuries.
- Suggest strategies to minimize negative impacts of changing environment in nearby area of Oriental Honey buzzard populations and to promote conservation of habitats.
- Another way to help preserve the endangered species is to create society dedicated to ecological ethics. All the conservation measures will be implemented with the help of and in the consultation of the district forest department.
- With the objective of effectively protecting the wild life and to control poaching, smuggling and illegal trade in wildlife and its derivatives, the Government of India enacted Wild Life (Protection) Act 1972. The Act was amended in January 2003 and punishment and penalty for offences under the Act have been made more stringent.

- **Short Toed Snake Eagle(*Circaetusgallicus*)**

Scientific classification

Kingdom: Animalia

Phylum: Chordata

Class: Aves

Order: Accipitriformes

Family: Accipitridae

Genus: *Circaetus*

Species: ***C. gallicus***

Binomial name

Circaetusgallicus

General Description of the species

The **short-toed snake eagle** (*Circaetusgallicus*), also known as **short-toed eagle**, is a medium-sized bird of prey in the family Accipitridae, which also includes many other diurnal raptors such as kites, buzzards and harriers. The genus name *Circaetus* is from the Ancient Greek*kirkos*, a type of hawk, and *aetos*, "eagle". The specific *gallicus* means "of Gaul".

This is an Old World species found throughout the Mediterranean basin, into Russia and the Middle East, and parts of Asia, mainly in the Indian Subcontinent and also further east in some Indonesian islands.The short-toed snake eagle is found in open cultivated plains, arid stony deciduous scrub areas and foothills and semi-desert areas. It requires trees for nesting and open habitats, such as cultivations and grasslands for foraging.

Adults are 62–67 cm (2 ft 0 in–2 ft 2 in) long with a 170–185 cm (5 ft 7 in–6 ft 1 in) wingspan and weigh 1.2–2.3 kg (2.6–5.1 lb). They can be recognised in the field by their predominantly white underside, the upper parts being greyish brown. The chin, throat and upper breast are a pale, earthy brown. The tail has 3 or 4 bars. Additional indications are an owl-like rounded head, brightly yellow eyes and lightly barred under wing.

The short-toed snake eagle spends more time on the wing than do most members of its genus. It favours soaring over hill slopes and hilltops on updraughts, and it does much of its hunting from this position at heights of up to 500 m (1,600 ft). When quartering open country it frequently hovers like a kestrel. When it soars it does so on flattish wings.

Breeding of the species

This eagle is generally very silent. On occasions, it emits a variety of musical whistling notes. When breeding, it lays only one egg. It can live up to 17 years.

The short-toed snake eagle has suffered a steep decline in numbers and range in Europe and is now rare and still decreasing in several countries due to changes in agriculture and land use. It needs protection. In the middle and far eastern part of its range, this species is not yet threatened.

Food Habits&Behaviour of the Species

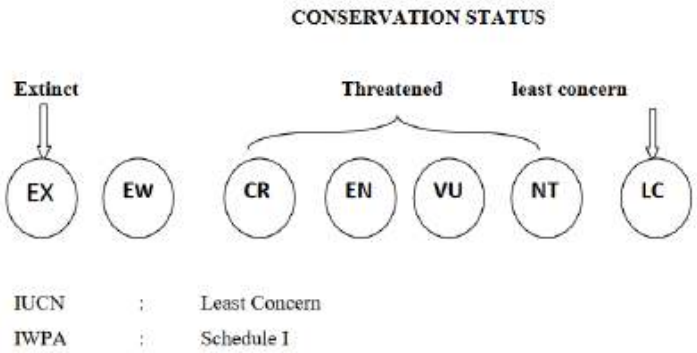
Its prey is mostly reptiles, mainly snakes, but also some lizards. Sometimes they become entangled with larger snakes and battle on the ground. Occasionally, they prey on small mammals up to the size of a rabbit, and rarely birds and large insects.

Conservation and Its relationship with Humans

In his description of the species, Buffon says that he kept one of these eagles in captivity and observed its behaviour. The captive bird ate mice and frogs, and he states that the *Jean-de-blanc* was well known by French farmers for raiding poultry. It also helps humans especially in agriculture sector by preying upon so called pests such as Rats and Mice and reduces its adverse effect on seed storage.

Probable Threats to the species

- Short toed Snake Eagle often perch on electric wires and are frequent victims of electrocution.
- Their habit of swooping to pick up dead rodents or other roadkill leads to collisions with vehicles.
- Instances of mass poisoning as a result of feeding on poisoned pests in agricultural fields.



Conservation Measures

Direct and indirect approach is required to provide effective conservation, which is recommended as under:

- Increasing the tree cover in the study area which will provide shelter and roosting to the Short toed Snake Eagle. This can be achieved by planting of trees (a group of trees that grow close together, generally without many bushes or other plants) in

buffer area. By encouraging people for plantation of some local species such as Neem, Shirish, Khakhro, Haldu, Amli, Banyan, Peepal and Peeper or other *Ficus sp.* Vacant places such as edges of agricultural fields, village Gauchar, Panchayat's common land, neighbourhood of people inhibiting, road side avenue tree plantation, open scrubs, ravines, school compounds can be selected for practicing the plantation activity.

- Awareness programmes (community and school level) for conservation of Bird of Preys in the study area as well as negative effects of Chemical pesticide and how it is harmful to the food chain of such species is very essential and the same can be achieved through organizing competitions during "Wildlife Week" and "Van Mahotsav" celebrations by active involvement of local community.
- Some provision of rewards to informers for the control of poaching and illegal trade in wildlife.
- Carrying out census and research projects to know the potential threats and population status of the species in collaboration of local schools, colleges, panchayats and forest department.
- Provision of veterinary care and cages for injured or sick deformed birds especially during 'Uttarayan' – A Kite flying festival where the birds are prone to thread injuries.
- Suggest strategies to minimize negative impacts of changing environment in nearby area of Short toed Snake Eagle populations and to promote conservation of habitats.
- Another way to help preserve the endangered species is to create society dedicated to ecological ethics. All the conservation measures will be implemented with the help of and in the consultation of the district forest department.
- With the objective of effectively protecting the wild life and to control poaching, smuggling and illegal trade in wildlife and its derivatives, the Government of India enacted Wild Life (Protection) Act 1972. The Act was amended in January 2003 and punishment and penalty for offences under the Act have been made more stringent.

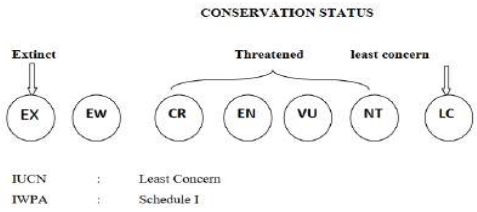
Indian Flapshell Turtle (*Lissemyspunctata*)

Scientific classification

Kingdom:	Animalia
Phylum:	Chordata
Class:	Reptilia
Order:	Testudines
Suborder:	Cryptodira
Family:	Trionychidae
Genus:	*Lissemys*
Species:	***L. punctata***

Binomial name

Lissemyspunctata



General Description of the species

The carapace of *L. punctata* viewed from above is broadly oval in adults, but more circular in young, widest just anterior to hind limbs. The width of the disc is 77-86% of its length, the carapace is moderately arched, shell height is 35.0-40.5% of carapace length, the margin of the carapace is smooth and slightly flared posteriorly, the marginal bones are not united with the pleurals, the plastron is large but mostly cartilaginous, and its length is 88-97% of the carapace length. A pair of large flaps can be closed over the hind limbs and a smaller flap over tail; seven plastral callosities are present, and the head is large, its width is 21-25% of the carapace width. The proboscis is short and stout; the nasal septum has no lateral ridge, the edges of the jaws are smooth, the alveolar surfaces are expanded and granular. The claws are large and heavy; the penis is thick and oval, with deep dorsal cleft and four pointed, soft papillae; the tail is very short in both sexes. The carapace length of *L. punctata* has been known to range from 240 to 370 mm (9.4 to 14.6 in).

L. punctata lives in the shallow, quiet, often stagnant waters of rivers, streams, marshes, ponds, lakes and irrigation canals, and tanks. Waters with sand or mud bottoms are preferred because of the turtle's tendency to burrow. *L. punctata* turtle plays an important role to reduce pollution in aquatic ecosystems by feeding on snails, insects, and fragments of dead animals*L. punctata* is very well adapted, both morphologically and behaviorally, to drought conditions. The turtle uses mainly burrowing and moving from water hole to water hole to avoid desiccation. The femoral flaps that cover the retracted legs help the turtle survive dry conditions. During a time of drought, the turtles enter a time of estivation in an attempt to survive the dry conditions. Although many turtles die during drought conditions, some turtles have been reported to survive up to 160 days.

Food Habits

The Indian flapshell turtle is known to be omnivorous. Its diet consists of frogs, fishes, shrimp, snails, aquatic vegetation, plant leaves, flowers, fruits, grasses, and seeds.

Reproduction

Courtship routines

*L. punctata*becomes reproductively active at age 2 or 3. Courtship and mating behavior is unique. Courtship begins when the male begins stroking the female's carapace with his neck and limbs extended. When receptive, the female faces the male with her neck extended and they begin bobbing their heads vertically three or four times. This behavior is repeated, then mating begins when the female settles to the bottom and is mounted by the male. Near the

end of mating, the male releases his grip and rotates to face the opposite direction from her. They remain attached in this position for as long as 15 minutes. During this time, the female may drag the male about. The pair then separates and copulation ends.

Nesting

Nesting times of *L. punctata* occur during many periods in the year depending on habitat and location. Generally starts during the late summer to the monsoon season which is around June to November. Swampy areas with soil and exposure to sunlight are common nesting sites. Eggs are usually laid two or three times per year in clutches of two to 16. These eggs are buried in soil for protection.

Probable Threats to the species

- The shell of *L. punctata* is believed to be of medicinal value in both China and India. The shell is burnt and ground with oil to produce a medicine in China used to treat certain types of skin diseases. In India, the shell is used to make a remedy believed to be a medicine for tuberculosis.
- In Bangladesh and India, this is especially evident as the Indian flapshell turtle is larger and has more meat than other turtles in the area. The value of this meat along with the efforts in the conservation of this species has driven the price of meat higher and has led to an increase in the illegal international exploitation and killing of these animals. But in present study area there are no any such evidences observed not people practice such killings for food purpose.
- Changes to the turtle's natural habitat by the construction of dams and barrages, cultivation along river banks, and pollution are also major threats to the survival of this turtle

Conservation Measures

Direct and indirect approach is required to provide effective conservation, which is recommended as under:

1. Awareness programmes (community and school level) for conservation of Reptiles such as Turtles in the study area and also through organizing Presentations, competitions during “Wildlife Week” and “Van Mahotsav” celebrations by active involvement of local community.
2. Some provision of rewards to informers for the control of poaching and illegal trade in wildlife.
3. Carrying out census and research projects to know the potential threats and population status of the species in collaboration of local schools, colleges, panchayats and forest department.
4. Provision of veterinary care and Rescue for the species when it comes with direct encounter to community inhibiting nearby.

5. Another way to help preserve the endangered species is to create society dedicated to ecological ethics. All the conservation measures will be implemented with the help of and in the consultation of the district forest department.
6. With the objective of effectively protecting the wild life and to control poaching, smuggling and illegal trade in wildlife and its derivatives, the Government of India enacted Wild Life (Protection) Act 1972. The Act was amended in January 2003 and punishment and penalty for offences under the Act have been made more stringent.

Indian Python (*Python molurus*)

Scientific classification

Kingdom:	Animalia
Phylum:	Chordata
Class:	Reptilia
Order:	Squamata
Suborder:	Serpentes
Family:	Pythonidae
Genus:	*Python*
Species:	***P. molurus***

Binomial name

Python molurus

(Linnaeus, 1758)

General Description of the species

The rock python's colour pattern is whitish or yellowish with the blotched patterns varying from tan to dark brown shades. This varies with terrain and habitat. Specimens from the hill forests of Western Ghats and Assam are darker, while those from the Deccan Plateau and Eastern Ghats are usually lighter. Indian pythons commonly reach a length of 2.4–3.0 m (7.9–9.8 ft.).It lives in a wide range of habitats, including grasslands, swamps, marshes, rocky foothills, woodlands, open forest, and river valleys. It needs a permanent source of water. It hides in abandoned mammal burrows, hollow trees, dense water reeds, and mangrove thickets.

Behaviour of the Species

Lethargic and slow moving even in their native habitat, they exhibit timidity and rarely try to attack even when attacked. Locomotion is usually with the body moving in a straight line, by "walking on its ribs". They are excellent swimmers and are quite at home in water. They can be wholly submerged in water for many minutes if necessary, but usually prefer to remain near the bank.

Food Habits

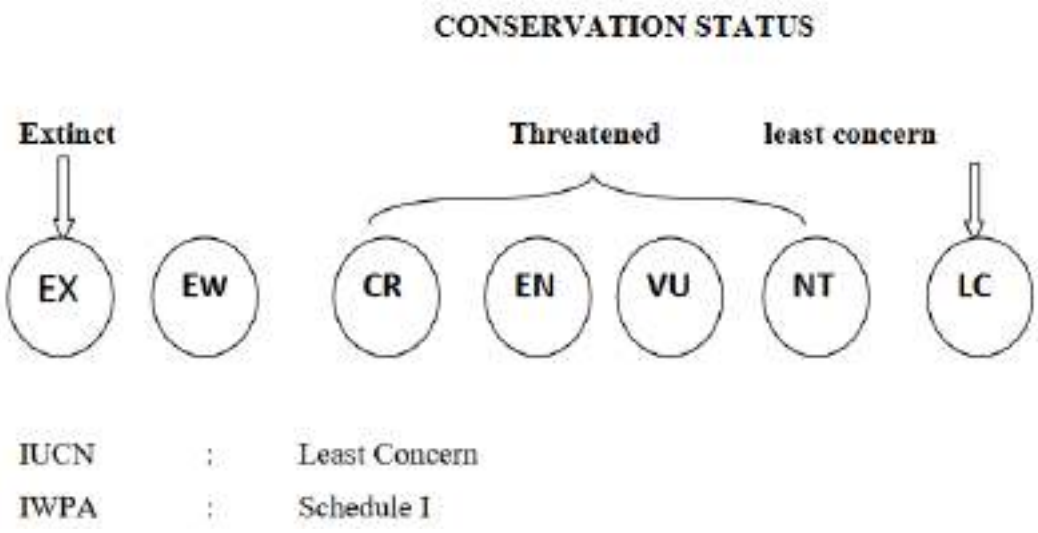
Like all snakes, Indian pythons are strict carnivores and feed on mammals, birds, and reptiles indiscriminately, but seem to prefer mammals. Roused to activity on sighting prey, the snake advances with a quivering tail and lunges with an open mouth. Live prey is constricted and killed. One or two coils are used to hold it in a tight grip. The prey, unable to breathe, succumbs and is subsequently swallowed head first. After a heavy meal, they are disinclined to move. If forced to, hard parts of the meal may tear through the body. Therefore, if disturbed, some specimens disgorge their meal to escape from potential predators. After a heavy meal, an individual may fast for weeks, the longest recorded duration being 2 years. The python can swallow prey bigger than its diameter because the jaw bones are not connected. Moreover, prey cannot escape from its mouth because of the arrangement of the teeth (which are reverse saw-like).

Reproduction

Oviparous, up to 100 eggs are laid by a female, which she protects and incubates. Towards this end, they are capable of raising their body temperature above the ambient level through muscular contractions. The hatchlings are 45–60 cm (18–24 in) in length and grow quickly. An artificial incubation method using climate-controlled environmental chambers was developed in India for successfully raising hatchlings from abandoned or unattended eggs.

Conservation and Its relationship with Humans

The Indian python is classified as lower risk – Least Concern on the IUCN Red List of Threatened Species.The Indian Python is given conservation through Wildlife Protection Act 1972 as it is under Schedule – I species of importance. As the species is Lethargic and Slow moving, people used to keep it as pet from historic times. Earlier this species was under threat as its body parts such as Bones, Skin and Testicles was illegally traded and used for traditional medicines as well as other items manufacturing such as Lather items. People in the study area are very much aware of this species and usually no one kills this species when it comes to accidental encounter with one another. People calls officials of forest department for rescue of it rather than killing by themselves.



IUCN : Least Concern
IWPA : Schedule I

Probable Threats to the species

- Habitat loss, due to rapid growth of development in rural as well as agricultural sector results in the shortage of natural habitats.
- Shortage of water sources the hot summer days as the Python prefers to live nearby a water body. As there are very few perennial water resources present in the study area.
- Casualties' causes by road accidents or by accidental encounter with community inhibiting.
- Illegal hunting by some communities In the study area, all the villages surveyed are against hunting or poaching of the people and not found any such activity promoted in this region.

Conservation Measures

Direct and indirect approach is required to provide effective conservation, which is recommended as under:

7. Increasing the tree cover in the study area which will provide habitat and roosting to the small birds, small mammals and other reptiles which can be important part of food chain of Indian Python. This can be achieved by planting of trees (a group of trees that grow close together, generally without many bushes or other plants) in buffer area. By encouraging people for plantation of some local species such as Neem, Shirish, Khakhro, Haldu, Amli, Banyan, Peepal and Peeper or other *Ficus sp.* Vacant places such as edges of agricultural fields, village Gauchar, Panchayat's common land, neighbourhood of people inhibiting, road side avenue tree plantation,

open scrubs, ravines, school compounds can be selected for practicing the plantation activity.

8. Awareness programmes (community and school level) for conservation of Reptiles such as Python in the study area and also through organizing Presentations, competitions during “Wildlife Week” and “Van Mahotsav” celebrations by active involvement of local community.
9. Some provision of rewards to informers for the control of poaching and illegal trade in wildlife.
10. Carrying out census and research projects to know the potential threats and population status of the species in collaboration of local schools, colleges, panchayats and forest department.
11. Provision of veterinary care and Rescue for the species when it comes with direct encounter to community inhibiting nearby.
12. Another way to help preserve the endangered species is to create society dedicated to ecological ethics. All the conservation measures will be implemented with the help of and in the consultation of the district forest department.
13. With the objective of effectively protecting the wild life and to control poaching, smuggling and illegal trade in wildlife and its derivatives, the Government of India enacted Wild Life (Protection) Act 1972. The Act was amended in January 2003 and punishment and penalty for offences under the Act have been made more stringent.

3.12 SOCIO - ECONOMIC ENVIRONMENT

Any developmental activity exerts a direct impact on the socio-economic environment of the region. Usually, the beneficial impacts such as better job opportunities, improved education, communication, energy, housing, health, transportation facilities etc. outweighs the adverse impacts, if any.

An assessment of socio - economic environment forms an integral part of an EIA study. Therefore, baseline information for the same was collected during the study period. The baseline socio - economic data collected for the study region, before the proposed expansion project is operational, has been identified for the four major indicators viz. demography, civic amenities, economy and social culture. The baseline status of the above indicators is compiled in forthcoming sections.

3.12.1 DEMOGRAPHY

Demographic structure of the study area was estimated for the selected parameters as households, population, sex ratio, scheduled caste, scheduled tribes, literacy from primary census abstract, CD 2011 of Rajasthan State.

TABLE – 3.18

DEMOGRAPHIC DATA

SR. NO.	TOWN / VILLAGE	NO. OF HOUSEHOLD	TOTAL POPULATION	POPULATION (0-6 YEARS)	LITERATES
1	Santhalka	149	945	167	547
2	Rampur	270	1486	204	1009
3	Beeliyawas	110	601	87	385
4	Beelaheri	302	1726	261	1156
5	Seethal	285	1567	174	1138
6	Gadpur	169	1338	348	650
7	Karendi	195	1362	375	490
8	Bahadari	110	775	194	340
9	Karenda	352	2155	530	948
10	Phalsa	125	660	162	322
11	Bhoodli	219	851	170	484
12	Joriya	437	2173	502	834
13	Jhiwana	969	5431	1132	2644

14	Banban	148	937	209	438
15	Tatarpur	382	1862	227	1273
16	Thara	614	2228	367	1566
17	Kalaka	150	748	127	424
18	Shahpur	144	707	113	441
19	Huseengpur	90	411	61	273
20	Banbeerpur	335	1453	165	948
21	Bibipur	181	1152	311	459
22	Chhapar	196	1154	315	482
23	Khatiwas	155	1054	289	381
24	Khohri Khurd	182	1164	259	540
25	Fakaruddinka	199	1381	355	626
26	Pathredi	293	1704	408	831
27	Chaupanki	415	2287	612	907
28	Bandapur	546	2054	420	1144
29	Husaipur	153	897	224	325
30	Kheri	240	1525	315	789
31	Kharkhari	97	765	220	400
32	Sare Kalan	445	2928	771	1154
33	Sare Khurd	204	1297	293	688
	TOTAL	**8712**	**47830**	**10200**	**24489**

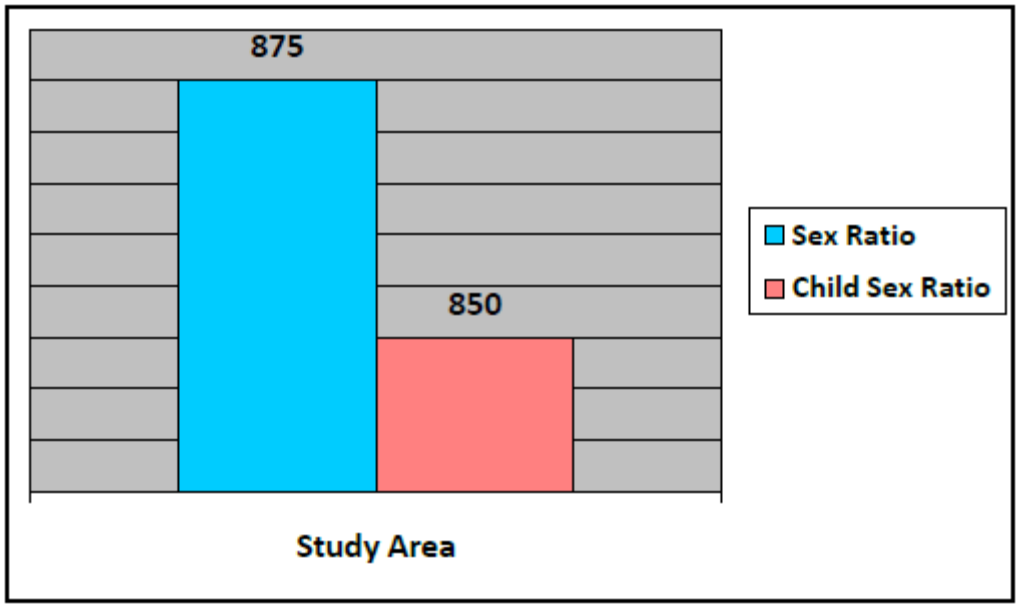
POPULATION DENSITY

Bhiwadi is 65 km away from the New Delhi, 200 km from Jaipur, 90 km from Alwar 22 km from Gurgaon (Manesar) and 60 km from Faridabad. It can also be reached by Gurgaon-Sohna-Tauru-Dharuhera road. As of 2011 India census, Bhiwadi had a population of 1,04,883 in 2011, males constituted 57% and females 43% of the population. The sex ratio of Bhiwadi city is 800 females per 1000 males. The town is spread over nearly 5,300 acres, and houses around 2,700 big, medium and smallscale industries. Industries range from steel mills, furnaces to automobile and electronics manufacturing.

Alwar District is a district in Rajasthan, a state in northern India, with capital in the city of Alwar. The district covers 8,380 km^2. It is bound on the north by Rewari district of Haryana, on the east by Bharatpur and Mewat district of Haryana, on the south by Dausa, and on the west by Jaipur districts. According to the 2011 census Alwar district has a population of 3,671,999. The district has a population density of 438 inhabitants per square kilometre (1,130/sq mi). Its population growth rate over the decade 2001-2011 was 22.7%. Alwar has a sex ratio of 894 females for every 1000 males, and a literacy rate of 71.68%.

FIGURE - 3.11

POPULATION DENSITY

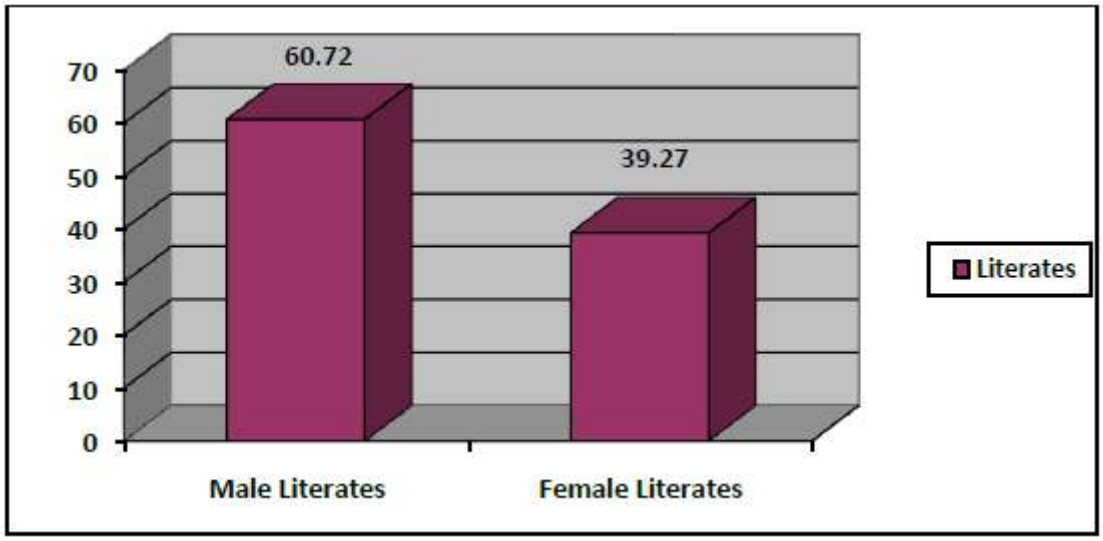


3.12.2 LITERACY RATE

According to the 2011 census Bhiwadi had a population of 104,883, males constituted 57% and females 43% of the population. The sex ratio of Bhiwadi city is 800 females per 1000 male. According to the 2011 census Alwar district has a population of 3,671,999. The district has a population density of 438 inhabitants per square kilometre (1,130/sq mi). Its population growth rate over the decade 2001-2011 was 22.7%. Alwar has a sex ratio of 894 females for every 1000 males, and a literacy rate of 71.68%. The town is spread over nearly 5,300 acres, and houses around 2,700 big, medium and small scale industries. Industries range from steel mills, furnaces to automobile and electronics manufacturing.

FIGURE - 3.12

LITERACY DATA



3.12.3 OCCUPATIONAL STRUCTURE

In economic development of the region its geographical location, natural resources, business and employment, industries and manpower play vital role. Table 3.20 provides the occupational patterns in all villages falling within the area of interest.

TABLE - 3.19

Occupational Structure

OCCUPATIONAL PATTERN IN VILLAGES FALLING UNDER AREA OF INTEREST								
Sr. No	Name of Village	Toal Main Workers	Main Workers				Marginal Workers	Non Workers
			Cultivators	Agricultural Laborers	Household Laborers	Other Workers		
1	Santhalka	443	350	67	3	23	1	501
2	Rampur	360	195	8	0	157	483	643
3	Beeliyawas	146	114	0	0	32	102	353
4	Beelaheri	495	319	7	3	166	392	839
5	Seethal	615	240	13	3	359	194	758
6	Gadpur	398	73	13	9	303	218	722
7	Karendi	321	259	0	3	59	518	523
8	Bahadari	177	146	2	2	27	239	359
9	Karenda	737	337	92	0	308	349	1069
10	Phalsa	282	124	49	0	109	3	375
11	Bhoodli	341	37	1	2	301	11	499
12	Joriya	914	158	0	0	756	214	1045
13	Jhiwana	1624	596	85	31	912	891	2916
14	Banban	379	283	0	0	96	220	338
15	Tatarpur	557	125	15	9	408	260	1045
16	Thara	837	123	2	0	712	202	1189
17	Kalaka	316	38	86	0	192	46	386
18	Shahpur	191	47	66	0	78	239	277
19	Huseengpur	145	61	32	0	52	33	233
20	Banbeerpur	717	110	41	0	566	144	592
21	Bibipur	247	121	8	23	95	175	730
22	Chhapar	339	126	1	0	212	230	585
23	Khatiwas	253	111	50	76	16	193	608
24	Khohri Khurd	429	203	11	1	214	139	596
25	Fakaruddinka	557	357	64	4	132	80	744
26	Pathredi	481	177	10	1	293	117	1106
27	Chaupanki	536	22	2	25	487	446	1305
28	Bandapur	968	95	13	3	857	204	882
29	Husaipur	373	112	3	7	251	112	412
30	Kheri	343	201	29	0	113	355	827
31	Kharkhari	267	69	27	0	171	58	440

32	Sare Kalan	670	481	153	0	36	560	1698
33	Sare Khurd	394	158	90	0	146	376	524
	TOTAL	**15409**	**5618**	**973**	**202**	**8616**	**7803**	**24618**

3.12.4 AMENITIES

Infrastructure resource base of the surveyed villages with reference to education, medical, water resources, post and telegraph, communication, power supply is presented in Table3.21. There are 33 villages within study area of plant site. Significant observations with respect to availability of amenities in study area are as follows.

TABLE – 3.20

DETAILS OF AMMENITIES AVAILABLE IN STUDY AREA

Sr. No.	Amenities	Availability in Number
1.	Education Facility	P(65),M(82), S(16), Ssc(14), C(1)
2.	Medical Facility	CHC(5), PHC(3), PHS(18), D(2), MCW(5)
3.	Drinking Water Facility	T (19), CW(5), HP(68), TW(44)
4.	Drainage Facility	CD(4), OD(64)
5.	Communication Facility	PO(7), PH(63)
6.	Transportation Facility	BS(19), RS(2)
7.	Approach Road	PR(63), KR(56)
8.	Power Supply	ED(69),EAG(71)
9.	Social Security	B(5)

Abbreviations:

Educational Institutions			**Medical Facilities**			**Drinking Water Supply**			**Communication**		
P	:	Primary School	PHC	:	Primary health Centre	T	:	Tap Water	PO	:	Post Office
M	:	Middle School	PHS	:	Primary health sub centre	CW	:	Covered Well Water	PH	:	Phone connections
S	:	Secondary School	D	:	Dispensary	UCW	:	Uncovered Well Water	**Drainage Facility**		
			MCW	:	Maternal and Child Welfare	HP	:	Hand pump	OD	:	Open Drainage
Power Supply			**Approach Road**			**Transportation**			Social Security		
ED	:	Electricity for domestic purpose	PR	:	Pucca Road	BS	:	Bus	CB	:	Commercial Bank
			KR	:	Kuccha road	RS	:	Railway Station	Co. B	:	Cooperative Bank

CHAPTER – 4:
ANTICIPATED ENVIRONMENTAL IMPACT & MITIGATION MEASURES

4.1 IDENTIFICATION OF IMPACTS

Various sources of pollution with respect to wastewater, the flue gas / process emission, hazardous waste and noise generation along with their qualitative and quantitative analysis as well as measures taken to control them are discussed herein with details. The network method was adopted to identify potential impact, which involves understanding of cause-condition-effect relationship between an activity and environmental parameters. This method involves the "road map" type of approach to the identification of second and third order effect. The basic idea is to account for the project activity and identify the type of impact that could initially occur followed by the identification of secondary and tertiary impacts.

Identified potential impacts for the various components of the environment, i.e. air, noise, water, land and socio-economic, are presented in Figure 4.1. It should be noted that in these illustrations the lines are to be read as "might have an effect on".

FIGURE – 4.1

IMPACT NETWORK ON AIR ENVIRONMENT

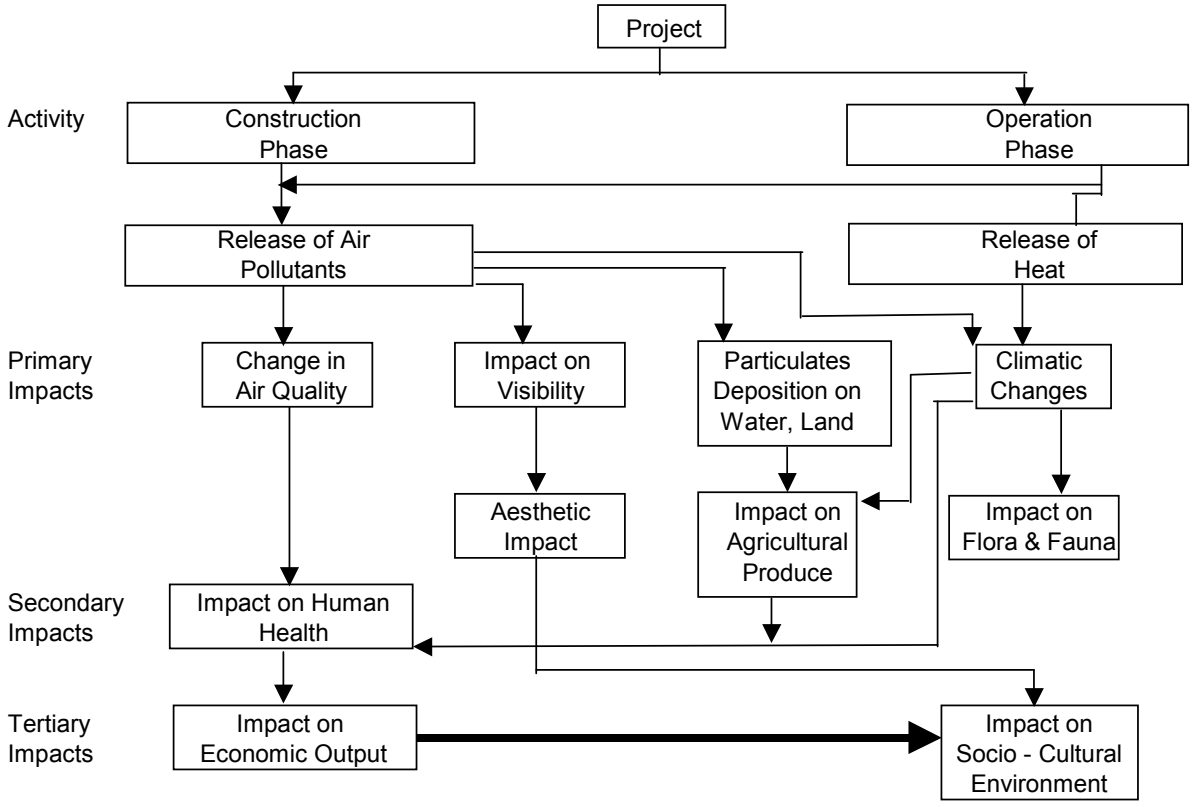


FIGURE – 4.1 CONTD.

IMPACT NETWORK ON NOISE ENVIRONMENT

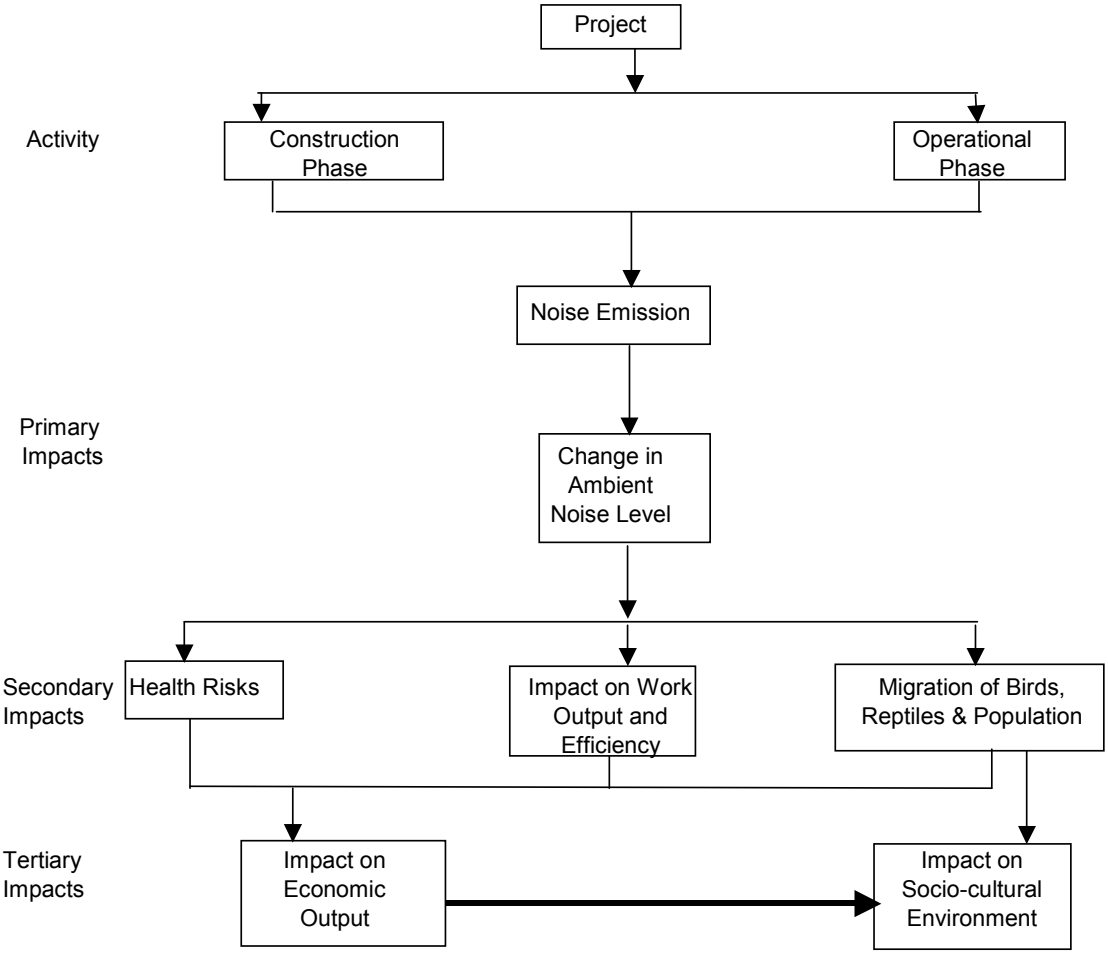


FIGURE – 4.1 CONTD.

IMPACT NETWORK ON WATER ENVIRONMENT

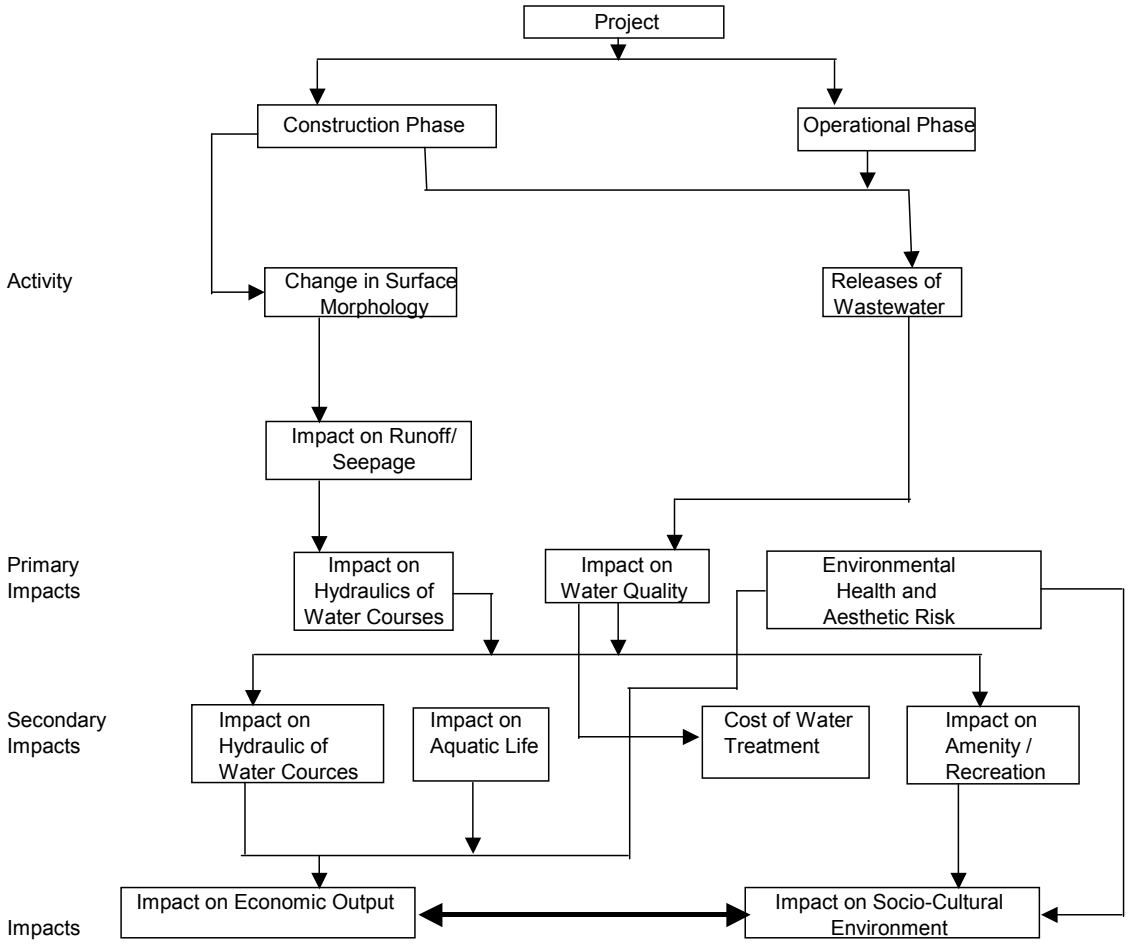


FIGURE – 4.1 CONTD.

IMPACT NETWORK ON GROUND WATER ENVIRONMENT

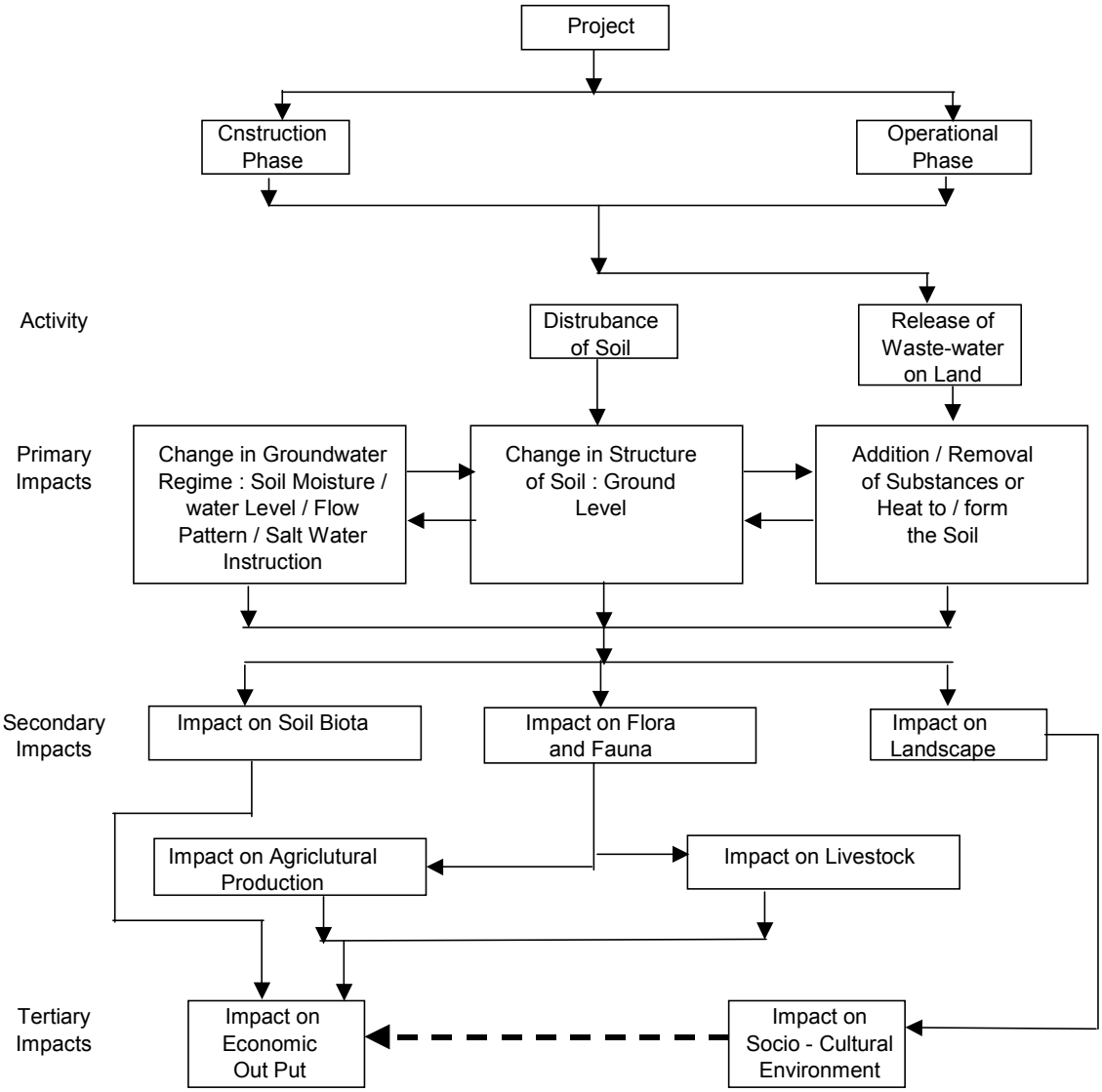


FIGURE – 4.1 CONTD.

IMPACT NETWORK ON LAND ENVIRONMENT

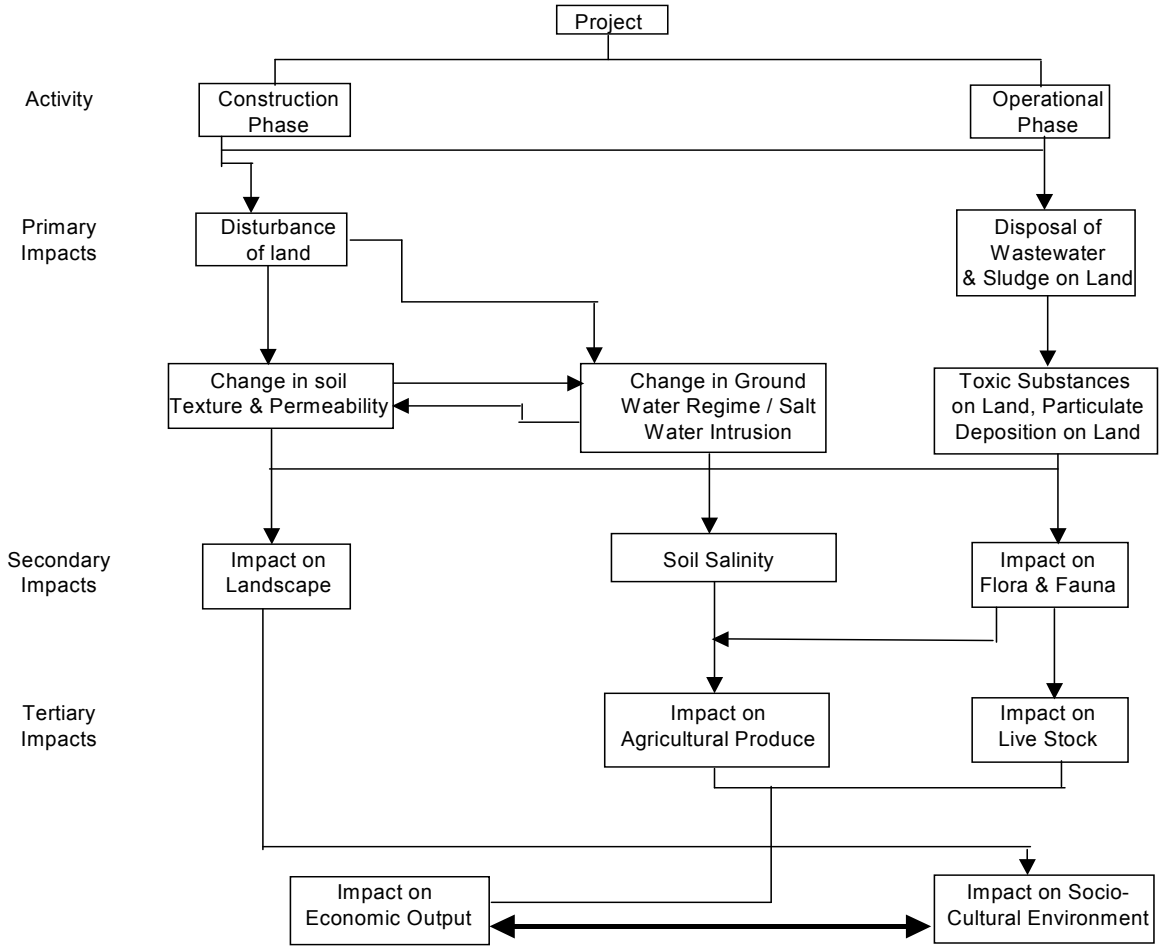
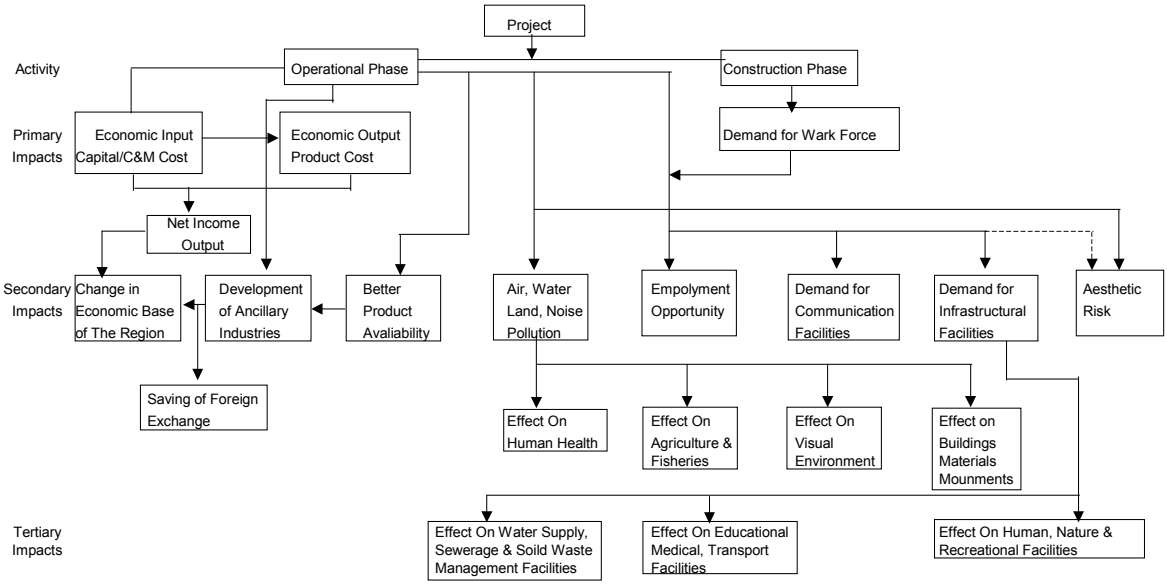


FIGURE – 4.1 CONTD.

IMPACT NETWORK ON SOCIO-ECONOMIC & CULTURAL ENVIRONMENT



4.2 PREDICTIONS AND EVALUATION OF IMPACTS

An impact can be defined as any change in physical, chemical, biological, cultural and/or socioeconomic environment that can be attributed to activities related to alternatives under study for meeting the project needs. Impact methodology provides an organized approach for prediction and assessing these impacts.

Scientific techniques and methodologies based on mathematical modeling are available for studying impacts of various project activities on environmental parameters.

The nature of the impacts due to said project activities are discussed here in detail. Each parameter identified in the proceeding chapter, is singularly considered for the anticipated impact due to various activities listed. The impact is quantified using numerical scores 0, 1, 2, 3, 4 and 5 in increasing order of activity. In order to assess the impact accurately, each parameter is discussed in detail covering the following:

1) Project activities likely to generate impact

2) Quantification and prediction of impact

4.2.1 IDENTIFICATION OF IMPACTING ACTIVITIES

Various activities involved in the project are divided viz.:

A. Construction phase activities: impacts are immediate, in the vicinity and sporadic

B. Operation phase activities: impacts are long term, in wide area and continuous

The activities identified for the project under each phase are:

Construction phase

- Foundation
- Civil work
- Transportation of construction materials, equipments & machineries Installation of equipments & machineries

Operation phase

- Plant operation
- Material storage & handling
- Utilities and services

- Green belt development

TABLE - 4.1

CONSTRUCTION & OPERATION STAGE POTENTIAL IMPACTS & MITIGATIVE MEASURES

ENVIRONMENTAL COMPONENTS	POTENTIAL IMPACTS	SOURCES OF IMPACT	MITIGATIVE MEASURE	REMARKS
Water Quality	Deterioration of water quality	Construction activity & abstraction of water for construction requirement and sanitation in housing for workers. Discharge of process effluents, sewage and utility wastewater.	Proper management of surface water runoff shall be made. Effluent treatment plant (ETP) consists of Primary, Secondary, Tertiary Treatment and MEE. Treated effluent from MEE will be treated in ETP & re-used in plant premises for industrial operations.	Treated Effluent will be re-used in plant premises. Minor adverse impact
Air Quality	Emission from flue gas & process vent	Fugitive emissions	Control equipment for fugitive emissions Adequate Stack Height Adequate APCM like – Multi cyclone Separator with Bag Filter & Scrubber & Scrubbers.	No remarkable increase in GLCs. NAAQ Standards are met Minor adverse impacts on ambient air quality
Hazardous Waste	Hazardous Waste generate from process, ETP, RM and Products storage yard, Machineries and Utilities, etc.	Project activities	• ETP Sludge, Incineration Ash & MEE salt will be Collected, Stored, Transported and Disposal at nearest TSDF site (M/s. UCCI). • Used Oil will be Collected, Stored and Transported & Sent to registered recycler / Reused for Machine Lubrication.	Minor adverse impacts on soil quality

			• Discarded barrels/ containers/ liners will be Collected, Stored, Decontaminated & reuse or Sell to Registered recycler. • Process Residue, Stripper Sludge will be Collected, Stored, Transported and Disposal at CHWIF (M/s. UCCI) or incinerated within premises.	
Socio-Economic	Overall growth & development of area, increased employment, improvement in infrastructure and growth of downstream industries	Project activities	General area planning in advance by RIICO and classified as notified industrial area by RIICO	Beneficial change
Terrestrial Ecology	Minor loss of habitat-flora & fauna, loss of agricultural land	Project activities	Green belt, Proper management of solid waste.	No impact
Noise	Increased noise level	Project operation	Oiling and lubrication, Earplugs and Earmuffs will be provided Maximum possible area will be covered as greenbelt and other forms of greenery.	Marginal impact
Infrastructure & Services	Improved communication, transport, housing, educational & medical facilities	Project	Development has been gradual	Beneficial impact
Environmental Hazards	Risk to environment & neighboring population	Handling and storage of chemicals & fuels	On site & off site Disaster management plan & Safe practices.	Insignificant adverse impact

4.2.2 WATER ENVIRONMENT

Daily water consumption shall be 188 KL/ Day and daily wastewater generation shall be 136 KL/ Day. Water requirement for the project shall be met through RIICO water supply and recycling. RIICO water supply authority is ready to supply the required water to M/s. Insecticides India Limited. Out of 129 KL/Day industrial effluent, effluent from processes, scrubber and lab (49 KL/Day) will be sent to Stripper and 47.75 KL/Day to MEE and MEE condensate (40 KLD) will be sent to ETP for further treatment. Total effluent (127 KL/Day) from septic tank, utilities, washing and MEE Condensate will be sent to ETP and 126 KL/Day final treated effluent will be recycled for industrial operations. Domestic wastewater (7 KL/Day) will be sent to septic tank and then mixed with industrial effluent in ETP for further treatment.

Details of ETP are discussed in Topic 2.10.4 of Chapter 2. Hence, overall there won't be any significant adverse impact due to proposed activity on the water environment. Details of water consumption & wastewater generation are given in Topic 2.10.3 of Chapter 2. Ground water and Soil will not get contaminated, as M/s. Insecticides India Limited is not going to discharge any effluent on land. With the above, it can be said that there will be no significant adverse impact on surface and ground water or soil quality.

4.2.3 AIR ENVIRONMENT

The dispersion of pollutants in the atmosphere is a function of several meteorological parameters viz. temperature, wind speed and direction, mixing depths, inversion level, etc. A number of models have been developed for the prediction of pollutant concentration at any point from an emitting source. The Industrial Source Complex – Short Term (ISCST3) dispersion model is a steady-state Gaussian plume model. It is most widely accepted for its interpretability. It gives reasonably correct values because this obeys the equation of continuity and it also takes care of diffusion, which is a random process. For the present study, this model is used for the prediction of maximum ground level concentration (GLC).

The proposed air emissions at M/s. Insecticides India Limited is PM, SO_2, NOx, HCl, CO & HBr. The site specific and monitored details considered for input data for the software "ISC-AERMOD View" by Lakes Environmental, Canada for prediction of impact on air environment are given in Table 4.1. The site-specific hourly meteorological data measured at site is given in Table 3.5. In order to conduct a refined air dispersion modeling using ISCST3 and ISC-PRIME short-term air quality dispersion models, the site specific hourly meteorological data measured at site is pre-processed using the U.S. EPA PCRAMMET and U.S. EPA AERMET programs. Before starting air dispersion modeling with ISC-AERMOD View, a building downwash analysis using BPIP View was done. BPIP View is a graphical user interface designed to speed up the work involved in setting up input data for the U.S. EPA Building Profile Input Program (BPIP) and Building Profile Input Program – Plume Rise Model Enhancements (BPIP-PRIME).

The air pollution caused by the gaseous emissions from a single or small group of stacks is a local phenomenon. Its impacts will occur at a distance ranging from within the immediate vicinity of the stack to several kilometers away from the stack. Maximum ground level concentration will occur within this range. All plumes at more downwind distances from the source by stack emission become so diluted by diffusion in the ambient atmosphere, that concentrations of pollutants become negligible. The maximum ground level concentration for different parameters is given in Table 4.2. Equal concentration contour plots for SPM, SO_2, NOx, HCl & HBr are given in Figure 4.2. Adequate measures shall be taken to minimize air pollution by providing air pollution control equipment. Flue gases are discharged from stacks at adequate height (as per RSPCB norms).

TABLE – 4.2

DETAILS OF EMISSION FROM STACK & VENTS

FLUE GAS EMISSION DETAILS

SR. NO.	OPERATING PARAMETER	UNIT	SOURCE OF EMISSION		
			BOILER-1 (E)	INCINERATOR (E)	BOILER-2 (P)
1.	Stack Height	Meter	30	30	30
2.	Stack Diameter	Meter	1	1	1
3.	Flue Gas Velocity	m/s	7.5	7.5	7.5
4.	Flue Gas Temperature	^0K	408	408	408
5.	Air Pollution Control Equipment	-	Adequate Stack Height	Adequate Stack Height	Adequate Stack Height
6.	Emission concentration				
	SPM	mg/Nm^3	800*	50*	800*
	SO_2	mg/Nm^3	--	200*	--
	HCl	mg/Nm^3	--	50*	--
	CO	mg/Nm^3	--	100*	--

(* - Permissible Limits)

FLUE GAS EMISSION DETAILS

SR. NO.	OPERATING PARAMETER	UNIT	SOURCE OF EMISSION		
			Process Vent-1 (P)	Process Vent-2 (P)	Process Vent-3 (P)
1.	Stack Height	Meter	10	10	10
2.	Stack Diameter	Meter	0.15	0.15	0.15
3.	Flue Gas Velocity	m/s	3.3	3.3	3.3
4.	Flue Gas Temperature	^0K	303	303	303
5.	Air Pollution Control Equipment	-	Scrubber	Scrubber	Scrubber
6.	Emission concentration				
	HCl	mg/Nm^3	--	50*	--
	SO_2	mg/Nm^3	40*	--	--
	HBr	mg/Nm^3	--	--	30*

(* - Permissible Limits)

FIGURE - 4.2

ISOPLETHS OF PM (EXISTING)

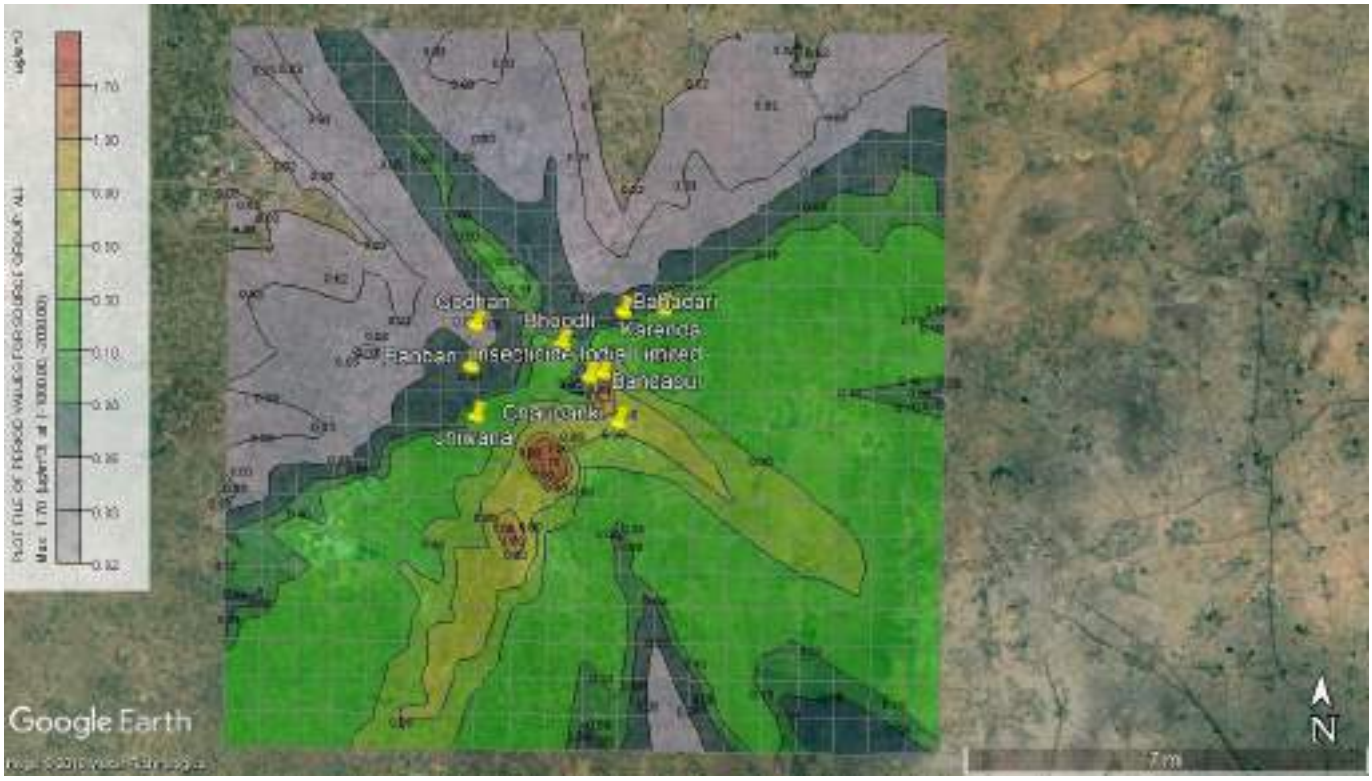


FIGURE - 4.2 (CONTD.)

ISOPLETHS OF SO_2 (EXISTING)

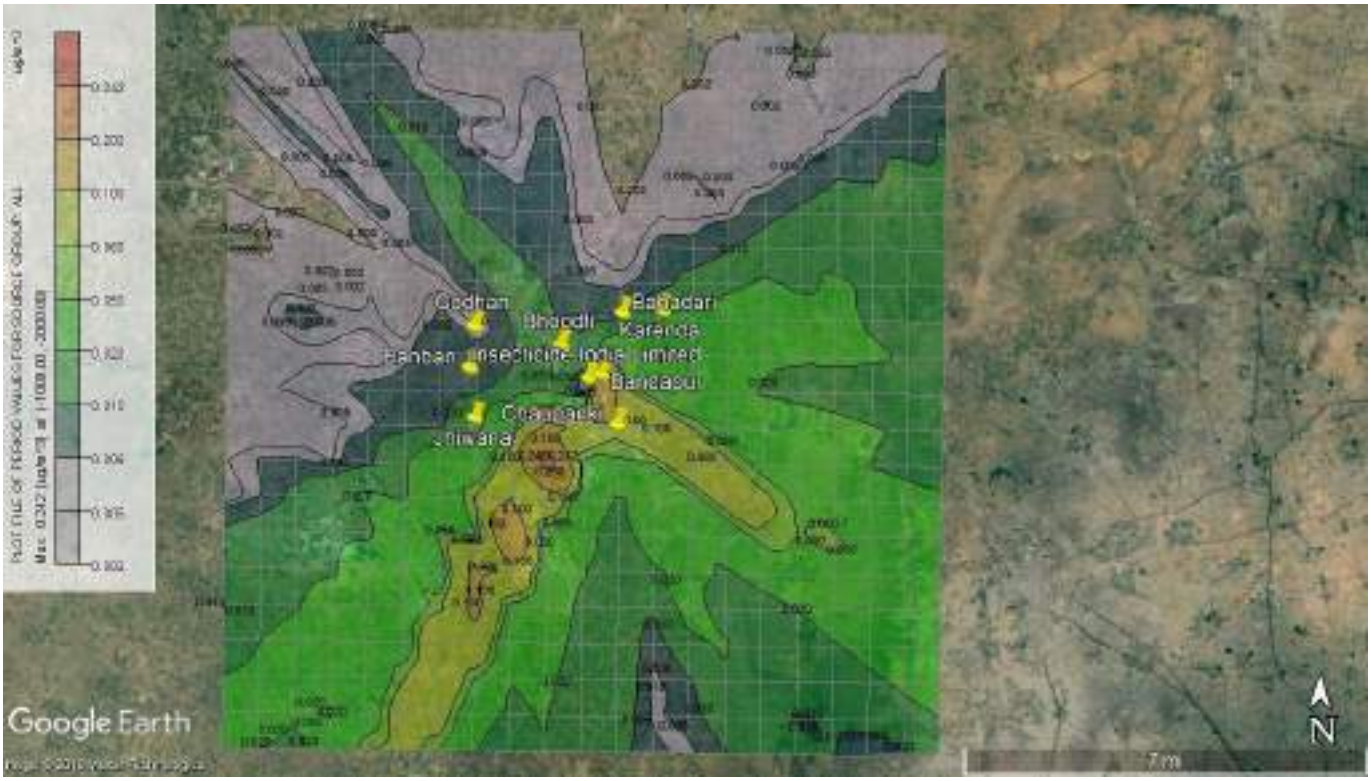


FIGURE - 4.2 (CONTD.)

ISOPLETHS OF HCl (EXISTING)

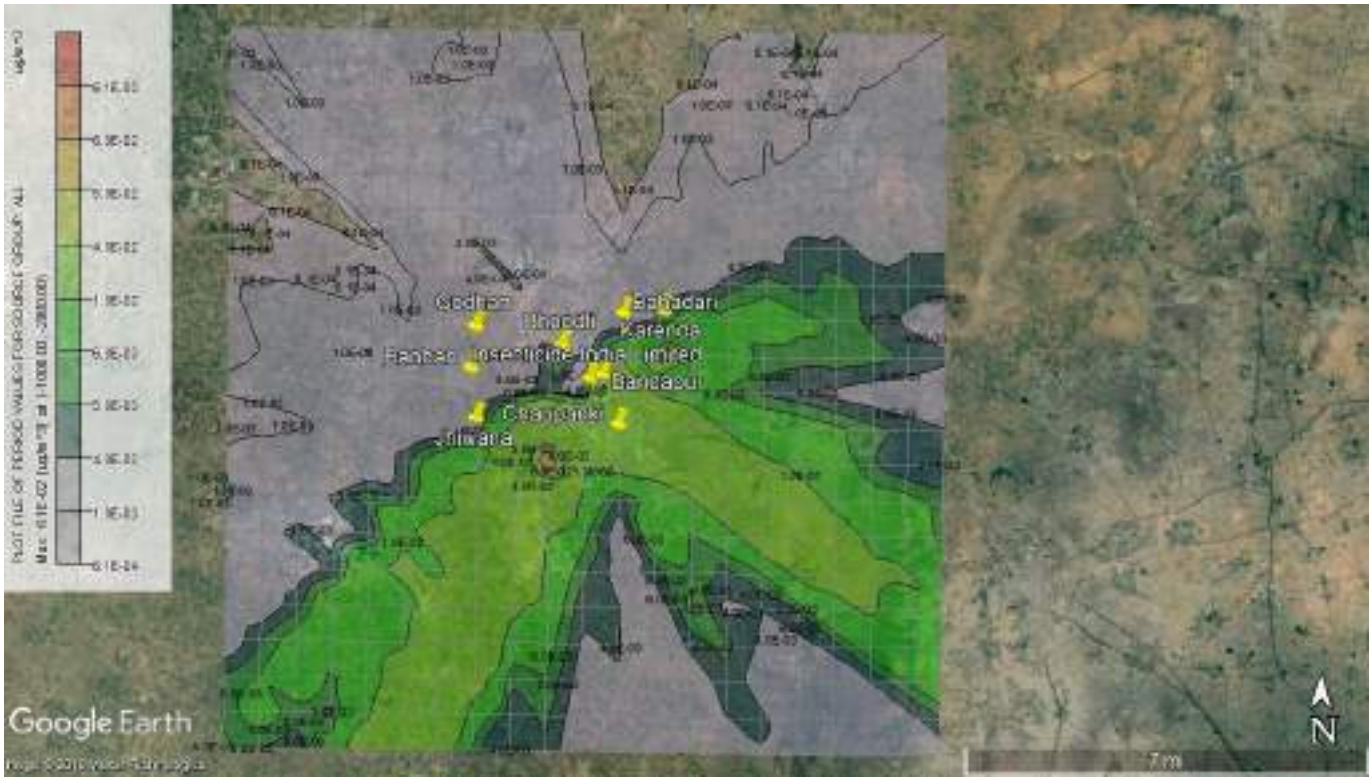


FIGURE - 4.2 (CONTD.)

ISOPLETHS OF CO (EXISTING)

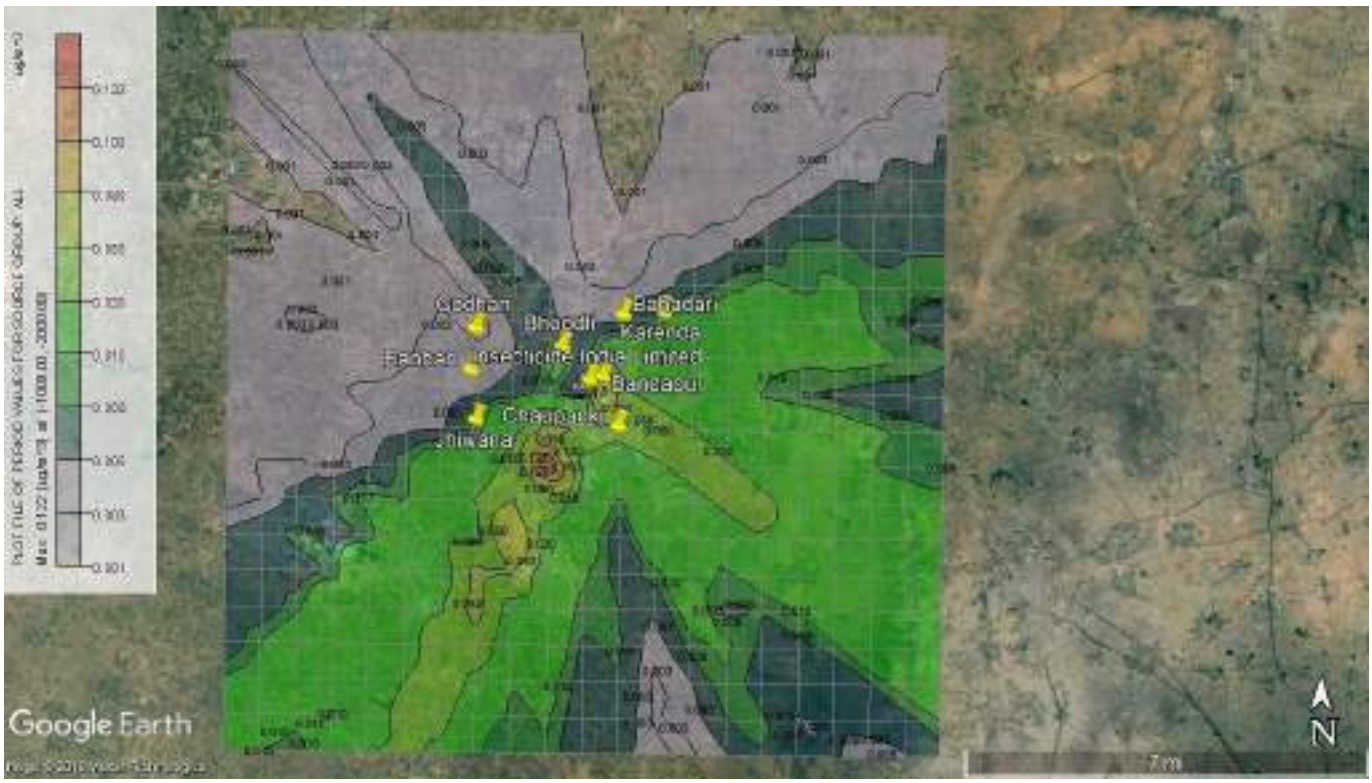


FIGURE - 4.2

ISOPLETHS OF PM (PROPOSED)

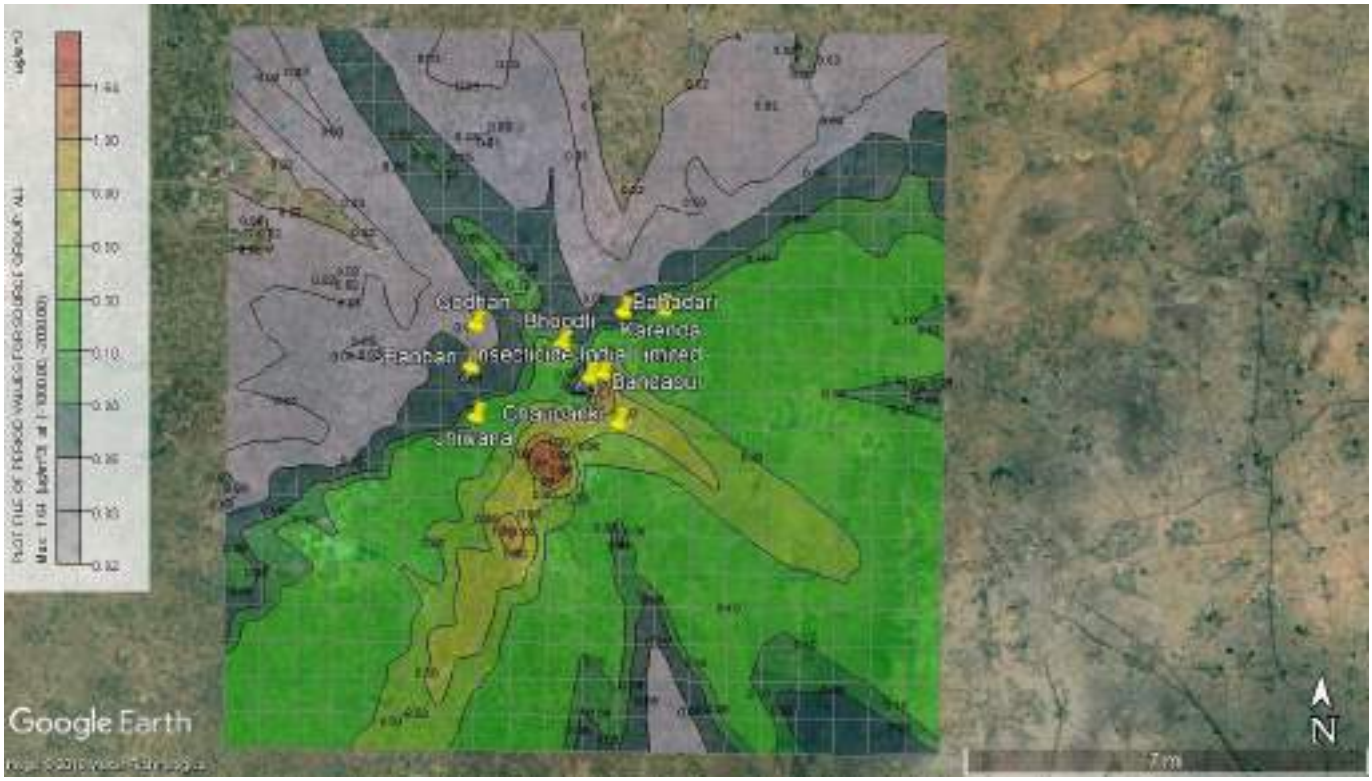


FIGURE - 4.2 (CONTD.)

ISOPLETHS OF SO_2 (PROPOSED)

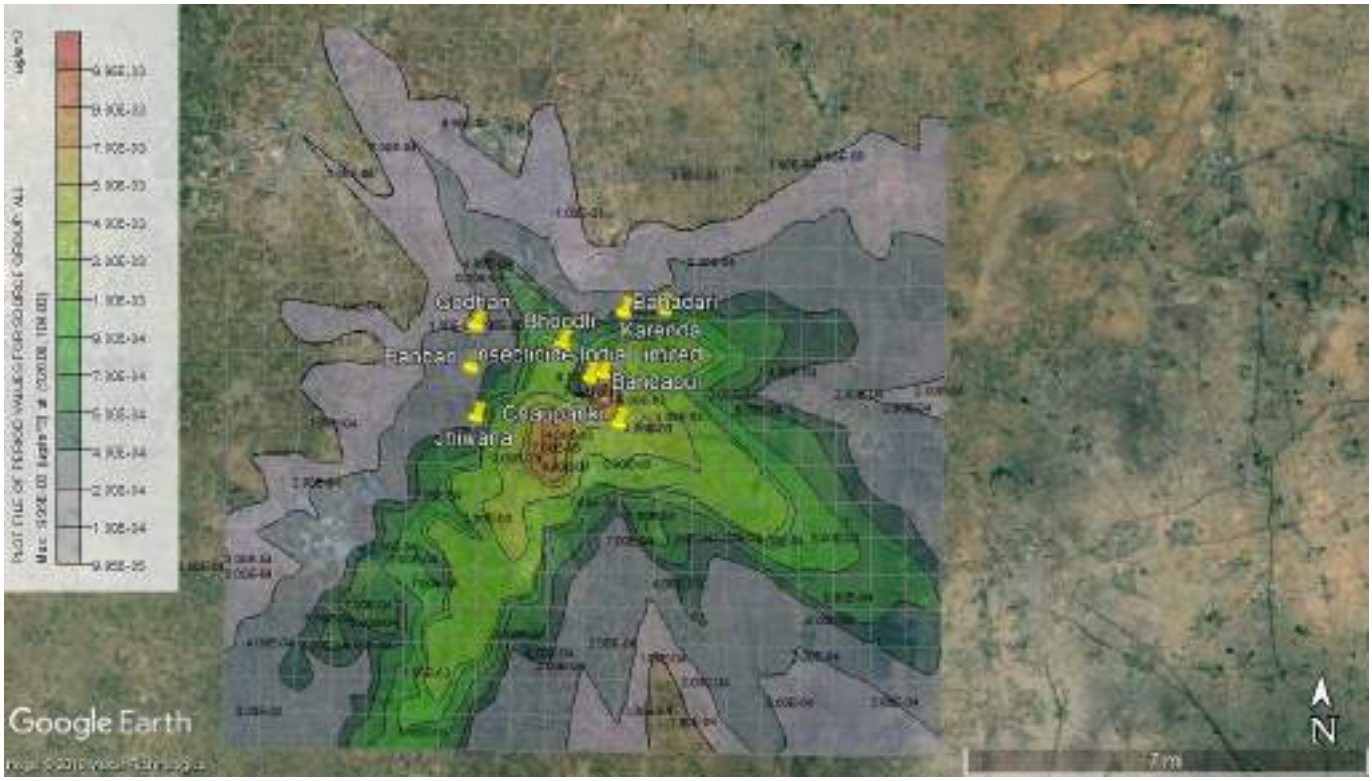


FIGURE - 4.2 (CONTD.)

ISOPLETHS OF HCl (PROPOSED)

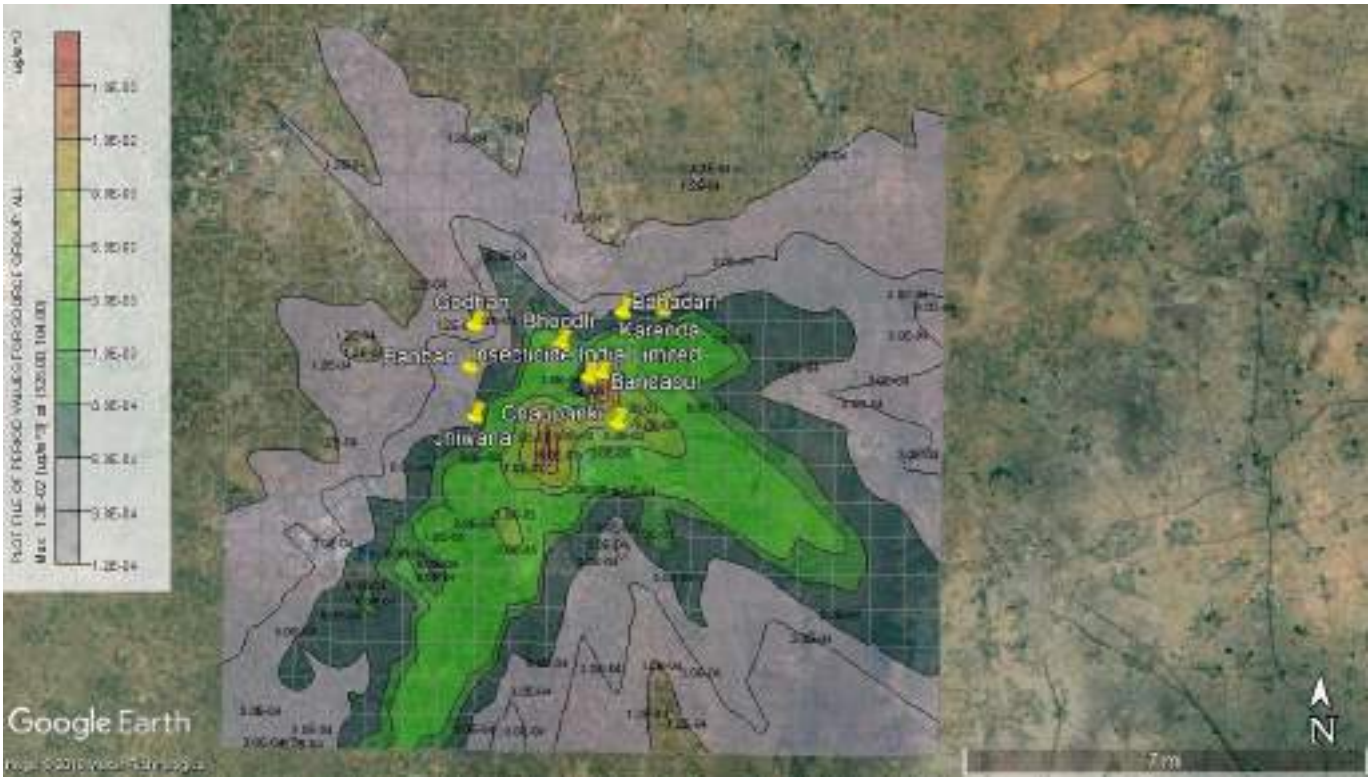


FIGURE - 4.2 (CONTD.)

ISOPLETHS OF HBr (PROPOSED)

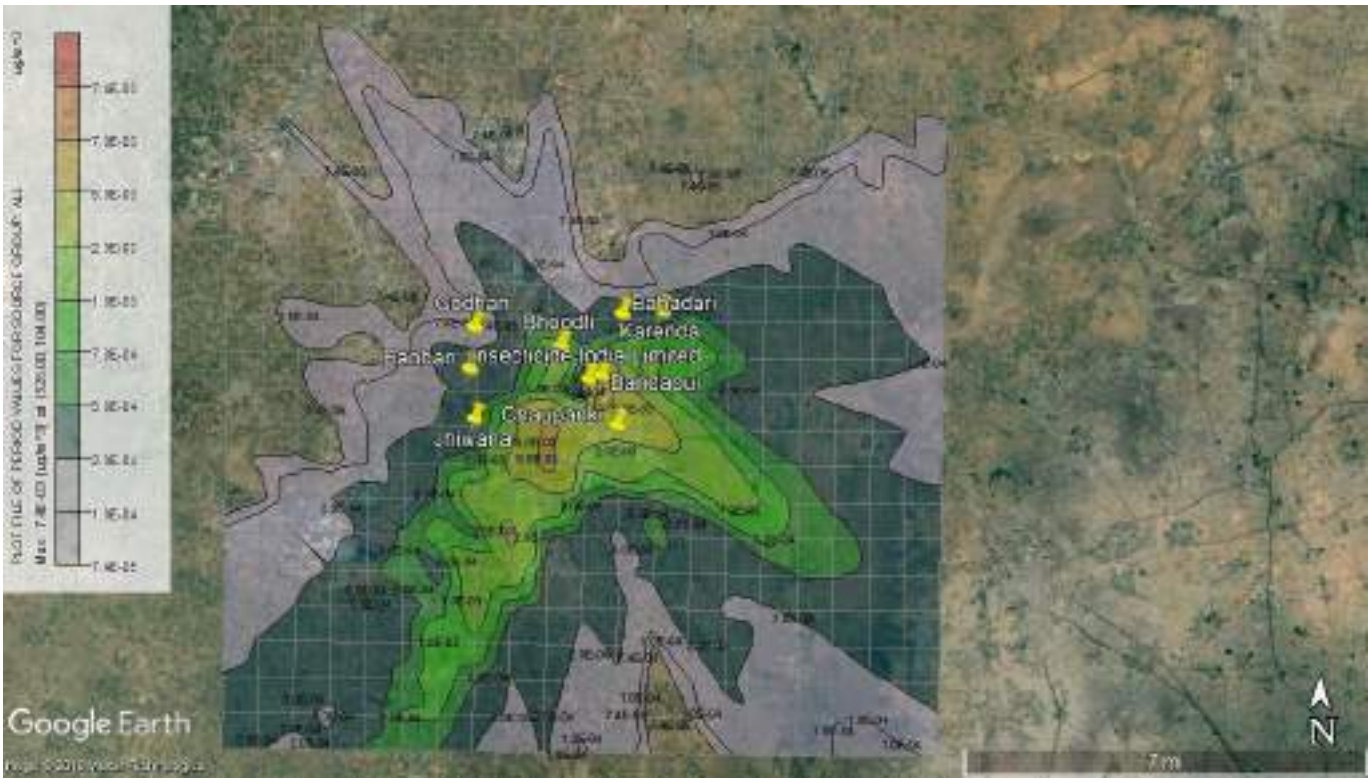


TABLE - 4.3

SUMMARY OF ISCST3 MODEL OUTPUT

SR. NO.	LOCATIONS	X, Y CO-ORDINATES	CONCENTRATION			
			SPM ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	HCl ($\mu g/m^3$)	HBr ($\mu g/m^3$)
1.	Project site (A1)	(0, 0)	0.000	0.000	0.000	0.000
2.	Karenda (A2)	(2211, 1333)	0.278	0.001	0.001	0.0008
3.	Bandapur (A3)	(526, 104)	1.149	0.009	0.012	0.007
4.	Chaupanki (A4)	(844, -1354)	0.385	0.002	0.003	0.001
5.	Godhan (A5)	(-3158, 938)	0.051	0.0003	0.0004	0.0002
6.	Banban (A6)	(-3263, 313)	0.046	0.0002	0.0003	0.0002
7.	Jhiwana (A7)	(-3158, -1146)	0.133	0.0005	0.0007	0.0004
8.	Bhoodli (A8)	(-737, 833)	0.168	0.002	0.002	0.001
9.	Bahadari (A9)	(2105, 1875)	0.153	0.0007	0.0009	0.0005

As manufacturing activities have not yet started, the predictions were made using CPCB permissible limit as these concentrations will in no case be exceeded. Ground level concentrations calculated for proposed activities are superimposed on existing ambient air quality monitoring results and combined values (Table 4.4) are found within permissible National Ambient Air Quality Standards.

TABLE - 4.4

PREDICTED AMBIENT AIR QUALITY FOR SPM, SO_2, NOx **Unit: $\mu g/m^3$**

SR. NO.	SAMPLING LOCATION	SPM	SO_2	HCl	HBr
		AVERAGE			
1.	Project site (A1)	402	11.09	BDL	BDL
2.	Karenda (A2)	239.278	6.301	BDL	BDL
3.	Bandapur (A3)	242.149	8.359	BDL	BDL
4.	Chaupanki (A4)	388.385	10.302	BDL	BDL
5.	Godhan (A5)	199.051	6.3903	BDL	BDL
6.	Banban (A6)	288.046	6.0902	BDL	BDL
7.	Jhiwana (A7)	211.133	6.8505	BDL	BDL
8.	Bhoodli (A8)	307.168	7.592	BDL	BDL
9.	Bahadari (A9)	297.153	7.8207	BDL	BDL

BDL = Below Detectable Limit

Conclusion: After expansion, ambient air quality will be within the NAAQS.

4.2.3.1 Mitigation Measures

In-plant Control Measures: Some of the mitigation measures, which can reduce the impact on air environment, are as follows:

- Company will install Multi-cyclone separator with bag filter and scrubber, adequate stack height and Scrubbing System to control emission.
- Ensuring the operations of various process units as per specified operating guidelines / operating manuals.
- Strict adherence to maintenance schedule including lubrication for various machinery / equipment.
- Ensuring the operations of various process units as per specified operating guidelines/ operating manuals.

4.2.4 NOISE ENVIRONMENT

Extensive oiling and lubrication and preventive maintenance shall be carried out to reduce noise generation at source to the permissible limit. Acoustic enclosures shall be provided for DG set. The Noise level is within the prescribed limit. At noisy area, adequate preventive & control measures are taken. No significant noise, vibration or emission of light & heat from the unit.

4.2.5 HAZARDOUS WASTE DETAILS

Hazardous wastes generation is Topic 2.12.1

4.2.6 INFRASTRUCTURE AND SERVICES

The plant is located in a well-developed industrial estate developed by Rajasthan State Industrial Development and Investment Corporation, which has all essential facilities such as water, power, fuel, post, telecommunication, bank, etc. M/s. Insecticides India Limited shall get water from RIICO water supply for proposed expansion project. Hence, there will be no additional stress on ground water resources and there will be no adverse effect on the ground water resources available in the nearby area.

The power requirement of plant will be 860 KW. Company shall purchase power from JVVNL. 1 No. of 125 KVA, 1 No. of 380 KVA & 1 No. of 500 KVA capacity DG Set will be kept for emergency power back up. The transportation of raw materials and finished products shall be by road. As stated earlier, the site is near to National Highway No. 919. As a result of proposed expansion project there will be a marginal increase in transportation activity as compared to present total traffic. As a result of development of industrial estate, the neighboring areas have developed for commercial use. The infrastructure services e.g. roads, state transport, post and telegraph, communication, education and medical facilities, housing, etc. have improved in the surrounding areas in recent years.

4.2.7 ENVIRONMENTAL HAZARD

Raw material such as different chemicals, solvents, etc. shall be transported by road and shall be stored in the plant premises. On site emergency plan shall be prepared for storage

and handling of hazardous chemicals and shall also be submitted to Government of Rajasthan. This report will be prepared with the consideration of hazards associated with the chemicals and care should be taken for all aspects of environmental hazards. The project proponent shall consider all the safety aspects in planning, designing and operation of the plant as per standard practices. Hence, no adverse impact on this account is anticipated.

4.2.8 HOUSING

Enough number of dwellings is available in nearby towns and villages for accommodating extra workforce. On neighboring towns or villages, the impact on this account is minimal.

4.2.9 ECOLOGY

The impact due to operation of the project and its activities on the ecological parameters like natural vegetation, cropping pattern, fisheries and aquatic life, forests and species diversity could be summarized as below.

4.2.9.1 NATURAL VEGETATION

The industry will develop a green belt on the surrounding periphery. Since the effluents and emissions generated from the project activities shall be treated and disposed as per the EMP provisions, adverse impact over any of the ecological components of the environment is reduced to minimum.

4.2.9.2 CROPS

Since, the project shall be on a non-agricultural land, it shall not alter the crop production of the area. Further, the necessary environmental protection measures have been planned under EMP e.g. air pollution control systems shall be designed to take care of even emergency releases of the gaseous pollutants like PM, SO_2 & NOx; regular environmental surveillance shall be done, so as not to have any short-term or cumulative effect on the crops and the natural vegetation of the area.

4.2.9.3 FISHERIES AND AQUATIC LIFE

Since the effluents and emissions generated from the project activities shall be treated and disposed as per the EMP provisions, proposed project shall not envisage any adverse effect on fisheries and aquatic life.

4.2.9.4 AESTHETIC ENVIRONMENT

The proposed activities shall be within RIICO Industrial Area. The proposed activities and further plantation will enhance the aesthetic environment.

4.2.9.5 DEMOGRAPHY, ECONOMICS, SOCIOLOGY AND HUMAN SETTLEMENT

M/s. Insecticides India Limited will give employment to about 35 employees due to expansion (Including Contract workers). In addition to direct employment, indirect employment shall generate ancillary business to some extent for the local population. There is a positive effect due to improved communication and health services, which have lead to economic prosperity, better educational opportunities and access to better health and family welfare facilities. There has been a beneficial effect on human settlement due to employment opportunities from various industries in RIICO Industrial Area & after proposed expansion project of M/s. Insecticides India Limited, more direct and indirect employment shall be generated.

Local quality of life has improved. This factor combined with all other mitigation measures, like proper treatment and disposal of hazardous waste; liquid effluent and gaseous emission, has minimized the adverse impact on ecology and has a beneficial impact on human settlement and employment opportunities. There has been a beneficial impact on the local socio-economic environment. There shall be no displacement of any population in plant area. Any major activity that may lead to resettlement of the people is considered as permanent impact. Hence, there is no permanent impact on this account. The increasing industrial activity will boost the commercial and economical status of the locality up to some extent.

Socio-Economic Environment

Positive Impact:

There will generate the local employment for proposed expansion project. The project is likely to give a boost to the economy of the area and providing primary and secondary sectors employment to local people.

Project will lead to development of ancillary industries and an overall economic growth of nearby towns to supplement the population of the area.

Project proponent will ensure to connect even last people with the infrastructural facility like educational, health, road etc in the locality.

Other needs and social-economic aspects of local inhabitants will be dealt with CSR activities & CER activities in the region.

Negative Impact:

There will be transformation of many aspects of human life like social structures, livelihood pattern, health institution, education etc which is subject to realization and behavioral change of the PAFs.

Employment:

During construction phase of the company, skilled and un-skilled manpower will be required and their requirement will be met with from the local community. M/s. Insecticides India Limited will give employment to about 35 additional employees (Including Contract workers). With the employment opportunities, local people's income will increase and thereby, their economic status will boost up. Further, secondary jobs shall also increase in the local area to provide day-to-day needs/services to the working men. Demand for essential daily utilities in the market will also temporarily increase to some extent.

Public Health:

During construction period the workers will be provided with safe water supply, low-cost sanitation facilities, first aid treatment, necessary personal protective equipment etc, to prevent an increase in diseases related to personal hygiene. With some other industrial units coming up in the surrounding area, Govt. dispensary, medical check-up, medicines,

services of nurses & doctors etc. are likely to be increased with a view to taking care of general health of the local community.

Education:

Presently, every village has a primary school up to VII std. and for higher standard education, the students, both boys and girls, have to go to Alwar. With increase in population due to industrial growth, the surrounding villages may start higher standards up to X and XII. Not only male students but female students can also take advantage of the some and thereby, percentage of literate population in the local area may increase.

Transport:

With increased employment opportunities and higher economic status of the local community and with an increase in market conditions, transport facilities by way of buses, two-wheeler & four-wheeler vehicles will develop in future. Thus, overall development of the local community and their health is likely to become a matter of fact with the co-operation and support of RIICO and the industrial organizations of the local area. To sum up, it could be said that there will be a positive effect due to improved communication and health services, which would lead to economic prosperity, better educational opportunities and access to better health and family welfare facilities. There will be a beneficial effect on human settlement due to employment opportunities from various industrial establishments in RIICO Industrial Area in addition to employment generated by M/s Insecticides India Limited. There is likely to be a beneficial impact on the local Socio-Economic environment. There shall be no displacement of any population in the plant area. The increasing industrial activity will boost up the commercial and economical status of the locality to some extent.

1. This project is on non-agricultural land and therefore, it is not likely to alter the crop production.

2. The manufacturing unit shall adopt comprehensive environmental plan covering several environment protection measures to reduce the environmental pollution resulting from the project.

To control the emission from process and utility stacks, the company would regularly examine, inspect and test its emission to make sure that the emission is below the permissible limit. With this, the status of sanitation and community health of the area would not change.

Impact of Transportation

The vehicular traffic of trucks will increase during the construction phase. Trucks, tankers and other vehicles may cause additional air pollution to the surrounding areas. The effects may be more prominent.

During Operation, Trucks, tankers and other vehicles may cause traffic jam outside and within the premises and cause additional air pollution.

Mitigation Measures:

This will be temporary and restricted to construction phase only. However proper traffic management will be followed as per the specified norms.

In RIICO, a well developed RIICO main road and internal road are made and having carrying capacity to take care of additional traffic due to proposed expansion.

Therefore no additional roads will required to be constructed therefore there will not be any change in land use of the study area.

However, Separate entry and exit gate shall be provided and trained security guards shall be deployed to ensure proper management and movement of vehicles within premises. Internal RCC road along with signboard of traffic sign will be provided. Traffic rules and discipline shall be strictly implemented.

Adequate internal road of shall be provided for uninterrupted movement of fire tender. Speed break bumper shall be provided on internal road at regular interval to avoid over speed.

No vehicles will stop near weight bridge, wheel washing area after completion of activities.

To prevent Road accident following precautions to be taken :

- Transportation of waste/raw materials/ products by only authorized vehicles
- Regular training to drivers
- Implementation of MSDS and TREM card

4.2.10 IMPACT AND MITIGATION MEASURES OF GEOLOGY

Impact:

During Operation, Accidents and risk assessments - Changes in soil chemistry due to addition of foreign material due to system failures and/or accidents.

In case of accidents mentioned in the risk scenarios proper actions will be taken according to the mitigation measures.

Storage, Transportation and Handling of Construction and other Raw Material and Hazardous Waste - Changes in soil texture will lead to change in porosity, permeability & other such physical characteristics of soil of the area.

Mitigation Measures:

Properly lined/paved area for the works having potential of leakage/spillage of fuel or material like area for Storage of construction and other raw material etc. Proper mitigate measures like use of efficient pollution control systems, proper stack height, use of top soil in plantation results in no significant impact on soil of the core zone. There will be no impact on soil of the study area located beyond the working area of the proposed expansion project. Soil samples will be collected and tested at regular intervals from the nearby areas. This will help in mitigation of any harmful impact on soil due to the project activity, if any. Transportation of hazardous waste will be done as per CPCB Guidelines. The dumpers will be covered to prevent spillage or dusting. The drivers will be imparted training. The containers/ dumpers will be marked with the name of TSDF where it is to be sent, contact details and the other details required.

4.2.11 IMPACT AND MITIGATION MEASURES OF GEOHYDROLOGY

Impact:

Temporary contamination of groundwater may occur due to leakage and spillages. Contamination of groundwater may occur due to existing water level during any kind of accidents or leakage. This will affect villages located around the site and crops may also get affected.

Mitigation Measures:

Properly lined/paved area for the works having potential of leakage/spillage of fuel or material like area for Storage of raw material etc. Transportation of hazardous waste will be done as per CPCB Guidelines. The dumpers will be covered to prevent spillage or dusting. The drivers will be imparted training. The containers / dumpers will be marked with the name of TSDF where it is to be sent, contact details and the other details required.

Plant water/ wastewater treatment and its conveyance system shall be designed and proper monitoring and care shall be taken for effective management of treated effluents.

4.3 DETAILS ON STRATEGY FOR THE IMPLEMENTATION OF CLEANER PRODUCTION ACTIVITIES

The company will actively initiate recycling, reuse and cleaner production philosophy as under:

- On-site recovery of solvent in distillation column. Recovered solvent will be recycled back for re-use and residue will be sent for incineration.
- Use of LED bulb instead of CFL bulb in production plant, street light etc. to conserve energy.
- Closed feeding system in centrifuge.
- Explore the possibilities to harvesting of rain water from roof top and also treating run off rain water by UF & RO system shall be used in utilities etc.
- All process vents attached to scrubbers.

4.4 MATRIX REPRESENTATION

The impact matrix relating the parameters to the activities during operation phase is presented in Table 4.5. The quantification of impact is done using numerical scores 0 to 5 as per the following criteria.

Score	Severity criteria
0	No impact
1	No damage
2	Slight/ Short-term effect
3	Occasional reversible effect
4	Irreversible/ Long-term effect
5	Permanent damage

The scores for various parameters and activities are presented in Table 4.6.

4.4.1 CUMULATIVE IMPACT CHART

The total negative impact of various activities on any one parameter is represented as a cumulative score and the cumulative scores of various parameters are given in the form of a cumulative impact chart presented in Table 4.7. Any particular parameter having an individual score greater than 5 or cumulative score of 20 implies serious effects due to the project and calls for suitable mitigation measures. It is evident from the matrices that the resultant impact is beneficial to the local population and due to export (and import substitution) the resultant impact is beneficial to our country.

TABLE – 4.5

IMPACT IDENTIFICATION MATRIX (CONSTRUCTION PHASE)

Activities During Construction Phase	Air Quality	Noise & Odour	Water Quality	Land Quality	Infrastructure	Terrestrial Ecology Land use	Aquatic Ecology	Socio-Economic Status	Health-issue
Water Requirement	×	x	√	×	×	x	×	×	×
Material Storage/ Transport	√	√	×	×	√	×	x	×	√
Material Handling	√	√	×	×	×	×	×	×	×
Utilities	√	√	√	×	×	×	×	×	√
Effluent Discharge	×	×	√	√	×	√	×	x	×
Gaseous Emissions	√	×	x	x	x	x	x	x	√
Solid Waste Disposal	×	×	×	√	x	√	×	x	×
Spills & Leaks	√	√	√	×	×	×	×	×	√
Transport of Workers	×	×	×	×	×	×	×	√	×
Movement of Vehicles	√	√	×	×	x	×	×	×	×

TABLE – 4.5 (CONTD.)

IMPACT IDENTIFICATION MATRIX (OPERATION PHASE)

ACTIVITIES DURING OPERATION PHASE	Air Quality	Noise & Odour	Water Quality	Land Quality	Infrastructure	Services	Env. Hazards	Terrestrial Ecology Land use	Socio-Economic Status	Aquatic Ecology
Water Requirement			x			X				X
Raw material Storage/ Transport	X	X		X		X	X			
Raw Material Handling	X			X		X	X			
Utilities	X	X	X			X				
Effluent Discharge		X	X		X	X	X			X
Gaseous Emissions	X	X					X			
Fugitive Emissions	X	X					X	X		
Solid Waste Disposal	X	X		X		X	X	X		
Product Storage/ Handling	X			X			X			
Spills & Leaks	X	X	X	X	X		X	X		X
Shutdown/ Startup	X	X	X			X				
Equipment Failures		X				X	X			
Plant Operations	X	X	X			X	X	X	X	X
Transport of Workers	X	X				X				
Movement of Vehicles	X	X				X				
Medical & Other Needs						X		X	X	

TABLE - 4.6

ENVIRONMENTAL IMPACT MATRIX

Activities	Environmental Parameter										
	Air Quality	Noise & Odour	Water Quality	Land Environment	Infrastructure	Services	Environmental Hazard	Housing	Terrestrial Ecology/ Land use	Socioeconomic Status	Aquatic Ecology
Water Requirement	0	0	1	0	1	1	1	0	0	1	1
Effluent Discharge	0	0	1	1	1	1	1	0	1	0	0
Gaseous Emissions	1	0	0	0	0	0	1	0	1	0	0
Fugitive Emissions	1	0	0	0	0	0	1	0	1	0	0
Solid Waste Disposal	1	0	1	1	1	1	1	0	0	0	0
Raw Material Storage/ Transport	1	1	0	2	2	1	1	0	1	1	0
Raw Material Handling	1	1	0	1	0	0	1	0	1	0	0
Product Storage	1	0	0	1	0	0	1	0	0	0	0
Spills & Leaks	1	1	1	1	1	1	1	0	1	0	0
Shut down/ Start up	1	1	1	0	1	1	0	0	1	1	0
Equipment Failure	1	1	1	0	0	1	1	0	1	0	0
Plant Operations	1	1	1	0	1	1	1	1	1	1	0
Transport of workers	1	1	0	0	1	1	1	0	1	1	0
Movement of Vehicles	1	1	0	1	1	1	1	0	1	1	0
Housing Needs	0	1	0	1	1	1	0	1	0	1	0
Utilities	1	1	1	0	0	1	1	0	0	0	0
Cumulative score	**13**	**10**	**8**	**9**	**11**	**12**	**14**	**2**	**11**	**7**	**1**

TABLE – 4.7

CUMULATIVE IMPACT CHART

ENVIRONMENTAL PARAMETER	TOTAL CUMULATIVE SCORE
Air Quality	13
Noise and Odour	10
Water Quality	8
Land Requirement	9
Infrastructure	11
Service	12
Environmental Hazards	14
Housing	2
Terrestrial Ecology/ Land use	11
Socio Economic Status	7
Aquatic Ecology	1

CHAPTER – 5:

ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

5.1 ANALYSIS OF ALTERNATIVES (TECHNOLOGY)

In our aim of meeting the specific requirements of our clients related to pesticides & pesticide specific intermediates, we have established a widespread infrastructure unit. The manufacturing unit is well equipped with technologically advanced machines and equipment that enable us to process a wide range of Intermediates within the promised time limits. We have the following machines in our manufacturing unit:

- Mixing machine
- Reaction machine
- Powdering machine
- Vacuum machine
- Scrubber machine
- Heating machine
- Cooling Machine
- Filtering machine
- Drying machine

We also maintain research facilities where we customize the products as per the details specified by the clients. Our team of technical experts makes sure that all chemicals are safe to use and timely processed.

Warehousing and Packaging

We also possess a spacious and well maintained warehouse facility that helps us to effectively handle stored the raw material as well as ready to dispatch products. The entire space is divided to easily accommodate Intermediates category wise. Further, we also undertake:

- All preventive measures in storing our products under proper labels
- Maintaining records for future reference
- Checking chemicals for any spillage & leakage
- Quality packaging

5.2 ANALYSIS OF ALTERNATIVES (SITE)

- Proposed expansion is within the existing premises only.
- Minor modifications within the plant will be carried out after getting EC & CTE.
- Existing plant is having valid consents.
- Hence no alternative sites were examined.

CHAPTER - 6

ENVIRONMENTAL MONITORING PLAN

6.1 PROJECT ENVIRONMENT MONITORING PLAN

M/s. Insecticides India Limited shall adopt comprehensive environmental monitoring plan which is essential to take into account the changes in the environment. The objective of monitoring is:

- To verify the result of the impact assessment study in particular with regards to new developments.
- To follow the trend of parameters which have been identified as critical
- To check or assess the efficiency of controlling measures
- To ensure that new parameters, other than those identified in the impact assessment study, do not become critical through the commissioning of new project.

To monitor effectiveness of Control Measures:

- Monitor daily, Assess effectiveness of the Control Measures being implemented, Explore the need to modify or add new Control Measures particularly if a violation is observed & Report weekly.
- Regular monitoring of environmental parameters will be made to find out any deterioration in environmental quality.
- Monitoring of the proposed project area will be regularly conducted. The attributes, which merit regular monitoring, are specified underneath.

6.2 LABORATORY FACILITIES

M/s. Insecticides India Limited has its own laboratory equipped with different equipment i.e. analytical balance, pH meter, COD digester (heating) apparatus, oven, incubator and necessary glass-wares. Equipment of quality control laboratory is also available for analysis of environment parameters. M/s. Insecticides India Limited shall make plan for the regular monitoring to ensure that pollution will be limited to below prescribed limits and to take

corrective action. In case the monitored results of environment pollution shall be found to exceed the prescribed limits, remedial actions shall be taken through the concerned plant authorities. The actual operation and maintenance of pollution control equipments of each department shall under respective department heads.

6.2.1 DOCUMETATION & RECORDS

The environmental department in respect of operation of pollution control facility is being/will maintain following records:

- Instruction manual for operation and maintenance of pollution control equipments.
- Log sheet for self-monitoring of pollution control equipments.
- Manual for monitoring of Air, water for ambient conditions.
- Instruction manual for monitoring of water, solid and gaseous parameter discharged from the factory and also for various parameters of pollution control facilities.
- Stationary records as per the Environmental Acts.
- Monthly and annual progress reports.
- Medical checkup of employees.
- Regularly these documents & records shall be reviewed for necessary improvement of the monitoring plan/mitigation measures/environmental technologies as well as for necessary actions of Environmental Management Cell.

6.3 POST PROJECT MONITORING PLAN

Environment monitoring plan for proposed plant has described in Table-6.1 along with Environment Components, parameter, standards to be followed, location and frequency.

TABLE - 6.1

PROJECT ENVIRONMENT MONITORING PLAN

Environmental Component	Parameters	Standards	Frequency
Air Environment			
AAQM at plant site	As prescribed by RSPCB including $PM_{2.5}$, PM_{10}, SO_2, NOx, HCl, HBr & VOCs	Prescribed by CPCB	Quarterly through NABL Lab.
Stack emission monitoring	Parameters prescribed by RSPCB of Flue Gas emission and Process Gas Emission	Prescribed by RSPCB	Half yearly by NABL Lab.
Fugitive emissions/ work place monitoring within the plant side	VOC, PM10 & PM2.5	Prescribed by RSPCB	Half yearly by NABL Lab.
Water Environment			
Surface water quality	Parameters prescribed by RSPCB	Water quality Standards	Once in a Season
Ground water quality	Parameters prescribed by RSPCB	Water quality Standards	Once in a Season
Noise Environment			
Ambient Noise at plant site	Noise level in dB(A)	As per National Noise Standards	Once in a Month
Soil Environment			
At plant site	Analysis of pH, conductivity, Sulphates, calcium, magnesium, Cl^-	--	Once in a Season

6.3.1 MONITORING METHODOLOGIES

Monitoring of environmental samples shall be collected as per the guidelines provide by MoEF&CC/ CPCB/ RSPCB. The method followed shall be recommended/standard method approved/recommended by MoEF&CC/ CPCB.

TABLE - 6.2

METHOD OF ENVIRONMENTAL SAMPLING & ANALYSIS

Attributes	Method	
	Sampling / Preservation	**Analysis**
A. Air Environment 1. Micro meteorological data	Mechanical/automatic 1. Mechanical or automatic weather station/Meteorological Department	--
2. Ambient Air Quality	2. Samplers (Designed as per USEPA) to collect $PM_{2.5}$, PM_{10} and the gaseous samples	Standard methods such as IS - 5182 & CPCB guideline, ASTM, etc.
B. Noise	Instrument: Noise level meter	--

6.4 ENVIRONMENT POLICY

INSECTICIDES (INDIA) LIMITED		
DOCUMENT: INTEGRATED MANAGEMENT SYSTEM MANUAL		
ISSUE : 04	IIL/M/IMS/01	REV NO : 00
DATE: 01-04-2019		DATE : NIL

5.2 QUALITY, ENVIRONMENT, HEALTH AND SAFETY POLICY
ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

Quality, Environment, Health & Safety Policy

The company is committed to provide cost effective, quality products at competitive price. We provide timely delivery as per the need of our customers and interested parties. We follow all applicable legal regulations and organization's requirements and strictly adhere to Quality, Environment, Health & Safety System with its continual improvement to enhance customer satisfaction.

The company is committed to provide a safe work place and healthy environment for all its employees and associates. Company ensures that its operations are carried out in manner that protects environment, health, safety and community in general.

Date: 01.04.2019 (Top Management)

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Prepared and issued by
(Management Representative)

Approved and authorized by
(Top Management)

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INSECTICIDES (INDIA) LIMITED		
DOCUMENT: INTEGRATED MANAGEMENT SYSTEM MANUAL		
ISSUE : 04 DATE: 01-04-2019	IIL/M/IMS/01	REV NO : 00 DATE : NIL.

गुणवत्ता, पर्यावरण, स्वास्थ्य और सुरक्षा नीति

कंपनी प्रभावी लागत पर गुणवत्ता वाला उत्पाद प्रतिस्पर्धी मूल्य पर उपलब्ध कराने के लिए प्रतिबद्ध है। हम अपने ग्राहकों की जरूरत के अनुसार समय पर वितरण प्रदान करते हैं। हम लागू होने वाले सभी कानूनी नियमों और संगठन आवश्यकताओं के साथ ग्राहकों और इच्छुक पार्टी की संतुष्टी को बढ़ाने के लिए गुणवत्ता, पर्यावरण, स्वास्थ्य और सुरक्षा नीति का सख्ती से पालन करते हुए इसके निरंतर सुधार की ओर अग्रसर हैं।

कंपनी अपने सभी कर्मचारियों और सहयोगियों के लिए एक सुरक्षित काम करने की जगह और स्वस्थ वातावरण प्रदान करने के लिए प्रतिबद्ध है। कंपनी अपने परिचालन इस तरह से करती है कि सामान्य रूप से पर्यावरण, स्वास्थ्य, सुरक्षा और समुदाय की सुरक्षा सुनिश्चित रहै।

दिनांक: 01/04/2019 (प्रबंध निदेशक)

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(Top Management)

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INSECTICIDES (INDIA) LIMITED		
DOCUMENT: INTEGRATED MANAGEMENT SYSTEM MANUAL		
ISSUE : 04	IIL/M/IMS/01	REV NO : 00
DATE: 01-04-2019		DATE : NIL.

The implementation of the policy will be achieved at all our work areas by:

1. Complying with all applicable legal and other requirements related to Quality, Environment, Health & Safety system.
2. Ensuring employee compliance through mandatory training & programs on quality, health, safety and environment awareness.
3. Making the Employees responsible and accountable for all quality, health, safety and environmental issues and includes a commitment to consultation and participation of workers, and, where they exist, workers' representatives.
4. Providing adequate protection & maintaining safe working environment in all our work area for prevention of pollution, injury and ill Health arising out of our activities and includes a commitment to provide safe and healthy working conditions for the prevention of work-related injury and ill health.
5. 5. Conservation of natural resources through optimal utilization.
6. Control of air emissions, water discharge and land contamination.
7. Minimization of waste generation.
8. Create Quality, health, safety & environment awareness amongst all our employees / business associates, and also make them aware of their roles & responsibilities.
9. Timely review of Objectives & targets to ensure the implementation of Quality, Environment, Health & Safety policy
10. Making efforts to improve effectiveness of Quality, Environment, Health & Safety Management systems through periodic review of the Quality, Environment, Health & Safety Objectives & targets.

This Quality, Environment, Health & Safety policy will be regularly reviewed and is communicated to all persons working for or on behalf of the organization and is made available to the public.

Date: 01.04.2019 **(Top Management)**

This policy is made available to relevant interested parties and communicated, understood & implemented in the organization.

For Interested Parties-
a) By sending mail or
b) By display outside the organization
c) Availability of Hard Copy at the gate.

For All Employees-
a) By sending mail or
b) By display outside the organization
c) Availability of Hard Copy at the gate and
d) by Training

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(Management Representative) **(Top Management)**

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6.5 ENVIRONMENTAL MANAGEMENT CELL

Apart from having an environmental management plan, it is also necessary to have a permanent organizational set up charged with the task of ensuring effective implementation. In this effect M/s. Insecticides India Limited has assigned responsibilities to officers from various disciplines to co-ordinate the activities concerned with management and implementation of environment control measures.

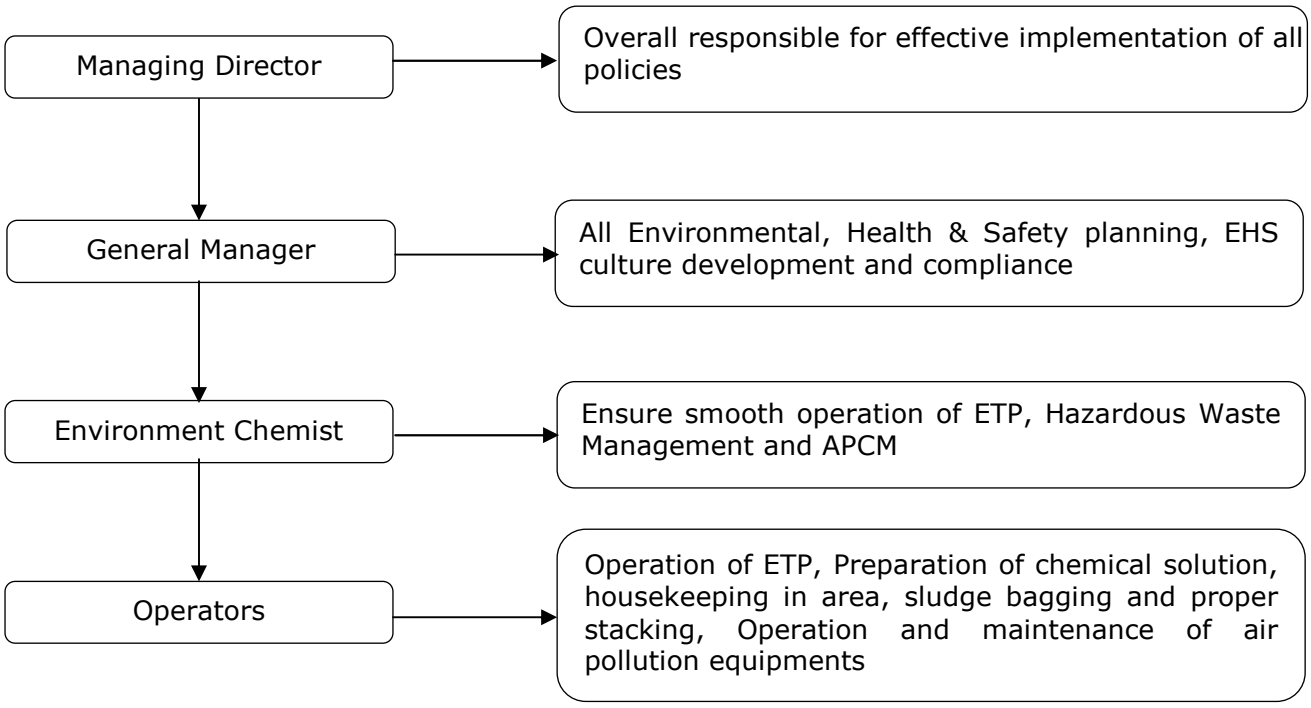
An organogram of Environment management cell is shown in Figure 6.1. This department undertakes the monitoring of environment pollution level by measuring stack emissions, Ambient air quality, water and effluent quality, Noise level, etc. either departmentally or by appointing external agency whenever necessary.

M/s. Insecticides India Limited carries out the regular monitoring and in future as well will carry out to ensure that pollution is limited below prescribed limits and will take corrective action by providing new pollution control equipment if required. In case the monitored results of environment pollution are found to exceed the prescribed limits, remedial actions are taken through the concerned plant authorities. The actual operation and maintenance of pollution control equipment of each department is under respective department heads.

The environmental department shall also look after preparation and submission of Water Cess Return, Environmental statement and Consolidated Consent & Authorization application/ renewal under water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act, 1981, Ambient Air Quality as per NAAQS Standards, 2009 and Hazardous & Other Wastes (Management and Transboundary Movement) Rules, 2016 under Environment Protection Act, 1986.

FIGURE - 6.1

ORGANOGRAM OF ENVIRONMENT MANAGEMENT CELL



6.6 System of reporting of non compliances / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large.

The facility is having online monitoring system and directly attached to CPCB and state pollution control board. Any abnormality is directly reported online. Further, there will be third party monitoring as per schedule and if there will be any non-compliance/ violation of environmental norms, it will be reported to the management and all the stake holders through mail.

CHAPTER - 7

RISK ASSESSMENT & DISASTER MANAGEMENT PLAN

In order to support the environment impact assessment and environment management plan, following additional studies have been included in the report.

- Risk assessment
- Disaster Management Plan
- On-site and off-site emergency action plan
- Occupational Health and Safety Management System

7.1 RISK ASSESSMENT

7.1.1 INTRODUCTION

Hazard analysis involves the identification and quantification of the various hazards (unsafe conditions). On the other hand, risk assessment deals with recognition and computation of risks, the equipment in the plant and personnel are prone to, due to accidents resulting from the hazards present in the plant.

Risk assessment follows an extensive hazard analysis. It involves the identification and assessment of risks the neighboring populations are exposed to as a result of hazards present. This requires a thorough knowledge of failure probability, credible accident scenario, vulnerability of population etc. Much of this information is difficult to get or generate. Consequently, the risk assessment is often confined to maximum credible accident studies. It provides basis for what should be type and capacity of its on-site and off-site emergency plan also what types of safety measures shall be required.

7.1.2 APPROACH TO THE STUDY

Risk involves the occurrence or potential occurrence of some accidents consisting of an event or sequence of events. The risk assessment study covers the following:

- Identification of potential hazard area;
- Identification of representative failure cases;

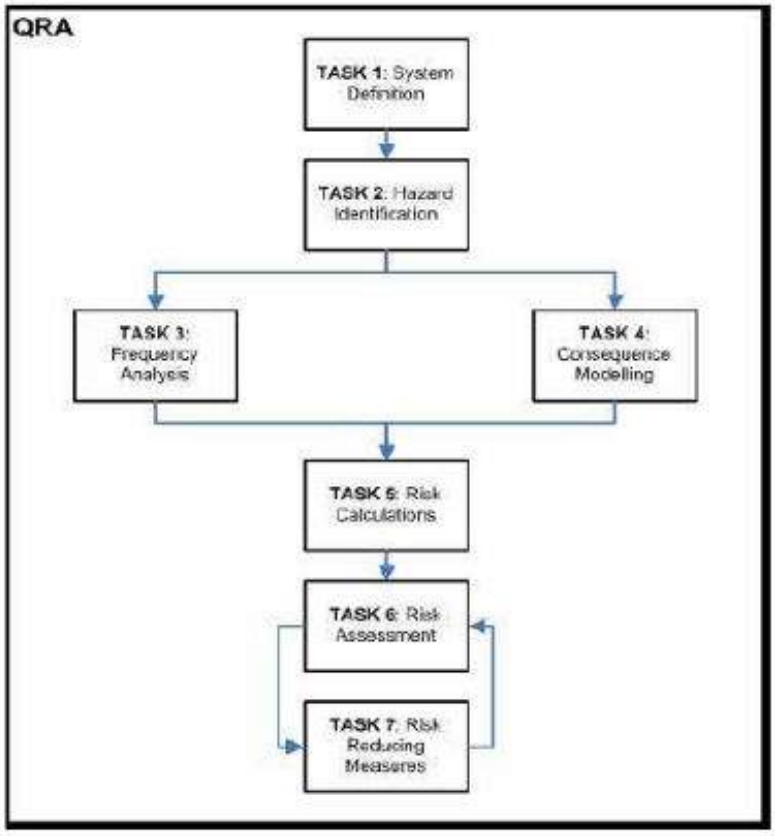
- Visualization of the resulting scenarios in terms of fire and explosion;
- Assess the overall damage potential of the identified hazardous events and the impact zones form the accidental scenarios;
- Furnish the recommendations on the minimization of the worst accident possibilities
- Preparation of Disaster Management Plan;
- Emergency Plan, which includes Occupational and Health Safety Plan;

7.1.3 METHODOLOGY

Quantitative risk assessment (QRA) is a means of making a systematic assessment of the risks from hazardous activities, and forming a rational evaluation of their significance, in order to provide input to a decision-making process. The term 'quantitative risk assessment' is widely used, but strictly this refers to the purely numerical assessment of risks without any evaluation of their significance. The study has been conducted based on the premises of a traditional Quantitative Risk Assessment. The key components of a QRA are explained below, and illustrated in Figure-7.1 and Figure-7.2.

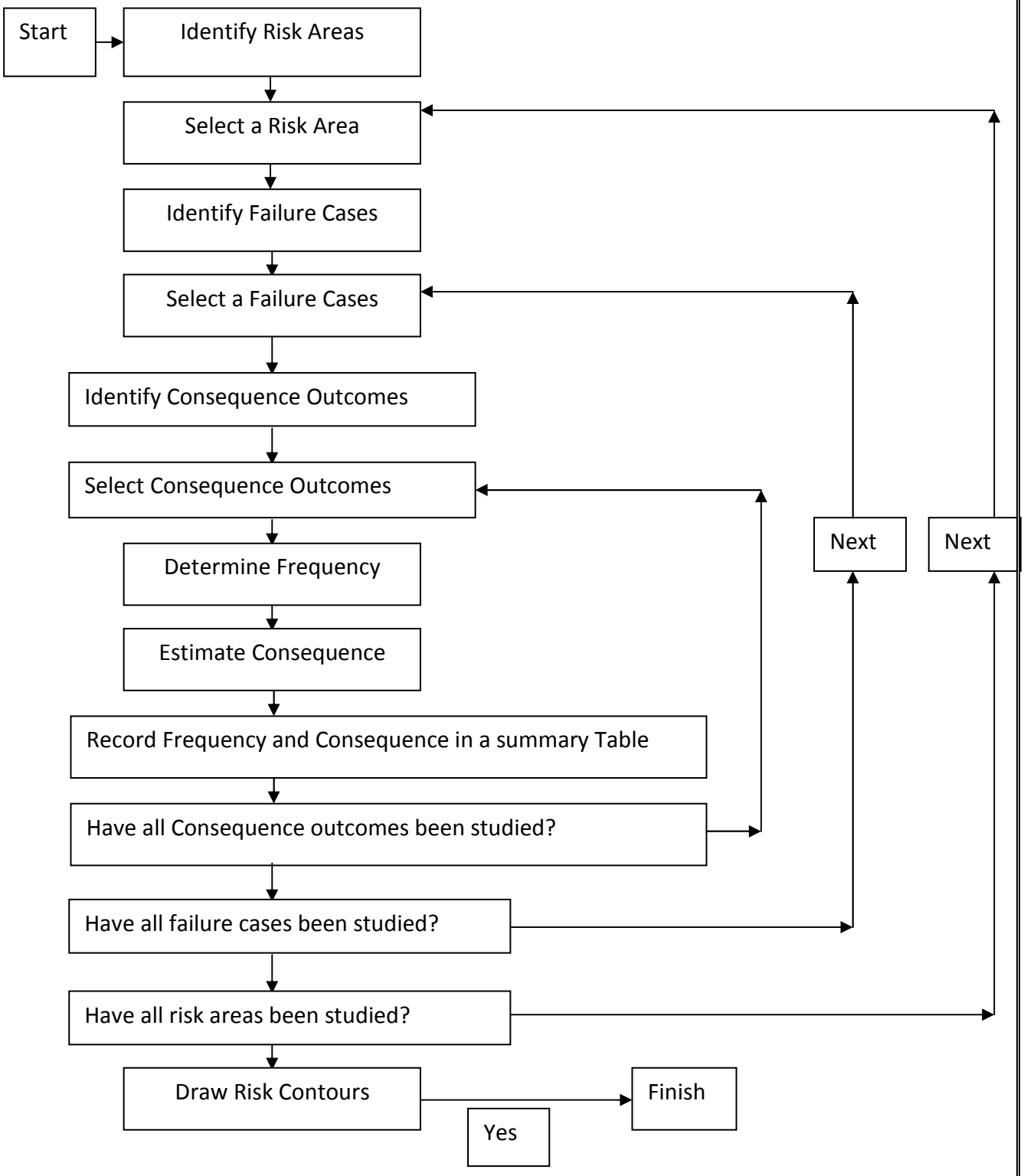
FIGURE – 7.1

QRA METHODOLOGY



FIGURE–7.2

FLOW CHART FOR QUANTITATIVE RISK ASSESSMENT



7.1.4 HAZARD IDENTIFICATION

Identification of hazards in the proposed project activity is of primary significance of the analysis, and quantification. Hazard states the characteristics of system/plant/process that presents potential for an accident. All the components of a system/plant/process need to be thoroughly examined to assess their potential for initiating or propagating an unplanned event/ sequence of events, which can be termed as an accident.

7.1.4.1 IDENTIFICATION OF HAZARDOUS AREAS

The procedure for QRA starts with identification of major risk areas in the installation. Operation carried out in specialty and agrochemical Industries usually come under certain board, general categories. At M/s. Insecticides India Limited, major risk areas are as follows:

- Bulk storage area for Raw Materials at Standard temperature and atmospheric pressure.
- Process Plant involving pumping, transportation, reactors, heating, cooling, etc.
- Bulk loading and unloading from storage tanks to road takers and vice versa.

7.1.4.2 IDENTIFICATION OF FAILURE CASES FOR HAZARDOUS AREAS

- Release due to catastrophic failure of storage tanks or process vessels.
- Rupture of connected pipe with storage tank or process vessels.
- Continuous release at significant rates for long durations transfer pipelines caused by sudden, major break of the pipeline.
- Continuous release at low rate through small holes or cracks in piping and vessels, flange leaks, and leakage from pump glands and similar seals.

It is to be noted that for Quantitative Risk Assessment, worst case scenarios has been considered, though their frequency of occurrence is much lower than the cases of small leaks.

7.1.4.3 MAJOR HAZARDOUS AREAS AND SAFETY PRECAUTIONS

The hazardous chemical storage area is shown in Figure-7.3. The major Hazardous chemicals to be stored, transported, handled and utilized within the plot area are summarized in the Table-7.1. Other hazards and control measures are summarized in Table-7.2. Facilities / System for process safety, transportation, fire fighting system and emergency capabilities to be adopted are stated below.

FIGURE-7.3

HAZARDOUS CHEMICAL STORAGE AREA

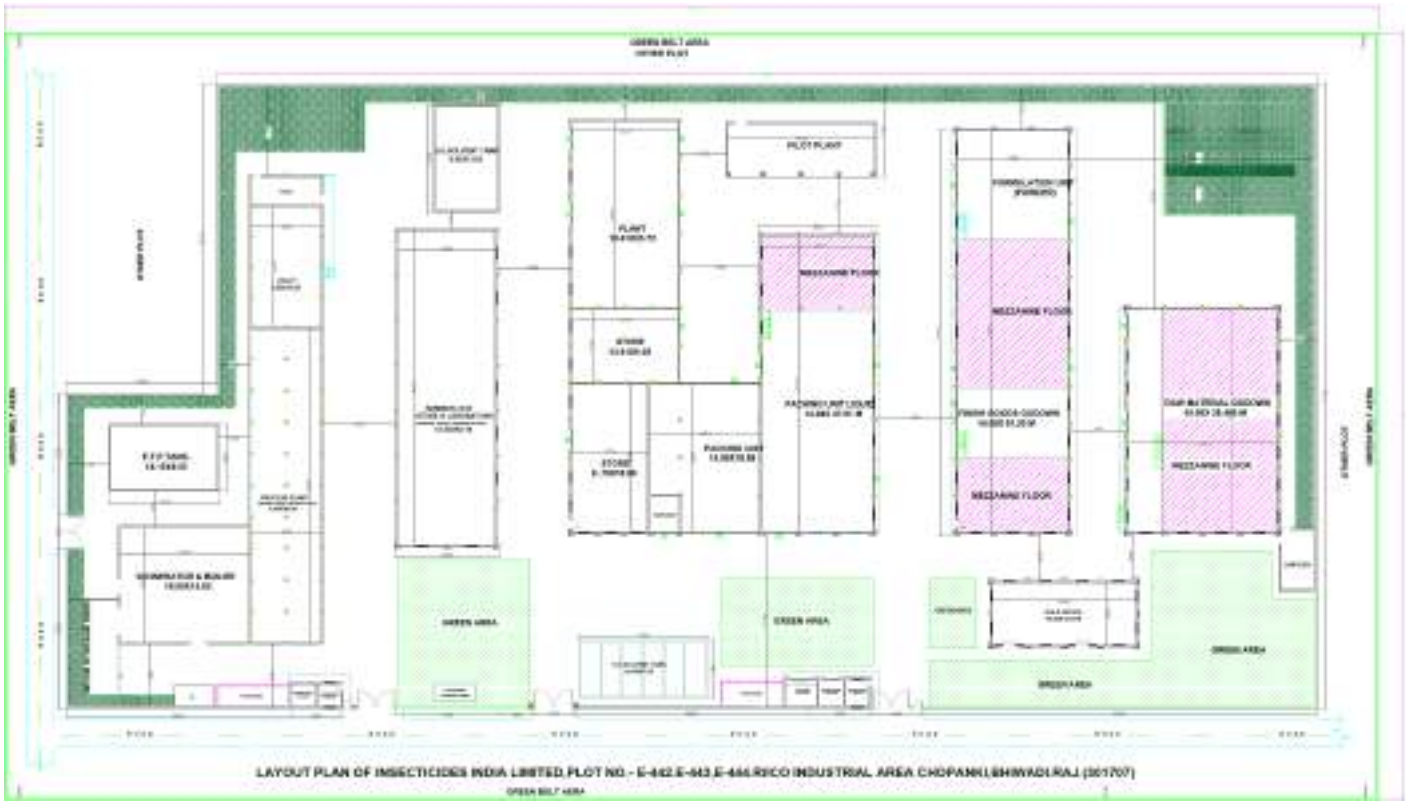


TABLE-7.1

STORAGE AND HANDLING DETAILS OF HAZARDOUS CHEMICALS

Sr. No.	Name of the Material	Type of Hazard	Kind of Storage	Max. quantity to be stored (MT)	Storage condition i.e. temp., pressure	Tank Dimensions in (m)	Dyke Dimension	Control Measures provided
1.	Cyclohexanone	Fire and spillage	U/G tank	38	ATMP	2 x 4 L x 2.5 D	Sufficient	Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
2.	CIX solvent	Fire and spillage	U/G tank	76	ATMP	4 x 4 L x 2.5 D	Sufficient	Store in a cool, dry, underground storage area away from incompatible substances. Flammables-area. Respiratory Protection equipment Fire Fighting Equipment, Flame proof electrical equipment.
3.	Isopropyl Alcohol	Fire and spillage	U/G tank	40	ATMP	2 x 4 L x 2.6 D	Sufficient	Store in a cool, dry place. Store in a tightly closed container, Respiratory Protection equipment Fire Fighting Equipment, Flame proof electrical equipment., No manual handling
4.	Toluene	Fire and spillage	U/G tank	40	ATMP	2 x 4 L x 2.6 D	Sufficient	Store in a, dry well-ventilated location, away from any area where the fire hazard may be acute. If the exposure limit is exceeded and engineering controls are not feasible, a full face piece respirator with organic vapor cartridge may be worn up to 50 times the exposure limit or the maximum use concentration

								specified by the appropriate regulatory agency or respirator supplier, whichever is lowest above flash point, vapor-air mixtures are explosive within flammable limits noted above.
5.	Hexane	Fire and spillage	U/G tank	20	ATMP	2 x 3 L x 2.2 D	Sufficient	Store in a cool, dry, underground storage area away from incompatible substances. Flammables-area. Respiratory Protection equipment Fire Fighting Equipment, Flame proof electrical equipment., No manual handling

TABLE 7.2

OTHER HAZARDS AND CONTROL

SR. NO.	NAME OF THE POSSIBLE HAZARD OR EMERGENCY	ITS SOURCES & REASONS	ITS EFFECTS ON PERSONS, PROPERTY & ENVIRONMENT	PLACE OF ITS EFFECT	CONTROL MEASURES PROVIDED
1	**BOILER** (1) Burning (2) Physical injury (3) Explosion	Over pressure in the boiler if safety valve not working. Water level indicator not working. Low water level indicator fails. High temp. System fails.	Minor/Major Injury Loss of human life Loss of property (Loss of Main/ Machine Material)	Boiler House and surrounding places	Lower & Upper Level Indication System provision. Safety valves for pressure control fixed temp. & pressure indicator provided. Blow down & blowing system provided for cleaning tube and shell. Soft water used. Inter locking provided on pumps, FD fan, ID fan. Periodical checking & inspection maintenance done. Yearly inspection done by Boiler Inspector.
2	**ELECTRICITY** (1) Burning (2) Fire (3) Shock	Loose Contacts, Weak earthling Short Circuit Improper Insulation	Burning, Shock, Death	Surrounding the accident area	Proper Earthing, Periodical Checking of joints, proper insulations of Equipments, etc. Flame proof fitting in solvent storage area, bounding and jumpers to all solvent barrier lines provided.
3	**HOUSE KEEPING** (1) Physical (2) Burning (3) Fire (4) Chemical Exposure	Bad House keeping	Physical / Chemical Thermal Burn Injury (Major / Minor)	In all surrounding areas i.e. Storage, Plants	Proper Handling, regular cleaning, Proper placement of material **(RIGHT THING AT THE RIGHT PLACE)**
4	**PIPE LINE LEAKAGES Spillages etc**. (1) Corrosion (2) Toxic gas release	Leaking of pipe line due to corrosion, Loose contact etc.	Physical / Chemical Thermal Burn Injury (Major / Minor)	Plant area	Proper maintenance, Proper Selection of Material for pipe lines, Immediate attention, Earthing provided, flame proof fitting, NO SMOKING Boards displayed.
5	**Structural Failure**	Inside the factory (Corrosion)	Injury/Death to persons, damage to property	Within the factory	Automatic operation Periodic Testing of safety valves Regular Inspection and Maintenance
6	**Toxic Release from outside**	Outside the factory	Injury/Death	Within & outside the unit	Alarm, Evacuation rescue & shelter/ Welfare
7	**Natural Calamity**	Nature	Injury / Death to persons, damage to property	Within & outside the unit	Alarm, Evacuation rescue & shelter/ Welfare

TABLE 7.3

HAZARDOUS PROPERTIES OF THE CHEMICALS, COMPATIBILITIES, SPECIAL HAZARD AND ANTIDOTES

SR.	NAME OF CHEMICAL	HAZARD	FLASH POINT ^{0}C	BP ^{0}C	LEL %	UEL %	SP.GR. 20 ^{0}C	VD	SOLUBILITY WITH WATER at 20 ^{0}C	NFPA H F R	TLV PPM TWA	IDLH PPM	LC50/LD50 mg/m3	ANTIDOTE
1.	Sulphuric Acid (98%) CAS No: 7664-93-9	T/C	NA	270-340	NA	NA	1.84	3.4	Easily soluble in cold water.	3 0 2	3 mg/m^3	15 mg/m^3	320 mg/m3 2 hours (Mouse)	Milk of Magnesia 4 % Sodium Hydro carbonate solution Milk
2.	Nitric Acid CAS No: 7697-37-2	T/C	NA	121	--	--	1.408	2.5	Easily soluble in cold water, hot water. Soluble in diethyl ether	4 0 0	4	25 ppm	--	Milk of Magnesia 4 % Sodium Hydro carbonate solution Milk
3.	Caustic Solution CAS No: 1310-73-2	T	NA	1388	--	--	2.13	NA	Easily soluble in cold water.	3 0 1	2 mg/m^3	10 mg/m^3	--	No specific antidote
4.	Xylene CAS No: 95-47-6	F	17	144.4	0.9	6.7	0.88	3.7	0.0175%	2 3 0	100	900	3608 mg/kg (Rat)	No specific antidote
5.	Toluene CAS No: 108-88-3	F	7	111	3.3	19	0.86	3.14	0.05 gm/100 gm water	2 3 1	200	-	636 mg/kg (Rat)	No specific antidote
6.	Acetonitrile CAS No: 75-05-8	F	2	81.6	3	16	-	1.42	Completely soluble	2 3 0	20	500	2460 mg/kg (Rat)	Hydroxocobalamin or the cyanide antidote kit
7.	Iso Propyl Alcohol CAS No: 67-63-0	F	12	82.4	2	12.7	-	2.1	Miscible	1 3 0	400	2000	-	Drink plenty of water to help your body flush out the toxin
8.	Dimethyl formamide CAS No: 68-12-2	H/F	57.78	153	2.2	15.2	0.95	2.51	Easily soluble in cold water, hot water	2 2 0	-	-	2800 mg/kg (Rat)	No specific antidote
9.	Acetic Acid CAS No: 64-19-7	F/C	39	118.1	4	19.9	1.05	2.07	Easily soluble in cold water, hot water	3 2 0	15	1000	3310 mg/kg (Rat)	No specific antidote
10.	Tri Ethyl Amine CAS No: 121-44-8	F/T	-11	90	1.2	8.0	0.72	3.5	Soluble	3 3 0	1	200	460 mg/kg (Rat)	Use 0.9% saline (NS) or lactated Ringer's (LR)
11.	Ethyl Acetate CAS No: 141-78-6	F	-4.4	77	2.2	9.0	0.9	3.04	Easily soluble in cold water, hot water	1 3 0	4000	10000	5620 mg/kg (Rat)	No specific antidote
12.	Methanol CAS No: 67-56-1	F/T	12	64.5	6	36.5	0.79	1.11	Easily soluble in cold water, hot water	1 3 0	250	25000	5628 mg/kg (Rat)	Fomepizole, or if unavailable, ethanol.
13.	Thionyl Chloride	C/H	-	79	-	-	-	1.64	-	4 0 2	0.2	-	324 mg/kg	Use 0.9% saline (NS) or lactated

	CAS No: 7719-09-7												(Rat)	Ringer's (LR)
14.	Benzene CAS No: 71-43-2	F	-11	80.1	1.3	7.1	0.88	2.8	0.18 g/ 100 ml @ 25^{0}C	2 3 0	10	500	930 mg/kg (Rat)	No specific antidote
15.	Methylene Chloride CAS No: 75-09-2	T	-4	39.8	13	22	-	2.9	10-50 mg/ml	2 1 0	50	2300	-	No specific antidote
16.	Hexane CAS No: 110-54-3	F	-22	62	1.2	7.7	0.68	2.97	Insoluble	1 3 0	50	1100	25 g/kg (Rat)	No specific antidote
17.	Hydrochloric Acid CAS No: 7647-01-0	C	-	-85.06	-	-	-	1.25	Miscible	3 0 1	5	50	-	Sodium Hydro- Carbonate (4% Conc.), Milk, Milk of Magnesia
18.	Trifluoro Acetic Acid CAS# 76-05-1	T	-3	72.4	-	-	1.535	3.9	Soluble	3 0 0	-	-	10 gm/m3 Rat	No specific antidote
19.	Ethanol CAS# 64-17-5	F	14	78	3.3	19	0.790	1.59	Soluble	2 3 0	1000	3300	Inhalation - rat - 10 h - 20000 ppm	2 gm sodium bi carbonate in 250 ml water, Diazepam 10 mg through injection
20.	Ammonia (Anhydrous) CAS # 7664-41-7	C	NF	- 33.3	15.50	27	0.6819 at -30 C (Water) 0.5970 at 00C 1 atm (Air 1)	Liq. 608.7 kg/m3 210C Gas 0.771 kg/m3 00C	Insoluble	3 1 0	25 ppm	300 ppm	7040 mg/m3	Smelling Ethanol or Ether
21.	Bromine CAS #7726-95-6	C/T	--	58.78	--	--	3.11	7.1	Soluble in water	3 0 0	0.2 ppm	3.0 ppm	2600 mg/kg [Rat]	Put two or three drops of Pontocane (0.5 solution) or Benoxinate (Novesine) 0.4 %. If problem in respiration, give milk, butter-milk or lemon juice or make a small cotton ball and drench with ethanol or ether solution drops and put it near victim's nose for smell. Apply

														pure oxygen.
22.	Chlorine CAS #7782-50-5	T	-	The lowest known value is 100°C	NA	NA	1.424	0.62	Boils	3 0 0	1	10	1017 ppm for human	Milk butter and milk of magnesia.
23.	Phosgene CAS #75-44-5	F	4	8.2	1.2	7	1.4	3.4	Insoluble in water	4 0 1	0.1	2	3 ppm for Rat / 4 hrs.	No specific antidote

F	= FIRE	T	= TOXIC
E	= Explosive	R	= REACTIVE
BP	= BOILING POINT	LEL	= LOWER EXPLOSIVE LIMIT
UEL	= UPPER EXPLOSIVE LIMIT	SP.GR	= SPECIFIC GRAVITY
VD	= VAPOUR DENSITY	ER	= EVAPORATION RATE
H	= HEALTH HAZARD CLASS	F	= FIRE HAZARD CLASS
R	= REACTIVE HAZARD	BR	= BURNING RATE

7.2 SAFETY PRECAUTIONS

7.2.1 Control measures provided for Solvent Tank Farm:

1. Construction & Installation of solvent storage facility is provided as per explosive act, (License & local rules / regulation followed).
2. Flame proof electrical fitting & intrinsically safe instruments are installed.
3. Flame arrestor installed on vent pipe with breather valve & emergency vent valve provided.
4. Earth fault relay trip installed for solvent tanker unloading system (Solvent pump having interlock with grounding of the tanker to make 100% grounding.).
5. Grounding (double earthing) & Jumper for flange joint provided for all installation & it is monitored periodically.
6. Road Tanker grounded before unloading.
7. Convenient metallic SS hose pipes provided for tanker unloading for better connectivity.
8. Deep in let pipe provided inner side of the solvent tanks.
9. Check list is followed for loading & unloading.
10. Level indicator provided on the tank.
11. Adequate dyke wall (noncombustible) is provided.
12. Leakage collection bund with foam system is provided.
13. Combustible Gas Detection system, Fire (Foam / Powder) extinguisher, Foam monitors is provided.
14. F-30 coating provided for solvent storage tanks.
15. Nitrogen blanketing system is provided.
16. Closed handling system is provided.
17. Smoke detector system installed at Hydrogen Peroxide storage room.
18. Cooling system provided for Hydrogen Peroxide storage room.
19. In case of High temperature of Hydrogen Peroxide Storage Room, High temp. indication provided & connected centralized DCS system.

7.2.2 Control measures provided for Acid / Alkali Tank Farm:

1. Adequate dyke wall (with acid proof coating) provided.
2. Level indicator with high level alarm provided on the tank.
3. Water curtain system installed on southern extreme of site in front of tank farm to avoid gas dispersing on general road traffic.
4. Scrubber system installed for HCL storage tank & used during road tanker unloading.
5. Adequate flexible SS hose provided for tanker connection for unloading.
6. Dedicated pumps are provided and located with its close proximity to the respective tank to avoid unintentional mistake of mixing of chemicals.
7. Leakage / Spillage handling kit provided.
8. To avoid chemical exposure, closed handling system is provided.
9. Fire hydrant system provided including water curtain system.

7.2.3 Control measures provided for Warehouse:

1. Fixed electrical fitting is provided. Lighting is installed between racks above the gangways & away from material storage to avoid heating to storage goods.
2. Electrical fitting tested periodically (i.e. electrical load thermo graphic temperature measurement, mechanical integrity of cables, physical condition of cable & other electrical appliances / installation.)
3. BT reach truck battery charging station is provided outside of ware house.
4. Appropriate passage, gangways provided.
5. Fire detection system (Beam Detector) provided.
6. Adequate portable fire extinguishers installed at noticeable position & kept easily accessible.
7. Fire hydrant system provided.
8. Auto sprinkler system provided on individual racks compartments at Ware House: this system is independent system having Separate Pumps with separate piping from Pump House to Ware House, it consists of automatic operated sprinkler on 59°C.

9. Fire Alarm System: Automatic fire detection & alarm system consists of Fire Detectors, Addressable Manual Call Points (MCP) & Hooters Beam Detectors (Ware House) are placed at strategic locations and connected by cable to central control panel at ECC with repeater panel at DCS Control Room.
10. Emergency exit provided.
11. A warehouse is used exclusively for storage activities. Loose chemical handling not allowed.
12. Chemical segregation is done based on reactivity.
13. In case of maintenance work, Ignition sources controlled by hot work permit system.
14. Natural & Eco ventilator is provided.
15. Proper drainage system is provided for used fire water.

7.3 PRECAUTIONS DURING STORAGE AND TRANSPORTATION OF HAZARDOUS CHEMICALS LIQUIDS

- Always use the road tankers having authorization for transporting the said liquids.
- Vendor will be asked to provide MSDS to Tanker Driver.
- Tankers will have clearly marked identification of material being contained with mentioning Safety Card.
- Driver to have concerned Safety Officer's contact details to contact him in case of emergency.
- Provide muffler on exhaust while entering tanker within premises.
- Ensure Earthing Boss connection before starting any transferring.
- SOP to cover routine checking of Tank farm area to be carried out for checking any spillage / leakage.
- Tanks will be inspected physically daily for having any visual abnormality.
- Readings of Temperature & Pressure will be noted, recorded & reported immediately for abnormality.

- Safety instruments like rupture disc, safety valves will be checked at defined duration for intakeness.
- Scheduled testing of tanks to be done for thickness testing.
- Tanks to be painted on regular interval defined as per laws to protect them from atmospheric corrosion.
- Barrels to be checked for proper fixing of bungs before sending it outside the premises.
- Barrels to be monitored physically daily for developing any pressure or vacuum within it on long storage.
- Concerned persons will be trained properly to use spill kit in case of observing any spillage inside warehouse.

SOLIDS

- Vendor will be asked to provide MSDS to Truck Driver.
- Driver to have concerned Safety Officer's contact details to contact him in case of emergency.
- Provide muffler on exhaust while entering truck within premises.
- SOP to cover routine checking of Bags & Containers for checking any damage.
- Containers to be tested for safe racking & transportation.
- Proper PPE to be used while handling the material & concerned persons to be trained for usage of the same.
- Concerned persons will be trained properly to use spill kit in case of observing any spillage inside warehouse.

For PESO Underground Storage Tank Farm:

- Class A petroleum products will be received through road tanker and stored in underground storage tank as per petroleum rules.
- Tank farm will be constructed as per explosive department requirement and separation distance will be maintained.
- Static earthing provision will be made for road tanker as well as storage tank.
- Flame arrestor with breather valve will be provided on vent line.
- Road tanker unloading procedure will be prepared and implemented.
- Fire load calculation will be done and as per fire load Hydrant System will be provided as per NFPA std. and Fire extinguishers will be provided as per fire load calculation.
- Spark arrestor will be provided to all vehicles in side premises.
- Flame proof type equipment s and lighting will be provided.
- Lightening arrestor will be provided on the top of chimney.
- Trained and experience operator will be employed for tank farm area.
- NFPA label (hazard identification) capacity and content will be displayed on storage tank.
- Solvents will be transferred by pump only in plant area and day tank will be provided. Overflow line will be return to the storage tank or Pump On-Off switch will be provided near day tank in plant.
- Jumpers will be provided on solvent handling pipe line flanges.
- Flexible SS hose will be used for road tanker unloading purpose and other temp. Connection.

For Above Ground Non PESO Storage Tank Farm:

- SS storage tank provided as per IS code.
- Dyke wall provided to storage tank.
- Level gauge provided with low level high level auto cut-off provision.
- Fire hydrant monitor with foam trolley facility provided.
- FLP type pump provided.

- Double static earthing provided to storage tank.
- Double Jumper clip provided to all pipeline flanges.
- Road tanker unloading procedure prepared and implemented.
- Lightening arrestor, PPEs provided.
- Safety shower, eye wash provided.
- NFPA labeling system adopted for drums as well as storage tanks.

Safety Measures for Acid Storage Tank Area:

- Storage tank will be stored away from the process plant.
- Tanker unloading procedure will be prepared and implemented.
- Caution note and emergency handling procedure will be displayed at unloading area and trained all operators.
- NFPA label will be provided.
- Required PPEs like full body protection PVC apron, Hand gloves, gumboot, Respiratory mask etc. will be provided to operator.
- Neutralizing agent will be kept ready for tackle any emergency spillage.
- Safety shower, eye wash with quenching unit will be provided in acid storage area.
- Material will be handled in close condition in pipe line.
- Dyke wall will be provided to all storage tanks, collection pit with valve provision.
- Double drain valve will provided.
- Level gauge will be provided on all storage tanks.
- Safety permit for loading unloading of hazardous material will be prepared and implemented.
- TREM CARD will be provided to all transporters and will be trained for transportation Emergency of Hazardous chemicals.
- Fire hydrant system with jockey pump as per TAC norms will be installed.

For Drum Storage Area:

Some chemicals will be received at plant in drums by road truck and stored in a separate drum storage area.

- FLP type light fittings will be provided.
- Proper ventilation will be provided in Godown.
- Proper label and identification board /stickers will be provided in the storage area.
- Conductive drum pallets will be provided.
- Drum handling trolley / stackers/fork lift will be used for drum handling.
- Separate dispensing room with local exhaust and static earthing provision will be made.
- Materials will be stored as per its compatibility study and separate area will be made for flammable, corrosive and toxic chemical drums storage.
- Smoking and other spark, flame generating item will be banned from the Gate.

For Chlorine:

Following steps will be adopted:

- SOP will be prepared for safe handling of Chlorine tonners.
- Chlorine Emergency Kit will be procured and kept ready at chlorine shed.
- Chlorine Hood with blower will be provided with scrubbing arrangement.
- Safety Shower and eye wash will be provided in Chlorine shed area.
- Tonner handling EOT crane will be installed in Chlorine shed area for safe Tonner handling.
- Safety Valve will be provided on chlorine header line and it will be connected to caustic scrubber.
- SCBA sets will be kept ready at chlorine handling area.
- Safety valve will be provided on vaporizer header and outlet of safety valve connected to scrubber.
- Flow and temperature controllers will be provided on process line.

Chlorination Plant:

- FLP type area will be provided.
- Total enclosed process system.
- Instrument & Plant Air System.
- Nitrogen blanketing in Chlorination reactor.
- Safety valve and Rupture disc provided on reactor.
- Cooling Chilling and power alternative arrangement have been made on reactor.
- Chlorine and Nitrogen Cylinder bank away from the auto clave reactor.
- PRV station with shut off valve, safety valve provision will be made for chlorination reaction safety.
- Flame arrestor will be provided on vent line of reactor and it will be extended up to roof level.
- Open well ventilated and fragile roofs will be provided to on reactor.
- Safe Catalyst charging method will be adopted.
- SOP will be prepared and operators will be trained for the same.

Transportation, Unloading and Handling Procedure for Solvents

SR. NO.	ACTIVITY	TYPE OF POSSIBLE HAZARD	MITIGATION MEASURES
1	Transportation of Solvents by road tanker	Leakage& Spillage	• Check the source of leakage point. • Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. • Stop leak if you can do it without risk.
		Fire & explosion	• Use water spray to reduce vapors; do not put water directly on leak, spill area or inside container. • Keep combustibles (wood, paper, oil, etc.) away from spilled material. • Auto earthling to be connect & ensure
		Toxic release	• Isolate the area • Isolate the container • Training will be provided to driver and cleaner regarding the safe driving, hazard of Flammable

			chemicals, emergency handling. • TREM card will kept with TL. • Fire extinguishers will be kept with TL. • Flame arrestor will be provided to TL exhaust. • Instructions will be given not to stop road tanker in populated area. • Clear Hazard Identification symbol and emergency telephone number will be displayed as per HAZCHEM CODE. • Appropriate PPEs will be kept with TL.
2	Road tanker unloading at tank farm area	Leakage& Spillage	• Check the source of leakage point. • Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. • Stop leak if you can do it without risk. • Auto earthling to be connect & ensure
		Fire & explosion	• Use water spray to reduce vapors; do not put water directly on leak, spill area or inside container. • Keep combustibles (wood, paper, oil, etc.) away from spilled material.
		Toxic release	• Isolate the area • Isolate the container • Check the source of leakage point. • Isolate the area • Isolate the container • Spray the water on leakage • Priority will be given to Tanker to immediately enter the storage premises at site and will not be kept waiting near the gate or the main road. • Security person will check License, TREM CARD, Fire extinguisher condition; Antidote Kit, required PPEs as per SOP laid down. • Store officer will take sample as per sampling SOP from sampling point. • After approval of QC department unloading procedure will be allowed be started. **Following precautions will be adopted during unloading** • Wheel stopper will be provided to TL at unloading platform. • Static earthing will be provided to road tanker. • Tanker unloading procedure will be followed

			according to check list and implemented. • Flexible SS hose connection will be done at TL outlet line. • The quantity remaining in the hose pipeline will be drained to a small underground storage tank. • All TL valves will be closed in TL. • Finally earthing connection and wheel stopper will be removed. • Only day time unloading will be permitted.
3	Storage tank safety	Leakage& Spillage	• Check the source of leakage point. • Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. • Stop leak if you can do it without risk.
		Fire, Explosion	• Use water spray to reduce vapors; do not put water directly on leak, spill area or inside container. • Keep combustibles (wood, paper, oil, etc.) away from spilled material.
		Toxic release.	• Isolate the area • Isolate the container • Check the source of leakage point. • Isolate the area • Isolate the container • Spray the water on leakage • SS storage tank will be provided as per IS code. • Dyke wall will be provided to storage tank. • Level transmitter will be provided with low level high level auto cut-off provision. • Vent will be connected to water trap and vent of water trap will be provided with flame arrestor. • Water sprinkler system will be provided to storage tank. • Fire hydrant monitor with foam attachment facility will be provided. • Dumping / Drain vessel/alternate vessel will be provided to collect dyke wall spillage material. • FLP type pump will be provided. • Nitrogen blanketing will be provided to storage tank. • Double static earthing will be provided to storage tank. • Double Jumper clip will be provided to all Solvent handling pipeline flanges.

4	Transfer from storage tank to Day tank	Leakage& Spillage due to Line rupture, Flange Gasket failure, Fire, Explosion, Toxic release.	• Double mechanical seal type FLP type pump will be provided. • Double on / off switch will provided at tank farm and process area near day tank. Pump auto cut off with day tank high level will be provided. • Flame arrestor will be provided on day tank vent. • Over flow will be provided for additional safety and it will be connected to main storage tank. • NRV will be provided on pump discharge line. • Double Jumper clip will be provided to all solvent handling pipeline. • Double static earthing will be provided to day tank.
5	Transfer from Day tank to reactor.	Leakage, Spillage due to Line rupture, Flange Gasket failure, Fire, Explosion, Toxic release.	• Gravity transfer. • Total quantity of day tank material will be charged in to reactor at a time. • NRV will be provided on day tank outlet line. • Static earthing will be provided to storage tank. • Double Jumpers will be provided to pipeline flanges.

- **Bromine Transportation, Unloading and Handling Procedure**

SR.NO.	ACTIVITY	TYPE OF POSSIBLE HAZARD	MITIGATION MEASURES
1	Transportation of Bromine by ISO container	Leakage, Spillage, Toxic release	• Leak check with ammonia torch and detect the leak point. • ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). • Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. • Stop leak if you can do it without risk. • Prevent entry into waterways, sewers, basements or confined areas. • Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. • Do not get water inside containers. • GPS will be installed in all the trucks and ISO container vehicle. • Driver and assistant will be trained in using GPS. • Open space separated from public highway and public dwellings, where public does not normally pass. No passengers are allowed. • The crew shall know how to use fire-fighting appliances. • The driver or driver's assistant may not open a package containing bromine. • Bromine receptacles are not to be checked with open flames. • No smoking is permitted around the transport unit or in the vicinity of the vehicle during handling operations.

			• The engine is to be shut off during all handling operations unless required to drive pumps, hoist, etc. • Parking brakes are to be applied whenever parked. • If the vehicle is parked on a road at night or with poor visibility, warning signs are to be placed 10 meters ahead of and behind the vehicle. • TREM CARD provided to all transporters and trained for transportation Emergency of Hazardous chemicals. • Training will be provided to driver and cleaner regarding the safe driving, hazard of Bromine emergency handling, use of Self-contained breathing apparatus (SCBA) sets and neutralizing agent. • SCBA set will be kept with ISO container truck. • All the ISO container truck will be equipped with Global Positioning system (GPS) and route will be predefined. • Clear Hazard Identification symbol and emergency telephone number will be displayed as per HAZCHEM CODE. • Appropriate PPEs will be kept with Truck.
2	Bromine ISO container unloading and handling at IIL site	Leakage, Spillage, toxic release	• Leak check with ammonia torch and detect the leak point. • ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). • Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. • Stop leak if you can do it without risk. • Prevent entry into waterways, sewers, basements or confined areas. • Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. • Do not get water inside containers. • Directly ISO container will be placed at storage area and connected with process tank. • Wear recommended personal protective equipment during connection of ISO container. • Make sure the absorber unit is working and capable of handling vented bromine fumes. • **BE SURE THAT DRY AIR (DEW POINT -40"C) OR DRY NITROGEN** is available in ample supply and its pressure is controlled below 3 atm. gauge. • Check that all the Iso-container valves are closed and blind flanges are in place. • Remove the blind flange above the red valve. • Connect your pressure release line to the red valve outlet. Use a new rubber gasket (use limit - 24 hours) to ensure tight connection. • Open the red valve slowly and then the depressurizing valve, to release any pressure which might have developed in the Iso-container. • Remove the blind flange above the yellow valve. • Connect your line to the yellow valve outlet. Use a new rubber gasket (use limit - 24 hours) to ensure tight connection.

			• Open the yellow valve and all the valves in your liquid unloading line. • Close the depressurizing valve. • Open the pressurizing valve, at first slowly (to check for bromine leaks), then fully, to start bromine unloading. Use only enough pressure to lift the bromine to the high point in the unloading system. • **NEVER EXCEED 3 ATM. PRESSURE** • When air/nitrogen blows through the unloading line into your storage tank, the Iso-container is empty. • Close the pressurizing valve. • Close the yellow valve and then all the other valves in your liquid unloading line. • Slowly open the depressurizing valve to release the air/nitrogen pressure on the Iso-container to your absorber unit. Wait 5 minutes. • Close the red valve and then the depressurizing valve. • Cautiously disconnect your liquid unloading line from the yellow valve of the Iso-container. Replace its blind flange, tightening all the bolts. Do not forget to reinstall the proper gasket. • Disconnect your pressure release line from the red valve of the Iso-container. Replace its blind flange, tightening all the bolts. Do not forget to reinstall the proper gasket. • If there has been a bromine spillage, wash it off the Iso-container with plenty of water to prevent corrosion. Small bromine spills on the ground may be neutralized with a clear soda ash or a sodium thiosulphate solution. Then dispose of in a manner approved by the local authorities. • Close the cover dome and pin it securely. • Mark the Iso-container EMPTY (use erasable means). • Bromine Iso tanks should be stored no closer than 10 meters from human or animal consumable articles. Explosives and flammable materials should not be stored close to bromine. • There would be sufficient bromine storage tank capacity or an empty ISO tank to accommodate the transfer of bromine from a leaking container • Area where bromine will be used or stored will be enclosed so that unauthorized persons and animals are prevented from entering the area. Adequate lighting will be provided to allow sufficient night surveillance. Surveillance will be provided 24 hours a day. • Personnel escape routes will be clearly marked and it will be maintained without any obstructions including adequately sized doors and windows. • Facilities like offices, eating, showering and changing rooms, will be located in up wind direction and remote from the area where bromine is handled or stored. Provide an adequate supply of clean water for washing and showers. • Emergency siren, telephone will be provided in storage area for the reporting of accidents or emergency situations. The emergency

			telephone numbers will be displayed at prominent locations and it include the fire department, ambulance service, emergency response team, hospital and police. • A wind sock will be provided which will clearly visible from all points on the site and replaced as required. This is required for indicating wind strength and direction. • Emergency respirator equipment cabinets (Cupboard) will be installed not more than 30 meters or ten seconds walking distance from any location in the storage area. • Showers and eyewash fountains will be provided, clearly marked, well lit and with unobstructed access. • Signs will be posted prominently at the site entrance and throughout the installation with area maps showing access ways, hydrant locations, emergency showers, location of emergency equipment and emergency telephone numbers. • All management and operating personnel involved in the use or handling of bromine will undergo safety training, in addition to specific task training. • Only experienced well-trained operators will be allowed to receive and unload bromine receptacles. • The management will ensure that emergency response plans have been made and coordinated with the emergency response local authorities. • Safety permit for hazardous material loading unloading will be prepared and implemented. Fire hydrant system and water sprinkler system installed at tank farm area.

Chlorine Transportation, Unloading and handling Procedure:

SR.NO.	ACTIVITY	TYPE OF POSSIBLE HAZARD	MITIGATION MEASURES
1	Transportation of Chlorine Tonners by road tanker	Leakage, Spillage, Toxic release	• Leak check with ammonia torch and detect the leak point. • ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). • Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. • Stop leak if you can do it without risk. • Prevent entry into waterways, sewers, basements or confined areas. • Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. • Do not get water inside containers. • Training will be provided to driver and cleaner regarding the safe driving, hazard of Chlorine emergency handling, use of SCBA sets. • TREM card will kept with TL.

			• SCBA set will be kept with TL. • Instructions will be given not to stop Chlorine road truck in populated area. • Clear Hazard Identification symbol and emergency telephone number will be displayed as per HAZCHEM CODE. • Appropriate PPEs will be kept with TL.
2	Chlorine tonners unloading at site	Leakage, Spillage, toxic release	• Leak check with ammonia torch and detect the leak point. • ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). • Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. • Stop leak if you can do it without risk. • Prevent entry into waterways, sewers, basements or confined areas. • Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. • Do not get water inside containers. • Priority will be given to Tanker to immediately enter the storage premises at site and will not be kept waiting near the gate or the main road. • Security person will check License, TREM CARD, Fire extinguisher condition; SCBA set condition, required PPEs as per SOP laid down.
3	Chlorine tonners storage shed	Leakage, Spillage, Toxic release.	• Leak check with ammonia torch and detect the leak point. • ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). • Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. • Stop leak if you can do it without risk. • Prevent entry into waterways, sewers, basements or confined areas. • Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. • Do not get water inside containers. • SOP will be prepared for safe handling of Chlorine toners. • Chlorine Emergency Kit will be procured and kept ready at chlorine shed. • Chlorine Hood with blower will be provided with scrubbing arrangement. • Safety Shower and eye wash will be provided in Chlorine shed area. • Tonner handling EOT crane will be installed in Chlorine shed area for safe tonner handling.

			• Safety Valve will be provided on chlorine header line and it will be connected to caustic scrubber. • SCBA sets will be kept ready at chlorine handling area. • Safety valve will be provided on vaporizer header and outlet of safety valve connected to scrubber. • Flow and temperature controllers will be provided on process line.
4	Chlorine tonners connected with header	Leakage, Spillage due to Line rupture, Toxic release.	• Leak check with ammonia torch and detect the leak point. • ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). • Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. • Stop leak if you can do it without risk. • Prevent entry into waterways, sewers, basements or confined areas. • Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. • Do not get water inside containers. • Teflon or copper tube will be used for connection with header. • Pressure gauge and safety valve will be provided on header line.

Storage of Sodium Cyanide:

Sodium Cyanide will store in closed room of 10 m x 10 m and it will be locked always. Only authorized person will be allowed in storage room with PPE's. Key of lock will be kept only authorized person.

Sodium Cyanide Transportation, Unloading and handling Procedure:

SR. NO.	ACTIVITY	TYPE OF POSSIBLE HAZARD	MITIGATION MEASURES
1	Transportation of Sodium Cyanide by road truck	Leakage, Spillage, Toxic release in case of direct contact or ingestion	• Close pack HDPE drums with seal. • Transport by dedicated container • No hazard during transportation due to solid pallets. • Isolate the contaminated area
2	NACN storage and handling safety	Leakage, Spillage, Toxic release in case of direct contact or ingestion	• Separate stored in locked room. • To adopt close procedure like charging with hopper hood & blanketing by nitrogen pressure. • Away from water sources. • Total body protection suite will be provided to charging operator with air line respirator. • Safe operating (Charging) procedure will be prepared and displayed in process and storage area. • Total close process for charging and handling. • Antidote kit for cyanide will be kept ready in OHC. • Training is being provided to handle NACN, • SCBA sets are available in handling area.

7.4 Hazard Identification

In the storage of chemical & manufacturing operation various flammable / toxic / corrosive material, compressed gases are utilized &also the stock of the combustible material is maintained. These items have potential to lead to an accident (explosion / fires etc).

The major industrial hazards can be divided into following different categories.

1. FIRE HAZARD.
2. EXPLOSION HAZARD.
3. TOXIC HAZARD.

Above hazard should be taken into consideration because some of the chemical used, stored are having inflammable / flammable, toxic, corrosive and explosion properties.

7.4.1 Hazard Control Measures

A) Hazard Control Measures:		
1) Fire Hazard	**2) Others Hazard**	**3) Chemical / Solvent leakage**
▪ Flameproof electrical apparatus installed at probable fire hazard area. ▪ Well maintained Fire Fighting Apparatus (fire extinguisher, fire hydrant system) in sufficient quantity. ▪ Well defined storage facility for fire hazard substances. ▪ Copper Jumpers are provided on solvent transferring lines. ▪ Earthing/Bonding system is provided at designated areas. ▪ Smoke detectors and fire alarm system installed at site. ▪ Process / operation handling by competent person only. ▪ Permit to work system. ▪ Round the clock availability of qualified Safety Officer & Paramedic. ▪ Mutual aid with nearby industries and Disaster Preventive Management Centre.	• WH & Solvent Building located away from other plants. • Online flammable gas detection meters with audible alarm / hooter. • Explosion proof wall & doors of process area where such hazards are apparent. • Copper Jumpers are provided on solvent transferring lines. • Earthing/Bonding system is provided at designated areas. • Process operated by competent person only. • Regular testing / inspection of pressure vessels by competent person • Installation of safety valve on probable explosion hazards vessels. • Permit to work system.	• Handling of chemicals with confined containers / drums only. • Availability of spillage control kit & sand buckets on specific locations. • Regular monitoring of VOC level of plant by internally and externally agency and precaution are taken to avoid exposure. • PPEs like organic cartridge mask, air bubbler and full body pressure suit with breathing air provision are provided as and when required. • People in vicinity of area are trained to use spillage control kit. • SCBA set is readily available at designated locations for emergency scenario.

7.5 CONSEQUENCE ANALYSIS

In a plant handling hazardous chemicals, the main hazard arises due to storage, handling & use of these chemicals. If these chemicals are released into the atmosphere, they may cause damage due to resulting fires or vapour clouds. Blast Overpressures depend upon the reactivity class of material between two explosive limits.

Operating Parameters

Potential vapour release for the same material depends significantly on the operating conditions. Especially for any liquefied gas, the operating conditions are very critical to assess the damage potential. If we take up an example of ammonia, if it is stored at ambient temperature, say 30°C, and then the vapour release potential of the inventory is much higher as compared to the case if it is stored at 0°C.

Inventory

Inventory Analysis is commonly used in understanding the relative hazards and short listing of release scenarios. Inventory plays an important role in regard to the potential hazard. Larger the inventory of a vessel or a system, larger the quantity of potential release. The potential vapour release (source strength) depends upon the quantity of liquid release, the properties of the materials and the operating conditions (pressure, temperature). If all these influencing parameters are combined into a matrix and vapour source strength estimated for each release case, a ranking should become a credible exercise.

Loss of Containment

Plant inventory can get discharged to Environment due to Loss of Containment. Certain features of materials to be handled at the plant need to the clearly understood to firstly list out all significant release cases and then to short list release scenarios for a detailed examination. Liquid release can be either instantaneous or continuous. Failure of a vessel leading to an instantaneous outflow assumes the sudden appearance of such a major crack that practically all of the contents above the crack shall be released in a very short time. The more likely event is the case of liquid release from a hole in a pipe connected to the vessel. The flow rate is depending on the size of the hole as well as on the pressure, which was present, in front of the hole, prior to the accident. Such pressure is basically dependent on the pressure in the vessel. The vaporisation of released liquid depends on the vapour pressure and weather conditions.

Such consideration and others have been kept in mind both during the initial listing as well as during the short listing procedure. In the study, Maximum Credible Loss accident methodology is to be used, therefore, the largest potential hazard inventories have been considered for consequence estimation.

7.5.1 DAMAGE CRITERIA

In consequence analysis, use is made of a number of calculation models to estimate the physical effects of an accident (spill of hazardous material) and to predict the damage (lethality, injury, material destruction) of the effects. The calculations can roughly be divided in three major groups:

a) Determination of the source strength parameters;

b) Determination of the consequential effects;

c) Determination of the damage or damage distances.

The basic physical effect models consist of the following.

Source strength parameters

* Calculation of the outflow of liquid, vapour or gas out of a vessel or a pipe, in case of rupture. Also two-phase outflow can be calculated.
* Calculation, in case of liquid outflow, of the instantaneous flash evaporation and of the dimensions of the remaining liquid pool.
* Calculation of the evaporation rate, as a function of volatility of the material, pool dimensions and wind velocity.
* Source strength equals pump capacities, etc. in some cases.

Consequential effects

* Dispersion of gaseous material in the atmosphere as a function of source strength, relative density of the gas, weather conditions and topographical situation of the surrounding area.

* Intensity of heat radiation [in kW/ m^2] due to a fire or a BLEVE, as a function of the distance to the source.
* Energy of vapour cloud explosions [in N/m^2], as a function of the distance to the distance of the exploding cloud.
* Concentration of gaseous material in the atmosphere, due to the dispersion of evaporated chemical. The latter can be either explosive or toxic.

It may be obvious, that the types of models that must be used in a specific risk study strongly depend upon the type of material involved:

- Gas, vapour, liquid, solid
- Inflammable, explosive, toxic, toxic combustion products
- Stored at high/low temperatures or pressure
- Controlled outflow (pump capacity) or catastrophic failure?

Selection of Damage Criteria

The damage criteria give the relation between extent of the physical effects (exposure) and the percentage of the people that will be killed or injured due to those effects. The knowledge about these relations depends strongly on the nature of the exposure. For instance, much more is known about the damage caused by heat radiation, than about the damage due to toxic exposure, and for these toxic effects, the knowledge differs strongly between different materials.

In Consequence Analysis studies, in principle three types of exposure to hazardous effects are distinguished:

1. Heat radiation, from a jet, pool fire, a flash fire or a BLEVE.
2. Explosion
3. Toxic effects, from toxic materials or toxic combustion products.

In the next three paragraphs, the chosen damage criteria are given and explained.

Heat Radiation

The consequence caused by exposure to heat radiation is a function of:

- The radiation energy onto the human body [kW/m^2];
- The exposure duration [sec];
- The protection of the skin tissue (clothed or naked body).
- The limits for 1% of the exposed people to be killed due to heat radiation, and for second-degree burns are given in the table herein:

Damages to Human Life Due to Heat Radiation

Exposure Duration	Radiation for 1% lethality (kW/m^2)	Radiation for 2nd degree burns (kW/m^2)	Radiation for first degree burns (kW/m^2)
10 Sec	21.2	16	12.5
30 Sec	9.3	7.0	4.0

Since in practical situations, only the own employees will be exposed to heat radiation in case of a fire, it is reasonable to assume the protection by clothing. It can be assumed that people would be able to find a cover or a shield against thermal radiation in 10 sec. time. Furthermore, 100% lethality may be assumed for all people suffering from direct contact with flames, such as the pool fire, a flash fire or a jet flame. The effects due to relatively lesser incident radiation intensity are given below.

Effects Due To Incident Radiation Intensity

INCIDENT RADIATION kW/m^2	TYPE OF DAMAGE
0.7	Equivalent to Solar Radiation
1.6	No discomfort for long exposure
4.0	Sufficient to cause pain within 20 sec. Blistering of skin (first degree burns are likely)
9.5	Pain threshold reached after 8 sec. second degree burns after 20 sec.
12.5	Minimum energy required for piloted ignition of wood, melting plastic tubing etc.

Explosion

In case of vapour cloud explosion, two physical effects may occur:

* a flash fire over the whole length of the explosive gas cloud;
* a blast wave, with typical peak overpressures circular around ignition source.

As explained above, 100% lethality is assumed for all people who are present within the cloud proper.

For the blast wave, the lethality criterion is based on:

* A peak overpressure of 0.1 bar will cause serious damage to 10% of the housing/structures.
* Falling fragments will kill one of each eight persons in the destroyed buildings.

The following damage criteria may be distinguished with respect to the peak overpressures resulting from a blast wave:

Damage Due To Overpressures

Peak Overpressure	Damage Type
0.83 bar	Total Destruction
0.30 bar	Heavy Damage
0.10 bar	Moderate Damage
0.03 bar	Significant Damage
0.01 bar	Minor Damage

From this it may be concluded that p = 0.17 E+5 pa corresponds approximately with 1% lethality. Furthermore it is assumed that everyone inside an area in which the peak overpressure is greater than 0.17 E+ 5 pa will be wounded by mechanical damage. For the gas cloud explosion this will be inside a circle with the ignition source as its centre.

Intoxication

The consequences from inhalation of a toxic vapour/gas are determined by the toxic dose.

This dose D is basically determined by:

- Concentration of the vapour in air;
- Exposure duration.

Furthermore, of course, the breathing rates of the victim, as well as the specific toxic mechanism unto the metabolism play an important role.

The dose is defined as $D = C^n.t$, with:

C = concentration of the toxic vapour, in [ppm] or [mg/m^3];

t = exposure duration, in [sec] or [min];

n = exponent, mostly > 1.0; this exponent takes into account the fact that a high concentration over a short period results in more serious injury than a low concentration over a relatively longer period of exposure. The value of n should be greater than zero but less than 5.

The given definition for D only holds if the concentration is more or less constant over the exposure time; this may be the case for a (semi) continuous source. In case of an instantaneous source, the concentration varies with time; the dose D must be calculated with an integral equation:

$D = \int C^n.dt$

For a number of toxic materials, so-called Vulnerability Models (V.M.) has been developed. The general equation for a V.M. (probit function) is:

$Pr = a + b.\ln (C^n.t)$, with

Pr = probit number, being a representation of the percentage of people suffering a certain kind of damage, for instance lethality

Pr = 2.67 means 1% of the population;

Pr = 5.00 means 50% of the population;

a and b material dependent numbers;

$C^n.t$ = dose D, as explained above.

The values for a & b are mostly derived from experiments with animals; occasionally, however, also human toxicity factors have been derived from accidents in past. In case only animal experiments are available, the inhalation experiments with rats seem to be best applicable for predicting the damage to people from acute intoxication. Although much research in this field have been done over the past decades, only for a limited number of toxic materials consequence models have been developed. Often only quite scarce information is available to predict the damage from an acute toxic exposition. Data transformation from oral intoxication data to inhalation toxicity criteria is sometimes necessary. Generally, in safety evaluations pessimistic assumptions are applied in these transformation calculations. The calculated damage (distance) may be regarded as a maximum. For the purposes of a response to a major incident, the IDLH value level has been chosen for the 'wounded'criteria. This type of injury will require medical attention.

7.5.2 MAXIMUM CREDIBLE LOSS ACCIDENT SCENARIOS

A Maximum Credible Accident (MCA) can be characterised as the worst credible accident. In other words: an accident in an activity, resulting in the maximum consequence distance that is still believed to be possible. A MCA-analysis does not include a quantification of the probability of occurrence of the accident. Another aspect, in which the pessimistic approach of MCA studies appears, is the atmospheric condition that is used for dispersion calculations. As per the reference of the study, weather conditions having an average wind speed have been chosen.

The Maximum Credible Loss (MCL) scenarios have been developed for the Facility. The MCL cases considered, attempt to include the worst "Credible" incidents- what constitutes a credible incident is always subjective. Nevertheless, guidelines have evolved over the years and based on basic engineering judgement, the cases have been found to be credible and modelling for assessing vulnerability zones is prepared accordingly. Only catastrophic cases have been considered and not partial or small failures (as is the case in Quantitative Risk Assessment

where contributions from low frequency - high outcome effect as well as high frequency - low outcome events are distinguished). The objective of the study is emergency planning, hence only holistic & conservative assumptions are used for obvious reasons. Hence though the outcomes may look pessimistic, the planning for emergency concept should be borne in mind whilst interpreting the results.

7.5.2.1 CONSEQUENCE ANALYSIS CALCULATIONS

The Consequence Analysis has been done for selected scenarios. This has been done for weather conditions having wind speed. In Consequence Analysis, geographical location of the source of potential release plays an important role. Consideration of a large number of scenarios in the same geographical location serves little purpose if the dominant scenario has been identified and duly considered.

7.5.2.2 SOFTWARE USED FOR CALCULATIONS

PHAST MICRO: Phast is the most comprehensive software available for performing Process Hazard Analysis (PHA), Quantitative Risk Assessment (QRA) and Financial Risk Analysis (FRA). Our extensively validated software for consequence and risk assessment is used by governments and industry helping them to comply with local safety regulation and their own corporate best practice. Phast contains all the discharge, dispersion, effects and risk models you will need to accurately assess all your major hazards and associated risks. Phast Consequence provides you with comprehensive hazard analysis facilities to examine the progress of a potential incident from the initial release to its far-field effects.

TOXIC AND FLAMMABLE IMPACT

It calculates the initial discharge, as the material expands from its storage conditions to atmospheric, through dispersion, as the material mixes with air and dilutes, and the subsequent toxic or flammable effects. Phast includes a wide range of models for discharge and dispersion as well as flammable, explosive and toxic effects.

DISCHARGE

- Phast requires basic information about storage or process conditions and material properties in order to perform discharge calculations
- The software comes with an integrated material property database containing more than 1,600 pre-defined pure component chemicals
- Various discharge scenario options have been implemented to represent common process failures, and model their behavior. These include:
    - ❖ Leaks and line ruptures from long & short pipelines
    - ❖ Catastrophic ruptures
    - ❖ Relief valve and disc ruptures
    - ❖ Tank roof collapse
    - ❖ Vent from vapour spaces
    - ❖ In building release effects

DISPERSION

The dispersion models within Phast are able to model the following phenomena

- Dispersion of gas, liquid and two-phase releases
- Liquid droplet thermo dynamics calculations and liquid droplet rainout
- Pool spreading and vaporization
- Building wake dispersion effects for vapor releases

FLAMMABLE EFFECTS

For releases of flammable material Phast calculates

- Radiation profiles and contours from a range of fire scenarios including pool fires, flash fires, jet fires and fire balls, including cross-wind effects on a jet fire
- Vapor Cloud Explosion modeling using industry standards models including the TNO Multi-energy, Baker Strehlow Tang and TNT Equivalence models
- Overpressure contours from Boiling Liquid Expanding Vapor Explosions

TOXIC EFFECTS

- Graphs of toxic concentration profile
- Indoor and outdoor toxic dose prediction
- Reporting of distance to specific dose and concentration
- Calculated exposure time and use as “averaging time” for passive dispersion effects

PHAST RISK

Phast Risk allows you to combine the flammable and toxic consequences from each scenario in your QRA model with their likelihood to quantify the risk of fatalities. Phast Risk allows you to take account of local population distribution, sources of ignition, land usage and local prevailing weather conditions. It is designed to perform all the analysis, data handling and results presentation elements of a QRA within a structured framework.

Phast Risk allows you to quickly identify major risk contributors so that time and efforts can be directed to mitigating these highest risk activities. Based on effects calculations and population vulnerabilities, Phast Risk can integrate over all scenarios and weather conditions to estimate the total risk. The established individual and societal risk indicators are predicted by Phast Risk across your facility and surrounding area using the classical QRA methodology. Risk ranking reports can be produced at points of strategic importance to show the relative influence of the various failure scenarios and their contribution to both the individual and societal risk metrics.

A key benefit of Phast Risk is the ability to identify major risk contributors and differentiate these from incidents with worst case consequences which might otherwise dominate the safety reviews. Whilst medium scale incidents have lesser consequences, they may have a higher frequency, which, when combined with their hazardous effects, generate a higher level of risk. Time and effort directed to mitigating high consequence but often low frequency events may not be well spent. Phast Risk helps you direct this effort more effectively.

Phast Risk also provides facilities to help you manage large quantities of input data, including scenarios, parameters, wind roses, ignition and population, and combine these in many ways. This is critical when looking at sensitivity analyses and assessing the merits of a range of risk reduction measures.

Benefits

- Facilitates cost reduction in terms of losses and insurance
- Allows optimization of plant and process design
- Assist in compliance with safety regulators
- Enables quicker response to hazardous incidents
- Improve engineer's understanding of potential hazards
- Regular software upgrades incorporate industry experience and expertise, and advances in consequence modeling technology

7.5.2.3 SCENARIOS

TABLE 7.4

POSSIBLE ACCIDENT SCENARIOS

Scenario	MCL Scenario	Quantity in MT
1	Release of Cyclohexanone	38
2	Release of Iso Propyl Alcohol	40
3	Release of Toluene	40
4	Release of Hexane	20
5	Unconfined Pool Fire Simulations for Drum Storage Area	50
6	Release of Phosgene	0.3
7	Release of Bromine	8

Scenario#1: Release of Cyclohexanone

This scenario considers release of Cyclohexanone from Storage Tank:

Results indicate:

Catastrophic Rupture		
Input Data		
Stored quantity - 38 MT		
Wind speed – 1.97 m/s		
Density (Air) – 0.947 g/cm^3		
Pool Fire Scenario		
Radiation Level (KW/m^2)	**Distance in meter**	**Effect if IHR at Height of simulation**
4	28.20	This level is sufficient to cause personnel if unable to reach cover within 20 however blistering of the skin (second degree burn) is likely; 0: lethality
12.5	17.68	This level will cause extreme pain within 20 seconds and movement to a safer place is instinctive. This level indicates around 6% fatality for 20 seconds exposure.
37.5	9.63	This level of radiation is assumed to give 100% fatality as outlined above.
Pool diameter – 32.93 m		

Results

- 37.5 KW/m^2 IHR - In the 9.63 meter radius area is considered as 100% fatality in 1 min.
- 12.5 KW/m^2 IHR - In the 17.68 meter radius first degree burn in 10 sec.
- 4 KW/m^2 IHR - In the 28.20 meter radius area will give pain after 20 seconds. Blistering unlikely.

Pool Fire

Green – 4 KW/m^2
Yellow – 12.5 KW/m^2
Red – 37.5 KW/m^2

Scenario#2: Release of Iso Propyl Alcohol

This scenario considers release of IPA from Storage Tank:

Results indicate:

Catastrophic Rupture					
Input Data					
Stored quantity - 40 MT					
Wind speed – 1.97 m/s					
Results indicate					
Pool Fire Scenario					
Radiation Level (KW/m^2)	**Distance in meter**	**Effect if IHR at Height of simulation**			
4	38.0	This level is sufficient to cause personnel if unable to reach cover within however blistering of the skin (second degree burn) is likely; 0: lethality			
12.5	16.0	This level will cause extreme pain within 20 seconds and movement to a safer place is instinctive. This level indicates around 6% fatality for 20 seconds exposure.			
37.5	9.5	This level of radiation is assumed to give 100% fatality as outlined above.			
Vapor Cloud Explosion					
Radial Distance (m)	**Over Pressure (psi)**	**Fatality lung Rupture (%)**	**Eardrum Rupture (%)**	**Structure Damage (%)**	**Glass Rupture (%)**
6.50	36.7	100.0	100.0	100.0	100.0
6.83	8.4	0.0	73.3	100.0	100.0
10.02	1.9	0.0	2.8	12.8	100.0
In case of Unconfined Vapor Cloud Explosion up to 6.50 meter is considered as 100% fatality and 100% ear drum rupture radius.					
In case of Unconfined Vapor Cloud Explosion up to 6.83 meter is considered as 100% structure damage and up to 10.02 meter 100% glass rupture area.					

Results

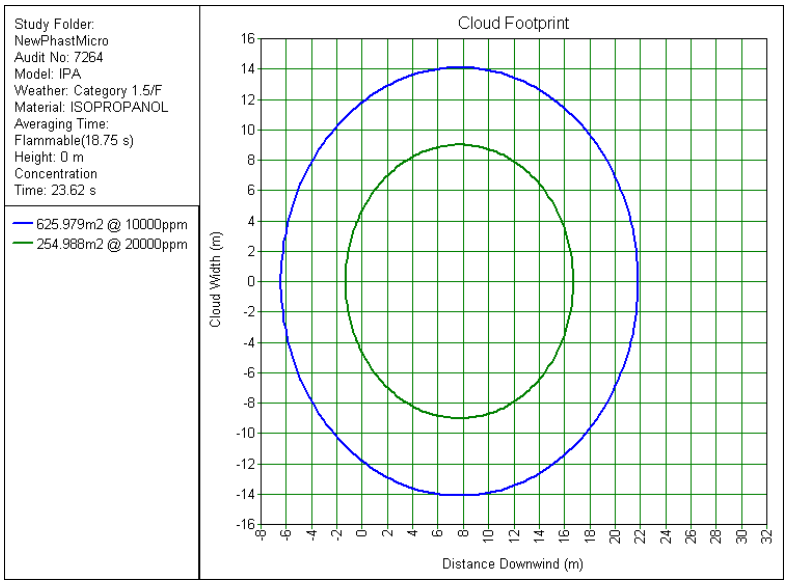
- 37.5 KW/m^2 IHR - In the 12.5 meter radius area is considered as 100% fatality in 1 min.
- 12.5 KW/m^2 IHR -In the 20.0 meter radius first degree burn in 10 sec.
- 4 KW/m^2 IHR -In the 42.0 meter radius area will give pain after 20 seconds. Blistering unlikely.

Fireball Scenario		
Fireball Radius: 6.36m		
Fireball intensity of Heat Radiation (KW/m^2) – 134.186		
Fireball rate of Energy release (KJ/Sec)- 68393.6		
Fireball total energy released (KJ)- 96888.6		
Fireball duration (Sec) – 1.40		
Radiation Level (KW/m^2)	**Distance in meter**	**Injury Type**
100.20	2.0	100% Fatal
37.5	6.0	100% Fatal
12.5	13.0	1st degree Burn
9.96	18.0	Pain after 20secs.
4.0	27.0	Pain after 20secs.
1.54	45.0	No Injury

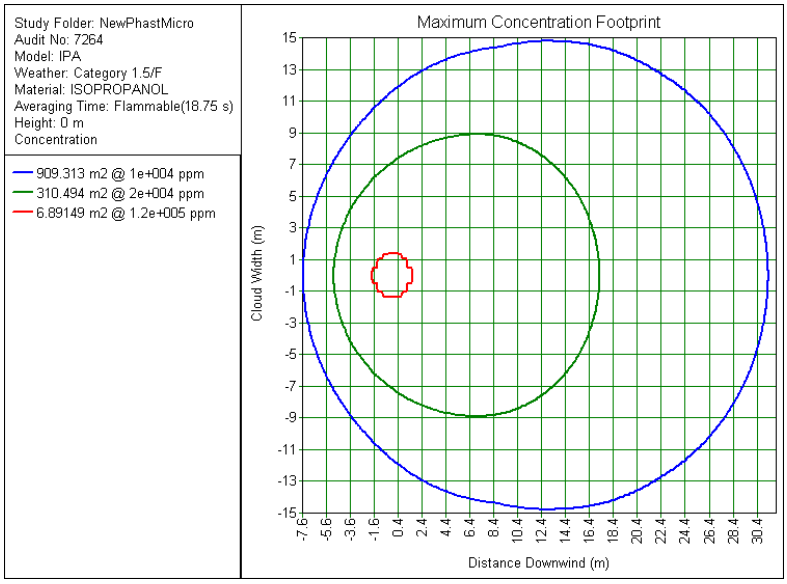
Results

- 37.5 KW/m^2 IHR **-** In the 6.0 meter radius area is considered as 100% fatality in 1 min.
- 12.5 KW/m^2 IHR **-** In the 13.0 meter radius first degree burn in 10 sec.
- 4 KW/m2 IHR - In the 27.0 meter radius area will give pain after 20 seconds. Blistering unlikely.

Cloud Footprint



Maximum Concentration



Pool Fire

Fireball

Green – 4 KW/m^2
Yellow – 12.5 KW/m^2
Red – 37.5 KW/m^2

Scenario#3: Release of Toluene

This scenario considers release of Toluene from Storage Tank:

Results indicate:

Catastrophic Rupture					
Input Data					
Stored quantity - 40 MT					
Wind speed - 1.97 m/s					
Results indicate					
Pool Fire Scenario					
Radiation Level (KW/m^2)	**Distance in meter**	**Effect if IHR at Height of simulation**			
4	28.0	This level is sufficient to cause personnel if unable to reach cover wi 20s; however blistering of the skin (second degree burn) is likely; 0: letha			
12.5	15.5	This level will cause extreme pain within 20 seconds and movement to a safer place is instinctive. This level indicates around 6% fatality for 20 seconds exposure.			
37.5	6.0	This level of radiation is assumed to give 100% fatality as outlined above.			
Vapor Cloud Explosion					
Radial Distance (m)	**Over Pressure (psi)**	**Fatality lung Rupture (%)**	**Eardrum Rupture (%)**	**Structure Damage (%)**	**Glass Rupture (%)**
4.7	36.2	100.0	100.0	100.0	100.0
5.1	8.9	0.0	77.0	100.0	100.0
8.7	2.0	0.0	3.1	14.5	100.0
Fireball Scenario					
Fireball Radius: 8.13656 m					
Radiation Level (KW/m^2)	**Distance in meter**	**Injury Type**			
37.50	12.5	100% Fatal			
12.5	18.0	1st Degree burn			
4	26.5	Pain after 20secs.			
Flash Fire					
Radiation Level (KW/m^2)	**Distance in meter**	**Injury Type**			
37.5	10.0	100% Fatal			
12.5	16.0	Pain after 20secs.			
4	21.0	Pain after 20secs.			

SAFETY PRECUASION:

- Flame proof pumping and other equipments will be provided.
- Transfer will be done in close process,
- Double Static earthling and Jumper clips will be provided on flanges,
- Hydrant system and Fire extinguishers will be provided.
- Automatic Sprinklers will be provided.
- Tanker unloading procedure will be made and followed.
- Dyke around the tank will be provided.

Pool Fire

Fire Ball

Flash Fire

Green – 4 KW/m^2
Yellow – 12.5 KW/m^2
Red – 37.5 KW/m^2

Scenario#4: Release of Hexane

This scenario considers release of Hexane from Storage Tank:

Results indicate:

Catastrophic Rupture		
Input Data		
Stored quantity - 40 MT		
Wind speed – 1.97 m/s		
Density (Air) – 869 kg/m^3		
Pool Fire Scenario		
Radiation Level (KW/m^2)	**Distance in meter**	**Effect if IHR at Height of simulation**
4	16.4	This level is sufficient to cause personnel if unable to reach cover within 20 however blistering of the skin (second degree burn) is likely; 0: lethality
12.5	11.8	This level will cause extreme pain within 20 seconds and movement to a safer place is instinctive. This level indicates around 6% fatality for 20 seconds exposure.
37.5	7.6	This level of radiation is assumed to give 100% fatality as outlined above.
Pool diameter – 2.35 m		
Maximum Flame width – 4.12 m		

Results

- 37.5 KW/m^2 IHR - In the 7.6 meter radius area is considered as 100% fatality in 1 min.
- 12.5 KW/m^2 IHR - In the 11.8 meter radius first degree burn in 10 sec.
- 4 KW/m^2 IHR - In the 16.4 meter radius area will give pain after 20 seconds. Blistering unlikely.

Green – 4 KW/m^2
Yellow – 12.5 KW/m^2
Red – 37.5 KW/m^2

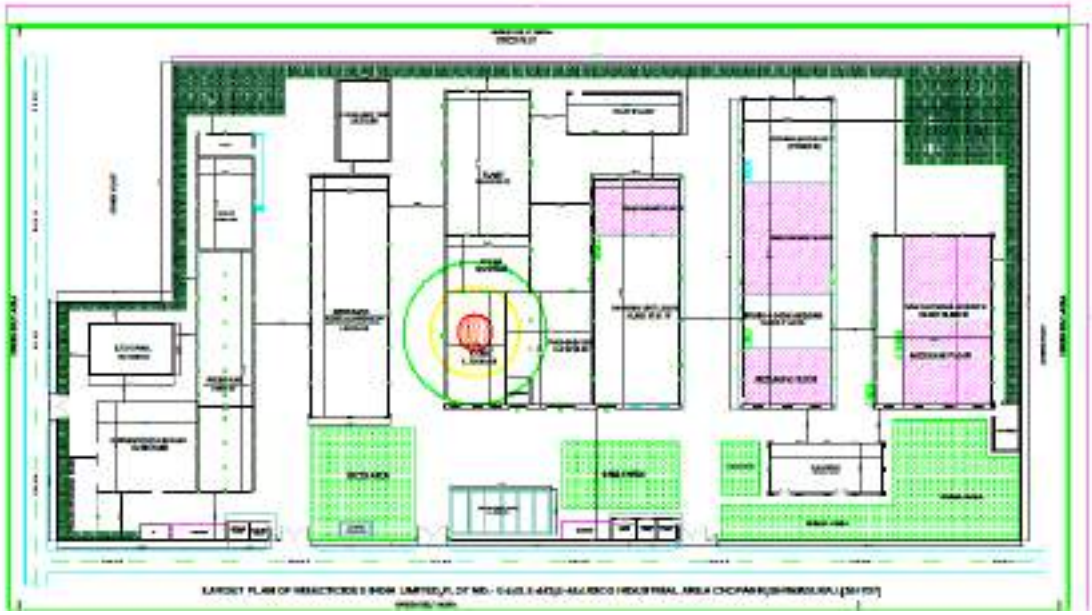
Scenario#5: Unconfined Pool Fire Simulations for Drum Storage Area

Catastrophic Rupture		
Input Data		
Stored quantity - 20 MT		
Wind speed – 1.97 m/s		
Density (Air) – 0.867 g/cm^3		
Results indicate		
Pool Fire Scenario		
Radiation Level (KW/m2)	**Distance in meter**	**Effect if IHR at Height of simulation**
4	24.13	This level is sufficient to cause personnel if unable to reach cover within 20s; however blistering of the skin (second degree burn) is likely; 0: lethality
12.5	14.32	This level will cause extreme pain within 20 seconds and movement to a safer place is instinctive. This level indicates around 6% fatality for 20 seconds exposure.
37.5	6.40	This level of radiation is assumed to give 100% fatality as outlined above.
Fire Ball Scenario		
Radiation Level (KW/m^2)	**Distance in meter**	**Injury Type**
4	28.58	Pain after 20secs.
12.5	18.11	1st degree Burn
37.50	6.98	100% Fatal

Pool Fire Scenario:

Red – 4 KW/m^2
Yellow – 12.5 KW/m^2
Green – 37.5 KW/m^2

Fire Ball Scenario:



Red – 4 KW/m^2
Yellow – 12.5 KW/m^2
Green – 37.5 KW/m^2

Measures to be taken to prevent such accident:

- Priority will be given to Tanker to immediately enter the storage premises at site and will not be kept waiting near the gate or the main road.
- Security person will check License, TREM CARD, Fire extinguisher condition, Antidote Kit, required PPEs as per SOP laid down.
- Store officer will take sample as per sampling SOP from sampling point.
- After approval of QC department unloading procedure will be allowed be started.

Following precautions will be adopted during unloading

- Wheel stopper will be provided to TL at unloading platform.
- Static earthing will be provided to road tanker.
- Tanker unloading procedure will be followed according to check list and implemented.
- Flexible SS hose connection will be done at TL outlet line.
- The quantity remaining in the hose pipeline will be drained to a small underground storage tank, which will be subsequently transferred by nitrogen pressure to the main storage tank thus ensuring complete closed conditions for transfer from road tanker.
- All TL valves will be closed in TL.
- Finally earthing connection and wheel stopper will be removed.
- Only day time unloading will be permitted.

Following precautions will be adopted Storage of such chemicals

- Storage tank will be stored away from the process plant.
- Tanker unloading procedure will be prepared and implemented.
- Caution note and emergency handling procedure will be displayed at unloading area and trained all operators.
- NFPA label will be provided.
- Required PPEs like full body protection PVC apron, Hand gloves, gumboot, Respiratory mask etc. will be provided to operator.
- Neutralizing agent will be kept ready for tackle any emergency spillage.
- Safety shower, eye wash with quenching unit will be provided in acid storage area.
- Material will be handled in close condition in pipe line.
- Dyke wall will be provided to all storage tanks, collection pit with valve provision.
- Double drain valve will provided.
- Level gauge will be provided on all storage tanks.
- Safety permit for loading unloading of hazardous material will be prepared and implemented.
- TREM CARD will be provided to all transporters and will be trained for transportation Emergency of Hazardous chemicals.
- Fire hydrant system with jockey pump as per TAC norms will be installed.

For Storage tank farm area:

- Under N2 pressure storage.
- Safety valve provided and storage facility to ensure safe release of HC in case of over pressure.
- Dyke with separate fencing area is provided.
- SOP prepared
- Road tanker unloading procedure prepared
- Work permit followed
- PPEs used
- Safety shower, eye wash provided.
- NFPA labeling system adopted for storage tanks.
- Sprinkler system will be provided.
- Alarm for high level & high pressure.
- Automatic fire fighting indication provided for around the storage area

Scenario - 6: Release of Phosgene

Quantity - 300 Kg

Results indicate:

Dispersion starts as elevated instantaneous cloud
Maximum Pool radius 0.82723 m

Preventative / Mitigation Measures:

Storage Store at in cool ventilated area.

Handling All chemicals should be considered hazardous. Avoid direct physical contact. Use appropriate, approved safety equipment. Untrained individuals should not handle this chemical or its container. Handling should occur in a chemical fume hood.

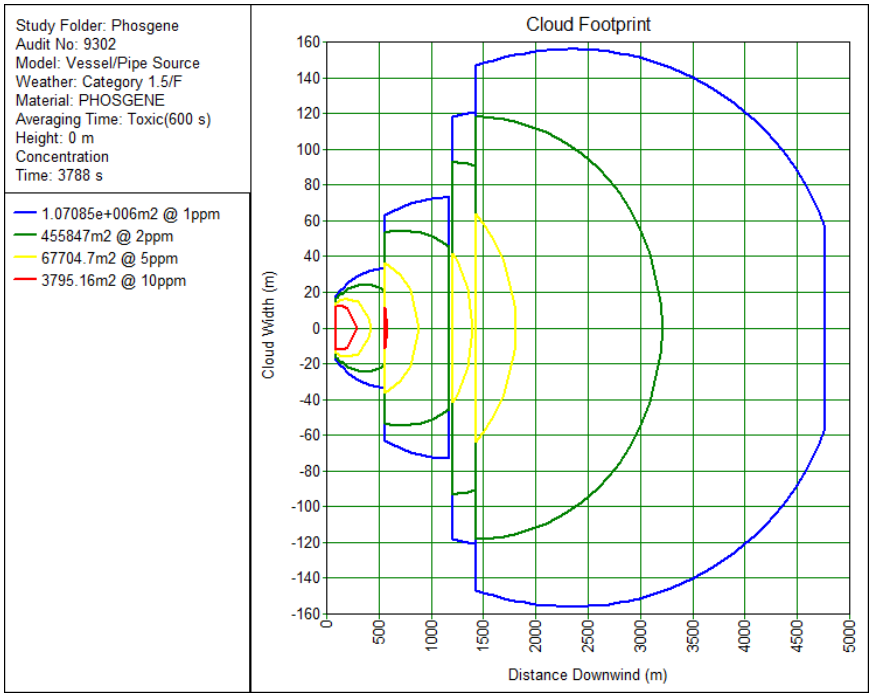
Protection Wear appropriate protective gloves, clothing and goggles.

Respirators Wear positive pressure self-contained breathing apparatus (SCBA).

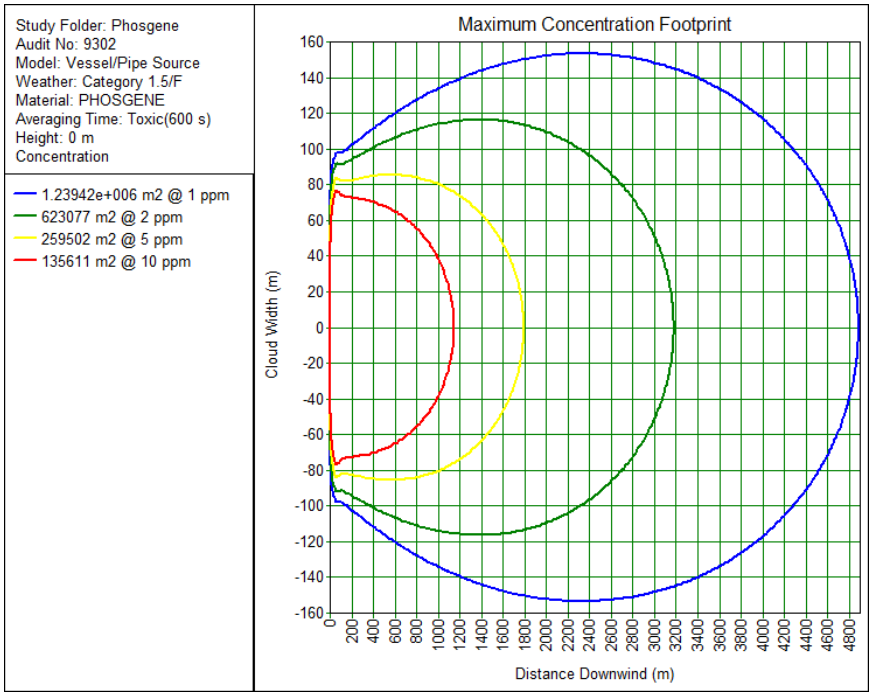
Small spills/leaks Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Attempt to stop leak if without undue personnel hazard. Use water spray to knock-down vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Neutralize with agricultural lime (CaO), crushed limestone ($CaCO_3$) or sodium bicarbonate ($NaHCO_3$). Dilute slowly with water. Water spill: Neutralize with agricultural lime (CaO), crushed limestone ($CaCO_3$), or sodium bicarbonate ($NaHCO_3$).

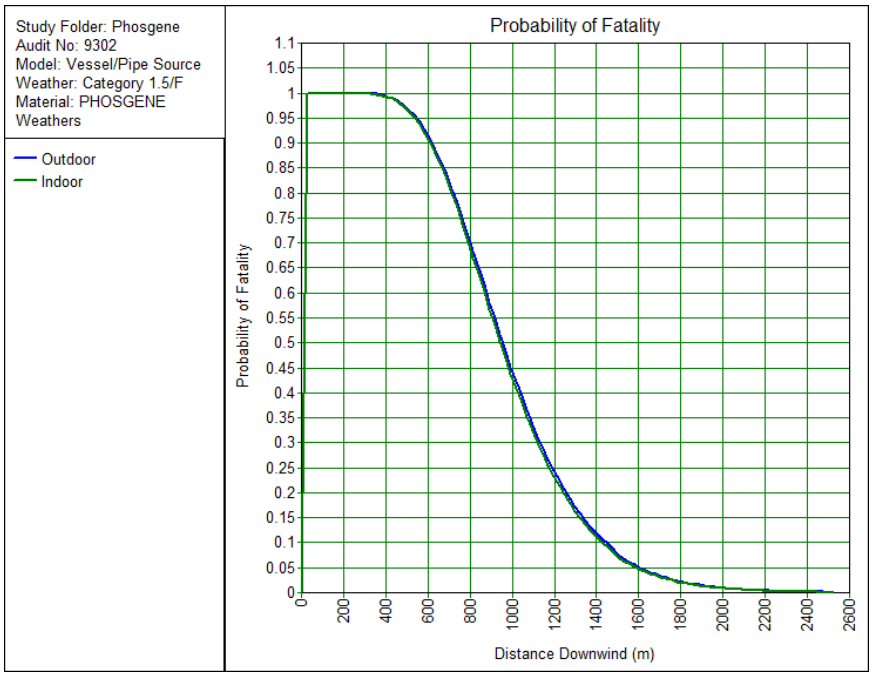
Fire fighting If necessary to stop flow of gas, use water spray to protect the personnel effecting shutoff. Sodium hydroxide or anhydrous ammonia have been used to neutralize phosgene. Non-flammable. For small fires, use dry chemical or carbon dioxide. Use water spray, fog, or foam for larger fires. Do not get water inside containers. Move container from fire area if you can do so without risk. Stay away from the ends of tanks, and cool exposed containers with water until well after the fire is out. Isolate the area until gas has dispersed.

Cloud Footprint



Maximum Concentration




Study Folder: Phosgene
Audit No: 9302
Model: Vessel/Pipe Source
Weather: Category 1.5/F
Material: PHOSGENE
Weathers
Outdoor
Indoor
Probability of Fatality
Probability of Fatality
Distance Downwind (m)
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0.55
0.6
0.65
0.7
0.75
0.8
0.85
0.9
0.95
1
1.05
1.1
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600

Scenario – 7 Release of Bromine

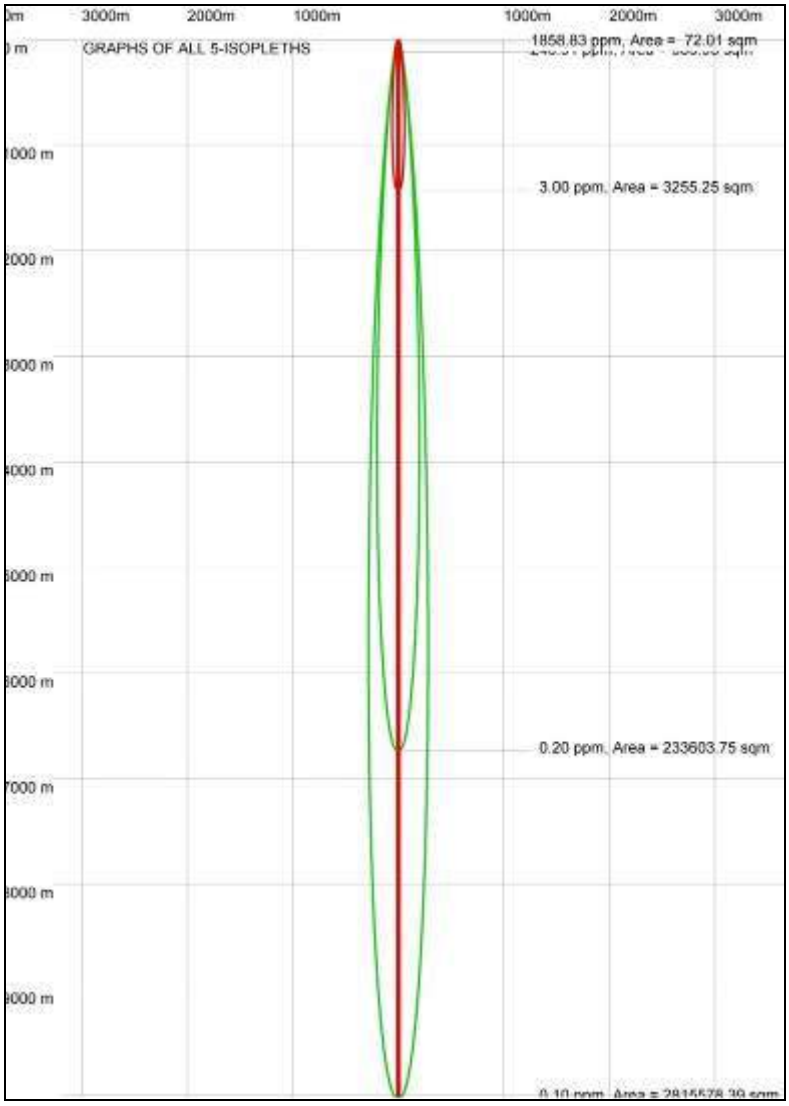
This scenario considers release of Bromine from Storage Tank:

Results indicate:

Spill Pool Evaporation for Bromine 8 KL day tank catastrophic failure		
Scenario : Puff release		
Input Data		**Results of Computations**
Stored quantity	8 KL	**End point (meter)**
Evaporation rate	1500 g/s	
LC50 Human	1075 ppm	50
IDLH value	3.0 ppm	1418

Results

- LC50 HUMAN (1075 ppm) area up to 50 meter, IDLH (Immediate danger to life and health) concentration (3.0 ppm) area up to 1418 meter and TWA (0.1 PPM) area.

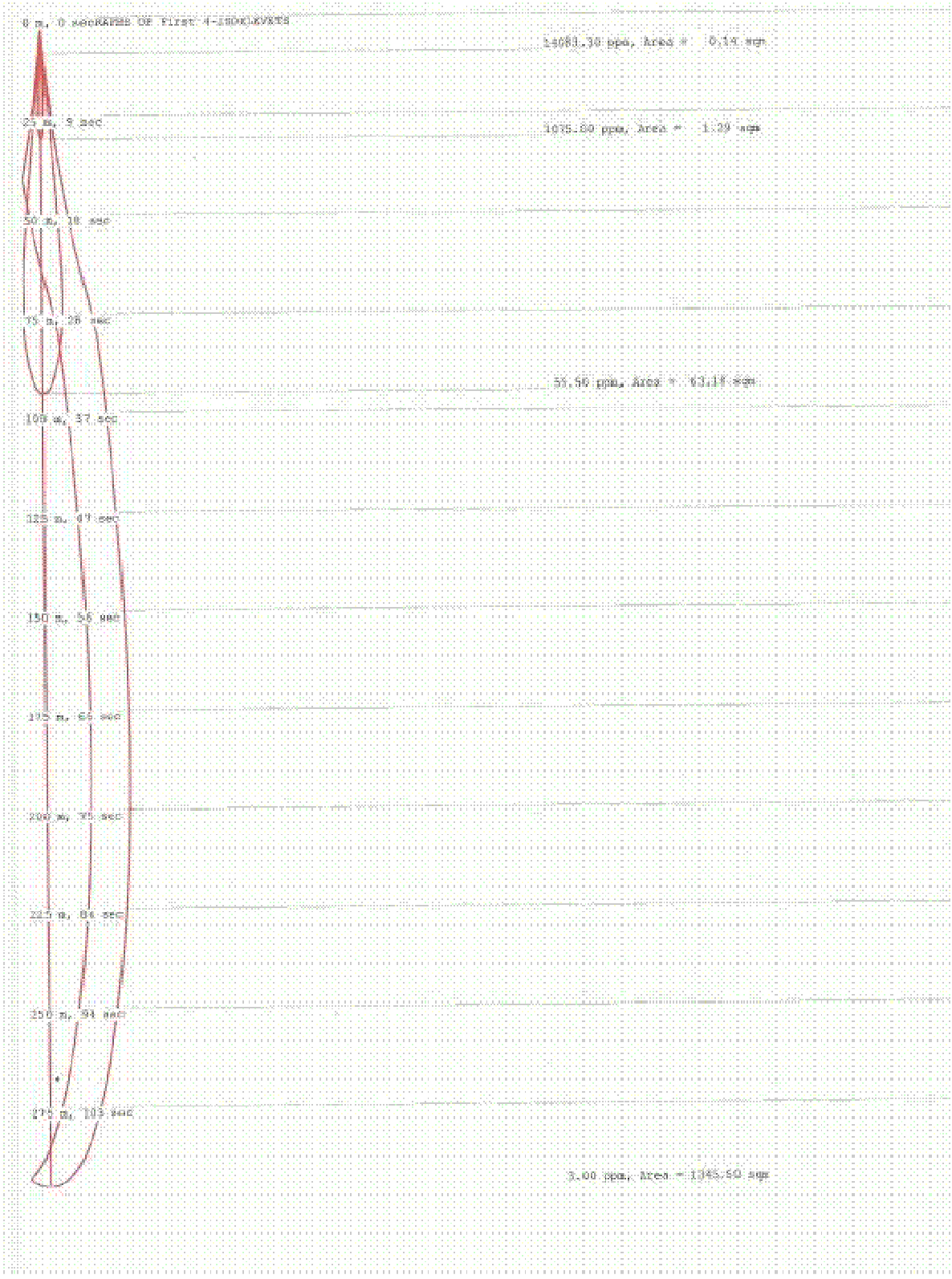


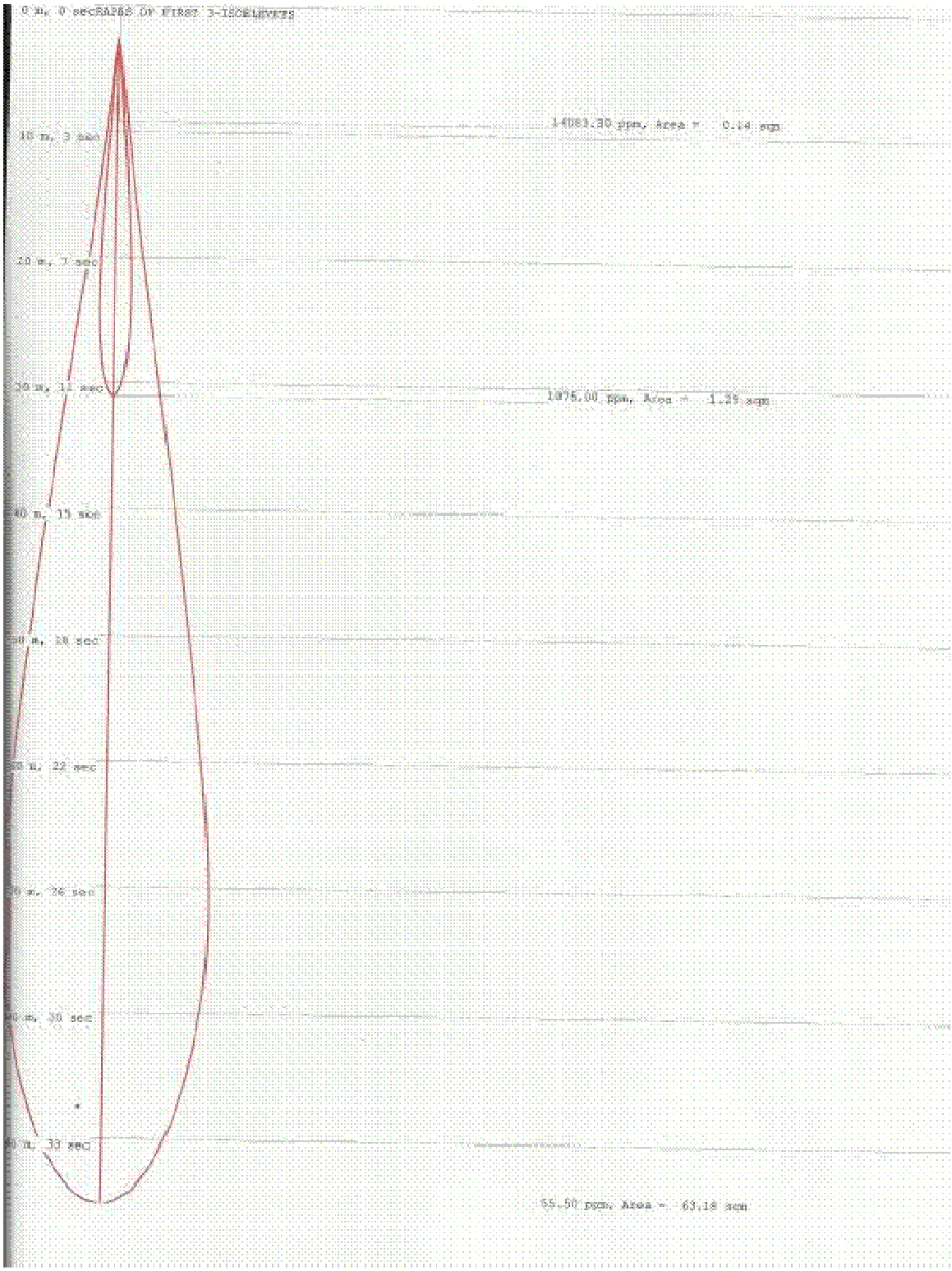
Catastrophic Rupture	
Input Data	
Stored quantity - 8 KL	
Molecular weight -159.82	
Wind speed – 1.97 m/s	
Density (Air) – 2980 kg/m^3	
Results indicate (Puff Release)	
LC50 – 1075 ppm	**27.50**
IDLH – 3 ppm	**292.84**
TLV – 0.1 ppm	**787.33**

Safety Precaution:

- Preventive maintenance of FLT. Train and license driver will be employed to drive FLT.
- Limit switch, interlock will be provided, Apron, Hand gloves, gumboot, helmet, goggles will be provided.
- Apron, Hand gloves, gumboot, helmet, goggles will be provided.

0 m, 0 sec
SHAPES OF ALL 3-ISOCLEVESTS
14083.30 ppm, Area = 0.14 sqm
1075.00 ppm, Area = 1.79 sqm
50 m, 18 sec
55.50 ppm, Area = 61.18 sqm
100 m, 37 sec
150 m, 56 sec
200 m, 75 sec
250 m, 94 sec
3.00 ppm, Area = 1345.38 sqm
300 m, 112 sec
350 m, 131 sec
400 m, 150 sec
450 m, 169 sec
500 m, 188 sec
550 m, 207 sec
600 m, 225 sec
650 m, 244 sec
700 m, 263 sec
750 m, 282 sec
0.10 ppm, Area = 19029.91 sqm


0 m, 0 sec
25 m, 9 sec
50 m, 18 sec
75 m, 28 sec
100 m, 37 sec
125 m, 47 sec
150 m, 56 sec
175 m, 66 sec
200 m, 75 sec
225 m, 84 sec
250 m, 94 sec
275 m, 103 sec


14083.39 ppm, Area = 0.14 sqm
1875.00 ppm, Area = 1.39 sqm
55.50 ppm, Area = 63.18 sqm

Measures to control and mitigate Emergency of Bromine:
Bromine emergencies:
Transportation Emergencies
Evacuate the area in down wind direction:

- For Bromine evacuate area in down wind direction up to 0.6 km (600 meter) in small

Spillage and in case of large spillage, evacuate the area in down wind direction 3.1 kms (3100 meters).

In emergency situations resulting from vehicle accidents:

1. Notify the local police, fire departments, emergency responders and the carrier.
2. Isolate the area.
3. Any person not dressed in proper protective clothing and not using a NIOSH approved self-contained breathing apparatus should be kept a safe distance away.
4. Call to the supplier.
5. Seek immediate medical assistance for those injured and follow recommended first aid procedures.

Leaking Containers
6. When handling a leaking bottle personal protective clothing, goggles and NIOSH approved self contained breathing equipment must be worn.
7. Clear contaminated area of non-essential personnel and send them to assembly point.
8. Maintain a slight ammonia atmosphere throughout the clean up. Carefully release anhydrous ammonia gas to neutralize bromine vapor. The ammonia gas will convert bromine to white ammonium bromide “smoke.”
9. Do not allow liquid bromine and liquid ammonia to combine; a violent reaction will occur. Ammonia (16 to 25% by volume) can form an explosive mixture with air.
10. Pour hypo solution*, lime and water slurry or soda ash solution over the spill. Hypo-bromine reactions produce hydrobromic acid.
11. Dry sodium thiosulfate and liquid bromine produce a violent reaction; do not mix them.
12. Using cold water, wash neutralized bromine into a sump for transfer to an approved waste disposal facility where the waste can be processed.
13. Ventilate the area to remove the ammonium bromide and any bromine fumes. Scrub the floors and equipment with soap and water.

First Aid Procedure
14. Immediate medical assistance is required if bromine is swallowed, inhaled or has contacted the eyes or skin.
15. If bromine has been ingested, do not give anything by mouth. Seek medical attention immediately. Do not induce vomiting.
16. If bromine has been inhaled, move the exposed person to a well ventilated area. Seek medical attention immediately. The victim should be placed in a comfortable sitting or partly reclining position. The exposed individual should avoid exertion. If vomiting occurs, turn the patient on his side to avoid choking. Keep the patient warm. If the patient is coughing and showing signs of respiratory distress, properly trained personnel should administer oxygen.
17. For skin contact, the affected area must be flooded immediately with large amounts of clean water from a safety shower or other appropriate source of flowing water. Seek medical attention immediately. All contaminated clothing, including shoes, should be removed as quickly as possible while the victim is under the shower. Washing should be continued for a minimum of 30 minutes. If possible, continue to wash the affected area during transport to medical facilities. (Extended wash times of two hours or more have proven beneficial.)
18. If bromine liquid or vapor contacts the eyes, they must be irrigated immediately with large amounts of running water. Eye wash stations are preferable for irrigation. If one is not available, a hose, water source with a liberal, gentle flow may be utilized. The eyelids must be held apart during irrigation to ensure contact of water with all accessible tissues of the eyes and lids. Eyes should be washed continuously for a minimum of 30 minutes. If possible, continue flushing the eyes while transporting the employee to a physician. In all cases of bromine injury, obtain immediate medical attention. Provide emergency personnel with information about all materials used by the person and provide appropriate information about bromine and first aid procedures.

EMERGENCY RESPONSE

ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).

· Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

· Stop leak if you can do it without risk.

· Prevent entry into waterways, sewers, basements or confined areas.

· Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.

· Do not get water inside containers.

7.5.3 RISK ASSESSMENT SUMMARY

- From the Risk Assessment studies conducted, it would be observed that by and large, the risks are confined within the factory boundary walls.
- Based on these studies company has been proposed to plan its facility sitting as well as location of operator cabin, open area, etc.
- Company has to increase awareness Programme in the surrounding vicinity and educate people for safe evacuation at the time of toxic release.
- A HAZOP study to be carried out for all product plant and storage facilities.
- Induction safety course to be prepared and trained all new employees before starting duties in plant.

7.5.3.1 PROCESS SAFETY

- Safety measures will be adopted from the design stage.
- Safety Valve and pressure gauge will be provided on reactor and its jacket (if jacket is provided).
- Utility like Chilling, cooling, vacuum, steaming and its alternative will be provided to control reaction parameters in a safe manner.
- Free Fall of any flammable material in the vessel will be avoided.
- Static earthing provision will be made at design stage to all solvent handling equipments, reactors, vessels & powder handling equipments.
- Any reaction upsets will be confined to the reaction vessel itself.
- All emergency valves and switches and emergency handling facilities will be easily assessable.
- Further all the vessels will be examined periodically by a recognized competent person under the Rajasthan Factory Rules.
- All the vessels and equipments will be earthed appropriately and protected against Static Electricity. Also for draining in drums proper earthing facilities will be provided.
- Materials will be transferred by pumping through pipeline or by vacuum from drums.
- All solvents and flammable material storage tanks will be stored away from the process plant and required quantity of material will be charge in reactor by pump.

- Jumpers will be provided on all solvent handling pipeline flanges.
- Caution note, safety posters, stickers, periodic training & Updation in safety and emergency preparedness plan will be displayed and conducted.
- Flame proof light fittings will be installed in the plant.
- All the Plant Personnel will be provided with Personal Protection
- Equipments to protect against any adverse health effect during operations, leakage, spillages or splash. PPE like Helmets, Safety Shoes, Safety
- Glasses, Acid-Alkali Proof Gloves etc. will be provided to the employees.
- All employees will be given and updated in Safety aspects through periodic training in safety.
- Material Safety Data Sheets of Raw Materials & Products will be readily available that the shop floor.

7.5.3.2 FOR HAZARDOUS STORAGE TANK FARM

- Tank farm will be constructed as per explosive department requirement and separation distance will be maintained.
- Tanks shall be located and marked in designated area of hazardous chemical storage.
- Static earthing provision will be made for road tanker as well as storage tank.
- Tanks of proper MOC will be selected.
- Flame arrestor with breather valve will be provided on vent line.
- Road tanker unloading procedure will be prepared and implemented.
- Fire load calculation will be done and as per fire load Hydrant System will be provided as per NFPA std. and Fire extinguishers will be provided as per fire load calculation.
- Spark arrestor will be provided to all vehicles in side premises.
- Flame proof type equipments and lighting will be provided.
- Lightening arrestor will be provided on the top of chimney.
- Trained and experience operator will be employed for tank farm area.
- NFPA label (hazard identification) capacity and content will be displayed on storage tank.

- Solvents will be transferred by pump only in plant area and day tank will be provided. Overflow line will be return to the storage tank or Pump On-Off switch will be provided near day tank in plant.
- Jumpers will be provided on solvent handling pipe line flanges.
- Flexible SS hose will be used for road tanker unloading purpose and other temperature connection.
- All tanks shall be uniformly tagged.
- Level indicator shall be provided in tanks.
- Dyke will be provided.
- Industrial type electric fittings shall be provided.
- Adequate fire fighting equipments will be provided.
- Anti corrosive paint shall be done.
- Safety instruction board will be displayed.

7.5.3.3 FOR DRUM/CARBOY STORAGE AREA

Some chemicals will be received at plant in drums/Carboys by road truck and stored in a drum/Carboy storage area.

- FLP type light fittings will be provided.
- Proper ventilation will be provided in Godown.
- Proper label and identification board /stickers will be provided in the storage area.
- Conductive drum pallets will be provided.
- Drum handling trolley / stackers/fork lift will be used for drum handling.
- Separate dispensing room with local exhaust and static earthing provision will be made.
- Materials will be stored as per its compatibility study and separate area will be made for flammable, corrosive and toxic chemical drums storage.
- Smoking and other spark, flame generating item will be banned from the Gate.

7.5.3.4 TRANSPORTATION

- Road tanker unloading procedure will be in place and will be implemented for safe unloading of road tanker.
- Static earthing provision will be made for tanker unloading.
- Earthed Flexible Steel hose will be used for solvent unloading from the road tanker.
- Fixed pipelines with pumps will be provided for solvent transfer up to Day tanks/reactors.
- Double mechanical seal type pumps will be installed.
- NRV provision will be made on all pump discharge line.

7.5.4 OTHER RISK REDUCTION OPPORTUNITIES

The following opportunities shall be considered as a potential means of reducing identified risks during the detailed design phase:

- Buildings and plants structures shall be designed for cyclone floods and seismic events to prevent structural collapse and integrity of weather (water) proofing for storage of goods;
- Provision for adequate water capacity to supply fire protection systems and critical process water;
- Isolate people from load carrying/mechanical handling systems, vehicle traffic and storage and stacks locations;

7.5.5 RECOMMENDATIONS FOR ALARP

The following actions are particularly recommended to be implemented in order to ensure **ALARP (As Low As reasonably practical)** performance in the operation: Maintain and ensure effectiveness of all the safety measures, among others through the following actions:

Raw Material Storage Area

- The raw material storage area should be declared as a prohibited area and should be provided having at least two exits, “No Smoking” and “Prohibited Area” display boards, as applicable should be provided at site.
- Regular inspection of tanks/drums/carboys containing raw material to be done to take care.

- Periodic site inspection should be carried out to ensure that there is no leakage from any of the drums in the ware house.
- Fire hydrant system needs to be provided in storage area as per TAC standards.
- Smoke detector and fire alarm systems need to be provided.
- Provision of fire doors in ware house area.

Fire access for Tank Farm area and Ware Houses

- Fire access roads should be provided to storage area. The storage tanks/area should have suitable fire protection and fire fighting facility.

The following features are also important for the project by taking the layout into consideration:-

- Hinged doors swing outward in an explosion.
- Window panes (if installed) are shatterproof or plastic in frame.
- Floors, walls and ceilings are designed and installed to limit the generation and accumulation of static electricity.
- All doors must be fire resistant. Floors, walls and ceilings are designed for at least 2 h of fire resistance.
- Walls or partitions are continuous from floor to ceiling, and securely anchored.
- Integrity of the wall should be ensured i.e. blast wall not to be broken or drilled as that can leads to weak spots.
- The building is constructed of non-combustible materials, on a substantial frame.
- Restrained deflagration vent panels are present.
- There is adequate ventilation, and any heating in rooms is limited to steam, hot water, or other indirect means.

Electrical Safety for Whole Facility

- Electrical Safety: All cables and electric fittings shall be constructed, installed, protected, operated and maintained in such a manner so as to prevent risk of open sparking.

7.5.6 FIRE FIGHTING SYSTEM

M/s. Insecticides India Limited, management will take into consideration fire prevention measures at the project planning and during plant commissioning stage to avoid any outbreak of fire. But looking to the hazardous nature of process and the chemicals that are handled and processed, the chances of outbreak of fire cannot be totally ignored. Hence to tackle such a situation a good well laid fire protection system will be provided in the factory. Details of fire fighting are given in Table.

FIRE AND TOXICITY CONTROL ARRANGEMENT

1. Self-Breathing Apparatus: 02 Nos.
2. Safety showers: 2 Nos.
3. Emergency siren for emergency declaration.
4. Portable Fire Extinguishers as below. Total Nos. 75

Sr.No.	Type of Fire-Extinguisher	Capacity
1	DCP Type F.E.	05 Kg / 10 Kg
2	CO_2 Type F.E	4.5 Kg / 22.5 Kg
3	Mechanical Foam	9.0 Liter / 50 Liter
4	ABC Type F.E.	01 Kg / 05 Kg

5. Fire Blankets.
6. Safety interlocking systems with production equipments. And Flammable chemical unloading,
7. Safety Valves/ Breather Valves.
8. Personnel Protective Equipment as below.

Sr.No.	Name of PPE
1	Safety Helmet
2	Safety hand Gloves
3	Safety Goggles
4	Ear Plug / Ear Muff
5	Nose Mask / gas mask / Cotton dust mask
6	Safety belt
7	Face shield
8	Lung Protector with cartridge for Acid Gas with Face shield.
9	Safety Shoes

Other fire fighting facilities proposed to be installed at site:

- Fire load calculation will be carried out and Fire Extinguishers at different locations will be provided (as mentioned in above table) as per the TAC guidelines.
- Working staff will be given training to operate DCP and CO_2 extinguishers.
- Fire Hydrant Network will be installed as per the calculated requirement for fire fighting.
- First Aid Training will be imparted to employees by designated first aid trainers.

7.5.6.1 LOCATION OF FIRE EXTINGUISHERS

S. No.	Location	Type	Capacity	Nos
1.	Meter Room Ground floor	B.C.	10 Kg	01
2.	Boiler House	B.C.+ A	10 Kg	03
3.	Process Plant-GF	BC	6 Kg	02
4.	Process Plant-GF	BC	4.5 Kg	01
5.	Process Plant-GF	ABC	06 Kg	02
6.	Process Plant-GF	ABC	05 Kg	05
7.	Process Plant-GF	ABC	70 Kg	01
8.	Process Plant-GF	BC	4.5 Kg	01
9.	Process Plant-I-Floor	ABC	05 Kg	05
10.	Process Plant-I-Floor	BC	4.5 Kg	02
11.	Process Plant-II-Floor	ABC	05 Kg	03
12.	Process Plant -II-Floor	BC	05 Kg	01
13.	Utility-GF	BC	4.5 Kg	01
14.	Utility-GF	ABC	05 Kg	02
15.	Utility-GF	BC	10 Kg	01
16.	Utility-GF	BC	4.5 Kg	01
17.	LT Room-GF	BC	4.5 Kg	01
18.	LT Room-GF	ABC	05 Kg	01
19.	Tech.Godwn-GF	ABC	05 Kg	06
20.	Tech.Godwn-GF	BC	10 Kg	01
21.	Tech. Godwn-GF	A	09 Kg	01
22.	Solvent Tank-GF	BC	70 Kg	01
23.	Chemical Lab.	BC	02 Kg	02
24.	R&D Lab. Gate	ABC	04 Kg	01
25.	R&D Lab. Gate	BC	02 Kg	03
26.	Security Gate	ABC	04 Kg	01

7.6 DISASTER MANAGEMENT PLAN

Company has developed the emergency management system to tackle the emergency situation, apart from its emergency management system. The detail of disaster management system is discussed in the following section.

7.6.1 DEFIING THE NATURE OF EMERGENCY

7.6.1.1 LEVEL OF EMERGENCY CAN BE CLASSIFIED IN THREE CATEGORIES.

LEVEL - 1:

The leakage or emergency, which is confinable within the plant, premises. It may be due to -

a) Small fire in the plant

b) Low toxic gas release for short duration.

c) Collapsing of equipment that do not affect outside premises.

LEVEL - 2:

The emergency, which is confinable within the factory premises. It may arise due to -

a) Major fire inside the factory premises.

b) Medium scale explosion confined to the factory premises.

c) Heavy toxic/flammable gas leakage for short duration.

LEVEL - 3:

The emergency, which is not confinable within the factory premises and general public in the vicinity likely to be affected. It may arise due to -

a) Explosion of high magnitude affecting the adjacent area

b) Heavy / Profuse leakage of toxic / flammable gases for a long duration.

7.6.2 OBJECTIVES OF EMERGENCY MANAGEMENT SYSTEM

The objectives of the emergency management system are summarized as under.

- To identify and assess types of emergencies due to different types of hazards.
- To work out plan with all provisions to handle emergencies and safeguard employees and people in the vicinity of the factory.
- To provide for emergency preparedness and the periodical rehearsal of the plan.

- To plan mode of proper communication and actions to be followed in the event of emergency.
- To keep all necessary information with respect to hazard/accident control and emergency contacts in one document for easy and speedy reference.
- To inform employees, general public and the authorities about the hazards/risk if any and the role to be played by them in the event of emergency.
- To control and contain the accident.
- To effect rescue and treatment of casualties.
- To inform and help relatives of casualties.
- To secure rehabilitation of affected area and restore normalcy.
- To provide information to media and government agencies.
- To preserve record, equipment etc. for investigating cause of emergency.
- To be ready for "mutual aid" if need arises to help neighboring units.

7.6.3 STRUCTURE OF EMERGENCY MANAGEMENT SYSTEM

Company has developed an emergency management team. The management structure includes the following personnel's;

- Chief Emergency Controller
- Incident Controllers
- Site Main Controllers
- Key Personnel's
- Essential Workers
- Assembly points
- Emergency control center
- Fire control arrangements
- Medical arrangements
- Other arrangements

7.6.3.1 CHIEF EMERGENCY CONTROLLER

He will be Chief Manager in his absence, the Plant Supervisor will be the Chief Controller till any one of the designated Manager arrives at Site and assumes overall charge of the situation. His task will be to co-ordinate all internal and external activities from the Emergency Control Centre at Main Security Gate from where all operations will be directed. He shall:

1. Immediately on being informed of the emergency and its location, will arrive at the scene & handle the situation.
2. Relieve the Incident Controller from responsible of the Main Controller.
3. Co-ordinate to avail services from external agencies like fire brigade, hospitals etc, if called for, following the declaration of major emergency. If necessary, major installations in the vicinity may also be informed of the situation.
4. Exercise direct operational control of the unaffected section of the plant.
5. In consultation with the advisory team, expedite the shutting down of loading / unloading operations of tankers and if necessary, instruct the supervisor / security personnel to evacuate tankers.
6. Ensure that all employees are evacuated from the affected area and the casualties, if any, are given necessary medical attention. Instruct P & A Assistant / Security for rushing casualties to hospitals if required.
7. Liaise with fire and police officials, pollution control board officials and other statutory bodies and advise them of all possible consequence effects outside the premises.
8. Arrange for relief of personnel when emergency is prolonged.
9. Issue authorized statement or press release to the news – media.
10. Ensure preservation of evidence for enquiries to be conducted by statutory authorities.
11. Authorize the sounding of “All Clear” and “Evacuation Siren”.
12. Arrange for obtaining the head – count of all personnel within the premises and cross-checking with the data from records available for no. of persons within the premises.

13. Nominate a person from advisory team, to maintain chronological log of event during the entire period of emergency.

7.6.3.2 INCIDENT CONTROLLER AND DEPUTY INCIDENT CONTROLLER

His primary duties are to take charge at the scene of the incident. In the initial stage he may be required to take decisions involving the operation of the other plants or to stop or continue any process and to take technical decisions to control the incident. The deputy incident controller should take the charge of incident controller, if he is not available due to any reason. As our factory is running 24 hrs, so each plants shift in charge are being nominated as I.C (after 'G' Shift) and they will be always available in the shift and can take charge till the arrival of IC.

Responsibilities/Duties of Incident Controller and Deputy Incident Controller:

- He shall take charge at the scene of incident.
- He may be required to take decisions whether to stop or continue any Process and take a control the incident or to isolate affected area of the plant and simultaneously inform / consult senior officers as per requirement.
- He shall immediately assess the gravity of risk and alert panel and field operators to start controlling their respective section.
- After assessing the level of emergency likely to exist, he shall ad emergency. As per the assessment of risk, if necessary inform concerned Senior Officer to declare major emergency and active on-site/off site emergency plan accordingly. As Per the situation ensure that Site Main Controller (SMC) will be informed.
- He will work under the direction of the SMC, but till his arrival he may have to execute following responsibilities.
- Ensure that all the Key Personnel are called.
- Direct for evacuation of plant and areas likely to be affected by the emergency.
- He shall communicate to the SMC the type of outside help needed.
- He shall direct all emergency operations within the affected area with the following priorities.

- Personnel safety, including of surrounding community.
- Minimum damage to Plant, Property and Environment.
- Appropriate actions to minimize loss of Production and Material.
- Give information to the head of fire fighting and rescue team and other emergency services.
- Depending on the incident, instruct partial or total shut down, isolations, depressurization, Nitrogen purging, fire fighting, rescue operations.
- Instruct upstream/down stream units to take emergency shut down /cutting off supply and other appropriate actions and emergency evacuation help etc.
- Direct for search of casualties.
- Evacuate non-essential workers/visitors/contractors to safe assembly points.
- Brief site main controller and keep him informed about the developments.
- Pressure evidences. This will be necessary for investigation for cause and concluding preventive measures.
- Send runners, if telephones are out of order.

7.6.3.3 SITE MAIN CONTROLLER

He will have an overall responsibility for directing operations & calling outside help from Emergency Control Centers. He is required to take decisions after consultation with the Senior Manager available at site.

The Shift Engineer of non-affected Plant will act as SMC till arrival of the designated SMC at Emergency Control Centre (ECC). Until the arrival of SMC, he may have to execute following responsibilities.

- As soon as he received the information or comes to know about the incident, he shall proceed to Emergency Control Room (Control Room) and shall take charge of the incident. If Control Room gets affected due to unfavorable wind direction, Fire Control Room shall be used as alternate Emergency Control Room.
- He has overall responsibility for directing emergency action, operation and calling outside help.

- He shall ensure that all the Key Personnel are called.
- He shall assess the gravity of situation with the help of Incident Controller (IC), Plant Manager and Key Personnel and after quickly assess the situation, shall find out the of emergency from Incident Controller (I C), and declare the emergency**.**
- Level-l: Emergency - may be handled within the plant premises.
- Level-2: Emergency - On Site Emergency plant shag be activated.
- Level-3: Emergency - Action to be taken to operate Off-Site Emergency Plan.
- He shed direct all emergency operations within the affected area with the following priorities.
- Personnel safety, including of surrounding community.
- Minimum damage to Plant, Property and Environment.
- Appropriate actions to minimize loss of Production and Material.
- He shall direct for evacuation of plant and areas likely to be affected by the emergency.
- He shall continuously review and assess possible developments to determine most probable course of events and actions.
- He shall assess the situation and ensure that whatever resources needed is made available and utilized in a co-ordinate manner.
- He shall direct the safe shut down of plants in construction with incident controller and Key Personnel, if necessary.
- He shall check that all non-essential workers, visitors, contractors are evacuated to safe assembly points and head count is completed.
- He shall give instructions to the Incident controllers, Fire fighting and Rescue teams.
- He shall, if necessary arrange for evacuation of neighboring population.
- He shall ensure that search for casualties, within the affected area has been carried out and arrange for hospitalization of victims and additional medical help, if required.
- He shall ensure that liaison will be made with outside agencies such as Police Services, Fire Services, Expert on Health and Safety, Meteorological Office, District

Emergency Authorities, Collector and Senior Inspector of Factories. Provide advice on possible effects to areas outside the factory.

- He shall arrange for up to date records of emergencies.
- He shall advice not to re-start the plants unless it is declared safe to start by competent authorities.

7.6.3.4 KEY PERSONNELS

Key Personnel are required to provide and to implement the decisions made by the SMC in the light of information received on the developing situation at the time of emergency. As necessary, they will decide the actions needed to shutdown plants, evacuate personnel, carryout emergency engineering work, arrange for supplies of equipments, utilities, carryout environment monitoring, provide catering facilities, liaise with police, fire brigade and other local authorities, relative of casualties, hospital, press & neighboring industries. Action at assembly points, outside shelters and mutual aid center under the direction of the SMC. All the key personnel and other called in so to assist shall report to the ECC. They shall be available at any time on duty or on call or on oil duty or holiday.

7.6.3.5 ESSENTIAL WORKERS

A task force of essential trained workers (expert's team) is available to get the work done by the Incident Controller and the Site Main Controller. Such work will include:

1. Fire fighting and spill control till a Fire Brigade takes the charge.
2. To help the Fire Brigade and mutual aid teams, if it is so required.
3. Shutting down plant and making it safe.
4. Emergency engineering work e.g. isolating equipment, material process, providing temporary by-pass lines, safe transfer of materials, urgent repairing or replacement, electrical work, etc.
5. Provision of emergency power, water, lighting, instruments, equipments, materials, etc.
6. Movement of equipment, special vehicle and transport to or from the scene of the accident.
7. Search, evacuation, rescue and welfare.
8. The injured is given First Aid.

9. Moving tankers or other vehicles from area of risk.

10. Carrying out atmospheric test and pollution control.

11. Manning of assembly points to record the arrival of evacuated personnel. Manning for outside shelters and welfare of evacuated persons there.

12. Assistance at causalities reception areas to record details of causalities.

13. Assistance at communication centers to handle out going and in coming calls and to act as messengers if necessary.

14. Manning of works entrances in liaison with the police to direct emergency vehicles entering the work, to control traffic leaving the works and to turn away or make alternative safe arrangements for visitors, contractors and other traffic arriving at the works.

15. Informing surrounding factories and the public as well as directed by the Site Main Controller.

16. Any special help required.

7.6.3.6 ASSEMABLY POINT

In affected & vulnerable plants, all non-essential workers (who are not assigned any emergency duty) are evacuating the area & report to a specified Assembly Points. Each assembly Point will be clearly marked by a Conspicuous notices & provided with an identification numbers e.g. Assembly Point No. 1, 2 and so on. Assembly Points are located at a safe place, well away from area of risk and least affected by the down wind direction. To ensure that workers do not have to approach the affected area to reach the Assembly Point proper location and numbers have been marked at Assembly Points. Each Assembly Point in manned by a nominated person to record the names and dept. Further telephone to communicated SMC has been provided at each assembly Points. At each Assembly Point duties of Assembly Point In-charge has been also displayed in brief Before reaching an Assembly Point or subsequently, if it is required to pass through an affected area or due to presence of toxic substances. Suitable PPE's including respirators, helmet etc., are issued & made available with workers.

7.6.3.7 EMERGENCY CONTROL CENTER

The Emergency Control Center is the place or room from where the operations to handle the emergency are directed and coordinated. Main Control Room will be

earmarked/identified as the Emergency Control Room. Fire Control Room shall be earmarked/identified as the alternative Emergency Control Room to be operated in case of unfavorable wind direction. Adequate Telecommunication System will be available in the Emergency Control Room i.e. Hot Lines, Intercom Walkie-Talkies & External Phones.

The ECC center shall be equipper with the following facilities.

1. Internal and external telephone including STD facility
2. Telephone directory
3. Telephone nos. of mutual aid centers
4. Factory layout plan
5. Map of the area
6. Employee blood group and their address
7. Messengers / Runners for sending messages
8. Adequate numbers of PPE'S

7.6.3.8 FIRE CONTROL ARRANGEMENTS

7.6.3.8.1 FIRE FIGHTING, GAS LEAK CONTROL AND RESCUE OPERATION

A) Role of Manager (Fire and Safety) / Shift In-Charge (Fire & Safety)

1. Incident Controller will be the only person to direct the fire fighting and Emergency operation.
2. Keep the constant touch with the SMC / In charge - EHS.
3. Direct the crew members to the scene of emergency and arrange replenishment of Manpower / equipment / extinguishing media etc.

B) Role of EHS Representative:

1. On being notified about the location of fire/ gas leakage immediately proceed to the help.
2. Decide his line of action in consultation with Incident controller and take appropriate measures to handle the emergency.
3. Assessing the severity of the incident immediately report to emergency controller about the gravity of the situation.
4. He will assess the extra requirement required if any from the neighboring industry.

C) Fire crew members

1. On hearing fire alarm, emergency siren they shall immediately report to control room and proceed to the scene of emergency and work under the direction of IC/ Dy IC.
2. The personal availability at the scene of incident to be made optimize.

7.6.3.9 MEDICAL SERVICES

The roles of Medical officers are as follows;

a) He will contact immediately to the SMC/IC.
b) He will render necessary treatment, at Occupational Health Center.
c) He will arrange for Hospitalization and Treatment at outside hospitals, if required.
d) He will mobilize in getting the services of External medical agencies, other Para –medical services etc. and transportation services etc.
e) He will arrange for extra medical assistance/antidotes, from out, if required.
f) He will arrange for first-aid trained volunteers for necessary help.
g) He will liaise with the Government Health Authorities for treatment of the affected persons nearby.

7.6.3.10 OTHER ARRANGEMENTS

Other arrangements include external transport, cranes, generator sets to supply emergency power, environment monitoring equipment, rescue items etc. when available resources do not meet the requirement.

STANDARD OPERATING PROCEDURE (EMERGENCY)

- As soon as emergency alarm is heard, all essential workers shall report to IC or SMC.
- They shall carefully listen to the instructions given by IC or SMC.
- According to the type of emergency/accident, they shall get equipped with PPE/Fire fighting equipment and devices.
- The runner among the workers shall inform SMC/IC and key personnel if they are not at site.

- The messenger amongst the workers shall deliver messages to nearby units as per the instructions of SMC/IC.
- The in-charge of medical arrangements shall prepare first-aid and other required facilities for the injured.
- The other essential workers shall try to control the emergency as per the instructions given to IC.
- IC would keep SMC informed about the status of control measures being taken at the site and ask for other requirements e.g. Mutual aid, equipment etc., if he find necessary.
- SMC would co-ordinate with outside agencies regarding control measures being taken, need for external help, evacuation, medical treatment etc.

7.7 COMMMUNICATION SYSTEM

After the assessment of risk & their possible environmental impact and after making an organization for the preparedness to control the emergency, the next most essential step is to make us ready for Communication at the time of emergency. Communication System is a Crucial Factor while handling emergency.

Company will have quick & effective Communication System through which, any situation, which can lead to emergency, can be informed or known to.

i. All working inside the plant.
ii. Key Personnel outside during normal working hours & during off-duty hours.
iii. Outside emergency services, Statutory and Local Authorities and
iv. Neighboring facilities and public leaving in vicinity.

Each and every section, Plant & Department of the Factory shall be connected by internal telephones. External Phone at Office and Residence and Mobile shall be also available with Key Personnel and top executive of the factory. Hot lines shall be provided with mutual aid Partner through the Emergency Control Center. The Communication System begins with raising the alarm declaring the emergency, Telephone messages and Procedure to communicate the emergency to other persons & General Public.

7.7.1 RAISING THE ALARM

As soon as incident takes place inside the factory and is noticed by someone, the first step is to raise the nearest manual emergency bell to alert the nearby people. Next, he/she informs the security persons to raise the emergency siren located at the factory gate. The security personnel sound the siren, raising and lowering the sound three times in a 10 second "ON", 5 second "OFF" sequence. All the security employees shall be trained for operating the siren to announcing the emergency. In case of power failure, manual bell shall be also provided. The alarm sound informs the I.C and the S.M.C that an emergency has been created and emergency organization is to be activated. The I.C. rushes to the site and takes charge of the scene.

Emergency Siren Code

Onsite Emergency

Emergency Siren:-10 sec and 5 sec off for 03 times.

All Clear Emergency:-1 Minute continuously blown for All clear.

Offsite Emergency

Emergency Siren:-10 sec and 5 sec off for 05 times.

All Clear Emergency:-3 Minute continuously blown for All clear

7.7.2 DECLARING THE MAJOR EMERGENCY

Major emergency has to be declared after sufficient and through check because the declaration of major emergency puts many agencies on action and it may disturb the running system, which may be Costly at, time or its Consequence may be Serious. Therefore major emergency must not be decided on whims or immature judgment or without proper thought. Looking to all the above, we will have taken care to nominate the persons who can declare the emergency; we will have selected them on the basis of their knowledge & experience. These persons will be technically qualified and experienced. They shall advice the Incident Controller or Site Main Controller regarding the type of emergency. On being convinced, the Site Main Controller or Incident Controller shall declare an ON-SITE

emergency. The decision about major emergency shall be taken as early as possible and without wasting time so that control action can be started immediately.

7.7.3 TELEPHONE MESSAGES

After hearing the emergency alarm and during emergency or even while just receiving the emergency message on phone, Telephone operator should be precise, sharp, attentive and quick in receiving and noting the message and subsequently effective in further Communication A form to record emergency telephone calls shall be available with telephone operator or Person available in Emergency Control Center, who has to record such calls during emergency. Telephonic messages shall be given out by the telephone operator to Site main Controller and key personnel as per the instructions of the Incident Controller. Telephonic messages shall also be given to authorities and external agencies to describe the type of emergency. All details of emergency shall be collected/delivered according to this format shall available with the telephone operator.

7.7.4 COMMUNICATION OF EMERGENCY & STATUTORY INFORMATION

7.7.4.1 COMMUNICATION OF EMERGENCY

An effective system to communicate emergency shall be available.

- Inside the factory i.e. workers including key personnel and essential workers, on duty & inside during normal working hours.
- To key personnel and essential workers not on duty and outside during normal working hours.
- To the outside emergency services and the Government authorities.
- To the neighboring factory & the General Public in the vicinity.

a) Information to Workers

All personnel inside the factory shall be informed by the sounding of the siren or in case of electricity by ringing the bell.

b) To key personnel outside during normal working hours

The key personnel outside the factory premises shall be informed as per the need by external telephones or runners.

c) To the outside Emergency Services and the Authorities

Once the emergency is declared, it is essential that the outside emergency services should be informed in the shortest possible time. Responsibilities shall be fixed as per the Incident/Emergency Command structure/plan to contact outside agencies for help and to communicate to the all the Government and other Authorities such as Fire Brigade, Police, District Emergency Authorities, Factory Inspectorate & Hospital etc. In case of major emergency, outside agencies like mutual aid, hospitals, policies, Factory Inspector, Collector, Fire-brigade etc. shall be informed by telephone or by sending special messenger from emergency control center.

d) To neighboring factories and the General Public

A major emergency will affect areas outside the works and it is essential that neighboring factory and General Public, should be informed to enable them to take prompt action to protect their own workers and to take whatever measures may be possible to prevent further escalation of the emergency due to effects on their own installations, at the same time, they may be able to provide assistance as part of a prearranged mutual aid plan. Further responsibilities shall be fixed to inform the neighboring factories and the General Public leaving in the vicinity. The neighboring units shall be informed about an emergency through external telephones or runners. The general public shall be informed about an emergency using loudspeaker on scooter or rickshaw or car. Help from police shall be sought if required.

DETAILS OF COMMUNICATIONFACILITIES AVAILABLE DURING EMERGENCY AND THOSE REQUIRED FOR AN OFF-SITE EMERGENCY:

Following communication systems are provided at site ...

- Fire alarm and siren system
- Walkie -Talkie sets
- Intercom
- Direct telephone land line
- Mobile telephones to key personnel
- Internet connectivity
- Public announcement system
- Wireless system connected to DEFS (DMC)

7.7.4.2 STATUTORY INFORMATION

a) Information to Workers

Set of Statutory information regarding types of hazards and their prevention and control as directed in the Factories Act shall be prepared by the unit. This information shall be printed in the local language and given in the form of booklet to all workers including contract workers.

b) To the outside emergency services and authorities

Statutory information in the form of booklet shall be given to outside emergency services and authorities.

c) To neighboring firms and the general public

Statutory information in the form of booklet will be given to neighboring units and the general public of the villages in the vicinity of the unit.

INDIVIDUAL RESPONSIBILITY DURING ON SITE EMERGENCY PLAN

1	**EVERY INDIVIDUALS**	Primary responsibilities for all are to ensure that the fire is extinguished by using suitable fire extinguishers. As soon as fire / leak observed start shouting FIRE. FIRE and LEAK..LEAK and immediately intimate to incident controller (HOD / Plant incharges / shift incharges)
2	**S.M.C. Site Main Controller (Director – Works)**	Immediately to be aware of the emergency control centre he will go to the incident place. He will relieve the incident controller of his responsibility for overall main control. He will give information to district authority and decide the nature of help required such as evacuation, traffic control, warming to the public vehicle requirement etc. He will inform to head office. He will guide to incident controller.
3	**Dy.S.M.C. Dy. Site Main Controller (Sr.G.M.-Works)**	In absent of S.M.C. Dy.S.M.C. Will act as a S.M.C. and if S.M.C. is present then he will help to I.C. to control emergency.
4	**FIRE & SAFETY EHS DEPARTMENT (Manager / Officer)**	He will rush to the incident place and guide to I.C. for the actions to be taken to tackle the incident. He will organize for Mutual Aid from the neighbor and D.P.M.C. He will also help to S.M.C.
5	**TRANSPORTATION TEAM P & A DEPARTMENT (G.M. / Executive / officer)**	He will control safe assembly point. He will shift injured person to hospital. He will organize the additional vehicles if required. If evacuation require, mobilization of person have to done.
6	**INCIDENT CONTROLLER PRODUCTION DEPARTMENT (Manager / Executive / officer)**	Shall be incident controller and also act as S.M.C. till S.M.C.'s availability. His duties will be to assess the situation and take necessary actions deem fit, looking to the gravity of situation.
7	**Plant Operators**	If fire takes place in plant, he shall inform to the incident controller (shift officer / supervisor) immediately and follow his instruction. He is responsible for process isolation and fire fighting.
8	**Utility Incharge / Operator**	He will follow the instruction of incident controller / maintenance engineer. He is responsible to operate fire hydrant pumps.
9	**Electrical Maintenance (Manager / Officer / Electrician)**	He should contact the incident controller and follow his instruction. If fire takes place in plant where electrical cables are lying, immediately cut off power supply to necessary places. If there is a fire in MCC immediately cut off power supply and starts extinguishing activities.
10	**Mechanical Department (Manager / Exec./Officer/ Fitter)**	He should report to incident place and follow the incident controller's instructions. Help incident controller for process isolation.
11	**QAD Department (Manager / Exe. / officer)**	They should be ready with the first aid box and shift injured person to safe assembly point / vehicle and follow the instruction of incident controller.
12	**Security Department (Manager / ASO / Supervisor / Guards)**	He should be attending the telephone. Also ensuring emergency vehicle is kept in the running in the ideal condition at the gate area. He should be ready for gate operation when fire tenders arrives. Restrict outside person at gate. He should inform key persons of the company. Security guards will help in fire fighting. Do head count.
13	**Evacuation Team Store Department (Manager / Officer/ Helper)**	Reach near incident place and cordon area. Remove material from incident places.

7.8 ON-SITE EMERGENCY PLAN

7.8.1 Name & address of the Responsible person

Responsible Person

Name		:	Mr M Koteswar Rao
Designation		:	DGM (Works)
Address		:	Insecticides India Ltd. E-442, RIICO Industrial Area, Chopanki, Bhiwadi, Alwar (Rajasthan).
Telephone	(Works)	:	01493-516602 to 05
	(Resi)	:	8619320755
	(Mobile)	:	9116101175
Residence		:	House no 4-S-35 Ghandhi Kuti Bhiwadi, Rajasthan

7.8.1.1 LIST OF IMPORTANT STAFF

S. No.	Name	Designation	Residential Address	Tel No.
1	Mr. Rajesh Aggarwal	Managing Director	FD- 42, West Enclave, Pitampura, N. Delhi	27318181 27318171 27318151
2	Dr. Mukesh Kumar	GM (R&D)	A-034, Ashiana Greens Bhiwadi	1493-528510 9667231558
3	Mr. Koteswar Rao	DGM (Works)	House no 4-S-35 Ghandhi Kuti Bhiwadi, Rajasthan	9116101175
4	Mr. Ramayan Singh	Sr. Manager (Production)	3/247, UIT, Sector 3 Bhiwadi Dist. Alwar, Raj.	7733918124
5	Mr. Amar Pathak	Manager Maintenance	5/95, UIT, sector 5 Bhiwadi Dist. Alwar, Raj.	7737212078

7.8.1.2 EMERGENCY SERVICE TELEPHONE NUMBERS

OFFICE/ CONTACT PERSON	PHONE NO.
Collector Alwar	0144- 2337565, 2336101
SP Alwar	0144- 2337453, 2337838
SDM, Tijara	01460- 242008,
Addl. SP	223797, 223710, 9414406002
Deputy SP	220700, 277265
SHO	100, 220600, 277505
Police Chowki UIT	512007
Hospital Civil	221311, 225766, 9414013512
ESI Hospital	220790
Nursing Homes	
1. Rahtat Hospital	220395, 222242, 9414366495
2. City Nursing Home	221700, 510095, 230500
3. Gopinath Memorial Hospital	221843, 223543
4. Dr. P. M. Gupta	220377 (O), 220077 ®
5. Shakuntla Nursing Home	220417
Fire Brigade	
Bhiwadi	222700, 101, 512101
Rewari	01274- 225111
Gurgaon	0124/ 917- 320101
Alwar	0144- 222444
Parasrampuria	220974, 220975
Ambulance service	
Orient Syntax	220733, 220812
Rahat Hospital	220395, 222242
City nursing Home	221700, 221000
Delhi Orthopedics	221843, 223543

7.8.2 DESCRIPTION OF INDUSTRIAL ACTIVITY

7.8.2.1 SITE

The Plant is situated at Chopanki, District Alwar (Rajasthan). It is 10 Km from National Highway and situated in a spacious area, having vast open spaces. This is situated in well-developed industrial Area, Chopanki. The main gate and inside factory premises have well laid, good wide passages, walk way and roads. It is 7 Km away from Bhiwadi Hospital

7.8.2.2 INTRODUCTION

The Industry is a Limited company; well managed by professionally qualified and experienced personnel in chemicals lines. The main products of the company are insecticides and pesticides. It has plants and equipments like Reactor, Generators, cooling tower, water storage tank, chemicals storage tanks, exhaust ducts, scrubbers and bag filters.

7.8.2.3 MANUFACTURING PROCESS

Manufacturing process involves manufacturing of technical of pesticides with using of utilities like heating, chilling, cooling and this is done by addition of various Raw-materials, solvents, additives and carriers in a given portion.

7.8.3 HAZARDOUS CHEMICAL & PROCESS

7.8.3.1 HAZARDOUS CHEMICALS

There are no hazardous chemical expect technical pesticides approximate 290 MT (Solid) & 70 KL Liquid. The list of hazardous chemicals is attached below

1. Iso Propyl Alcohal 25.0 KL
2. Hexane 40.0 KL
3. Toluene 40.0 KL
4. Ethylene dichloride 20.0 KL
5. Bifenthrin Alcohol 15 MT
6. Hydrogen per oxide 20 MT
7. Lambda cyhalothric acid 50 MT
8. Thionyl chloride 20 MT
9. MPBD 20 MT

10. 2Chloro 5chloromethyle thiazole	40 MT
11. MNIO	40 MT

7.8.3.2 HAZARDOUS PROCESS

There is no hazardous process except chemical reaction.

7.8.3.3 TYPE OF ACCIDENTS DURING MANUFACTURING PROCESS

1.	Solvent	Spill on body and fire
2.	Pulverizer	Particulate matter inhalation
3.	Technical	Spill on body and fire

7.8.3.4 IDENTIFICATION OF HAZARDS

The hazards in the plant have been identified with long experience in these types of plants. There are two types of major hazards that are spillage and fire.

7.8.3.5 ASSESSMENT OF ACCIDENT CONSEQUENCES

Only fire hazard has been identified in the plant and process area, which may be due to electric short-circuiting and, wrong use of matches. List of contact telephone numbers is available at main gate, administration office and plant in emergency.

7.8.3.6 ACCIDENT HISTORY

Since commissioning no explosion or fire has occurred in the plant.

7.8.3.7 REMEDIAL ACTION TAKEN IN DANGEROUS AREA

The operators and staff working in the area are given protective equipments. Also in heating and grinding area operators and staff does not work more than 5-10 minutes at a time. The machines operation in dangerous area is automatic in nature. No operator and staff have to work in these areas. This makes the area safe. The dust generated in the grinding areas is collected with cyclone arrangements and the dust is not allowed to escape in the atmosphere. Thus, the hazard is minimized.

7.8.3.8 ADDITIONAL REQUIREMENTS IN NORMAL & EMERGENCY SITUATIONS.

a) All staff and workers are being trained about use of PPE.

b) The PPE use on shop floor is made compulsory.

c) Concerned staff has been trained to use the fire extinguishers during fire hazards in any place of factory

d) The first aid kits and its use have been provided for easy use.

7.8.4 DESCRIPTION OF INFORMATION ON ORGANISATIONAL SET UP FOR SAFETY.

7.8.4.1 SAFETY ORGANISATION

Company is well equipped with day-to-day development in safety in India and abroad. All the rules enforced by the government of India and Rajasthan are studies and implemented.

7.8.4.2 SAFETY POLICY

The safety policy of Company is to protect employees and environment from accident and pollution.

The management gives top priority to safety. Each and every accident be thoroughly investigated to find out the root cause and to stop reoccurrence of the same type of mis-happening.

7.8.4.3 SAFETY TRAINING

Company imparts general training to all workmen and staff. Hygiene, housekeeping and safety activity are the main thrust areas.

7.8.4.4 AVAILABILITY OF SAFETY EQUIPMENTS

1. Hand gloves Rubber
2. Hand gloves cloth
3. Hand gloves Canvas
4. Gum Boots
5. Apron rubber
6. Safety Goggles
7. Head covers & Helmets

8. Cloth and Asbestos aprons
9. Masks
10. Self contained breathing apparatus.

7.8.4.5 DELEGATION OF RESPONSIBILITIES FOR PLANT SAFETY

The departmental head is responsible for all kind of safety activities and incidents in the department. In the absence of departmental head, the responsibilities have been delegated to the plant shift in-charge.

7.8.4.6 SAFETY RELATED ACTIVITIES IN PLANT

1. Mechanical ventilation system and scrubbers are always in use.
2. Safety valves provided where ever needed
3. Emergency hooter/ Bell.
4. Periodical preventive maintenance
5. Routine medical check –up
6. Development of green belt
7. Routine maintenance check –up of fire extinguishers.
8. First aid training.

7.8.5 DESCRIPTION OF EMERGENCY CONTROL PLANING

7.8.5.1 INTRODUCTION

An onsite emergency may arise which threatens to man, machines, building and environment and may convert into a major accident if not controlled on site properly.

7.8.5.2 EMERGENCY PLAN ORGANISATION

Following are the key personnel designated

Main Work controller (MWC)

Team A	**Team B**
Site Controller	Site Controller
Incident Controller	Incident Controller
Emergency Team	Emergency Team

7.8.5.3 EMERGENCY OPERATION

7.8.5.3.1 KEY PERSONNELS

Following are the key personnel designated:

S. No.	Designation	Name & Home address
1.	Factory DGM	Mr Koteswar Rao House no 4-S-35 Ghandhi Kuti Bhiwadi, Rajasthan
2.	Manager Maintenance	Mr. Amar Pathak 5/95, UIT, Sector 5 Bhiwadi Dist. Alwar, Raj.
3.	Sr. Manager Production	Mr Ramayan Singh 3/247, UIT, Sector 3 Bhiwadi Dist. Alwar, Raj.

The factory manager will act as main works controller and overall charge of emergency will be on the MWC 2 and MWC 3 will act as MWC in the absence of MWC 2 in serial.

7.8.5.3.2 SITE CONTROLLER

Section in- charge and supervisor will act as site controller and co-ordinate all activities. In the absence of section in- charge, shift deputy in-charge will co-ordinate the activities.

7.8.5.3.3 INCIDENT CONTROLLER

All the departmental heads will act as incident controllers and co-ordinate all activities and assist MWC.

7.8.5.3.4 COMMUNICATION OFFICER

Commercial officer will act as communication officer. He will co-ordinate all activities and communicates all information to higher management. He will assist to MWC.

7.8.5.3.5 LIAISON OFFICER

The Security supervisor will act as liaison officer. He will co-ordinate MWC and will handle security, Police, Press and public.

7.8.5.4 RESPONSIBILITIES OF KEY PERSONNELS

7.8.5.4.1 MAIN WORKS CONTROLLERS

a. Overall in charge of Emergency.

b. To access magnitude of situation.

c. Maintain continuous review of the situation with site and incident controller.

d. Evaluation of people if needed.

e. To stop panic in the minds of employees.

f. To be in touch with govt. officials.

g. To remain in factory till emergency is restored.

7.8.5.4.2 SITE CONTROLLER

a. Will direct all operation in the affected area.

b. Will maintain harmony among with persons in the plant involved in operations.

c. Security of affected area.

d. Shutting of the process to prevent disaster.

e. Co-ordinate incident controller to preserve the evidences of the accident to facilitate inquiry into the cause and circumstances which escalated the emergency.

7.8.5.4.3 INCIDENT CONTROLLER

a. Will coordinate emergency teams and persons on duty to over power the situation.

b. All electrical, chemical and fire sources to be cut off

c. Evacuations of persons from the affective area.

d. Correct use of safety appliances.

e. Stopping the process so that no further complication arises.

7.8.5.4.4 COMMUNICATION OFFICERS

a. To maintain communication link between MWC and incident controller.

b. To arrange for messenger in case of failure of telephones.

c. To maintain proper inventory of control centers property.

d. To inform and persons needed for emergency operations

e. To arrange first aid teams.

7.8.5.4.5 LIAISION OFFICER

a. Will co-ordinate MWC.

b. Will handle police, press and public.

c. To arrange additional help from outside agencies.

d. To transport injured to hospital

e. To arrange for the relief of the persons engaged in the emergency by arranging drinking water, medicines, refreshments and other amenities needed.

f. Any spontaneous work assigned by MWC.

7.8.6 LIST OF ANTIDOTES AVAILABLE AT PLANT SITE

Symptomatic treatment is given for the pesticides poisoning. Antidotes should be used as prophylactic or preventive. Antidotes should be administered only under guidance of a doctor. The following will be kept in the factory.

Atropine is the usual antidote for organophosphate or carbamate poisoning. It can be administered orally and in severe cases injections are given. Repeated injections may be required.

Pralidoxime (2-PAM) is injected intravenously as an antidote in organophosphate poisoning. It must be given in conjunction with atropine therapy. It must not be used in cases of carbamate poisoning.

Barbiturates injected intravenously may help in controlling convulsions. Diazepam may also be used for this purpose. Epinephrine must not be used for this purpose.

Vitamin K (Phytonadione) is the preferred antidote for anticoagulant poisoning such as warfarin. Vitamin C is sometimes used as adjunct for this purpose.

Calcium gluconate given intravenously is effective against some organochlorine insecticides.

Dimercaprol (BAL) is recommended for arsenic poisoning. It is normally given intramuscularly. In case of methyl bromide and ethylene dibromide poisoning this drug may be given before the appearance of symptoms.

Amyl nitrite inhalation is effective against poisoning of hydrogen cyanide and calcium cyanide. Sodium nitrite and sodium thiosulphate may be given intravenously.

Sodium methylthiouracil can be used as an antidote to reduce the basal metabolic rate of the body in case of a dinitrophenol pesticide such as DNOC or dinoseb.

7.8.7 NEUTRALIZATION ARRANGEMENT IN CASE OF TOTAL CHEMICAL LEAKAGE

In case of total chemical leakage the material is collected in the dike. Wear protective equipment to prevent skin and eye contamination. Use absorbent (soil, sand or other inert material like soap stone). Wash the affected area with detergent and water.

The neutralization of the area is also done with soda ash. The sufficient quantity of absorbent material and soda ash is always available in the store.

The protective equipment like hand gloves, gum boots, apron, safety goggles, head covers, masks and self contained breathing apparatus are all wish available in the working area and store.

7.8.8 ON-SITE SAFETY COMMITTEE

Sr. No.	Name	Designation	Remarks
1.	Dr. Mukesh Kumar	GM (R&D)	Chairman
2.	Mr. M Kokeswar Rao	DGM	Records
3.	Mr. S.K. Pathak	Sr. Manager QC	Records
4.	Mr. Jaipal Singh	Manager Production	Records
5.	Amar Pathak	Manager Maint.	Records
6.	Mr. Yunus Khan	Store Officer	Records
7.	Mr. Jagdish Prasad	Sr. Executive Production	Rotation
8.	Mr. Kailash	Production Officer	Rotation
9.	Mr. V.K. Sharma	Health Officer	Rotation
10.	Mr. Yashpal Singh	ETP operator	Rotation
11.	Mr. Vidhya Sagar	Operator	Rotation
12.	Mr. Kuldeep Sharma	Safety Officer	Rotation
13.	Mr. Dalip Singh	Store Supervisor	Rotation
14.	Mr.Lal Chand	Plant Operator	Rotation
15.	Ram Chand	Labour	Rotation
16.	Puran Singh	Labour	Rotation
17.	Radhey	Labour	Rotation
18.	Laloo Singh	Labour	Rotation

7.9 OFF – SITE EMERGENCY PLAN

7.9.1 NEED OF THE OFF – SITE EMERGENCY PLAN

An off-site emergency plan is prepared to deal with those incidents which have the potential to harm persons or the environment outside the boundary of the factory premises. A major accident, major emergency and disaster may affect areas outside the plant. An explosion can scatter debris over wide areas and its effects of blasts can cover considerable distances. Wind can spread burning fumes of toxic gases. Thus the events like these described above can affect outside areas and combating them needs an Off-site Emergency plan.

Envisaging such a rare incident, an off-site emergency plan should be drawn up for the following purpose.

1. To provide basic information about the risk and environmental impact assessment related to the unit to local / district authorities, police, fire-brigade, surrounding units, and the general public. To appraise them of consequences and the protection / prevention measures and control actions and to seek their help to communicate with public in case of a major emergency. The information from all industries shall enable district authorities to educate public about what could go wrong, and to train them of measures to be taken as an individual.
2. To enable district authorities to prepare the off-site emergency plan (contingency) for the district or particular area and to organize rehearsals and initiate actions learnt from these incidents.

Our Emergency Plan shall be made after considering the all possible effects of incidents on the neighboring population and the remedial measures will be devised in consultation with the local authorities and emergency services.

7.9.2 STRUCTURE OF THE OFF-SITE EMERGENCY PLAN

IC → SMC Essential Workers (Implementing Action plan, Informing nearby Public)	District Authorities (Collector, Factory Inspector, Police) Information, Evacuation	→ Mutual Aid teams, outside services, voluntary organizations (Fire-fighting, Gas leak control, First-aid, Shelter, Hospitalization, Transportation)

7.9.3 ROLE OF FACTORY MANAGEMENT

The Off-Site emergency Plans are dovetail so that the emergency services shall be summoned at the appropriate time and shall be provided with accurate information and a correct assessment of the situation. The responsibility for this is with the Site Main Controller. The Site Main Controller shall provide a copy of our On-Site and Off-Site Emergency Plan to the District authorities, the Factories Inspectorate and the Emergency Services, so that on the basis of information and such authorities can make their emergency

preparedness plan to formulate and execute the District / Area off Site Emergency Plan. Further on the advice of the authorities we can also modify our plan to make our plan more effective and perfect.

7.9.4 ROLE OF EMERGENCY CO-ORDINATION OFFICER (ECO)

The various emergency services will be co-ordinated by the Emergency Co-ordination officer (ECO), who will likely to be a Collector. The ECO will liaise closely with the Site Main Controller. The Emergency Control Centre of the factory can be utilized by the ECO to keep liaison with the Site Main Controller.

7.9.5 ROLE OF THE FIRE AUTHORITIES

The control of fire is normally the responsibility of the senior fire officer who would take over the handling of fire from the IC on arrival at the site.

- The senior fire brigade officer may also have similar responsibility for other events such as explosion and toxic releases. Fire authority having major hazard units in the area shall- Familiarize themselves with the location and site of all stages of flammable materials, water and foam supply points, fire fighting equipment.
- Act as observer of an on-site exercise involving only site personnel.

7.9.6 ROLE OF THE HEALTH AUTHORITIES

Health authorities, including Doctors, Surgeons, Hospitals, and Ambulances so on, have a vital part to play following a Major Accident and they should form an integral part of any emergency plan. In case of major fires, injuries will be the result of the effects of thermal radiation to a varying degree, and the knowledge and experience to handle this type of injuries cases may be generally available in most of the hospitals. But in case of major toxic releases, the effects vary according to the chemical, which has leaked, and it is important for health authorities that might be involved in dealing with the aftermath of a toxic release to be familiar with the treatment appropriate to such casualties. Major Off-Site incidents are likely to require medical equipment and facilities additional to those available locally and a Medical 'Mutual Aid' scheme should exist to enable the assistance of neighboring authorities to be obtained in the event of an emergency.

7.9.7 ROLE OF TELEPHONE DEPARTMENT

The communication system between the factory and the various above role-playing authorities must be effective. The ineffective public telephone system will not be useful in emergency. Therefore, telephone department should maintain the phones and if required temporary telephone connection may be provided to various above authorities to deal the emergency.

7.9.8 ROLE OF POLICE AND EVACUATION AUTHORITIES

- To protect life and property
- To control traffic movement
- To inform people to remain indoors or evacuate
- To carry-out evacuation
- To identify dead, deal with casualties and inform relatives of dead or injured.

For evacuation, the following criteria are useful:

a) In case of major fire, only houses close to fire and in the direction of smoke need evacuation

b) If fire is escalating and in turn threatening a store of hazardous material, it is necessary to evacuate people nearby if time is available; otherwise they should be informed to keep themselves indoor and shield from the fire.

c) For release of toxic gases, limited evacuation may be appropriate in downwind direction with windows closed and provides good protection. Toxic gases which are hazardous down to much lower concentration cover a long distance. This factor must be considered while deciding upon the need and extent of evacuation.

7.9.9 ROLE OF THE MUTUAL-AID AGENCIES

Mutual-aid arrangements shall be made in areas of fire & toxicity control, medical and transport & evacuation. All partners of mutual-aid shall extend all possible help in these areas.

7.10 OCCUPTIONAL HEALTH AND SAFETY

General Safety Precautions:

A brief description of the measures taken site:

For large industries, where multifarious activities are involved during construction, erection, testing, commissioning, operation and maintenance; the men, materials and machines are basic inputs. Along with the boons, industrialization generally brings several problems like occupational health and safety.

The industrial planner, therefore, has to properly plan and take steps to minimize the impacts of industrialization and to ensure appropriate occupational health and safety including fire plans. All these activities again may be classified under construction and erection, and operation and maintenance.

7.10.1 OCCUPATIONAL HEALTH

Occupational health needs attention both during construction & erection as well as operation & maintenance phases. However, the problem varies both in magnitude and variety in the above phases.

7.10.1.1 CONSTRUCTION AND ERECTION

The occupational health problems envisaged at this stage can mainly be due to constructional accident and noise. To overcome these hazards, in addition to arrangements to reduce it within Threshold Limit Values (TLV's), necessary protective equipments shall be supplied to workers.

7.10.1.2 OPERATION AND MAINTENANCE

The problem of occupational health in operation and maintenance phase is primarily due to noise which could affect consultation. The necessary personal protective equipments will be given to all the workers. The working personnel shall be given the following appropriate **personnel protective equipments**.

- Industrial Safety Helmet
- Face shield
- Zero power plain goggles with cut type filters on both ends

- Zero power goggles with cut type filters on both sides and blue color glasses
- Welders equipment for eye and face protection
- Cylindrical type earplug
- Ear muffs
- Canister Gas mask
- Self contained breathing apparatus
- Leather apron
- Aluminized fiber glass fix proximity suit with hood and gloves
- Boiler suit
- Safety belt/line man's safety belt
- Leather hand gloves
- Asbestos hand gloves
- Acid/Alkali proof rubberized hand gloves
- Canvas cum leather hand gloves with leather palm
- Lead hand glove
- Electrically tested electrical resistance hand gloves
- Industrial safety shoes with steel toe

7.10.1.3 HOSPITAL FACILITIES

It is proposed that client will make formal agreements with nearby hospital having facilities to attend fire and toxic effect cases for attending the affected persons in the emergency arising out of accidents, if any.

7.10.1.4 FACTORY MEDICAL OFFICER (FMO)

A qualified doctor will be appointed as FMO on retainer ship basis. Apart from FMO, paramedical staff will be employed.

7.10.1.5 PROPOSED FACILITY TO BE MADE AVAILABLE AT OHC

One Room is proposed to be provided to be operated as OHC. The centre will be equipped with following medical equipments:—

1.	Examination Table	
2	Dressing Tables	For performing Dressing
3.	Glucometer	For measurement of Blood Sugar
4	Vision chart	To evaluate vision acuity
5.	Nebulizer	For relieving coughs & Breathing Difficulty
6.	Infra red light	for relieving muscular pain

7.	Suction machine	For cleaning airway
8.	Autoclave machine	For sterilizing cotton &dressing material
9.	Weighing Machine	For measuring body weight
10.	Medical Oxygen Cylinder kit	
11.	Sphygmomanometer	To measure blood pressure
12.	Refrigerator	To preserve medicines
13.	Thermometer	To measure body temperature

7.10.1.6 AMBULANCE VAN

A jeep as ambulance van proposes to be made available 24 hours at the factory site.

7.10.1.7 FIRST AID BOX

First Aid Boxes propose to be made available at the different location in the plant, Training to be given to employees for First Aid.

7.10.1.8 PERIODIC MEDICAL EXAMINATION

It is proposed that client will ensure that…

(1) Workers employed shall be medically examined by a qualified medical practitioner/ Factory Medical Officer, in the following manner;

a) Once in a period of 6 months, to ascertain physical fitness of the person to do the particular job;

b) Once in a period of 6 months, to ascertain the health status of all the workers in respect of occupational health hazards to which they are exposed and in cases where in the opinion of the Factory Medical Officer it is necessary to do so at a shorter interval in respect of any workers;

C) In periodic and pre-medical examinations, various parameters will be checked. Viz., LIVER FUNCRION TESTS, Chest X-rays, Audiometry, Spirometry, Vision testing (Far & Near vision, color vision and any other ocular defect) ECG and other parameters as will be found necessary as per the opinion of Factory Medical officer.

(2) No person shall be employed for the first time without a certificate of granted by the Factory Medical Officer.

7.10.1.9 EMP FOR THE OCCUPATIONAL SAFETY & HEALTH HAZARDS SO THAT SUCH EXPOSURE CAN BE KEPT WITHIN PERMISSIBLE EXPOSURE LEVEL (PEL)/THRESHOLD LEVEL VALUE (TLV) SO AS TO PROTECT HEALTH OF WORKERS

1. It is proposed to formulate and implement an EMP for Occupational Safety and Health with following aims…
    - To keep air-borne concentration of toxic and hazardous chemicals below PEL and TLV.
    - Protect general health of workers likely to be exposed to such chemicals.
    - Providing training, guidelines, resources and facilities to concerned department for occupational health hazards.
    - Permanent changes to workplace procedures or work location to be done if it is found necessary on the basis of findings from workplace Monitoring Plan.

2. It is proposed that this EMP be formulated on the guidelines issued by Bureau of Indian Standards on OH&S Management Systems: IS 45001:2018 Occupational Health and Safety Management Systems.
3. Propose EMP will be incorporated in Standard Operating Procedure also.

4. Propose EMP will also include measure to keep air-born concentration of toxic and hazardous chemicals below its PEL and TLV, like…
    a. Leak Surveys
    b. Separate storage for toxic chemicals
    c. Exhaust Ventilation
    d. Proper illumination
    e. On-line detectors toxic chemicals
    f. Close processes to avoid spills and exposures
    g. Atomization of process operations to hazards of manual handling of chemicals.
    h. Supply of proper PPEs like Air mask, Berating canisters, SCBA sets, On-line breathing apparatus at the places where there is possibility of presence of toxic chemicals.
    i. Decontamination procedure for empty drums and carboys.
    j. Regular maintenance program for pumps, equipment, instruments handling toxic and corrosive chemicals.
    k. Display of warning boards.
    l. Training to persons handling toxic and corrosive chemicals.

5. Workplace Monitoring Plan

- It is proposed that a Workplace Monitoring Plan to be prepared & implemented in consultation with FMO and industrial hygienists.
- Each workplace must be evaluated to identify potential hazards from toxic substances or harmful physical agents. Air-borne concentration of toxic chemicals will be measured and record will be kept.
- The current state-of-the-art exposure measurement model is as follows: For purposes of measuring worker exposure across a single shift it is sufficient t o place a reasonably accurate exposure measuring device on the worker , within t he worker 's breathing zone, and have it operate for nearly the full shift.

6. Health Evaluation of Workers

1. It is proposed that management will devise a plan to check and evaluate the exposure specific health status evaluation of workers
2. Workers will be checked for physical fitness with special reference to the possible health hazards likely to be present where he/she is being expected to work before being employed for that purpose. Basic examinations like Liver Function tests, chest x ray, Audiometry, Spirometry Vision testing (Far & Near vision, color vision and any other ocular defect) ECG, etc. will be carried out. However, the parameters and frequency of such examination will be decided in consultation with Factory Medical Officer and Industrial Hygienists.
3. While in work, all the workers will be periodically examined for the health with specific reference to the hazards which they are likely to be exposed to during work. Health evaluation will be carried out considering the bodily functions likely to be affected during work. The parameters and frequency of such examination will be decided in consultation with Factory Medical Officer and Industrial Hygienists. Plan of monthly and yearly report of the health status of workers with special reference to Occupational Health and Safety.

7.10.1.10 MEDICAL SURVEILLANCE PROGRAM

Pre-employment Medical Check Up

1. Chest X-ray
2. Cardiogram
3. Audiometry
4. Hematological Examination:- CBC, SGOT, SGPT, Cholesterol, Blood Sugar etc
5. Urine Examination
6. Vision test
7. Color blindness test
8. Lung function test- Spirometry

Periodical Medical Check up

1. Lung Function test
2. Cardiogram
3. Audiometry
4. Hematological Examination
5. Urine examination
6. Vision test
7. Color blindness test
8. Biomarker in Blood & Urine

Occupational health impact on employees, control measures, action plan if accident occur

Sr. No.	Chemical	Occupational health impact on employees	Control measures provided	Action plan if accident occurs
1.	Acetic Acid CAS No. 64-19-7	Chronic respiratory disease due to long term exposure inhalation Skin disease due to skin contact	Process enclosure, Local exhaust, General dilution ventilation, Personal protective equipments	Remove victim from the spillage location into fresh air area. Small spillage control absorb on paper towel. Large spillage – Evacuate area and stop source of ignition. Dilute with water and collect washed out water in tank and neutralize it in safe manner.
2.	Acetonitrile CAS #75-05-8	Potential Acute Health Effects: skin contact (irritant), of eye contact (irritant), Potential Chronic Health Effects: The substance is toxic to blood, kidneys, lungs, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, skin, eyes, central nervous system (CNS). The substance may be toxic to the reproductive system.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.	Ventilation. Remove all ignition sources. Collect leaking liquid in sealable containers. Absorb remaining liquid in dry sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: complete protective clothing including self- contained breathing apparatus
3.	Liq. Ammonia CAS No. 7664-41-7	Very hazardous in case of skin contact (corrosive, irritant, permeator), Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure	Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of acetic acid. Corrosive liquid. Poisonous

		over-exposure can result in death. The substance is toxic to upper respiratory tract	that eyewash stations and safety showers are proximal to the work-station location.	liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of acetic acid.
4.	Chlorine CAS #7782-50-5	Toxic by inhalation. Irritating to eyes, respiratory system and skin. Very toxic to aquatic organisms.	Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.	Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment. Eliminate all ignition sources if safe to do so. Do not touch or walk through spilled material. Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.
5.	Dimethyl formamide (DMF) CAS #68-12-2	The substance is toxic to kidneys, liver, central nervous system (CNS). The substance may be toxic to blood, the nervous system. Repeated or prolonged exposure to the substance can produce target organs damage.	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.	Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed.
6.	Ethyl Acetate CAS # 141-78-6	The substance is toxic to blood, the reproductive system, liver, upper respiratory tract, skin, central	Provide close process	Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with

		nervous		DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed.
7.	Hexane CAS #110-54-3	The substance is toxic to blood, the reproductive system, liver, upper respiratory tract, skin, central nervous	Provide close process	Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed.
10.	Hydrochloric Acid	Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion. Slightly hazardous in case of inhalation (lung sensitizer). Non- corrosive for lungs. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death.	Provide close process and scrubber on process vent and storage vent	Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift.
11.	Hydrogen peroxide	Very hazardous in case of skin contact (irritant), of eye contact (irritant). Hazardous in case of skin contact (corrosive), of eye contact (corrosive), of ingestion. Slightly hazardous in case of inhalation (lung sensitizer).	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure	Explosion Hazard: Severe, when highly concentrated or pure H_2O_2 is exposed to heat, mechanical impact, or caused to decompose catalytically by metals & their Salts, dusts & alkalies.

		The substance is toxic to lungs, mucous membranes	that eyewash stations and safety showers are proximal to the work-station location. Use PPEs.	Another source of hydrogen peroxide explosions is from sealing the material in strong containers. Under such conditions even gradual decomposition of hydrogen peroxide to water + 1/2 oxygen Can cause large pressures to build up in the containers which may burst explosively. Corrosive liquid. Oxidizing material. Stop leak if without risk. Absorb with dry earth, sand or other non-combustible material. Do not get water inside container. Avoid contact with a combustible material (wood, paper, oil, clothing...). Keep substance damp using water spray. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or Confined areas; dike if needed.
12.	Methanol CAS# 67-56-1	The substance is toxic to blood, the reproductive system, liver, upper respiratory tract, skin, central nervous	Provide close process	Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed.
13.	Methylene Chloride CAS #75-09-2	CARCINOGENIC EFFECTS: Classified + (Proven.) by OSHA. The substance is toxic to lungs, the nervous system, liver, mucous membranes, central nervous system (CNS).	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold	Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV.

			limit value. Ensure that eyewash stations and safety showers are proximal to the workstation location.	
14.	Nitric acid CAS#7697-37-2	The substance may be toxic to lungs, mucous membranes, upper respiratory tract, skin, eyes, teeth. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection.	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.	Corrosive liquid. Oxidizing material. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other noncombustible material. Do not get water inside container. Avoid contact with a combustible material (wood, paper, oil, clothing...). Keep substance damp using water spray. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV.
15.	Sulfuric Acid	Prolonged or repeated skin contact may cause dermatitis. Prolonged or repeated inhalation may cause nosebleeds, nasal congestion, erosion of the teeth, perforation of the nasal septum, chest pain and bronchitis. Prolonged or repeated eye contact may cause conjunctivitis. Effects may be delayed. Workers chronically exposed to sulfuric acid mists may show various lesions of the skin,	Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. Use a corrosion-resistant ventilation system.	Clean up spills immediately, observing precautions in the Protective Equipment section. Carefully scoop up and place into appropriate disposal container. Provide ventilation. Do not get water inside containers. Cover with dry earth, dry sand, or other non-combustible material followed with plastic sheet to minimize spreading and contact with water.

		tracheobronchitis, stomatitis, conjunctivitis, or gastritis. Occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic to humans.		
16.	Toluene CAS # 108-88-3	The substance is toxic to blood, the reproductive system, liver, upper respiratory tract, skin, central nervous	Provide close process	Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed.

7.10.1.11 Annual Medical Check Up Report & Form -32

insecticides (INDIA) LIMITED

INSECTICIDES (INDIA) LIMITED Year 2019

E-443-444 RIICO INDUSTRIAL AREA, CHOPANKI, BHIWADI, RAJASTHAN

MEDICAL EXAMINATION RECORD

FORM-XXII-(RULE-37)

S. No. - 10 Name- Mr. Santosh Kumar Tiwari Age- 25 yrs Sex- male

Father's Name- Shri Shyam Lal Tiwari

Full Address- Vill. Bahora Pur Tel. Tanda Distt. Ambedkar Nagar (U.P.)

Identification Mark- Cut mark at ex eye side

Date of Appointment- 01.03.2008

Occupation (Nature of Duty)- Sr executive Production

01. Past- 02.Present-

PAST HISTORY

Illness	Poisoning	Allergy	Exposure to Pesticides(Compound)	No. of Year/Reason	Remarks if any
No	No	NA	NA	NA	NA

FAMILY HISTORY

Allergy	Psychological Disorders	Hemorrhagic Disorders

PERSONAL HISTORY

Smoking	Alcohol	Other Addiction
No	No	No

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Insecticides (INDIA) LIMITED

INSECTICIDES (INDIA) LIMITED — **Year 2019**

E-443-444 RIICO INDUSTRIAL AREA, CHOPANKI, BHIWADI, RAJASTHAN

MEDICAL EXAMINATION RECORD

OBSERVATIONS

Medical Examination	Pre-employment Examination	End of 1st Quarter (March)	After 2nd Quarter (June)	After 3nd Quarter (September)	End of the Year (December)	Remarks
01	02	03	04	05	06	07
1. General Examination						
General body limit		OK	OK	OK	OK	
Weight		80kg	79 kg	80kg	80kg	
Piles		NO	NO	NO	NO	
Blood Pressure		140/98	140/90	120/86	140/90	
Respiration		20/min	20/min	20/min	20/min	
Anemia		NO	NO	NO	NO	
Oadema		NO	NO	NO	NO	
Jaundice		NO	NO	NO	NO	
Skin condition		OK	OK	OK	OK	
Temperature		98°F	98.6°F	98°F	99.2°F	
Fatigability		NO	NO	NO	NO	
Sweating Sleep		OK	OK	OK	OK	
Sleep		Nov	Nov	Nov	Nov	
Urination		NAD	NAD	NAD	NAD	

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INSECTICIDES (INDIA) LIMITED

Year 2019

E-443-444 RIICO INDUSTRIAL AREA, CHOPANKI, BHIWADI, RAJASTHAN

MEDICAL EXAMINATION RECORD

II. Gastro Intestinal						
Nausea						
Vomiting						
Appetite						
Taste						
Pain in abdomen						
Bowel Movement						
Liver						
Spleen						
III. Cardio Respiratory						
Nasal discharge						
Wheeze						
Cough						
Expectoration						
Tightness of chest						
Cyanosis						
Tachycardia						
Dyspnoea						
Palpitation						
Heart						
P F T						

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Insecticides (INDIA) LIMITED

INSECTICIDES (INDIA) LIMITED

E-443-444 RIICO INDUSTRIAL AREA, CHOPANKI, BHIWADI, RAJASTHAN

Year 2019

MEDICAL EXAMINATION RECORD

IV. Neuro Muscular						
Headache						
Dizziness	NO	NO	NO	NO	NO	
Irritability	NO	NO	NO	NO	NO	
Pulse	NO	NO	NO	NO	NO	
Twitching	89/MT	96/MT	103/MT	96/MT		
Tremors	NO	NO	NO	NO	NO	
Convulsion	NO	NO	NO	NO	NO	
Par anesthesia	NO	NO	NO	NO	NO	
Hallucination	NO	NO	NO	NO	NO	
Unconsciousness	NO	NO	NO	NO	NO	
Deep reflexes	Nor.	Nor.	Nor.	Nor.	Nor.	
Superficial reflexes	Nor.	Nor.	Nor.	Nor.	Nor.	
Coordination	Nor.	Nor.	Nor.	Nor.	Nor.	
V. Eye						
Pupil	Nor.	Nor.	Nor.	Nor.	Nor.	
Lachrymation	NO	NO	NO	NO	NO	
Double vision	NO	NO	NO	NO	NO	
Clumped vision	NO	NO	NO	NO	NO	
VI. Psychological						

Page 4 of 6

INSECTICIDES (INDIA) LIMITED

Year 2019

E-443-444 RIICO INDUSTRIAL AREA, CHOPANKI, BHIWADI, RAJASTHAN

MEDICAL EXAMINATION RECORD

Temperament	Good	Good	Good	Good	Good	
Judgment	Good	Good	Good	Good	Good	
Nervousness	NO	NO	NO	NO	NO	
VII. Kidney						
Kidney condition						
VIII.Investigation						
Blood HB %						
Blood D.C.						
Serum Cholinesterase						
Serum Bilirubin						
Urin routine Examination						
X-ray of chest						
Blood Sugar						
Signature						

Page 5 of 6

Insecticides (India) Limited

INSECTICIDES (INDIA) LIMITED

E-443-444 RIICO INDUSTRIAL AREA, CHOPANKI, BHIWADI, RAJASTHAN

Year 2019

MEDICAL EXAMINATION RECORD

Date /Year

Advice given to:

The patient:

The Employer:

Steps taken by the Employer as per Doctor's Advise:

Signature/Thumb Impression

01. Doctor DR. ROOP SINGH M.D. RMC 2347 City Nursing Home

DR. ROOP SINGH M.D. RMC 2347 City Nursing Home

DR. ROOP SINGH M.D. RMC 2347 City Nursing Home

02. Employee

03. Employer/Manufacturer

04. Licensing Officer at the time of inspection

Page 6 of

City Nursing Home

(ISO 9001 : 2015 CERTIFIED)

C-1, Sadar Bazar, Near Housing Board, BHIWADI-301019, Distt. Alwar (Raj.)

Ph. : 01493-221700, Mob. : 94140-13100, e-mail : citynursinghome@rediffmail.com

HEALTH EXAMINATION

Regn No - 2728/15

Date : 26/6/19

Name : Mr. Santosh Tiwari S/o Shyamsingh Age/Sex : 35y / M

Address : Insecticides India Ltd

Mark of Identification : scar over (D) size of forehead

MEDICAL HISTORY :

Any Present illness : No any present illness

Past Medical History : No past medical History

Family illness : No family H/o HTN/DM

GENERAL EXAMINATION :

Height : 174 (Cm) Weight : 81 (Kg.) BP : 130/80

Teeth : NAD Abd : NAD

Eyes : Rt. 6/6 Lt. : 6/6 (normal)

SYSTEMIC EXAMINATION :

Heart : S.S.O.P Lung : Bilateral PFT :

Brain : NAD Gut : NBH Joints : NAD

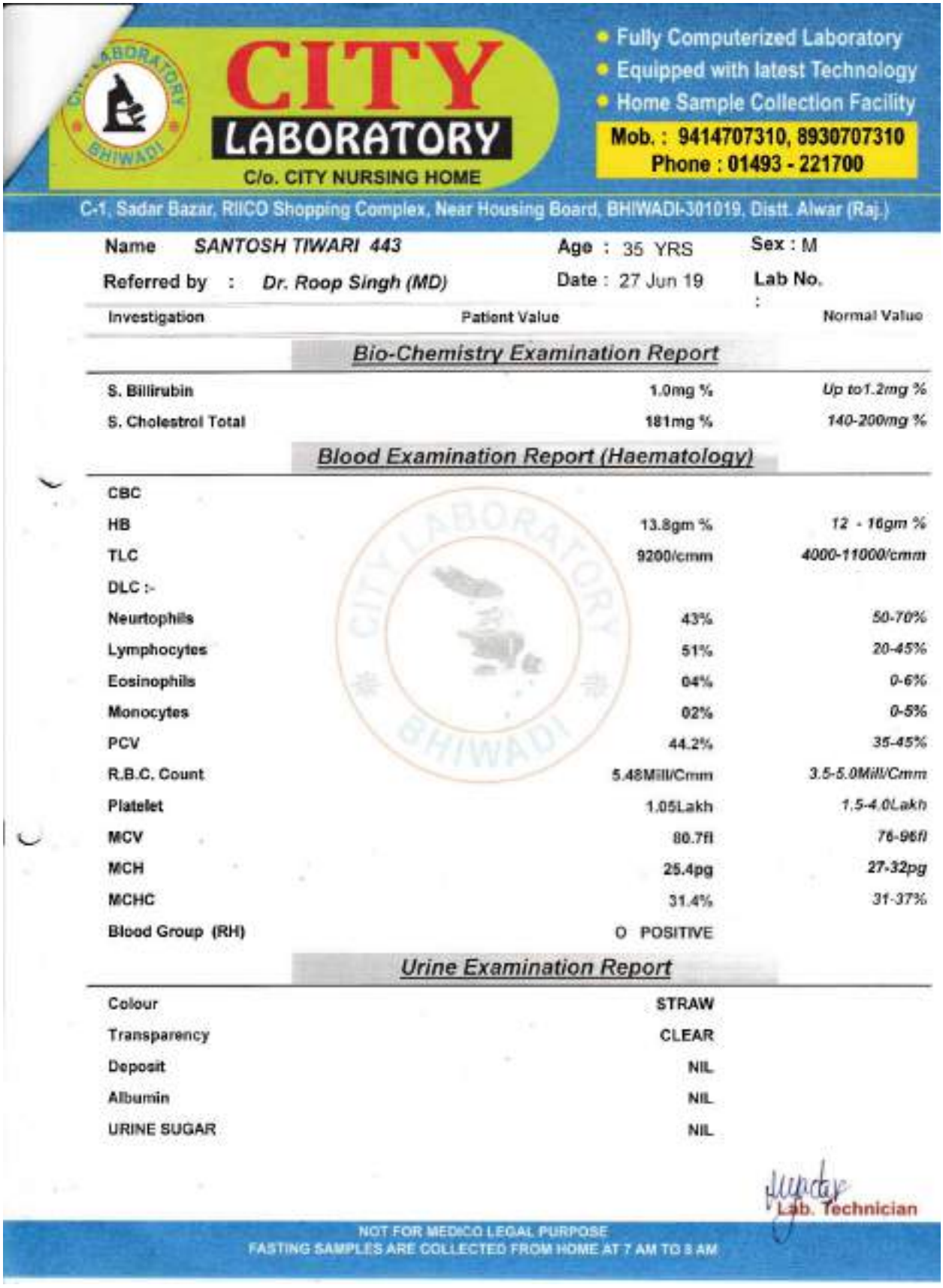
MEDICAL INVESTIGATION REPORTS :

Blood : X-Ray Chest :

Urine : ECG :

Results/Remark :

Dr. Roop Singh
M.B.B.S, M.D.
(General Medicine)
Reg. No. RMC-002347/15278



CITY LABORATORY
C/o. CITY NURSING HOME
BHIWADI

- Fully Computerized Laboratory
- Equipped with latest Technology
- Home Sample Collection Facility

Mob. : 9414707310, 8930707310
Phone : 01493 - 221700

C-1, Sadar Bazar, RIICO Shopping Complex, Near Housing Board, BHIWADI-301019, Distt. Alwar (Raj.)

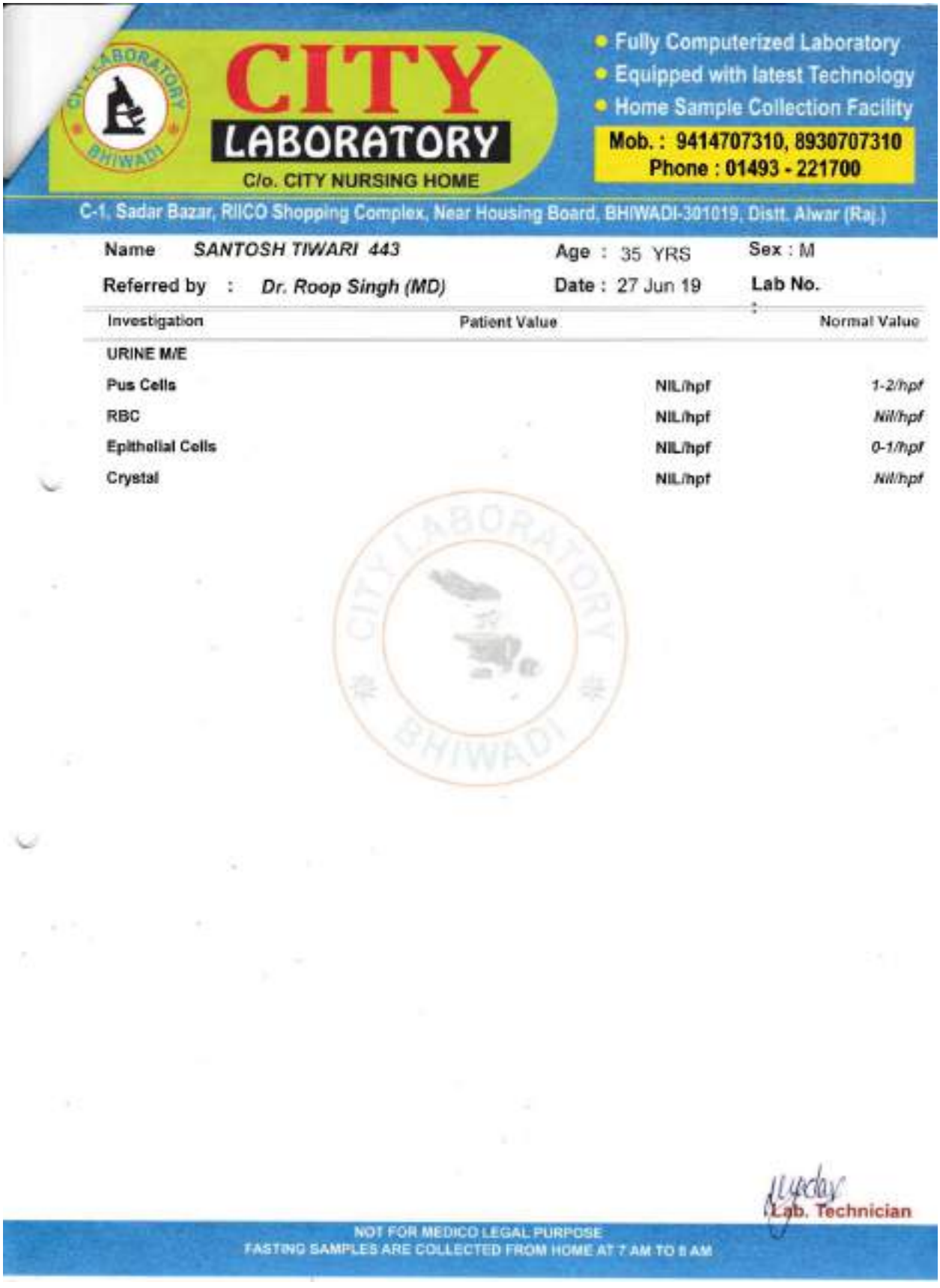
Name SANTOSH TIWARI 443 | Age : 35 YRS | Sex : M

Referred by : Dr. Roop Singh (MD) | Date : 27 Jun 19 | Lab No. :

Investigation	Patient Value	Normal Value
Bio-Chemistry Examination Report		
S. Billirubin	1.0mg %	Up to1.2mg %
S. Cholestrol Total	181mg %	140-200mg %
Blood Examination Report (Haematology)		
CBC		
HB	13.8gm %	12 - 16gm %
TLC	9200/cmm	4000-11000/cmm
DLC :-		
Neurtophils	43%	50-70%
Lymphocytes	51%	20-45%
Eosinophils	04%	0-6%
Monocytes	02%	0-5%
PCV	44.2%	35-45%
R.B.C. Count	5.48Mill/Cmm	3.5-5.0Mill/Cmm
Platelet	1.05Lakh	1.5-4.0Lakh
MCV	80.7fl	76-96fl
MCH	25.4pg	27-32pg
MCHC	31.4%	31-37%
Blood Group (RH)	O POSITIVE	
Urine Examination Report		
Colour	STRAW	
Transparency	CLEAR	
Deposit	NIL	
Albumin	NIL	
URINE SUGAR	NIL	

Lab. Technician

NOT FOR MEDICO LEGAL PURPOSE
FASTING SAMPLES ARE COLLECTED FROM HOME AT 7 AM TO 8 AM



CITY LABORATORY
C/o. CITY NURSING HOME
C-1, Sadar Bazar, RIICO Shopping Complex, Near Housing Board, BHIWADI-301019, Distt. Alwar (Raj.)

- Fully Computerized Laboratory
- Equipped with latest Technology
- Home Sample Collection Facility

Mob. : 9414707310, 8930707310
Phone : 01493 - 221700

Name SANTOSH TIWARI 443 Age : 35 YRS Sex : M
Referred by : Dr. Roop Singh (MD) Date : 27 Jun 19 Lab No.

Investigation	Patient Value	Normal Value
URINE M/E		
Pus Cells	NIL/hpf	1-2/hpf
RBC	NIL/hpf	Nil/hpf
Epithelial Cells	NIL/hpf	0-1/hpf
Crystal	NIL/hpf	Nil/hpf

Lab. Technician

NOT FOR MEDICO LEGAL PURPOSE
FASTING SAMPLES ARE COLLECTED FROM HOME AT 7 AM TO 8 AM

MOLQ LABORATORY

MOLQ LABORATORY
Molecular Quest Healthcare Pvt. Ltd.
28-29,Sector 18, Gurgaon
Corporate Office :
INDIA +91-9999-778-778
USA 001-855-876-MOLQ

NABL ACCREDITED
Certificate No. MC-2278

Client Code: MOLQ1021CM
Client Name And Address:
City Lab, Bhiwadi
G-1 Ricco Shopping Complex, New Housing Board Bhiwa
301019
9414705710

Name	Mr.SANTOSH TIWARI		
Age/Sex	35 Years/Male	Ordering Physician	
Institution	City Lab, Bhiwadi		
Lab ID	8119026030	Specimen Collected by Rajat Rao	
Vial ID	1046229		

Collection Date	26-Jan-2019 [illegible] PM
Specimen Received	26-Jan-2019 [illegible] PM
Report Date	26-Jan-2019 09:12 PM
Print Date	27-Jan-2019 09:20 AM
Status	Final Report

BIOCHEMISTRY

Test Name	Status	Result	Unit	Reference Interval
Cholinesterase		8,104.20	UI	5400-13200

NORMAL VALUES

Children, Men, Women over 40yrs	-	5400-13200
Women (16 - 39yrs, not pregnant, not taking oral contraceptives	-	4500-11500
(18 - 41yrs, pregnant of taking oral contraceptives)	-	3700-9500

Comments

Cholinesterase is an enzyme, found in erythrocytes, lung, spleen nerve endings and gray matter of brain, which is responsible for hydrolysis of acetylcholine released at nerve endings to mediate transmission of neural impulse across the synapses. It is useful test for monitoring liver fuction. It is also used as and indicator for detecting organophosphorous insecticide poisoning. Typically decreased levels of enzyme are encountered in patients of insecticide / organophosphorous poisoning.Also levels are low in cases of acute and chronic hepatitis of long duration, cirrhosis and carcinoma with metastasis in the liver. Decreased levels may also be encountered in acute infection, pul embolism and muscular dystrophy. Whereas marginal increase may be observed in cases of nephrotic syndrome, thyrotoxicosis, hemochromatosis and in obesediabetic people. Higher levels may also be seen anxiety and psychiatric states.

*** End Of Report ***

For [illegible]

The Tests marked with an * are not accredited by NABL.

Dr. Jatinder Kaur
Consultant Biochemistry

MolQ Laboratory (A Unit of Molecular Quest Healthcare Pvt. Ltd.) Corporate Identity No.: U85100HR2012PTC047641
Reference Laboratory: 28-29, Sector-18 (P) | Gurgaon, Haryana, 122015 | Phone 0124 - 4307906 | Email: contact@molq.in

INSECTICIDES (INDIA) LIMITED — Year 2018

[redacted] RIICO INDUSTRIALAREA, CHOPANKI, BHIWADI, RAJASTHAN

MEDICAL EXAMINATION RECORD

FORM-XXII-(RULE-37)

S. No. - 26 Name- Mr. Yaspal Age- 37 yrs Sex- Male

Father's Name- Shri Babu Lal

Full Address- Vill. Khakhra Tel Dharuhera Distt. Rewari (H.R.)

Identification Mark- Masses on lt cheek

Date of Appointment- 01.04.2013

Occupation (Nature of Duty)- E.T.P operator

01. Past- 02.Present-

PAST HISTORY

Illness	Poisoning	Allergy	Exposure to Pesticides(Compound)	No. of Year/Reason	Remarks if any
No	No	N.A	N.A	N.A	N.A

FAMILY HISTORY

Allergy	Psychological Disorders	Hemorrhagic Disorders

PERSONAL HISTORY

Smoking	Alcohol	Other Addiction
No	No	No

Page 1 of 6

INSECTICIDES (INDIA) LIMITED Year 2018

[redacted] RIICO INDUSTRIALAREA, CHOPANKI, BHIWADI, RAJASTHAN

MEDICAL EXAMINATION RECORD

OBSERVATIONS

Medical Examination	Pre-employment Examination	End of 1st Quarter (March)	After 2nd Quarter (June)	After 3rd Quarter (September)	End of the year (December)	Remarks
01	02	03	04	05	06	07
I. General Examination						
General body limit		N.D				
Weight						
Piles						
Blood Pressure						
Respiration						
Anemia						
Oadema						
Jaundice						
Skin condition						
Temperature						
Fatigability						
Sweating Sleep						
Sleep						
Urination						

Page 2 of 6

INSECTICIDES (INDIA) LIMITED **Year 2018**

RIICO INDUSTRIAL AREA, CHOPANKI, BHIWADI, RAJASTHAN

MEDICAL EXAMINATION RECORD

II. Gastro Intestinal							
Nausea	NO	NO	NO	NO	NO		
Vomiting	NO	NO	NO	NO	NO		
Appetite	GD	GD	GD	GD	GD		
Taste	NORM	NORM	NORM	NORM	NORM		
Pain in abdomen	NO	NO	NO	NO	NO		
Bowel Movement	GD	GD	GD	GD	GD		
Liver	NORM	NORM	NORM	NORM	NORM		
Spleen	NORM	NORM	NORM	NORM	NORM		
III. Cardio Respiratory							
Nasal discharge	NO	NO	NO	NO	NO		
Wheeze	NO	NO	NO	NO	NO		
Cough	NO	NO	NO	NO	NO		
Expectoration	NO	NO	NO	NO	NO		
Tightness of chest	NO	NO	NO	NO	NO		
Cyanosis	NO	NO	NO	NO	NO		
Tachycardia	NO	NO	NO	NO	NO		
Dyspnoea	NO	NO	NO	NO	NO		
Palpitation	NO	90	90	90	90		
Heart	NORM	NORM	NORM	NORM	NORM		

Page 3 of 6

INSECTICIDES (INDIA) LIMITED **Year 2018**

[redacted] RIICO INDUSTRIALAREA, GHOPANKI, BHIWADI, RAJASTHAN

MEDICAL EXAMINATION RECORD

IV. Neuro Muscular						
Headache		NO	NO	NO		
Dizziness		NO	NO	NO		
Irritability		NO	NO	NO		
Pulse		84/min	95/min	72/min		
Twitching		NO	NO	NO		
Tremors		NO	NO	NO		
Convulsion		NO	NO	NO		
Par anesthesia		NO	NO	NO		
Hallucination		NO	NO	NO		
Unconsciousness		NO	NO	NO		
Deep reflexes		Nor	Nor	Nor		
Superficial reflexes		Nor	Nor	Nor		
Coordination		Nor	Nor	Nor		
V. Eye						
Pupil		Nor	Nor	Nor		
Lachrymation		NO	NO	NO		
Double vision		NO	NO	NO		
Clumped vision		NO	NO	NO		
VI. Psychological						

Page 4 of 6

INSECTICIDES (INDIA) LIMITED **Year 2018**

[redacted] RIICO INDUSTRIALAREA, CHOPANKI, BHIWADI, RAJASTHAN

MEDICAL EXAMINATION RECORD

Temperament		Good	Good	Good		
Judgment		Good	Good	Good		
Nervousness		NO	NO	NO		
VII. Kidney						
Kidney condition						
VIII. Investigation						
Blood HB %						
Blood D.C.						
Serum Cholinesterase						
Serum Bilirubin						
Urin routine Examination						
X-ray of chest						
Blood Sugar		96 mg	80/mg	[illegible]		
Date/Year		22/8/2018	25/8/2018	[illegible]		

Page 5 of 6

INSECTICIDES (INDIA) LIMITED **Year 2018**

[redacted] RIICO INDUSTRIAL AREA, CHOPANKI, BHIWADI, RAJASTHAN

MEDICAL EXAMINATION RECORD

Date /Year

Advice given to:

The patient:

The Employer:

Steps taken by the Employer as per Doctor's Advise:

Signature/Thumb Impression of:

01. Doctor DR. ROOP SINGH M.D. RMC 2347 City Nursing Home

02. Employee

03. Employer/Manufacturer

04. Licensing Officer at the time of Inspection DR. ROOP SINGH M.D. RMC 2347 City Nursing Home

Page 6 of 6

CITY LABORATORY

C/o. CITY NURSING HOME

- Fully Computerized Laboratory
- Equipped with latest Technology
- Home Sample Collection Facility

Mob. : 9414707310, 8930707310
Phone : 01493 - 221700

C-1, Sadar Bazar, RIICO Shopping Complex, Near Housing Board, BHIWADI-301019, Distt. Alwar (Raj.)

Name *MR . YASH PAL SHARMA 442* Age : 37 YRS Sex : M

Referred by : *Dr. Roop Singh (MD)* Date : 20 Dec 18 Lab No. : 02

Investigation	Patient Value	Normal Value
Bio-Chemistry Examination Report		
S. Billirubin	0.91mg %	*Up to1.2mg %*
S. Cholestrol Total	162mg %	*140-200mg %*
Blood Examination Report (Haematology)		
CBC		
HB	15.5gm %	*12 - 16gm %*
TLC	9400/cmm	*4000-11000/cmm*
DLC :-		
Neurtophils	60%	*50-70%*
Lymphocytes	32%	*20-45%*
Eosinophils	06%	*0-6%*
Monocytes	02%	*0-5%*
PCV	44.5%	*35-45%*
R.B.C. Count	4.42Mill/Cmm	*3.5-5.0Mill/Cmm*
Platelet	3.31Lakh	*1.5-4.0Lakh*
MCV	100.7fl	*76-96fl*
MCH	33.1pg	*27-32pg*
MCHC	34.8%	*31-37%*
Blood Group (RH)	O POSITIVE	
Urine Examination Report		
Colour	STRAW	
Transparency	CLEAR	
Deposit	NIL	
Albumin	NIL	
URINE SUGAR	NIL	

Lab. Technician

NOT FOR MEDICO LEGAL PURPOSE
FASTING SAMPLES ARE COLLECTED FROM HOME AT 7 AM TO 8 AM

CITY LABORATORY
C/o. CITY NURSING HOME

- Fully Computerized Laboratory
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- Home Sample Collection Facility

Mob. : 9414707310, 8930707310
Phone : 01493 - 221700

C-1, Sadar Bazar, RIICO Shopping Complex, Near Housing Board, BHIWADI-301019, Distt. Alwar (Raj.)

Name *MR . YASH PAL SHARMA 442* Age : 37 YRS Sex : M

Referred by : *Dr. Roop Singh (MD)* Date : 20 Dec 18 Lab No. : 02

Investigation	Patient Value	Normal Value
URINE M/E		
Pus Cells	NIL/hpf	*1-2/hpf*
RBC	NIL/hpf	*Nil/hpf*
Epithelial Cells	NIL/hpf	*0-1/hpf*
Crystal	NIL/hpf	*Nil/hpf*

Lab. Technician

NOT FOR MEDICO LEGAL PURPOSE
FASTING SAMPLES ARE COLLECTED FROM HOME AT 7 AM TO 8 AM

MOLQ LABORATORY
Molecular LABORATORY Ltd.
28-29,Sector 18, Gurgaon
Corporate Office :
INDIA +91-9999-778-778
USA 001-855-876-MOLQ

NABL ACCREDITED
Certificate No. MC-2278

Client Code: MOLQ1021CM
Client Name And Address: City Lab, Bhiwadi
C-1 Ricco Shopping Complex, Near Housing Board Bhiw
301019
9414707310
mukeshyadav7310@gmail.com

NABL ACCREDITED
Certificate No. MC-2278

Name	**Mr. YASHPAL SHARMA**			**Collection Date**	20-Dec-2018 05:16 PM
Age/Sex	37 Years/Male	**Ordering Physician**		**Specimen Received**	20-Dec-2018 05:16 PM
Institution	City Lab, Bhiwadi			**Report Date**	20-Dec-2018 07:59 PM
Lab ID	011812200234	**Specimen Collected by** Lalit Kataria		**Print Date**	24-Dec-2018 09:47 AM
Vial ID	10345381			**Status**	**Final Report**

BIOCHEMISTRY

Test Name	Status	Result	Unit	Reference Interval
Cholinesterase *Sample Type : Serum*		9879.0	U/L	5400-13200

NORMAL VALUES

Childred, Men, Women over 40yrs	-	5400-13200
Women (16 - 39yrs, not pregnant, not taking oral contraceptives	-	4300-11500
(18 - 41yrs, pregnant of taking oral contraceptives)	-	3700-9300

Comments

Cholinesterase in an enzyme, found in erythrocytes, lung, spleen nerve endings and gray matter of brain, which is responsible for hydrolysis of acetycholine released at nerve endings to mediate transmission of neural impulse aross the synapses. It is usful test for monitoring liver fnction. It is also used as and indicator for detecting organophosphorous insecticide poisoning. Typically decreased levels of enzyme are encountered in patients of insecticide / organophosphrours posoining Also levels are low in cases of acute and chronic hepatitis of long duration, cirrhosis and carcinoma with metastasis in the liver. Decreased levels may also be encountered in acte infection, pul embolism and msclar dystrophy. Whereas marginal inrease may be observed in cases of nephrotic syndrome, thyrotoxicosis, hemochromatosis and in obesediabetic people. Higher levels may also be seen anxiety and psychiatric states.

*** End Of Report ***

For related test information on this accession, please visit website www.molq.in or email at contact@molq.in

The Tests marked with an * are not accredited by NABL.

Dr. Gulshan Bhalla
Consultant Pathologist

City Nursing Home

(ISO 9001 : 2008 CERTIFIED)

C-1, Sadar Bazar, Near Housing Board, BHIWADI-301019, Distt. Alwar (Raj.)

Ph. : 01493-221700, Mob. : 94140-13100, e-mail : citynursinghome@rediffmail.com

HEALTH EXAMINATION

Date : 20/12/18

Name : MR. yash pal sharma Age/Sex : 37 yrs.

Address : insecticides

Mark of Identification : A black mole left cheek

MEDICAL HISTORY :

Any Present illness : No complain of present illness

Past Medical History : No significant past medical history

Family illness : No significant Family H/o DM/HTN

GENERAL EXAMINATION :

Height : 165 (Cm) Weight : 63.2 (Kg.) BP : 130/70

Teeth : NAD Abd : Soft & non tender Pulse = 70

Eyes : Rt. 6/6 Lt. : 6/6

SYSTEMIC EXAMINATION :

Heart : $S_1 S_2$ (+) Lung : B/L clear PFT : 250

Brain : NAD Gut : NAD Joints : NAD

MEDICAL INVESTIGATION REPORTS :

✓Blood : ✓X-Ray Chest : (N)

✓Urine : ECG : ~~NAD~~

Results/Remark :

Medically fit

Dr. Roop Singh
M.B.B.S. M.D.
(General Medicine)
Reg. No. RMC-002347/13273

CITY NURSING HOME

C-1, RIICO SHOPING COMPLEX, RHB COLONY,
BHIWADI-301019, PH. 01493-221700/EMail:,

Ref No.		Date	20/12/2018
Name Of Employee	Mr. Yashpal Sharma	Age & Sex	37(Male)
Name of Company	Insecticides India Limited	Test Done	X-Ray

X-RAY CHEST P.A. VIEW

RIBCAGE	NORMAL
TRACHEA	CENTRAL
LUNGS	NORMAL
R T LUNG	NORMAL
LT LUNG	NORMAL
HEART	NORMAL
CP ANGLE	CLEAR

RESULT :– NORMAL

CITY NURSING HOME

DR.ROOP SINGH (MD)

Dr. Roop Singh
M.B.B.S, M.D.
(General Medicine)
Reg. No. RMC-[illegible]

7.10.2 SAFETY PLAN

Safety of both men and materials during construction and operation phases is of concern. Safety plan shall be prepared and implemented in the proposed project activity. The preparedness of an industry for the occurrence of possible disasters is known as emergency plan. The disaster in the plant is possible due to collapse of structures and fire/explosion etc.

- The proposed expansion project would formulate safety policy keeping in view the safety requirement during construction, operation, maintenance phases, with the following regulations:
- To allocate sufficient resources to maintain safe and healthy conditions of work;
- To take steps to ensure that all known safety factors are taken into account in the design, construction, operation and maintenance of plants, machinery and equipment;
- To ensure that adequate safety instructions are given to all employees;
- To provide wherever necessary protective equipment, safety appliances and clothing and to ensure their proper use;
- To inform employees about materials, equipment or processes used in their work which are known to be potentially hazardous to health or safety;
- To keep all operations and methods of work under regular review for making necessary changes from the point of view of safety in the light of experience and up to date knowledge;
- To provide appropriate facilities for first aid and prompt treatment of injuries and illness at work;
- To provide appropriate instruction, training, retraining and supervision to employees in health and safety, first aid and to ensure that adequate publicity is given to these matters;
- To ensure proper implementation of fire prevention methods and an appropriate fire fighting service together with training facilities for personnel involved in this service;
- To organize collection, analysis and presentation of data on accident, sickness and incident involving people injury or injury to health with a view to taking corrective, remedial and preventive action;
- To promote through the established machinery, joint consultation in health and safety matters to ensure effective participation by all employees;

- To publish/notify regulations, instructions and notices in the common language of employees;
- To prepare separate safety rules for each type of occupation/processes involved in a plant; and
- To ensure regular safety inspection by a competent person at suitable intervals of all buildings, equipments, work places and operations.

7.10.3 SAFETY ORGANIZATION

Construction and Erection Phase

A qualified and experienced safety officer shall be appointed. The responsibilities of the safety officer include identification of the hazardous conditions and unsafe acts of workers and advice on corrective actions, conduct safety audit, organize training programs and provide professional expert advice on various issues related to occupational safety and health. He is also responsible to ensure compliance of Safety Rules/ Statutory Provisions.

Operation and Maintenance Phase

When the construction is completed the posting of safety officers shall be in accordance with the requirement of Factories Act and their duties and responsibilities shall be as defined thereof.

7.10.4 SAFETY CIRCLE

In order to fully develop the capabilities of the employees in identification of hazardous processes and improving safety and health, safety circles would be constituted in each area of work. The circle would consist of about five to six employees from that area. The circle normally shall meet for about an hour every week.

7.10.5 SAFETY TRAINING

Safety training shall be provided by the Safety Officers with the assistance of faculty members called from Professional Safety Institutions and Universities. In addition to regular employees, limited contractor labors shall also be provided safety training. To create safety awareness safety films shall be shown to workers and leaflets shall be distributed.

Some precautions and remedial measures proposed to be adopted to prevent fires are:

- Compartmentalization of cable galleries, use of proper sealing techniques of cable passages and crevices in all directions would help in localizing and identifying the area of occurrence of fire as well as ensure effective automatic and manual fire fighting operations;
- Spread of fire in horizontal direction would be checked by providing fire stops for cable shafts;
- Reliable and dependable type of fire detection system with proper zoning and interlocks for alarms are effective protection methods for conveyor galleries;
- Housekeeping of high standard helps in eliminating the causes of fire and regular fire watching system strengthens fire prevention and fire fighting; and
- Proper fire watching by all concerned would be ensured.

7.10.6 HEALTH AND SAFETY MONITORING PLAN

The health of all employees shall be periodically monitored for early detection of any ailment due to exposure to heat and noise.

7.11 TRAINING, REHERASAL & RECORDS

7.11.1 NEED OF TRAINNING & REHEARASAL

Training is important in order to –

- Teach worker's how to handle chemicals safely, how to act as a runner/messenger, how to use PPE, how to start and shut down the plant, how to carry out emergency repairs etc.
- Teach one to be a safe and alert worker.

Rehearsal is essential for -

- Explaining and making key personnel and essential workers aware of their role in case of an emergency.
- Testing the emergency procedure, emergency arrangements and ability of all involved with it to grasp the procedure and implement the same.

- Testing the effectiveness of communication system including the alternative arrangement in case of failure.
- Testing the speed of mobilization of resources, search, rescue and treatment of casualties, emergency isolation and shut down.
- Detecting the shortcomings in the emergency plan and incorporating remedial measures.
- Allowing professional emergency services to test their parts of the plan and testing co-ordination.
- Building confidence in workers which is helpful in facing real situations.

Training shall be given to regular employees and contract personnel also. Effective and latest teaching aids will be used to train workers and supervisory staff. Such training courses shall be conducted once in a year and co-ordination with offsite personnel shall be sought during such training. Records will be maintained for training.

7.11.2 SOME CHECK POINTS

Following points can be checked at the time of training/assessing the adequacy of the Emergency Plan.

- Does the plan cover the range of incidents that can realistically be anticipated?
- Have the consequences of the various incidents considered been adequately assessed?
- Are there sufficient resources in terms of personnel and equipment on the site to carry out the Emergency Plan for the various incidents in conjunction with the public emergency services?
- Have the time scales been assesses correctly?
- Is there a logical sequence of actions for each person given a role in the plan? Whether key personnel, especially the nominated incident controllers, consulted in the preparation of the plan?
- Is there 24 hours cover, to take account of absences due to sickness and holidays, minimum shift manning, operator only periods, silent hours, shutdown periods, only security personnel being present, or for unmanned sites etc.?
- Is there satisfactory co-operation with the local emergency services and district emergency planning officers?

- At sites where an off-site plan to protect people and the environment outside the site in the event of an incident is appropriate what is the procedure for initiating the off-site plan and is this satisfactory?

7.11.3 RECORDS AND UPDATING THE PLAN

All records of On-Site and Off-Site Emergency Plan and modifications by experience and suggestion, the rehearsals and conclusions of such plans and the enquiries shall be well maintained and preserved. The necessary data bank shall be also maintained for the utility of industries and others. New information and the deficiencies identified during the rehearsal is reviewed and incorporated in the document for continual up dating of the plan and such information shall be communicated to the concerned authorities.

7.11.4 Safety Training Records

Safety Training record from January 2019 to October 2019				
Sr. No.	Date	Subject	Department	Total Participant
1	19-01-2019	Mock Drill (fire fighting training)	EHS	25
2	12-02-2019	Work Permit System Training	EHS	13
3	10-05-2019	Fire & safety & type of fire	EHS	12
4	09-06-2019	Training for Slips, Trips & Falls	EHS	11
5	28-06-2019	Work Permit System Training	EHS	20
6	08-08-2019	Fire Fighting & Unsafe Act	EHS	12
7	12-08-2019	Unsafe Condition Unsafe Act	EHS	25
8	28-08-2019	Basic Fire Fighting	EHS	23
9	11-09-2019	Unsafe Condition Unsafe Act	EHS	17
10	25-09-2019	Work Permit System Training	EHS	15
11	15-10-2019	Self contained Breathing Apparatus (SCBA) Set	EHS	11

7.12 LEAK DETECTION AND REPAIR (LDAR) PROGRAM

To Prevent Losses of these Solvents in Atmosphere, following Infrastructure Shall be used in Addition to LDAR Program

- Leak Free Pumps for Transfer of Solvents
- MSW Gaskets in Solvent Pipelines to Prevent Leakage from flanges
- Minimum Number of Flanges, Joints and Valves in Pipelines.
- To Eliminate Chances of Leakages from glands of pumps, mechanical seal will be provided at all solvent pumps.
- All the rotating equipments like pumps will be installed with mechanical seals to arrest any sort of emissions.
- Condenser and scrubber post reactor with cooling arrangement
- Enclosures to chemical storage area, collection of emission from loading of raw materials in particular solvents through hoods and ducts by induced draft, and control by scrubber / dust collector to be ensured.
- In case the small spillage or leakage observed, first pour the china clay (vermiculate) on material and collect the contaminated china clay (vermiculate) and send to ETP.
- If the spillage is of inflammable liquid, switch off all the power supply in the area to prevent electric spark.
- Two condenser will install with cooling water and chilled brine to recover the solvent.
- Primary Condenser HE-01:Cooling Tower water or chilled water will be used to condense the solvents depend on the vapor pressure at its operating conditions and the non condensed vapors will be condensed in a secondary condenser
- Voc Trap Condenser HE-02: Chilled Brine at -05 ^{0}C will be used to trap any traces of solvent which is slipped from secondary condenser

MONITORING OF SOLVENT LOSSES

- In warding, storage and consumption of solvents in various products shall be measured through level transmitters and load cells weighing systems resp. The quantity at each stage shall be reconciled periodically to arrive at losses.
- Periodic monitoring of work area will be carried out to check the fugitive emission.
- VOC Detectors will be installed at various places to detect leak.

PREVENTIVE MAINTENANCE TO PREVENT LEAKAGES

In order to prevent leakage from pump, seals, valves etc, preventive maintenance shall be carried out periodically as per plan. Regular maintenance of valves, pumps, flanges, joints and other equipment will be done to prevent leakages and thus minimizing the fugitive emissions of VOCS.

SR. NO	Component	Preventive Maintenance Schedule
1	Pump seals with visible liquid dripping	Daily
2	Valves/flanges	Quarterly
3	Compressor seals	Quarterly
4	Pressure relief devices	Yearly
5	Pipeline thickness testing	Yearly

IMMEDIATE REPAIR OF DEVICES IN CASE OF LEAKAGES

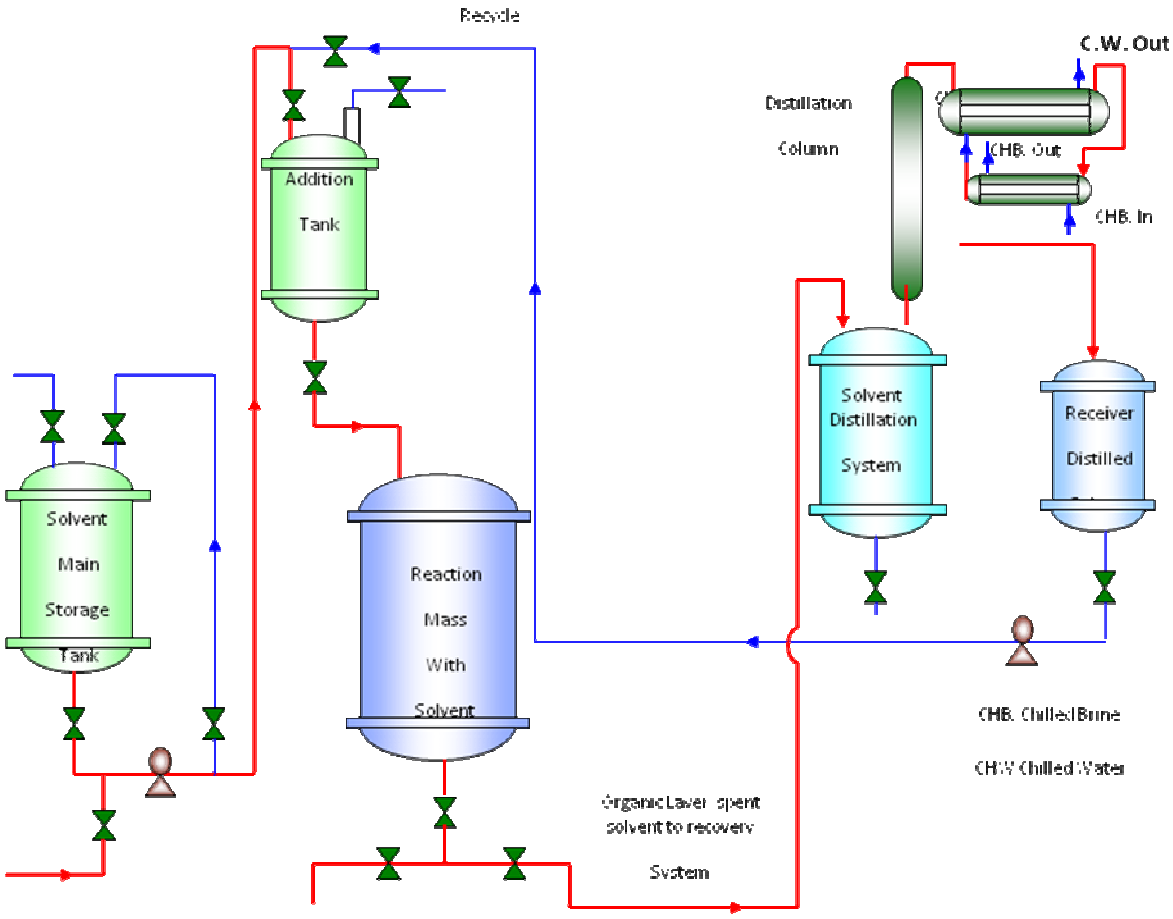
- A regular preventive maintenance schedule will be in place to replace or rectify all gaskets and joints etc to ensure no fugitive emissions shall take place.
- Plant shall also maintain adequate number of spares and consumables required to repair the leaking device
- Plant shall also have competent contractor team to handle leakages and can repair the same immediately

- Standby equipments like pumps, valves etc shall be kept basis the criticality and usage
- Plant shall also have access equipments like boom lift to handle leakages at height immediately

SOLVENT RECOVERY PATTERN

SOLVENT	INPUT	RECOVER	LOSSES	%RECOVER	%LOSSES
EDC	1000	970.4	29.60	97.04	2.96
IPA	1200	1150	50	95.83	4.17
DMF	1000	965.7	34.3	96.57	3.43
Toluene	4000	3875	125	96.88	3.12
Methanol	1800	1715	85	95.28	4.72
n-Hexane	1000	957.1	42.9	95.71	4.29
TEA	1800	1729.8	70.2	96.1	3.9
Ethyl Alcohol	2000	1944	56	97.2	2.8
n-Butanol	2500	2365	135	94.6	5.4

FIG. 7.2 FLOW DIAGRAM OF SPENT SOLVENT MANAGEMENT SYSTEM



7.13 CHECKLIST OF DO'S & DON'TS OF PREVENTIVE MAINTENANCE, STRENGTHENING OF HSE, MANUFACTURING UTILITY STAFF FOR SAFETY RELATED MEASURES.

Do's:

- Store used oil at proper place as per plant guidelines.
- Use lubricating oil carefully to avoid spillage on ground.
- Use lubricating oil as per requirement.
- Use minimum amount of water wherever it is required as per plant guidelines.
- Waste disposal system for all plants should be separate.
- Avoid spillage of liquid, hand gloves, cotton waste on road, which will cause pollution. Recycle or dispose that material.
- Use cleaning equipment carefully. (i.e. cotton waste, oil & chemicals)
- Place all the equipments (i.e. Fire Hose, Rubber Pipe and Chisel) at proper place.
- Handling of chemicals should be as per plant guidelines to avoid undesired chemical reaction.
- Safety training and correct use of PPE's must for all the employees.
- Environment guidelines should follow during cleaning of vessels, Tank, channels etc.
- Follow shift in charge's instructions during loading or unloading of chemicals.
- In case of fire or any accident, immediately inform responsible person.
- In case of emergency, inform operator as well as control room.
- Area of work during excavation, radiography, sand blasting shall be cordoned with warning tags of "work in progress", "no entry", "radiography" in progress' etc.
- Switch off lights and computers when not in use.
- Shut the water cock properly when not in use.
- Always follow safety rule during the plant operation.

Do's during shut down:

- All equipment, vessels, lines where hot work is envisaged shall be purged, flushed thoroughly and positively isolated. Similar precautions should be taken for vessel entry also.
- Back flow of materials from sewers, drains should be avoided by proper isolations.
- In case of confined space entry and other cleaning jobs etc. which are to be carried out by the process department, vessel entry permit should be issued to immediate supervising officer/operator by shift in charge. This permit should be renewed by incoming shift in charge during every shift.
- Hoist, Platform, cages used for lifting persons or to send persons inside vessels by such means must be of sound construction with wire ropes slings, etc. to avoid failure.
- All steam, condensate, hot water connections should be made tight with clamps.
- Nitrogen hazard should be kept in mind. All nitrogen sources should be positively isolated from vessels/confined spaces to avoid oxygen deficiency where vessel entry is required.
- All nitrogen hoses used for purging before vessel entry should be removed from source/utility point.
- All underground sewers shall be flushed, protected from sparks.
- Full PPEs like PVC suits, gum boots, face shield & other required shall be used while draining, flushing and other reclaiming activities to avoid burn, poisoning etc.
- Wet asbestos cloth/metallic plate should be used to collect flying sparks.

- Water, steam flushing, nitrogen blanketing shall be continued where spontaneous combustion takes place. Precautions should be taken for pyrophoric nature of material.
- Temporary electrical connections, cords, boards and other electrical fixtures should be of sound material to prevent electrical shock.
- Oil spillage in the pit of oil slope tank should be cleaned with water/sand.
- Proper approach like aluminum ladder should be provided to reach to the platforms of scaffolding and ladder must be tied.
- All clumps of scaffolding should be tightened properly and planks should be tied at both ends and supported at proper distances along span to avoid sagging and failure.
- Always use safety belt while working at height of more than 2 meters and ensure tieing the life line of safety belt with firm support.
- Ensure area cordoning for hot work, X-ray, excavation, hazard material temporary storage.
- Ensure proper tagging of valves, switches etc to prevent its use.
- Ensure proper guidance to workman and make him aware about local area hazards before start of the job.
- All welding machines should be provided with power isolation switch of suitable rating.
- Portable electrical appliances/tools earthing should be in good working condition. Insulation portion should be free from damages.
- All electrical cables should be joints free and connection taken by using three pin plugs.
- While inserting fuse all care should be taken so that no one touches conductor to avoid the shock to the persons.
- During hydro jetting work workers should wear hand gloves, safety helmet goggles and PVC suit.

Don’ts:

- Do not use fire hydrant water for washing/bath purpose.
- Do not use water for cleaning purpose, use broomstick if possible.

- Do not wash or clean trolley, tractor or trucks which are used for chemical/fertilizer's transportation. Wash them at proper place.
- Smoking & carrying matchbox, cigarettes, lighter, bidis etc. are prohibited.
- Photography & carrying cameras/Mobile phones are strictly prohibited in all areas.
- Do not spill liquid or chemicals in open atmosphere.
- The use of Radio Active Source within the plant shall not be allowed without obtaining valid permission/work permit and intimation in the form of a circular to all plant persons shall be given in advance.
- Unauthorized entry into any battery limit of plant is strictly prohibited.
- Sitting or walking on rail tracks, crossing between wagons, taking rest under stabled wagons, crossing the rail through the openings underneath the stationary wagons are strictly prohibited.

Don'ts during shut down:

- Do not use gasket or other blinds as it can fail during job. All blinds should be metallic.
- No toxic/corrosive/irritating materials should remain plants or sections where hot work is to be carried out.
- No hot work should be permitted in battery limits near sewers till areas have been cleaned flushed properly.
- No hot work irrespective of place of area shall be done without valid permit.
- No combustible material shall be there in flare line for taking up of flare line job. Isolations shall be ensured.

7.14 Details on various SOP to be prepared.

Description	Distribution
Procedure on Approvals	All Departments
Health Care Program	All Departments
Employee participation	All Departments
Contractor Management	All Departments
Risk Assessment	All Departments
Management of Change	All Departments
Inspection of Fire & Safety Equipments and Facilities	All Departments
Work Permit	All Departments

Control of Spillage	All Departments
Vehicle Gate Check Entry / Exit Procedure (Raw Material and Finished Goods)	All Departments
Waste Handling and Storage	All Departments
Waste Water Treatment & Disposal	All Departments

7.15 PROCESS SAFETY

- Safety measures will be adopted from the design stage.
- Safety Valve and pressure gauge will be provided on reactor and its jacket (if jacket is provided).
- Utility like Chilling, cooling, vacuum, steaming and its alternative will be provided to control reaction parameters in a safe manner.
- Free Fall of any flammable material in the vessel will be avoided.
- Static earthing provision will be made at design stage to all solvent handling equipments, reactors, vessels & powder handling equipments.
- Any reaction upsets will be confined to the reaction vessel itself.
- All emergency valves and switches and emergency handling facilities will be easily assessable.
- Further all the vessels will be examined periodically by a recognized competent person under the Rajasthan Factory Rules.
- All the vessels and equipments will be earthed appropriately and protected against Static Electricity. Also for draining in drums proper earthing facilities will be provided.
- Materials will be transferred by pumping through pipeline or by vacuum from drums.
- All solvents and flammable material storage tanks will be stored away from the process plant and required quantity of material will be charge in reactor by pump.
- Jumpers will be provided on all solvent handling pipeline flanges.

- Caution note, safety posters, stickers, periodic training & Updation in safety and emergency preparedness plan will be displayed and conducted.
- Flame proof light fittings will be installed in the plant.
- All the Plant Personnel will be provided with Personal Protection
- Equipments to protect against any adverse health effect during operations, leakage, spillages or splash. PPE like Helmets, Safety Shoes, Safety
- Glasses, Acid-Alkali Proof Gloves etc. will be provided to the employees.
- All employees will be given and updated in Safety aspects through periodic training in safety.
- Material Safety Data Sheets of Raw Materials & Products will be readily available that the shop floor.

7.15.1 FOR HAZARDOUS STORAGE TANK FARM

- Tank farm will be constructed as per explosive department requirement and separation distance will be maintained.
- Tanks shall be located and marked in designated area of hazardous chemical storage.
- Static earthing provision will be made for road tanker as well as storage tank.
- Tanks of proper MOC will be selected.
- Flame arrestor with breather valve will be provided on vent line.
- Road tanker unloading procedure will be prepared and implemented.
- Fire load calculation will be done and as per fire load Hydrant System will be provided as per NFPA std. and Fire extinguishers will be provided as per fire load calculation.
- Spark arrestor will be provided to all vehicles in side premises.
- Flame proof type equipments and lighting will be provided.
- Lightening arrestor will be provided on the top of chimney.
- Trained and experience operator will be employed for tank farm area.
- NFPA label (hazard identification) capacity and content will be displayed on storage tank.
- Solvents will be transferred by pump only in plant area and day tank will be provided. Overflow line will be return to the storage tank or Pump On-Off switch will be provided near day tank in plant.
- Jumpers will be provided on solvent handling pipe line flanges.

- Flexible SS hose will be used for road tanker unloading purpose and other temperature connection.
- All tanks shall be uniformly tagged.
- Level indicator shall be provided in tanks.
- Dyke will be provided.
- Industrial type electric fittings shall be provided.
- Adequate fire fighting equipments will be provided.
- Anti corrosive paint shall be done.
- Safety instruction board will be displayed.

7.15.2 FOR DRUM/CARBOY STORAGE AREA

Some chemicals will be received at plant in drums/Carboys by closed containers and stored in a drum/Carboy storage area.

- FLP type light fittings will be provided.
- Proper ventilation will be provided in godown.
- Proper label and identification board /stickers will be provided in the storage area.
- Conductive drum pallets will be provided.
- Drum handling trolley / stackers/fork lift will be used for drum handling.
- Separate dispensing room with local exhaust and static earthing provision will be made.
- Materials will be stored as per its compatibility study and separate area will be made for flammable, corrosive and toxic chemical drums storage.
- Smoking and other spark, flame generating item will be banned from the Gate.

7.15.3 TRANSPORTATION

- Road tanker unloading procedure will be in place and will be implemented for safe unloading of road tanker.
- Static earthing provision will be made for tanker unloading.
- Earthed Flexible Steel hose will be used for solvent unloading from the road tanker.

- Fixed pipelines with pumps will be provided for solvent transfer up to Day tanks/reactors.
- Double mechanical seal type pumps will be installed.
- NRV provision will be made on all pump discharge line.

7.16 PUBLIC HEARING

Public Hearing is not applicable to this unit because the unit is located in Notified Industrial Area at RIICO Industrial Area, Chopanki.

7.17 REHABILITATION AND RESETTLEMENT (R & R)

Rehabilitation and Resettlement is not applicable to this unit because of company purchased the land from RIICO, Chopanki.

CHAPTER - 8

PROJECT BENEFITS

8.1 BACKGROUND

1 M/s Insecticides (India) Limited, a limited company is a leading Indian Brand company, holding a strong foothold in the India Agrochemical market, setting benchmarks in the manufacturing and marketing of pesticides and agrochemicals. With a strong countrywide network, commitment to growth and a mission to make the choicest of brands available to farmers at the most competitive prices, IIL is all set to touch the Rs. 1500 crore turnover mark by the year 2018. IIL's brands occupy leadership positions (No. 1 and 2) in almost all categories in pesticides and agrochemicals.

2 The company was incorporated in the year 1996. It was initially established as a private limited and subsequently converted into a limited company on 2.11.2001 to pursue the main objectives of pesticides and agrochemicals.

3 IIL stands for excellence in pesticide formulations. The name spells quality and trust all across the nation. The company is committed to provide the best products at the most competitive prices to the farmers.

4 M/s. Insecticides (India) limited have a product range of about 110 products. IIL took over the famous brands like Lethal, Milchlor, and Lethal Super to take them to soaring heights by widely making them available across the country. IIL entered into technical collaboration for manufacturing and marketing of Thimet in India and Nepal in the year 2006, which has poised a solid confidence on our overseas collaborators American Vanguard Corporation, USA by selling the record quantities in India. The wide acceptability of the company's Tractor brand product signifies IIL'S deep connection with the farming community.

5 To augment the manufacturing with constant innovation, IIL has established a dedicated R & D Center, which is recognized by Department of Scientific & Industrial research, Ministry

of Science & Technology. It focuses on developing high value added, complex new molecules for introduction in the market.

6 Ultra-modern automated manufacturing facility is backed by processes that are empowered by technology. This helps us to manufacture products with consistent quality with customer support.

7 This Manufacturing facility will be a non-polluting unit on the lines similar with the Company's existing Units.

8 The manufacturing facility is having ISO 9001, 14001 and 45001 for its commitment towards quality, environment, occupational health and safety ultimately leading to customer satisfaction.

9 The quality control laboratories are NABL accredited and having all the modern testing facilities and qualified chemists.

8.2 ENVIRONMENT

Their respect for the environment is reflected in their commitment & common objectives for continuous efforts by ensuring environmentally sound practices followed at all levels. They not only adhere to the statutory norms but have a holistic approach towards environmental protection. The major environmental issues addressed are:

- Proposed manufacturing processes are studied in detail with a view to minimize generation of liquid/gaseous waste streams as a part of continuous improvement.
- Company will be not just be aimed at pollution minimization but also to conserve energy, improve process yields and product quality.
- Company will use Briquettes or Wood as fuel in Boiler and will provide Adequate Stack Height and Multi-Cyclone Separator with bag filter & scrubber & adequate scrubbers for Process Vent as APCM.
- The effluent will be treated in ETP consisting of primary, secondary & tertiary treatment facilities followed by MEE and MEE Condensate after treatment in ETP will be re-used in plant premises thus the unit shall maintain ZLD.

8.3 EXPORTS

- Country will gain forex through exporting products, an export oriented unit.
- Country will save valuable foreign exchange as import of these products will be reduced by corresponding amount.

8.4 EMPLOYMENT GENERATION

As project will have considerable employment & trade opportunities with the commencement of the production activities. This will increase the employment opportunity. Secondary jobs will also bind to be generated to provide daily needs and services to the work force. This will also temporarily increase the demand for essential daily utilities in the local market. The manpower requirement for the proposed project will generate permanent and secondary jobs for the operation and maintenance of plant. Employment would be as per prevailing norms of state government for skilled and trained people for the proposed project. The company has sufficient skilled manpower for the existing project and our technical, administration and other staff are sufficient to take care of the proposed plant. M/s. Insecticide India Limited has given direct employment to approx. 125 Nos. of people based on qualification and requirement and after proposed expansion additional approx. 35 Nos. of people shall be employed. In addition to direct employment, indirect employment shall generate additional employment to some extent for the local population.

8.5 SOCIO-ECONOMIC DEVELOPMENTAL ACTIVITIES

Company will contribute 2% of project cost for Corporate Environmental Responsibility activities for 2 year. This fund will be administered by a local area development committee in accordance with the orders of the appropriate Government. This fund will be used for the creation of infrastructure and overall economic development of the project area. Other such activities as stated as below:

1) Integrated Agricultural Growth Project – For improvement and use of the modern techniques and thereby would certainly contribute to prosperity in the agriculture sector

and reduce the rural poverty by programs like Farmers Training, Nursery Growing Trainings, Modern agriculture equipment distribution programs etc.

2) Income Generation Program

1) Establishment of Self help groups
2) Rural Entrepreneurship Development Program
3) Vocational Training
4) Business process outsourcing

3) Health, Education & Infrastructure

1) General Health Camps
2) Innovative Teaching Methods
3) Adult Education
4) Sanitation
5) Infrastructure Development Projects

4) FUND FOR CSR ACTIVITIES

Area	2018	2019	2020	2021	2022	Total
Education Support - Study material distribution to poor students in schools - Support to Sports activities - Support to Library infrastructure / computer education	1,00,000	76,000	1,00,000	--	1,00,000	**3,76,000**
Health, Hygienic & Environment - Green Belt development factory surrounding area - Providing basic infrastructure for Drinking Water, sanitation in neighbouring schools - Health / Hygienic awareness programs/workshop in nearby schools	1,00,000	1,08,000	1,44,000	1,44,000	1,44,000	**6,40,000**

Socio-Economic - Water harvesting through Dam construction under Mukhaymantri Jan Sambal yojana, Tijara,	6,50,000	--	--	--	--	**6,50,000**
Year-wise Total	**8,50,000**	**1,84,000**	**2,44,000**	**1,44,000**	**2,44,000**	**16,66,000**

Company will contribute 2 % of the proposed project cost for socio economic development activities for 2 year.

Additional CER Activities	**Fund (Rs.)**
2019-2021	
Project Green School-clean toilet campaign in nearby schools	8,50,000
Providing fans, tube lights & minor civil work in primary school & repair work Rajkiya Sr. Sec. School, Jodiyamev, Tijara	8,30,000
Medical Camp & distribution of medicine free of cost at Bhoodli, Bandapur, Chopanki, and Karenda Village	7,20,000
Water Purifier System in Village Chopanki (RO), Village Bhoodli	9,50,000
TOTAL	**33,50,000/-**

8.6 Conclusion

It can be concluded that the proposed project is beneficial in the interest of common man, the society, the state and as the country as a whole. The benefits can be summarized as below:

- The proposed expansion project will provide quality product at lower cost to the users.
- Numbers of local trained persons are likely to get jobs.
- To generate local employment.
- Country will save valuable foreign exchange as import of these products will be reduced by corresponding amount.
- These products also have export potential. Hence, possibility of earning foreign exchange.
- There should be positive impact on the socio-economic condition of the area in terms of direct and indirect employment due to the proposed project.

CHAPTER - 9

ENVIRONMENTAL COST BENEFIT ANALYSIS

9.1 ENVIRONMENTAL COST BENEFIT ANALYSIS

Environment

Their respect for the environment is reflected in their commitment & common objectives for continuous efforts by ensuring environmentally sound practices followed at all levels. They not only adhere to the statutory norms but have a holistic approach towards environmental protection. The major environmental issues addressed are:

- Proposed manufacturing processes are studied in detail with a view to minimize generation of liquid/gaseous waste streams as a part of continuous improvement.
- Company will not only aim at just pollution minimization but also to conserve energy, improve process yields and product quality.
- Company will use Briquettes or Wood as fuel in Boiler and will provide Adequate Stack Height and Multi-Cyclone Separator with bag filter & scrubber & adequate scrubbers for Process Vent as APCM.
- The effluent will be treated in ETP consisting of primary, secondary & tertiary treatment facilities followed by MEE and MEE Condensate after treatment in ETP will be re-used in plant premises thus the unit shall maintain ZLD.

TABLE -9.1 BUDGETS FOR ENVIRONMENTAL PROTECTION MEASURES

Components	**Existing Capital Cost (Rs.)**	**Additonal Capital Cost (Rs.)**
ETP	1.00 Crore	0.00 Crore
MEE	0.00 Crore	1.00 Crore
APCM	1.80 Crore	0.20 Crore
Incinerator	2.5937 Crore	--
Audit, Monitoring, Documentation, ETP strengthening	1.40 Crore	0.20 Crore
Misc.	1.10 Crore	0.14 Crore
Total	**7.8937 Crores**	**1.54 Crores**

CHAPTER - 10

ENVIRONMENTAL MANAGEMENT PLAN

10.1 BACKGROUND

The industry shall adopt a comprehensive Environmental Management Plan (EMP) which covers several environmental protection measures, not only for abatement of environmental pollution resulting from the project, but also for the improvement in the ambient environment. The various components of the EMP are outlined in subsequent sections. An EMP is a site-specific plan developed to ensure that all necessary measures are identified and implemented in order to protect the environment and comply with environmental legislation.

10.2 OBJECTIVES OF ENVIRONMENTAL MANAGEMENT PLAN

The Environment Management area handled by a Qualified Manager with adequate training and experience in operation of ETP and management of other pollution control measures. He will be assisted by a Qualified Executive and one operator (in each shift) to run ETP and other pollution control system. All the necessary controls w.r.t. management of Liquid/ Hazardous/ Gaseous pollutants will be exercised. For all liquid effluents, full fledged effluent treatment plant consisting of primary treatment will be installed to ensure adequate treatment.

Process stacks will be equipped at safe height with scrubbers where required to ensure emissions within prescribed limits. DG sets will be provided with acoustic enclosure and stack.

To handle hazardous waste as per Hazardous & Other Wastes (Management and Transboundary Movement) Rules, 2016 of Environment Protection Act, 1986. Hazardous waste will be disposed off at the secured land fill facility available in the nearby vicinity.

- Fixed gas detection system will be installed in the workplace area.
- Work place monitoring will be carried out regularly through continuous monitoring systems and periodic checking.
- Ambient air quality will be monitored regularly.
- Good green belt will be maintained inside and outside the premises by planting trees, developing lawns.

- To work in R&D for continuous improvement in process to reduce Pollution Load & moving towards adopting cleaner production technology.

10.3 ENVIRONMENTAL MANAGEMENT CELL

Apart from having an environmental management plan, it is also necessary to have a permanent organizational set up charged with the task of ensuring effective implementation. In this effect, M/s. Insecticides India Limited has assigned responsibilities to officers from various disciplines to co-ordinate the activities concerned with management and implementation of environment control measures.

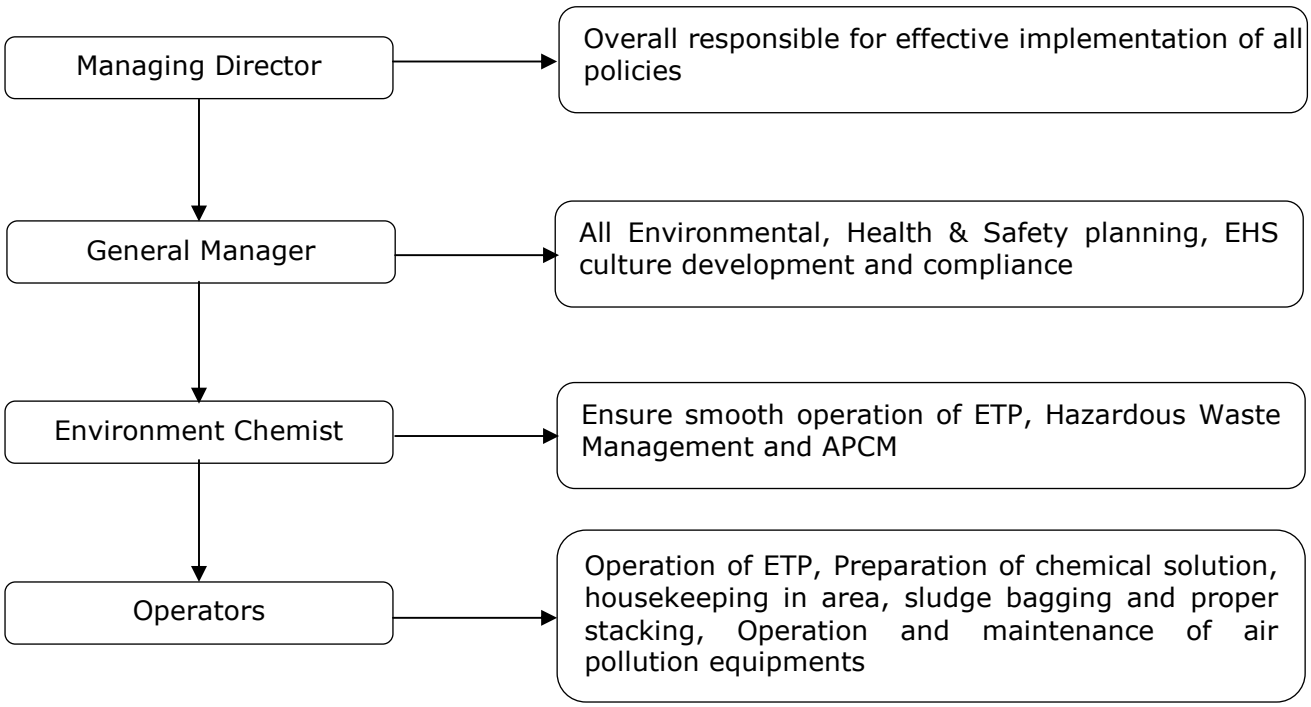
An organogram of Environment management cell is shown in Figure 10.1. This department shall undertake the monitoring of environment pollution level by measuring stack emissions, Ambient air quality, water and effluent quality, Noise level, etc. either departmentally or by appointing external agency whenever necessary.

M/s. Insecticides India Limited carries out the regular monitoring and in future as well to ensure that pollution is limited below prescribed limits and will take corrective action by providing new pollution control equipment if required. In case the monitored results of environment pollution are found to exceed the prescribed limits, remedial actions are taken through the concerned plant authorities. The actual operation and maintenance of pollution control equipment of each department is under respective department heads.

The environmental department will also look after preparation and submission of Water Cess Return, Environmental statement and Consolidated Consent & Authorization application/ renewal under water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act, 1981, Ambient Air Quality as per NAAQS Standards, 2009 and Hazardous & Other Wastes (Management and Transboundary Movement) Rules, 2016 under Environment Protection Act, 1986.

FIGURE - 10.1

ORGANOGRAM OF ENVIRONMENT MANAGEMENT CELL



10.4 ENVIRONMENT MANAGEMENT PLAN

The Environment Management plan is meant for mitigation/ management of the adverse impacts and the strengthening positive impacts during proposed project. Environment Management Plan is tabulated in Table:-10.1

TABLE - 10.1

ENVIRONMENT MANAGEMENT PLAN

ENVIRONMENTAL COMPONENTS	POTENTIAL IMPACTS	SOURCES OF IMPACT	MITIGATIVE MEASURE	REMARKS
Water Quality	Deterioration of water quality	Construction activity & abstraction of water for construction requirement and sanitation in housing for workers. Discharge of process effluents, sewage and utility wastewater.	Proper management of surface water runoff shall be made. Effluent treatment plant (ETP) consists of Primary, Secondary, Tertiary Treatment and MEE. Treated effluent from MEE will be treated in ETP & re-used in plant premises for industrial operations.	Treated Effluent will be re-used in plant premises. Minor adverse impact
Air Quality	Emission from flue gas & process vent	Fugitive emissions	Control equipment for fugitive emissions Adequate Stack Height Adequate APCM like – Multi cyclone Separator with Bag Filter & Scrubber & Scrubbers.	No remarkable increase in GLCs. NAAQ Standards are met Minor adverse impacts on ambient air quality
Hazardous Waste	Hazardous Waste generate from process, ETP, RM and Products storage yard, Machineries and Utilities, etc.	Project activities	• ETP Sludge, Incineration Ash & MEE salt will be Collected, Stored, Transported and Disposal at nearest TSDF site (M/s. UCCI). • Used Oil will be	Minor adverse impacts on soil quality

			Collected, Stored and Transported & Sent to registered recycler / Reused for Machine Lubrication. • Discarded barrels/ containers/ liners will be Collected, Stored, Decontaminated & reuse or Sell to Registered recycler. • Process Residue, Stripper Sludge will be Collected, Stored, Transported and Disposal at CHWIF (M/s. UCCI) or incinerated within premises.	
Socio-Economic	Overall growth & development of area, increased employment, improvement in infrastructure and growth of downstream industries	Project activities	General area planning in advance by RIICO and classified as notified industrial area by RIICO	Beneficial change
Terrestrial Ecology	Minor loss of habitat-flora & fauna, loss of agricultural land	Project activities	Green belt, Proper management of solid waste.	No impact
Noise	Increased noise level	Project operation	Oiling and lubrication, Earplugs and Earmuffs will be provided Maximum possible area will be covered as greenbelt and other forms of greenery.	Marginal impact
Infrastructure & Services	Improved communication, transport, housing, educational &	Project	Development has been gradual	Beneficial impact

	medical facilities			
Environmental Hazards	Risk to environment & neighboring population	Handling and storage of chemicals & fuels	On site & off site Disaster management plan & Safe practices.	Insignificant adverse impact

10.4.1 WATER ENVIRONMENT

Water requirement will meet through the RIICO Water Supply. However, record of water consumption for different usages should be maintained.

Construction Phase

The drinking water and sanitation facilities at the project site are available to the construction work force. This is necessary to reduce pollution of any receiving water body and also to prevent hazards due to water borne vectors. These facilities would preferably be connected to a septic tank and shall be maintained properly to have least environmental impact.

Operation Phase

- Total raw water requirement will be is 188.0 KL/day which will be met through RIICO water supply and recycling. Total waste water generation will be 136 KL/Day (Industrial: 129 KL/Day + Domestic: 7 KL/Day). Out of 136 KL/Day, wastewater from processes, scrubber and lab (49 KL/Day) will be sent to Stripper and 47.75 KL/Day to MEE and MEE condensate (40 KLD) will be sent to ETP for further treatment. Total effluent (127 KL/Day) from septic tank, utilities, washing and MEE Condensate will be sent to ETP and 126 KL/Day final treated effluent will be recycled for industrial operations. Domestic wastewater (7 KL/Day) will be sent to septic tank and then mixed with industrial effluent in ETP for further treatment.
- Proper housekeeping should be adopted to prevent spillages and contaminated surface runoff going to storm water drains.
- The following measures would be taken to minimize the water usage in the operational phase:
  - ✓ Endeavor to reduce the actual process water consumption by way of improvement in operation of processing units.

- ✓ Water saving by shower head flow controls, spray taps and faucet aerators and photo-sensitive taps.
- ✓ Exploring other options of reusing the treated effluent besides fire water make up or for horticulture development.

10.4.1.1 PLANS FOR MANAGEMENT, COLLECTION AND DISPOSAL OF WASTE STREAMS TO BE GENERATED FROM SPILLAGE, LEAKAGES, VESSEL WASHING, USED CONTAINER WASHING ETC. MEASURES PROPOSED FOR PREVENTING EFFLUENT DISCHARGE DURING UNFORESEEN CIRCUMSTANCES.

1. Proper housekeeping will be adopted to prevent spillages and contaminated surface runoff going to storm water drains.
2. Contamination will be minimized due to the spillage, leakage, vessel & drum washing. Washing water will be collected through appropriate channels and taken to ETP for treatment. To avoid leaching entire washing area will be paved.
3. Company should make continuous efforts in waste minimization.
4. For the equipments and pipelines, leakage detection and repair will be scheduled to minimize pollution.
5. Second wash of plant / equipment will be re-used as first wash in the same equipment / reactor to reduce fresh water consumption.
6. Adequate spares for effluent collection and disposal system will be maintained.

10.4.1.2 Rain Water Harvesting

Rain water harvesting is not possible in pesticide industries. Company has made the storm water drainage to collect rain water and also made guard pond for rain water then company shall check the pH and COD value of rain water. If result of rain water will find within norms, then company will utilize the rain water in plant premise otherwise it will be sent to ETP for further treatment.

10.4.2 AIR ENVIRONMENT

Construction Phase (Non point sources emissions)

- Generation of suspended particulate matter is a common phenomenon due to transportation of constructions materials. This would be mitigated by allowing the vehicles entering the premises under cover. Emission of fugitive dust due to movement of heavy vehicles etc. shall be controlled by spraying water in the affected zone. Hosing down the wheels of the vehicles with water and providing washing troughs for them would further mitigate the amount of dust generated. In addition, emission of other pollutants from construction machinery using diesel driven prime movers, will be controlled by proper maintenance.

Operation Phase (Point sources emissions)

In-plant Control Measures: Some of the mitigation measures, which can reduce the impact on air environment, are as follows:

- Ensuring the operations of various process units as per specified operating guidelines/ operating manuals.
- Strict adherence to maintenance schedule including lubrication for various machinery/ equipment.
- Scrubber system will be installed to control process gas emission.
- There are 6 Nos. of flue gas emission of air pollution at M/s. Insecticides India Limited i.e. Stack attached to Boiler (2 Nos.), Incinerator (1 Nos.), and D.G. Set (3 Nos.)
- And 3 Nos. of process gas emissions will be attached to Reaction vessels. Scrubbers will be installed to control process gas emissions.
- Adequate stack height and Multi-cyclone separator with bag filter & Scrubber for better dispersion of pollutants.
- Moreover, regular monitoring of stacks shall be carried out to check the emissions. Record should be maintained for changing of scrubbing media on printed logbook. In case emissions exceed, the corrective measures should immediately be taken and records of the same should be maintained.

- Regular ambient air quality monitoring and stack monitoring shall be carried out within premises and should also be carried out in the nearby area for PM_{10}, $PM_{2.5}$, SO_2, NO_x, & VOCs.
- A greenbelt around the factory will be developed for reducing the air pollution and attenuation of noise.
- Adoption of good house-keeping.

GASEOUS CONTROL SYSTEM:

1. Proper selection of material of construction of scrubbing system to eliminate any leakages during the operation, graphite at most of the places for getting optimum results will be provided.
2. Continuous monitoring of resulting concentrations as well as pH control during the scrubbing of gases like HCl, HBr, & SO_2.
3. All the reactors involved in scrubbing operations will be provided with mechanical seal which eliminates the possibility of any leakages.
4. All the heat exchangers used for this operation will be provided with primary as well as secondary systems with the provision of cooling water as well as Chilled / Brine circulation.
5. All the pumps used for scrubbing systems will be provided with mechanical seal which eliminates the possibilities of any leakages and thus reduces the waste generation.

DUST SUPPRESSION SYSTEM

Water sprinklers are provided at the unloading areas of the raw materials for dust suppression. Dust suppression systems with water sprinklers are provided and same practice will be continued in the present proposal.

10.4.2.1 INFORMATION FOR CONTROL OF FUGITIVE EMISSIONS

1. Airborne dust at all transfers operations/ points will be controlled either by spraying water or providing enclosures.
2. Adequate ventilation will be provided.

3. Regular maintenance of valves, pumps, flanges, joints and other equipment will be done to prevent leakages and thus minimizing the fugitive emissions.
4. Entire process will be carried out in the closed reactors with proper maintenance of pressure and temperature.
5. Periodic monitoring of work area will be carried out to check the fugitive emission.
6. Stand by pumps will be provided on all scrubbers. Besides, scrubbers will be equipped with on-line pH meter with hooter system for better operational control.
7. Close feeding system will be provided for centrifuges. Centrifuge and filtrate tank vents will be connected to vent chillers.
8. Minimum number of flanges, joints and valves in pipelines.
9. Regular inspection of floating roof seals and proper preventive maintenance of roofs and seals for tanks.
10. Fugitive emission over reactors, formulation areas, centrifuges, chemical loading and transfer area will be collected through hoods and ducts by induced draft and controlled by scrubber/ dust collector.
11. Dedicated scrubber will be provided are used for fugitive emissions to control.
12. For dust emissions bag filter will be provided.
13. Enclosures to chemical storage area, collection of emission from loading of raw materials in particular solvents through hoods and ducts by induced draft, and control by scrubber / dust collector to be ensured.

10.4.2.2 Odor Control Measures

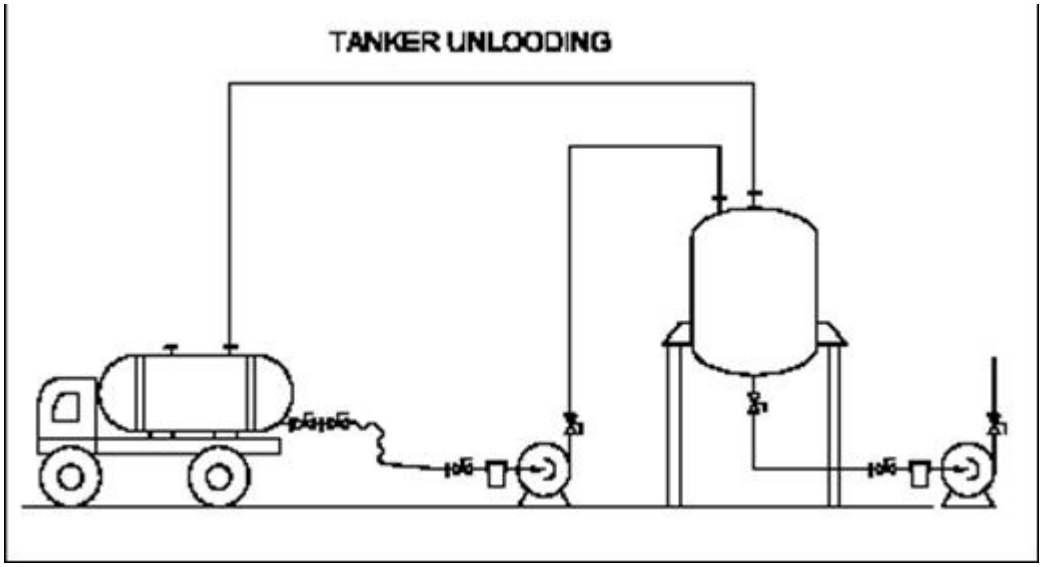
The chemicals used or manufactured related to the proposed expansion project do not release any disagreeable odor. However if any spillage or leakage of such chemicals are taken place then following material handling procedures will be followed to reduce the Odour and release of chemical vapors in atmosphere.

Procedure for unloading chemicals from tankers

When a liquid is transferred from one container to another the air from the receiving container is displaced to atmosphere and the air from atmosphere is sucked into the container from which the material is transferred.

The air released from receiving container is contaminated with vapors of the liquid being transferred. To avoid this release of vapors into atmosphere, the contaminated air from receiving tank is let into the tanker from where the material is transferred with help of a designated pipe line called as pressure equalization line or vent equalization line.

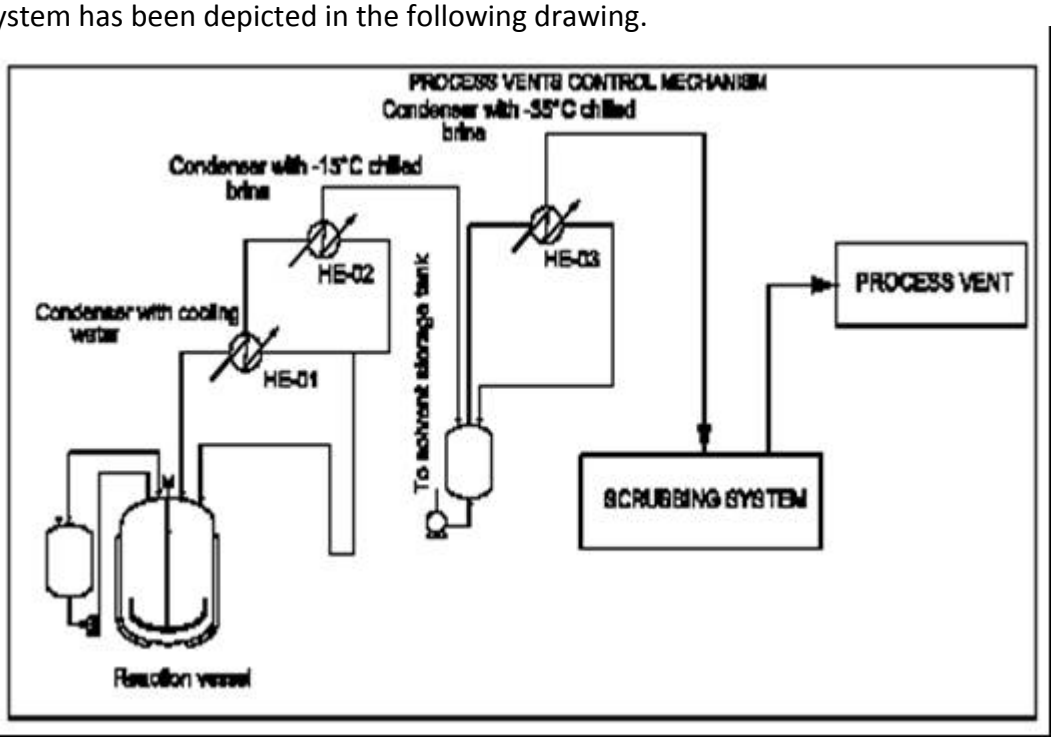
The system has been depicted in the following drawing.



Procedure for transferring chemicals from one tank to another tank or reactor.

The same technique of pressure equalization is used for transfer of liquid from one tank to another tank or reactor to reduce the release of vapors to atmosphere.

The system has been depicted in the following drawing.



Spill control measures

The accidental spill of chemicals is handled in a systematic manner to reduce the odor.

1. The area where the chemical spillage can take place is covered with appropriate adsorbent material like soda ash, saw dust or even an earth using all necessary Personal Protective equipment (PPE).
2. Contaminated area is then cleaned with soap and water and the water used is transferred to ETP.
3. Masking agents (e.g. PIION, ECOPEARL) spray is then used to reduce the impact of lingering odors.

Odor can be defined as the "perception of smell" or scientific terms as "a sensation resulting from the reception of stimulus by the olfactory sensory system". Whether pleasant or unpleasant, odors are induced by inhaling air-borne volatile organics or inorganic. An odor is the most complex of all the air pollution problems.

Unlike conventional air pollutants, odor has distinctly different characteristics, which, to an extent, can be comparable with noise pollution. Similar to noise, nuisance is the primary effect of odor on people. Some of such characteristics are:

Substance of similar or dissimilar chemical constitution may have similar odors. Nature and strength of odor may change on dilution.

- Weak odors are not perceived in presence of strong odors.
- Odors of same strength blend to produce a combination in, which one or both may be unrecognizable.
- Constant intensity of odors causes an individual to quickly loose awareness of the sensation and only noticed when it varies in intensity.
- Fatigue for one odor may not affect the perception of dissimilar odors but will interfere with the perception of similar odors.
- An unfamiliar odor is more likely to cause complaint than a familiar one.
- Two or more odorous substances may cancel the smell of each other.
- Odors travel downwind.
- Person can smell a distance.
- Many animals have keener sense of olfaction than man.

10.4.3 NOISE ENVIRONMENT

The sound pressure level generated by a noise source decreases with increasing distance from the source due to wave divergence. The propagation and attenuation of noise pressure wave is dependent on many parameters amongst which, the medium of travel and the ambient conditions are the most significant parameters. In order to minimize adverse impact on the noise environment, due attention shall be given for implementing noise control measures. Comprehensive measures shall be taken at design stage for noise from proposed expansion unit. The measures are as under:

- The noise level at the plant boundary shall be restricted to 75 dB (A) during day time and 70 dB (A) during night time.
- Noise level shall be specified for various rotating equipment as per Occupational Safety and Health Association (OSHA) standards.
- Equipment lay-out shall be done considering segregation of high noise generating sources.
- Erection of suitable enclosure, if required, to minimize the impact of high noise generating sources.
- There may be small addition to the ambient noise level, due to the increased transportation activities. This creates a slight adverse impact on the sound environment.
- Regular oiling, lubrication and maintenance of the equipment shall be carried out to minimize noise generation.

During Operation Phase

Following measures shall be adopted for abatement of noise during operation phase:

- Acoustic laggings, enclosures and silencers shall be provided wherever necessary for high noise generating equipment.
- Sound proof glass paneling shall be provided for all operating stations / control rooms as well as for shift rooms at critical places.
- Strict implementation/ compliance of all statutory norms w.r.t. noise generation, occupational exposure shall be done.
- Use of personal protective devices such as ear-muffs and ear-plugs shall be strictly enforced.

- Acoustic barriers / shelter shall be developed in noisy workplaces.
- Noise generating sources in the plant areas shall be monitored regularly. Monitoring of ambient noise levels should also be carried out regularly both inside the premises as well as outside the greenbelt.

However, due to the attenuation of noise level within the factory and due to the fact that the project site is situated in a well developed industrial estate and not in the immediate vicinity of human settlement, significant impact is not expected in the nearest present human settlement. The volume of transport vehicles to be handled is very low. The company shall develop a green belt around the periphery of the premises, which shall act as a barrier to the propagation of noise from the factory premises. This shall further reduce the noise levels appreciably.

- It is recommended to measure and maintain records of noise level at various places within and outside factory premises.
- Manufacturers/ suppliers of major noise generating equipment/ machines like compressors, turbines, generators should be asked to take required measures for minimizing the noise levels generated by machines by using noise absorbing material for various enclosures or using appropriate design/ technology for fabricating/ assembling the machines.
- Audiometric tests shall be conducted periodically for the employees working close to the high noise sources.
- High noise generating machines and processes required for proposed project will be enclosed and insulated.
- Insulation of ventilation pipes and use of dampers will be made at all possible places.
- Implementation of management control on site for limiting transportation timing by adopting mechanical and technological ideas.
- Preventive maintenance schedule will be followed for all instruments and machineries to maintain good working condition.

- Enclosures and barriers will be provided to pumps and machineries producing high noise levels, required for proposed project.
- Workers exposed to high noise generating operations will be provided with suitable ear protection devices.

10.4.4 LAND ENVIRONMENT

10.4.4.1 HAZARDOUS WASTE MANAGEMENT

7 Categories of Hazardous/Solid Wastes shall be generated from this Unit.

- ETP Sludge, Incineration Ash & MEE Salt will be Collected, Stored, Transported and Disposal at nearest TSDF site (M/s. UCCI, Udaipur).
- Used Lubricating Oil will be Collected, Stored and Transported & Sent to authorized recycler / Reused for Machine Lubrication.
- Discarded drums/ bags & liners will be Collected, Stored, Decontaminated & reuse or Sell to Approved Vendors.
- Process Residue & Stripper Sludge will be Collected, Stored, Transported and Sent for incineration within premises or common incineration facility of M/s UCCI, Udaipur.

Storage of Hazardous Waste:

- Hazardous waste shall not be stored for a period more than 90 days. And shall maintain records and make them available for inspection.
- Store at a designated Onsite-secured area with impervious floor that affords protection from sun & rain fall, spreading of leachate, mixing of wastes etc.

Transportation of Hazardous Waste:

- Properly packed & labeled waste transport through dedicated vehicle to a captive facility/ authorized TSDF facility.

10.4.4.2 METHODOLOGY OF DE-CONTAMINATION AND DISPOSAL OF DISCARDED CONTAINERS AND ITS RECORD KEEPING

Decontamination & Disposal of Discarded Containers: The proper disposal of empty chemical containers is more important for hazardous chemicals as it can contain residual amounts of chemicals. There can be no more than 1 inch of material left in the container not more than 3% by weight of the containers capacity. In an effort to ensure that this residue is handled properly and to be able to recycle or properly dispose of these containers, the following procedure is to be followed. The below guidelines are useful for non hazardous chemicals also.

Rinse Procedure: An empty chemical container that contains hazardous chemicals (liquid or solid), must be rinsed 3 times with water (or appropriate rinsing agent) before being discarded. The first rinse should be collected as chemical waste, it can be put into any waste container of compatible chemicals, the second & third rinses can then go down to drain. If the chemical is on the list of acutely hazardous waste, then all three rinses must be collected. After the containers are rinsed, they can be discarded appropriately as described below. All caps should be let off of the discarded containers. Containers should be labeled with "Empty" labels and the chemical name should be crossed or blacked out prior to being discarded. Caps may be discarded to regular trash. Finally, it is disposed off by sell it to authorized decontamination facility / recycler or reuse.

Reuse /Recycle/ Disposal of cleaned containers:

- All chemicals must follow the above rinse except the volatile Solvents & before being discarded in any form.
- Metal containers or any plastic containers, plastic tubing or plastic beakers that do not meet the recycling criteria can be discarded into regular trash.
- Glass containers, glass tubing that do not meet the recycling criteria should be placed into trash can for disposal.
- Plastic & glass containers that meet the recycling criteria must be placed in appropriate recycling containers.
- Empty compressed gas cylinders should be returned to vendor.

10.4.4.3 MAINTENANCE OF VEHICLES

One should be very careful in selecting the site for vehicle maintenance, so as to prevent the ground water contamination due to the spillage of oil. Both diesel and petrol engine vehicles shall be maintained properly. Unauthorized dumping of waste oil should be prohibited. Wastes should be disposed off to the CPCB approved vendors.

10.5 MEASURES FOR IMPROVEMENT OF ECOLOGY

There are no Wild life sanctuaries, Bird sanctuaries, National Parks within 10 Km radius of the plant. No significant vegetation occurs in and around the project site. No significant fauna exists in the area. Hence there will not be any adverse impact on flora & fauna due to the proposed expansion project.

10.6 IDENTIFICATION OF RECYCLE/REUSE, CLEANER PRODUCTION AND CO-PROCESSING OPTION OF HAZARDOUS WASTE

- It is recommended to analyze each hazardous waste periodically and maintain records.
- Check the calorific value of the ETP Sludge and process waste and then explore possibilities of Co-Processing in Cement Industry as Primary fuel. Waste materials used for co-processing are referred to as alternative fuels and raw materials (AFR).
    1. Reduce water consumption by proper housekeeping, utilizing low-flow, drip or micro-spray irrigation systems and technologies that reduce water loss.
    2. Repairing leaks to pipes, glands, seals and gaskets can significantly reduce energy costs.
    3. Second wash of plant/ equipment will be re-used as first wash in the same equipment/ reactor to reduce fresh water consumption.

10.7 GREEN BELT DEVELOPMENT

Tree plantation is known for improving the aesthetic and climatological environment of an area and properly designed green belt can help in ameliorating air pollution to a very significant degree. It should be borne in mind that the green belt will be most effective as a sink for particulate matter and gaseous emissions from ground level sources, such as, fugitive emissions. Effectiveness of green belt for the elevated sources is rather limited but its action

as a green lung greatly helps in improving the air quality of the area. However, considerable scope exists for strengthening the existing green belt and developing the same in future.

BREAK UP OF DIFFERENT LAND USE OF FACTORY

Total 11,958.0 sq. meter land area is available at site; out of this area about 4784 sq. meter (40 %) area is covered as greenbelt and other forms of greenery.

Existing Green belt area: 4000 m^2

Additional Green belt area: 784 m^2

Good greenery shall be maintained in and around the site by planting various types of tress and maintaining lawns. A green belt shall be developed within the site boundary and across the premises inside roads. Trees like Neem, Gulmohar, Champa, Pipal, Babool, Canopus, Ghaneri, Jangli badam, Shahtut, Asopalav etc. shall be planted in and around the site.

Plantation Details

Actual Status of Plantation/Green Belt

Trees species to be planted at plant are in line with trees species recommended in CPCB's guidelines for developing Greenbelts. For plantation at the plant in future, it is suggested that these guidelines should also be followed for selecting pollutants tolerant and absorbent species.

(a.) Species of tree planted

Green Belt	**Avenue Trees**	**Shrubs**	
		Above 3m height	**Below 3m height**
Jamun	Alstonia	Bamboo	Pentas var.
Gulmohar	Pinkcaassia	Bahunia	Galphemia
Peltophorum	Spethodia	Large stomia	Miniature bamboo
Kasid	Paras, papal	Cordia	Jestropha
Gultora	Pendula	Karen	Hibiscus var.
Sisoo	Gulmohar	Gulltora	Braya
Kapop	Jackranda	Tecoma var.	Palmbago capensis
Neem	Bignonia	Tagari	Acalypha var.
Arjun	Largestomia		Russolia
	Cadamba		Duranta var.
			Cassia biflora
			Ixora var.
			Cana

(b.) Co-relation of Trees with pollution control

Trees	**Air pollution**		**Dust**	**Noise**	**Salt**
Trees	Jackranda	Karen	Pendula	Neem	Neem
	Pangara	Pendulla	Bahunia	Peltophorum	Gulmohar
	Babool	Neem	Paras pipal	Jamun	
	Cadamba	Bogunvelia	Cassia fistula	Pendula	
	Vinca	Croton			
	Tecoma var.	Spethodia			
	Alstonia	Gulmohar			
Places:	Green-Belt	Plant Area	Plant Area	Plant Area And green belt	Plant Area

YEAR	**NO. OF TREES**	**COST INCURED**
2005-2019	210	Rs. 6,30,000/-

FIVE YEAR GREEN BELT DEVELOPMENT PLAN

YEAR	**NO. OF TREES**	**COST TO BE INCURED**
2020-2021	100	Rs. 1,00,000/-
2021-2022	100	Rs. 1,00,000/-
2022-2023	100	Rs. 1,00,000/-
2023-2024	100	Rs. 1,00,000/-
2024-2025	100	Rs. 1,00,000/-
TOTAL	**500**	**Rs. 5,00,000 /-**

Cost of Maintenance of Green Belt: - Rs. 1, 25, 000/- Per Annum

10.8 MEASURES FOR CONSERVATION OF ENERGY

M/s. Insecticides India Limited shall adopt various measures for energy conservation:

- Energy efficient machineries will be used during operation phase.
- Installation of economizer & high efficiency burner on steam boilers.
- Company shall try to utilize renewable sources of energy for conservation of non-renewable sources of energy.
- Enough care will be taken to prevent/minimize energy losses at each stage.
- Energy audit will be used as a tool for monitoring purpose.
- External lights will be controlled through timers for auto on/off function based on timings.
- The cable size will be selected so as to minimize the power losses.
- The power factor improvement capacitors will be provided individually for AC loads.
- Using water cooled chillers, variable frequency drives for secondary pumps and public area and building management system for HVAC equipments with non-CFC and non-HCFC based refrigerants.
- Use of VFDs for various utilities in variable load application to optimize pump and air handling unit performance, wherever required.
- Automated day light control.
- Efficient lamps and ballasts.
- Automated control for external lighting (Astronomical/Sensor).
- Occupancy Sensors.
- Phase-wise implementation of Advance Process Control (APC) in the process plants.
- Replacement of conventional lighting fixture by more energy efficient fittings.
- Installation of improved insulation over the High Pressure (HP) steam line to reduce the heat loss.
- Use of FRP blade on Cooling Tower.

Company shall explore possibility of use of solar energy for various infrastructure operations. Also use of Energy Efficient Lighting, Transformers, HVAC system, Use of Energy Efficient Motors, electrical appliances to minimize the energy consumption in addition to Process Planning.

10.9 SKILLED AND TRAINED MANPOWER

Employment would be as per prevailing norms of state government for skilled and trained people for the proposed project. M/s. Insecticide India Limited has given direct employment to approx. 125 Nos. of people based on qualification and requirement and after proposed expansion additional approx. 35 Nos. of people shall be employed. In addition to direct employment, indirect employment shall generate additional employment to some extent for the local population.

10.10 CAPITAL COST FOR ENVIRONMENTAL MANGEMENT

Total capital investment for the project is Rs. 45.6708 Crores. Capital cost of air & water pollution control system and environmental monitoring equipments will be Rs. 9.4337 Crores. Recurring cost of air & water pollution control system and environmental monitoring equipments will be Rs. 6 Crores per annum.

10.11 ACTION PLAN FOR TRANSPORTATION OF RAW MATERIALS AND PRODUCTS

1. Every material (FG and or Raw material) container should be with TREM CARD, Material Safety Data Sheet.
2. Container should be marked with Emergency Information Panel (includes Correct Technical Name, Class Label, UN NO, HAZCHEM, Emergency Dial, Specialist advice etc).
3. Container or Tank should be thoroughly hydraulically tested and test certificate should be available with driver.
4. Only trained driver having valid driving license are allowed to carry out transportation of material.
5. Driver should be allowed with attendant to enter inside or going outside from the company.
6. Driver and attendant well trained on Driving rules, Chemical Properties, Emergency Preparedness (Communication, Leakage spillage handling, Use of PPE, First-aid, Fire fighting measures, Toxic release measures).
7. Container should be certified for road worthiness, PUC certificate.

8. Vehicle should be equipped with fire fighting equipment, first aid box, Toolbox, Antidotes, PPEs and Emergency Exit.
9. Conditions of Valves and fittings should be checked at security gate and proper corrective action will be taken in case of any abnormality.

Transportation of all the raw material and products shall primarily by road only. The raw material and products shall be received delivered in Tanks, MS/HDPE/FIBRE drums, Carboys and cylinders as well as through tankers & containers and stores at ambient temperature. All the storage tanks of hazardous flammable substance will be located within premises in separate storage area i.e. solvent farm area at ambient temperature. Solvents shall be stored in cool and dry place with all precautionary process instrumentation and safety appliance.

Large area shall be covered by well-designed warehouse, which is containing store office, raw material store, finished product stores etc. In case of any abnormality reported to site regarding road accident, our emergency response team will reach at the site and take proper corrective action and information of such incident will be provided to local police station and other government authority as per situation.

CHAPTER - 11

EXECUTIVE SUMMARY & CONLCUSION

11.1 INTRODUCTION

1. M/s Insecticides (India) Limited, a limited company is a leading Indian Brand company, holding a strong foothold in the India Agrochemical market, setting benchmarks in the manufacturing and marketing of pesticides and agrochemicals. With a strong countrywide network, commitment to growth and a mission to make the choicest of brands available to farmers at the most competitive prices, IIL is all set to touch the Rs. 1500 crore turnover mark by the year 2020. IIL's brands occupy leadership positions (No. 1 and 2) in almost all categories in pesticides and agrochemicals.
2. The company was incorporated in the year 1996. It was initially established as a private limited and subsequently converted into a limited company on 02.11.2001 to pursue the main objectives of pesticides and agrochemicals.
3. IIL stands for excellence in pesticide formulations. The name spells quality and trust all across the nation. The company is committed to provide the best products at the most competitive prices to the farmers.
4. M/s. Insecticides (India) limited have a product range of about 110 products. IIL took over the famous brands like Lethal, Milchlor, and Lethal Super to take them to soaring heights by widely making them available across the country. IIL entered into technical collaboration for manufacturing and marketing of Thimet in India and Nepal in the year 2006, which has poised a solid confidence on our overseas collaborators American Vanguard Corporation, USA by selling the record quantities in India. The wide acceptability of the company's Tractor brand product signifies IIL'S deep connection with the farming community.
5. To augment the manufacturing with constant innovation, IIL has established a dedicated R & D Center, which is recognized by Department of Scientific & Industrial research, Ministry of Science & Technology. It focuses on developing high value added, complex new molecules for introduction in the market.

6. Keeping in view the present demand and expected increase in demand for these Products in the years to come, the company is planning for Expansion in Production Capacity from 1800 Tonnes Per Annum to 9350 Tonnes Per Annum Pesticides Technical. After merger of technical and formulation plant, the total pesticide formulation capacity will be 20,000 MT/ KL per Annum in existing Insecticide Manufacturing plant at E-442, 443 & 444, RIICO Ind. Area, Chopanki, Tal: Bhiwadi Dist: Alwar (Raj.).
7. Ultra-modern automated manufacturing facility is backed by processes that are empowered by technology. This helps us to manufacture products with consistent quality with customer support.
8. This Manufacturing facility will be a non-polluting unit on the lines similar with the Company's existing Units.
9. The manufacturing facility is having ISO 9001, 14001 and 45001 for its commitment towards quality, environment, occupational health and safety ultimately leading to customer satisfaction.
10. The quality control laboratories are NABL accredited and having all the modern testing facilities and qualified chemists.

11.2 Product and Capacity

List of Products Along With Their Production Capacity

SR. NO.	PRODUCT NAME	CATEGORY AS PER EIA NOTIFICATION	EXISTING	ADDITIONAL	TOTAL	CAS NOS.	LD_{50} (mg/kg)	
			CAPACITY (MT/ ANNUM)				Oral	Dermal
A. PESTICIDE TECHNICAL								
1.	**Phenoxy Herbicides**	5(b)	20	280	300			
	Quizalofop	5(b)				76578-12-6	1670	>5000
	2,4-D Ethyl Ester	5(b)				533-23-3	>2000	>2000
	2,4-D sodium salt	5(b)				2702-72-9;	>2000	>2000
	Clodinafop propargyl	5(b)				114420-56-3	1392	>2000
2.	**Imidazolinone Herbicide**	5(b)	50	0	50			
	Imazethapyr	5(b)				81335-77-5	5000	>2000
3.	**Sulfonyl Urea Herbicides**	5(b)	20	380	400			
	Metsulfuron methyl	5(b)				744223-64-6	>5000	>2000
	Sulfosulfuron	5(b)				141776-32-1	>5000	>5000
	Tribenuron methyl	5(b)				101200-48-0	>5000	>5000
	Flazasulfuron	5(b)				104040-78-0	>5000	>2000
	Iodosulfuron	5(b)				144550-36-7	2678	>2000
	Nicosulfuron	5(b)				111991-09-4	>5000	>2000

	Rimsulfuron	5(b)				122931-48-0	>5000	>2000
4.	**Organochlorine Herbicides**	5(b)	200	0	200			
	Butachlor	5(b)				23184-66-9	2000	>13000
	Pretilachlor	5(b)				51218-49-6	6099	>3100
5.	**Other Herbicides**	5(b)	600	200	800			
	Oxyfluorfen	5(b)				42874-03-3	>5000	>10000
	Paraquate	5(b)				1910-42-5	129	>911
	Diclofop methyl	5(b)				51338-27-3	563-693	>2000
	Diflufenican	5(b)				83164-33-4	>2000	>2000
	Sulcotrione	5(b)				99105-77-8	>5000	>4000
	Benfuresate	5(b)				68505-69-1	3536	>5000
	Glufosinate ammonium	5(b)				77182-82-2	2000	>4000
	Penoxsulam	5(b)				219714-96-2	>5000	>5000
	Pinoxaden	5(b)				243973-20-8	>5000	>5000
	Propanil	5(b)				709-98-8	367	4830
	Tembotrione	5(b)				335104-84-2	>2000	>5000
6.	**Carbamate Insecticide**	5(b)	10	90	100			
	Thiodicarb	5(b)				59669-26-0	66	>2000
7.	**Neo Nicotinoid Insecticides**	5(b)	100	2900	3000			
	Acetamiprid	5(b)				135410-20-7	217	>2000
	Imidacloprid	5(b)				138261-41-3	450	>5000
	Thiacloprid	5(b)				111988-49-9	621	>2000
	Thiamethoxam	5(b)				153719-23-4	1563	>2000
	Dinotefuran	5(b)				165252-70-0	2804	>2000
	Clothianidin	5(b)				210880-92-5	>5000	>2000
	Imidaclothiz	5(b)				105843-36-5	>2000	>2000
8.	**Organophosphorus Insecticides**	5(b)	300	0	300			
	Chlorpyriphos	5(b)				2921-88-2	135	>5000
9.	**Pyrethroid Insecticides**	5(b)	150	2850	3000			
	Allethrin	5(b)				584-79-2	2150	2660
	Alpha cypermethrin	5(b)				67375-30-8	57	>2000
	Cyfluthrin	5(b)				68359-37-5	500	>5000
	Cypermethrin	5(b)				52315-07-8	250-4150	>4920
	Delta cypermethrin	5(b)				52918-63-5	1965	>2000
	d-transallethrin	5(b)				28434-00-6	370	1200
	Lambda cyhalothrin	5(b)				91465-08-6	79	632
	Permethrin	5(b)				52645-53-1	430-4000	>2500
	Prallethrin	5(b)				23031-36-9	640	>5000
	Transfluthrin	5(b)				118712-89-3	>5000	>5000
	Bifenthrin	5(b)				82657-04-3	54.5	>2000
	Metofluthrin	5(b)				240494-70-6	>5000	>5000
10.	**Other Insecticides**	5(b)	100	200	300			
	Fipronil	5(b)				120068-37-3	97	>2000

	Buprofezin	5(b)				953030-84-7	2198	>5000
	Cartap hydrochloride	5(b)				15263-52-2	345	>1000
	Metalaxyl	5(b)				57837-19-1	633	>3100
	Novaluron	5(b)				116714-46-6	>5000	>2000
	Ethiprole	5(b)				181587-01-9	NA	NA
	Thiocyclam hydrogen oxalate	5(b)				31895-22-4	33900	NA
	Pymetrozine	5(b)				123312-89-0	5820	>2000
	Fenpyroximate	5(b)				134098-61-6	480	>2000
	Spirotetramat	5(b)				203313-25-1	>2000	>4000
	Flonicamid	5(b)				158062-67-0	>2000	>2000
	Flubendiamide	5(b)				272451-65-7	>2000	>2000
	Indoxacarb	5(b)				144171-61-9	1732	>5000
11.	**Conazole Fungicides**	5(b)	75	225	300			
	Difenoconazole	5(b)				119446-68-3	1453	>2010
	Hexaconazole	5(b)				79983-71-4	2189	>2000
	Ipconazole	5(b)				125225-28-7	888	>2000
	Paclobutrazol	5(b)				76738-62-0	2000	>1000
	Propiconazole	5(b)				60207-90-1	1517	>4000
	Tebuconazole	5(b)				107534-96-3	4000	>5000
	Tricyclazole	5(b)				41814-78-2	314	>2000
	Probenazole	5(b)				27605-76-1	NA	NA
	Prothioconazole	5(b)				178928-70-6	>2000	>2000
	Epoxiconazole	5(b)				133855-98-8	>2000	>2000
12.	**Other Fungicides**	5(b)	75	225	300			
	Thiophanate methyl	5(b)				23564-05-8	7500	>10000
	Pyraclostrobin	5(b)				175013-18-0	>5000	>2000
	Cyzofamid	5(b)				120116-88-3	>5000	>2000
13.	**Fermentation Technology**	5(b)	100	200	300			
	Abamectin	5(b)				71751-41-2	10-13.5	>2000
	Azoxystrobin	5(b)				131860-33-8	>5000	>2000
	Picoxystrobin	5(b)				117428-22-5	>2000	>2000
	Emamectin benzoate	5(b)				155569-91-8	56-63	>2000
	Total		**1800**	**7550**	**9350**			
B. PESTICIDE FORMULATIONS (KL/MT)								
1.	Pesticide formulation Bulk		1500	0	1500			
2..	Emulsifier formulation		500	0	500			
3.	Granule formulations		7500	0	7500			
4.	Liquid formulations		6000	0	6000			
5.	Powder formulations		4500	0	4500			
6.	R&D Unit		1 (Service)	0	1 (Service)			
	Total		**20,000**	**0**	**20,000**			

11.3 DESCRIPTION OF THE ENVIRONMENT

BASELINE ENVIRONMENTAL STATUS

AIR ENVIRONMENT

The dispersion of pollutants in the atmosphere is a function of several meteorological parameters viz. temperature, wind speed and direction, mixing depths, inversion level, etc. The ambient air samples were collected and analyzed for Particulate Matter (PM_{10}), Particulate Matter ($PM_{2.5}$), Sulphur Dioxide (SO_2), Oxides of Nitrogen (NOx), Ozone (O_3), Lead (Pb), Carbon Monoxide (CO), Ammonia (NH_3), Benzene (C_6H_6), Benzo (a) Pyrene (BaP), Arsenic (As), Nickel (Ni), HCl, Cl_2, HBr & VOCs were monitored at site and nearby villages for identification, prediction, evaluation and assessment of potential impact on ambient air environment.

Sr. No.	Criteria Pollutants	Unit	Maximum Value	Minimum Value	98 Percentile Value	Prescribed Standard
1.	PM_{10}	$\mu g/m^3$	99.18	62.12	95.19	100
2.	$PM_{2.5}$	$\mu g/m^3$	58.33	36.92	52.61	60
3.	SO_2	$\mu g/m^3$	11.09	6.09	9.28	80
4.	NO_x	$\mu g/m^3$	15.59	6.81	13.92	80

The PM_{10} and $PM_{2.5}$ concentrations at all the AAQM locations were primarily caused by local phenomena including industrial & vehicular activities and natural dust getting air borne due to manmade activities and blowing wind. PM_{10} and $PM_{2.5}$ concentrations were observed below stipulated standards of CPCB for Industrial, Residential, Rural and Other Area at all air quality monitoring locations during the monitoring period. Results of all parameters are found within limit.

WATER ENVIRONMENT

BASELINE GROUND WATER QUALITY

Sr. No.	Criteria Pollutants	Unit	Maximum Value	Minimum Value	Desirable Limit	Maximum Permissible Limit
1.	pH	pH Scale	7.69	6.93	6.5-8.5	No Relaxation
2.	Total Suspended Solids	mg/l	25	<2	80	120
3.	Total Hardness	mg/l	428	120	200	600
4.	Fluoride	mg/l	BDL	BDL	1	1.5
5.	Total Dissolved Solids	mg/l	946.0	480.0	500	2000
6.	Chlorides	mg/l	234.0	18.0	250	1000
7.	Zinc	mg/l	BDL	BDL	5	15

BASELINE SOIL STATUS

Sr. No.	Criteria Pollutants	Unit	Maximum Value	Minimum Value
1.	pH	pH Scale	8.66	7.32
2.	Nitrogen (N)	gm/kg	0.023	0.0023
3.	Phosphorus (P)	gm/kg	0.0019	0.00002
4.	Potassium (K)	gm/kg	1.78	0.929
5.	Electric Conductivity	mS/cm	0.470	0.112

NOISE ENVIRONMENT

The objective of the noise pollution survey around the project site was to identify existing noise sources and to measure background noise levels. The study was carried out in the following steps:

Reconnaissance

- Identification of noise sources and measurement of noise levels
- Measurement of noise levels due to transportation
- Community noise levels

11.4 Water Requirement, Waste Water Generation and Treatment

Total raw water requirement will be is 188.0 KL/day (Industrial: 170 KL/Day + Domestic: 8 KL/Day + Gardening: 10 KL/Day) which will be met through RIICO water supply and recycling of waste water. Total waste water generation will be 136 KL/Day (Industrial: 129 KL/Day + Domestic: 7 KL/Day). Out of 129 KL/Day industrial effluent, effluent from processes, scrubber and lab (49 KL/Day) will be sent to Stripper and 47.75 KL/Day to MEE and MEE condensate (40 KLD) will be sent to ETP for further treatment. Total effluent (127 KL/Day) from septic tank, utilities, washing and MEE Condensate will be sent to ETP and 126 KL/Day final treated effluent will be recycled for industrial operations in utilities (110 KL/Day), Washing (10 KL/Day) & Process (6 KL/Day). Domestic wastewater (7 KL/Day) will be sent to septic tank and then mixed with industrial effluent in ETP for further treatment.

11.5 Air Pollution Source and Control Management

There will be emission from Boiler (2 Nos.), Incinerator (1 No.), DG Set (3 Nos.) and Process Vent (3 Nos.). Adequate air pollution control equipments i.e. Multi-Cyclone separator with bag filter & scrubber, Scrubbers and Stack height for better dispersion of pollutants shall be installed to prevent air pollution.

11.6 Hazardous Waste

7 Categories of Hazardous/Solid Wastes shall be generated from this Unit.

- ETP Sludge, Incineration Ash & MEE Salt will be Collected, Stored, Transported and Disposal at nearest TSDF site (M/s. UCCI, Udaipur).
- Used Lubricating Oil will be Collected, Stored and Transported & Sent to authorized recycler / Reused for Machine Lubrication.
- Discarded drums/ bags & liners will be Collected, Stored, Decontaminated & reuse or Sell to Approved Vendors.
- Process Residue & Stripper Sludge will be Collected, Stored, Transported and Sent for incineration within premises or common incineration facility of M/s UCCI, Udaipur.

11.7 Green Belt

Total 11,958.0 sq. meter land area is available at site; out of this area about 4784 sq. meter (40 %) area is covered as greenbelt and other forms of greenery.

11.8 Power Requirements & Fuel requirement

- **Power Requirement**

Sr. No.	Description	Requirement (KW)	Source
1.	Process Plant technical	290	JVVNL, Jaipur, Rajasthan
2.	Process plant formulation	40	JVVNL, Jaipur, Rajasthan
3.	Process Packing Plant	50	JVVNL, Jaipur, Rajasthan
4.	Utility technical plant	210	JVVNL, Jaipur, Rajasthan
5.	Boiler and DM plant	20	JVVNL, Jaipur, Rajasthan
6.	Effluent treatment plant	40	JVVNL, Jaipur, Rajasthan
7.	Pilot Plant	100	JVVNL, Jaipur, Rajasthan
8.	Quality control Laboratory	20	JVVNL, Jaipur, Rajasthan
9.	Office and street light	20	JVVNL, Jaipur, Rajasthan
10.	R&D Centre	40	JVVNL, Jaipur, Rajasthan
11.	Utility formulation plant	30	JVVNL, Jaipur, Rajasthan
		860	

- **Fuel Requirement**

Sr. No.	Fuel	Requirement (MT/Hr)	
1	Diesel	50 litre/Hr	Generator
2	Diesel	35 litre/Hr	Incinerator
3	Wood	6 MT/Day	Boiler
4	Briquettes	18 MT/Day	Boiler

11.9 Details of Hazardous Chemicals Storage

The detail of Hazardous Chemical Storage & Handling is as under…

Sr. No.	Name of the Material	Type of Hazard	Kind of Storage	Max. quantity to be stored (MT)	Storage condition i.e. temp., pressure	Tank Dimensions in (m)	Dyke Dimension
1.	Cyclohexanone	Fire and spillage	U/G tank	38	ATMP	2 x 4 L x 2.5 D	Sufficient
2.	CIX solvent	Fire and spillage	U/G tank	76	ATMP	4 x 4 L x 2.5 D	Sufficient
3.	Isopropyl Alcohol	Fire and spillage	U/G tank	40	ATMP	2 x 4 L x 2.6 D	Sufficient
4.	Toluene	Fire and spillage	U/G tank	40	ATMP	2 x 4 L x 2.6 D	Sufficient
5.	Hexane	Fire and spillage	U/G tank	20	ATMP	2 x 3 L x 2.2 D	Sufficient

11.10 Capital and recurring cost earmarked for environmental protection measures

Total Cost for project after expansion will be Rs. 4567.08 Lakhs [Rs. 2913.08 Lakhs (existing) + Rs. 1654 Lakhs (additional)]. Cost for EMS will be Rs. 943.37 Lakhs.

Sr. No.	Item	Investment in Lakhs Rs.		
		Existing	Additional	Total
1	Land	70.48	0	70.48
2	Building and site development	581.75	450	1031.75
3	Plant and machinery	1471.48	1050	2521.48
4	Environment protection measures (includes cost of ETP, Tree Plantation, Evaporator System etc.)	789.37	154	943.37
	Total	**2913.08**	**1654**	**4567.08**

11.11 Conclusion

The EIA study of M/s. Insecticides India Limited has been carried out with respect to the TORs awarded by MoEF&CC, New Delhi.

It can be concluded that the proposed expansion project is beneficial in the interest of common man, the society, the state and as the country as a whole. The benefits can be summarized as below:

- The proposed expansion project will provide quality product at lower cost to the users.

- There should be positive impact on the socio-economic condition of the area in terms of direct and indirect employment due to the proposed project.
- Numbers of local trained persons are likely to get jobs.
- Country will save valuable foreign exchange as import of these products will be reduced by corresponding amount.
- These products also have export potential. Hence, possibility of earning foreign exchange.
- The effluent generated from the proposed expansion project will be treated in own MEE and re-used in premises which is Zero Liquid Discharge Unit.
- Company will use briquettes of agro-waste, wood & diesel as fuel in boiler, D. G. set and will also provide multi-cyclone separator with bag filter as APCM and there will be very minimal impact on air pollution due to emission from stacks and process vents.
- All the generated hazardous waste will be disposed to TSDF/ CHWIF of M/s. UCCI, Udaipur. Hence, there will be no impact on land environment.

CHAPTER – 12
DISCLOSURE OF CONSULTANTS ENGAGED

Aqua-Air Environmental Engineers Pvt. Ltd.

Pollution Control Engineers, Consultants & Equipments Supplier

NABL LABORATORY

ISO 9001:2015 Certified Company

COMPANY PROFILE

M/s. Aqua-Air Environmental Engineers Pvt. Ltd. is a Surat based company; one of the leading and multidiscipline Environmental Engineering & Consulting firms of the region.

M/s. Aqua-Air Environmental Engineers Pvt. Ltd. was founded by Mr. Jayesh S. Patel & Mrs. Archana J. Patel on May 7, 2008 and M/s. Aqua-Air Environmental Engineers Pvt. Ltd. was registered under the companies Act on May 7, 2008.

Office having 6,756 Sq. Ft. of area covering IA (EC/EIA) Department, R&D Centre (Environmental Laboratory), Consent (CTE & CC&A) Department, Design (EMS) Department and Account Department, Library, Conference Room and Administration Department, etc. with experienced and qualified staff to render services in the field of Environmental Engineering & Consulting to various types of industries.

M/s. Aqua-Air Environmental Engineers Pvt. Ltd. has a well-established track record in monitoring legislation and developing and implementing strategies for organizations that enable them to manage the impact of environmental issues on their business.

The company has built a reputation for delivering innovative and practical solutions to environment related business issues. These solutions help our clients to achieve successful business outcomes and make sustainable environment serving improvements within their business operations.

M/s. Aqua-Air Environmental Engineers Pvt. Ltd. started the process for ISO/IEC 17025:2005 Accreditation by NABL, New Delhi for the Competence Testing & Calibration Laboratories on June 24, 2008 and submitted the application (Version No. 10) to NABL, New Delhi for ISO/IEC 17025:2005 registration on October 7, 2008. After final assessment and Non-Conformances resolved and corrective actions taken against the Non-Conformances, Laboratory Department, M/s. Aqua-Air Environmental Engineers Pvt. Ltd. was accredited with the certification of ISO/IEC 17025:2005 on Oct. 15, 2010 and was valid up to Oct. 14, 2012. Re-accreditation of ISO/IEC 17025:2005 was received on June 5, 2013 and was valid up to June 4, 2015. Re- accreditation of ISO/IEC 17025:2005 was received on Jan. 6, 2016

and was valid up to Jan. 5, 2018. Re- accreditation of ISO/IEC 17025:2005 was received on May 28, 2018 and is valid up to May 27, 2020.

M/s. Aqua-Air Environmental Engineers Pvt. Ltd. started the process for ISO 9001:2008 registration for Quality Management System on December 1, 2009 and submitted the application for ISO 9001:2008 registration on March 4, 2010. After final assessment, M/s. Aqua-Air Environmental Engineers Pvt. Ltd. was certified from ANAB by M/s. Intertek System Certification on May 4, 2010 and it was valid up to May 4, 2013. We were re-certified on May 4, 2013 and it was valid up to May 4, 2016. We were re-certified on May 30, 2016 and it was valid up to Sept. 14, 2018. M/s. Aqua-Air Environmental Engineers Pvt. Ltd. got ISO 9001:2015 from M/s. Equalitas Certifications Ltd. on Dec, 4, 2018 and it is valid up to Dec. 3, 2021. M/s. Aqua-Air Environmental Engineers Pvt. Ltd. got OHSAS 18001:2007 from M/s. Equalitas Certifications Ltd. on March 16, 2019 and it is valid up to March 15, 2022.

M/s. Aqua-Air Environmental Engineers Pvt. Ltd. started the process for "EIA Consultant Organization" accreditation under National Accreditation Board for Education And Training (NABET)/Quality Council of India (QCI), New Delhi on January 7, 2010 and submitted the application (Rev. 06) for "EIA Consultant Organization" accreditation under NABET, New Delhi on April 8, 2010. Office assessment was done by external NABET/QCI auditors [Dr. L. Ramakrishnan & Mr. A. K. Gupta (B.Sc. Mechanical Engg.)] on Feb. 3 & 4, 2011. NABET/QCI closed the application of M/s. Aqua-Air Environmental Engineers Pvt. Ltd. on March 15, 2011. M/s. Aqua-Air Environmental Engineers Pvt. Ltd. filed SCA in Hon'ble High Court of Gujarat against MoEF, QCI & NABET, New Delhi on April 13, 2012. Hon'ble High Court of Gujarat issued stay order against operation of all OMs (related to NABET/QCI Scheme) of MoEF, New Delhi for the company on Jan. 24, 2013. MoEFCC, New Delhi published Notification regarding mandatory implementation accreditation scheme of NABET/QCI on March 3, 2016. M/s. Aqua-Air Environmental Engineers P. Ltd. along with 11 EIA Consultants of Gujarat filed SCA No. 5312 of 2016 in Hon'ble High Court of Gujarat. Hon'ble High Court of Gujarat gave Stay Order on Apr. 5, 2016 against implementation of Notification dated March 3, 2016 of MoEFCC, New Delhi till further orders.

M/s. Aqua-Air Environmental Engineers P. Ltd. received the Certificate of Registration of Trade Mark, Section 23 (2), Rule 62 (1) from Trade Marks Registry, Govt. of India on January 18, 2011.

The company's work is spread all over India & in Oman. Company have already prepared 444 Form-1, 352 EIA & EMP reports, 334 Risk Assessment & DMP reports, conducted 84 Public Hearings and obtained 331 Environmental Clearances so far that includes Water related Projects / Pesticide Industry Projects / Textile Industry Projects / Sugar Industry Projects / Chemical Industries / Specialty Chemical Industry Projects / Bulk Drug (API) Industry Projects / Chemical Fertilizer Industry Projects / Cement Plants / Thermal Power Plants / Mining Projects / Infrastructure Projects / Construction Projects / Distilleries / Petrochemical Industry Projects/ SEZ Projects/ CRZ Projects, etc.

Company's NABL Accredited Testing Laboratory has conducted Environmental Monitoring & Analysis with Environmental Institute and Gujarat Pollution Control Board in Industrial Estates of Ankleshwar, Panoli & Jhagadia. Company is also doing Turnkey/Consulting Projects for M/s. BASF India Ltd. (Unit-2), Ankleshwar (Detail Engineering for Effluent Treatment Plant), M/s. Reva Proteins Ltd., Jhagadia (Design of Effluent Treatment Plant, supply of mechanical items, Commissioning and operation of Effluent Treatment Plant), M/s. GSP Crop Science P. Ltd., Nadesari (Detail Engineering for Effluent Treatment Plant), M/s. Solvay Specialties India P. Ltd., Panoli (Up gradation of Effluent Treatment Plant), M/s. Kantha Vibhag Sahkari Khand Udyog Mandali Ltd., Olpad (Turnkey: Effluent Treatment Plant), M/s. Hindusthan M-I Swaco Ltd., Panoli (Turnkey: Sewage Treatment Plant), M/s. Hindusthan M-I Swaco Ltd., Dahej SEZ (Turnkey: UF & RO Plant), M/s. Colourtex Ind. Ltd., Vilayat (Consultancy for Sewage Treatment Plant), M/s Thermax Ltd., Dahej SEZ (Consultancy for Effluent Treatment and Recycling Plant), M/s. Glenmark Pharmaceuticals Ltd., Dahej SEZ (Consultancy work for ZLD Effluent Treatment Plant and recycling Plant), M/s. Firmenich Aromatics India P. Ltd., Daman (Turnkey: Modification of Effluent Treatment Plant to ZLD), M/s. Gujarat Argo Infrastructure Mega Food Park Pvt. Ltd., Mangrol (Industry) (Turnkey: Effluent Treatment Plant), M/s. Gujarat Argo Infrastructure Mega Food Park Pvt. Ltd., Mangrol (Park) (Turnkey: Common Effluent Treatment Plant), M/s. Panoli Enviro Technology Ltd. (Consultancy for Expansion of Common Effluent Treatment Plant), M/s. Privi Organics India Ltd., Jhagadia (Turnkey work of Effluent Treatment Plant to ZLD), M/s. Halol Industries Environment & Infrastructure Ltd., Halol (Consultancy for ZLD Common Effluent Treatment Plant), M/s. Parshwnath Pigment Ltd., Padra (Consultancy for Effluent Treatment Plant), etc.

2. ABOUT US

M/s. Aqua-Air Environmental Engineers Pvt. Ltd. has registered office in one of the top five fastest growing cities of India – Surat. We are one of the most trusted and reliable environmental and engineering consultancy service providers. With complete hold in the related domain and proficiency, we execute our work all over Gujarat region.

In addition to engineering consultancy, we also execute turnkey projects for effluent treatment plants at the client's site.

Aqua-Air Environmental Engineers Pvt. Ltd is:

- One of the leading companies in the region providing high quality services in environmental engineering to the best of client's satisfaction.
- Posses a well - developed design office with Computer Center and Laboratory -cum- R&D Center to carry out designing and analysis in the field of environmental engineering.
- Recognized as Schedule-II Environmental Auditor under the Environment Audit Scheme proposed by the Hon'ble High Court of Gujarat.
- Listed with Gujarat Pollution Control Board as Consultants and proposing to get enlisted with GPCB as Pollution Control Equipment Suppliers.
- Going to become a member of Consulting Engineers Association of India.
- Having well-developed library to render services in the field of environmental auditing, consulting, monitoring and analysis.

3. ACHIEVEMENTS

1. Registered under the companies Act on May 7, 2008.
2. Gujarat Pollution Control Board Recognized Schedule – II Environmental Auditor on Dec. 24, 2008.
3. Certificate of ISO 9001:2008 received on May 4, 2010. Import Export Licence received from Government of India on May 31, 2010.
4. Solvency Certificate of Rs. 1,40,00,000/- received from Bank of India, Gopipura branch, Surat on Sept. 3, 2010.
5. Certificate of National Accreditation Board for Testing and Calibration Laboratories (NABL) received on Oct. 15, 2010.
6. Certificate of Registration of Trade Mark, Section 23 (2), Rule 62 (1) from Trade Marks Registry, Govt. of India on Jan. 18, 2011.
7. Certificate of Authorization as dealer in India received from Spectrum Technologies, Inc., USA on May 1, 2011.
8. Gujarat Pollution Control Board Recognized Schedule – II Environmental Auditor on May 04, 2011.
9. Certificate of ISO 9001:2008 received on April 01, 2013. (Reassessment). And Certificate is valid upto May 04, 2016.
10. Certificate of National Accreditation Board for Testing and Calibration Laboratories (NABL) received on June 05, 2013. (Reassessment). And Certificate of NABL is valid upto June 04,2015
11. Gujarat Pollution Control Board Recognized Schedule – II Environmental Auditor on January 4, 2014. (Reassessment). And Certificate of Gujarat Pollution Control Board Recognized Schedule – II Environmental Auditor is valid upto January 17, 2017.

4. SERVICE PROVIDE

M/s. AQUA-AIR ENVIRONMENTAL ENGINEERS PVT. LTD. offers following specialized services in Environmental Engineering, Water Supply Engineering and Civil Engineering.

4.1 TURN KEY/BOOT/BOO PROJECTS

4.1.1 ENVIRONMENTAL ENGINEERING

- Detailed design
- Construction
- Fabrication
- Piping
- Electrification
- Supply
- Erection
- Testing and Commissioning of Effluent Treatment Plants (ETPs)
- Sewage Treatment Plants (STPs)
- Water Treatment Plants (WTPs)
- Common Effluent Treatment Plants (CETPs)
- Recycling Plants (RPs)
- Zero Discharge Plants (ZDPs)
- Incineration System Plants (ISPs)
- Hazardous waste Storage areas (HWSAs)
- Secured/ Sanitary Landfill Facilities
- Bio–Medical Waste (BMW) Treatment Facilities on a turnkey or BOOT/BOO basis.

4.1.2 CIVIL ENGINEERING

Construction of

- Water Treatment Plan
- Sewage Treatment plant
- Industrial Wastewater Treatment plant
- Elevated Service Reservoirs (ESRs)
- Underground Reservoirs (UGRs)
- Sewage Pumping Stations, etc.

4.2 CONSULTING

4.2.1 ENVIRONMENTAL ENGINEERING

1. Complete study of the Pollution Problem in industries from wastes generation to disposal and providing necessary technical knowledge like–

- How including design
- Basic engineering, detailed engineering
- Water Treatment Plants (WTPs)
- Tender preparation for Effluent Treatment Plants (ETPs) for industrial wastewater
- Sewage Treatment Plants (STPs) for residential wastewater
- Common Effluent Treatment Plants (CETPs) for more than two industries
- Zero Discharge Plants (ZDPs)
- Recycling plants (RPs) for reuse of water upto maximum extent
- Incineration System Plants (ISPs) for various non-biodegradable or toxic industrial wastes on Consulting basis
- Design of Hazardous waste Storage area and Consultancy Services for Secured/ Sanitary Landfill Facilities
- Design and Consultancy Services for Bio – Medical Waste Treatment Facilities.

2. Water Supply Distribution System

- Analysis
- Design
- Tender preparation

3. Laboratory Analysis of

- Air
- Water
- Sewage
- Waste Water
- Industrial Effluent
- Industrial Sludge

4. Process Study

- Reduce the pollution at source
- Reuse / Recycle effluent

5. Pollution Control Facility

- Performance study of existing
- Suggesting scheme for the optimization of the facility

6. Environment Management

- Environmental Clearance from
  - MoEF
  - New Delhi or DoEF
  - Gandhinagar
- Environmental Impact Assessment Studies (EIAs)
  - Short term (Rapid)
  - Long term (Comprehensive)
- Environmental statements
- Environmental Auditing

7. Statutory Requirements under Factory Act

- Safety Audit
- On-site / Off-site Emergency Plan
- HAZOP study

8. For Various Energy Conservation Schemes

- Energy Audit
- Design

9. Environmental Management System

- Preparing Adequacy Report
- Preparing Efficacy Report

10. Operation and Maintenance (O & M)

- Effluent Treatment Plants (ETPs)
- Sewage Treatment Plants (STPs)
- Water Treatment Plants (WTPs)

11. Air Monitoring

- Ambient Air
- Vent
- Stack

12. Design of Pollution Control Equipment

- Cyclone
- Scrubbers
- Bag Filters, fume extraction systems
- Blowers
- Aerators
- Flash mixers
- Reaction Vessels
- Clariflocculators
- Scrapper Mechanisms
- Incinerators

- Agitators
- Scrubbers, etc.

13. Pollution Control

- Effluent Survey
- Environmental review of Pollution control equipment and systems
- Feasibility Studies
- Laboratory bench scale Treatability studies
- Pilot Plant studies etc.

14. Consulting Service

- NOC
- Water Consent
- Air Consent
- Hazardous Waste Authorization Application, etc.

15. As per requirements under Factory Act-1948 and Gujarat Factory Rules

- Monitoring
- Analysis of Work Area Environment
- filling up Form-37

16. Technical Consultation & assistance to ensure and assure compete Environ-Legal compliance

- Liaison with statutory bodies in order to get the required permits
- Clearance
- Consents

4.3 EQUIPMENT MFG. /TRADING

4.3.1 ENVIRONMENTAL ENGINEERING

1. Manufacture and supply of Pollution Control Equipment such as

- Incinerators With scrubbers
- Autoclaves
- Hydro-claves
- Fixed Aerators
- Floating Aerators
- Submersible Aerators (EOLO2)
- Submersible Mixers (RIO or BRIO)
- Cascade Aerators
- Clarifier mechanisms
- Agitators
- Clariflocculator
- Clariflocculator mechanism
- Flash mixes
- Oil skimmers
- Dissolved Air Flotation (DAF) units
- Cyclone
- Scrubbers
- Bag Filters
- Oil Skimmers
- Deoiler Pipes
- API separators
- Vacuum Drum filters
- Solid bowl centrifuges
- Filter presses
- Belt filters
- Reaction vessels
- Reverse Osmosis, etc.

LIST OF ANNEXURES

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ANNEXURE - 1

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) (2009)

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO_2), µg/m^3	Annual* 24 Hours**	50 80	20 80	• Improved West and Geake • Ultraviolet fluorescence
2	Nitrogen Dioxide (NOx), µg/m^3	Annual* 24 Hours**	40 80	30 80	• Modified Jacob & Hochheiser (Na-Aresenite) • Chemiluminescence
3	Particular Matter (size less than 10 µm) or PM_{10} µg/m^3	Annual* 24 Hours**	60 100	60 100	• Gravimetric • TOEM • Beta attenuation
4	Particular Matter (size less than 2.5 µm) or $PM_{2.5}$ µg/m^3	Annual* 24 Hours**	40 60	40 60	• Gravimetric • TOEM • Beta attenuation
5	Ozone (O_2) µg/m^3	8 Hours** 1 Hour**	100 180	100 180	• UV photometric • Chemiluminescence • Chemical Method
6	Lead (Pb) µg/m^3	Annual* 24 Hours**	0.50 1.0	0.50 1.0	• AAS/ICP method after sampling on EPM 2000 or equivalent filter paper • ED-XRF using Teflon filter
7	Carbon Monoxide (CO) mg/m^3	8 Hours** 1 Hour**	02 04	02 04	• Non Dispersive Infra Red (NDIR) Spectrology
8	Ammonia (NH_3) µg/m^3	Annual* 24 Hours**	100 400	100 400	• Chemiluminescence • Indophenol blue method

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
9	Benzene (C_6H_6) $\mu g/m^3$	Annual*	05	05	• Gas chromatography based continuous analyzer • Absorption and Desorption followed by GC analysis
10	Benzo (a) Pyrene (BaP) particulate phase only, mg/m^3	Annual*	01	01	• Solvent extraction followed by HPCL/GC analysis
11	Arsenic (AS), mg/m^3	Annual*	06	06	• AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni), mg/m^3	Annual*	20	20	• AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

***** Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hours at uniform intervals

****** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed he limits but not on two consecutive days of monitoring.

Note: Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

ANNEXURE - 2

CPCB RECOMMENDATIONS FOR COMMUNITY NOISE EXPOSURE

CATEGORY OF AREA	**Leq (dBA) (DAYTIME) (0600 TO 2100 HRS)**	**Ldn (dBA) (NIGHT TIME) (2100 TO 0600 HRS)**
Industrial Area	75	70
Commercial Area	65	55
Residential Area	55	45
Silence Zone	50	40

ANNEXURE - 3

CLASSIFICATION OF INLAND SURFACE WATER (CPCB STANDARDS)

SR NO.	CHARACTERISTICS	A@	B@	C@	D@	E@
1	Dissolved Oxygen (mg/L), Min	6	5	4	4	-
2	Biochemical Oxygen Demand (mg/L), Min	2	3	3	-	-
3	Total Coliform Organisms, MPN/100 ml, Max.	50	500	5000	-	-
4	Total Dissolved Solids (mg/L), Max	500	-	1500	-	2100
5	Chlorides (as Cl^-), mg/L, Max.	250	-	600	-	600
6	Colour, Hazen units, Max	10	300	300	-	-
7	Sodium absorption ratio, Max	-	-	-	-	26
8	Boron (as B), mg/L, Max	-	-	-	-	2
9	Sulphates (as SO_4^{-2}), mg/L, Max.	400	-	400	-	1000
10	Nitrates (as NO_3^-), mg/L, Max	20	-	50	-	-
11	Free Ammonia (as N), mg/L, Max	-	-	-	1.2	-
12	Conductivity at 25°C, micromhos/cm, Max	-	-	-	1.0	2.25
13	pH value	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.0-8.0
14.	Arsenic (as As), mg/L, Max	0.05	0.2	0.2	-	-
15	Iron (as Fe), mg/L, Max	0.3	-	50	-	-
16	Fluorides (as F), mg/L, Max	1.5	1.5	1.5	-	-
17	Lead (as Pb), mg/L, Max	0.1	-	0.1	-	-
18	Copper (as Cu), mg/L, Max	1.5	-	1.5	-	-
19	Zinc (as Zn), mg/L, Max	15	-	15	-	-

*: If the Coliform count is found to be more than the prescribed tolerance limits, the criteria for coliforms shall be satisfied if not more than 20 percent of samples show more than the tolerance limits specified, and not more than 5 percent of samples show values more than 4 times the tolerance limit. Further, the feacal coliform should not be more than 20 percent of the coliform.

ANNEXURE - 4

INDIAN STANDARDS/SPECIFICATIONS FOR DRIINKING WATER IS: 10500-1991

SR NO.	SUBSTANCES OR CHARCTER-ISTICS MAX	REQUIREME-NT (DESIRABLE LIMIT)	UNDESIRABLE EFFECTS OUT-SIDE THE DESIRABLE LIMIT	PERMISSIBLE LIMIT IN ABSENCE OF ALTERNATE SOURCE	METHOD OF TEST CI REF OF IS: 3025	REMARKS
			ESSENTIAL CHARACTERISTICS			
1	Colour, Hazen unit	5	Above this, consumer acceptance decreases	25	4 of 3025, 1983	Extended upto 25 only if toxic substances are not suspected in absence of alternate Source.
2	Odour		Unobjectionable	-	5 of 3025,1983	a. Test cold and when heated b. Test at several dilutions
3	Taste		Agreeable	-	-	Test to be conducted only after safety has been established
4	Turbidity, NTU	5	Above this, consumer acceptance decreases	10	8	Test to be conducted only after safety has been established
5	pH Value	6.5-8.5	Beyond this range the water will affect the mucous membrane and/or water supply system	No relaxation	8	-
6	Total Hardness mg/L (as $CaCO_3$)	300	Encrustation on water supply structure and adverse effects on domestic use	600	-	-
7	Iron (as Fe), mg/L	0.3	Beyond this limit,, taste/appearance are affected has adverse effect on domestic uses and water supply structures & promotes iron bacteria	1.0	32 of 3025, 1964	-
8	Chlorides (as Cl^-) mg/L	250	Beyond this limit taste, corrosion and palatability are affected	1000	32 of 3025	-
9	Residual free chlorine, mg/L	0.2	-	-	26 of 3025, 1986	To be applicable only when water is chlorinated tested at consumer end, when protection against

						viral infection is required it should be min 0.5 mg/L
DESIRABLE CHARACTERISTICS						
10	Dissolved Solids, mg/L	500	Beyond this palatability decrease and may cause gastrointestinal irritation	2000	16 of 3025	
11	Calcium (as Ca) mg/L	75	-	200	40 of 3025, 1984	
12	Copper (as Cu), mg/L	0.05	Astringent,taste discoloration of pipes, fittings and utensils will be caused beyond this	1.5	36 of 3025, 1964	
13	Manganese (as Mn), mg/L	0.1	Astringent ,taste discoloration of pipes, fittings and utensils will be caused beyond this	0.3	35 of 3025,1964	
14	Sulphate (as SO_4^{-2}), mg/L	200	Beyond this causes gastrointestinal irritation when magnesium or sodium are present	400	24 of 3025, 1986	May be extended upto 400 provided (as Mg) does not exceed 30 mg/l
15	Nitrate (as NO_3^-), mg/L	45	Beyond this methaemoglo-binemia	100	-	-
16	Fluoride (as F^-), mg/L	1.0	Fluoride may be kept as low as possible. High fluoride may cause fluorosis	1. 5	23 of 3025, 1964	-
17	Phenolic substances mg/L (as C_6H_5OH)	0.001	Beyond this, it may cause objectionable taste and odour	0.002	54 of 3025	
18	Mercury (as Hg), mg/L	0.01	Beyond this, the water becomes toxic	No relaxation	See note mercury ion analyzer	To be tested when pollution is suspected
19	Cadmium (as Cd), mg/L	0.01	Beyond this the water becomes toxic	No relaxation	See note mercury ion analyser	To be tested when pollution is suspected
20	Selenium (as Se) mg/L	0.01	Beyond this the water becomes toxic	No relaxation	28 of 3025, 1964	To be tested when pollution is suspected
21	Arsenic (As), mg/L	0.05	Beyond this the water becomes toxic	No relaxation	37 of 3025, 1988	To be tested when pollution is suspected
22	Cyanide (CN^-), mg/L	0.05	Beyond this the water becomes toxic	No relaxation	27 of 3025, 1986	To be tested when pollution is suspected

23	Lead (Pb), mg/L	0.05	Beyond this the water becomes toxic	No relaxation	See note 86	To be tested when pollution plumbosolvency is suspected
24	Zinc (as Zn), mg/L	5	Beyond this limit it can cause astringent taste and an opalescence in water	15	39 of 3025,1964	To be tested when pollution is suspected
25	Anionic detergents mg/L (as MBAS)	0.2	Beyond this limit undesirable taste and odour after Chlorination takes place	1.0	Methylene blue extraction method	To be tested when pollution is suspected
26	Chromium (as Cr^{+6}), mg/L	0.01	May be carcinogenic above this limit	0.05	28 0f 3025	To be tested when pollution is suspected
27	Polynuclear aromatic hydrocarbons, mg/L	-	May be carcinogenic	-	28 of 3025,1964	To be tested when pollution is suspected
28	Mineral Oil, mg/L	0.01	Beyond this limit undesirable taste and odour after Chlorination takes place	0.03	Gas chromatographic method	To be tested when pollution is suspected
29	Pesticides mg/L	Absent	Toxic	0.001	58 of 3025, 1964	-
30	Radioactive materials a. Alpha emitters Bq/L b. Beta emitters pci/L	 - -	 - -	 0.1 1.0	 - -	 - -
31	Alkalinity (as $CaCO_3$), mg/L	200	Beyond this limit taste becomes unpleasant	600	13 of 3025,1964	-
32	Aluminum (as Al), mg/L	0.03	Cumulative effect is reported to cause dementia	0.2	31 0f 3025,1964	-
33	Boron (as B), mg/L	1	-	5	29 of 3025,1964	-

ANNEXURE - 5

INDIAN STANDARDS FOR INDUSTRIAL AND SEWAGE EFFLUENTS DISCHARGE IS: 2490-1982

SR NO.	PARAMETERS	INDUSTRIAL EFFLUENT			
		INTO INLAND SURFACE WATER	ON LAND FOR IRRIGATION	INTO MARINE COASTAL AREA	INTO PUBLIC SEWERS
1	Colour / odour	-	-	-	-
2	Suspended Solids (mg/L)	100	200	100(for Process Waste)	600
3	Particle Size Suspended Solids	Shall pass 850 micron IS sieve	-	Floatable Solids Max 3 mm Settable Solids Max 850 micron	-
4	Dissolved Solids (Inorganic), mg/L	2100	2100	-	2100
5	pH Value	5.5-9.0	5.5-9.0	5.5-9.0	5.5-9.0
6	Temperature °C	Shall not exceed 40 in any section of the stream within 15 mts. down stream from the effluent outlet	-	45 at the point of discharge	-
7	Oil & Grease, mg/L, Max.	10	10	20	20
8	Total Residual Chlorine, mg/L, Max	1	-	1	-
9	Ammonical Nitrogen (as N) mg/l max	50	-	50	50
10	Total Kjeldahl Nitrogen (as N), mg/L, Max	100	-	100	-
11	Free Ammonia (as NH_3) mg/L, Max.	5	-	5	-
12	Biochemical Oxygen Demand, 5 Days at 20 ° C	30	100	100	350
13	Chemical Oxygen Demand, mg/L, Max.	250	-	250	-

14	Arsenic (as As), mg/L, Max.	0.2	0.2	0.2	0.2
15	Mercury (as Hg) mg/L	0.01	-	0.01	0.01
16	Lead (as Pb), mg/L, Max	0.1	-	1.0	1.0
17	Cadmium (as Cd), mg/L, Max	2	-	2	1
18	Hexavalent Chromium (As Cr^{+6}), mg/L, Max.	0.1	-	1	2
19	Total Chromium (as Cr) mg/L, Max	2	-	2	2
20	Copper (as Cu), mg/L, Max	3	-	3	3
21	Zinc (as Zn), mg/L, Max.	5	-	15	15
22	Selenium (as Se), mg/L, Max	0.05	-	0.05	0.05
23	Nickel (as Ni), mg/L, Max	3	-	5	3
24	Boron (as B), mg/L, Max	2	2	-	2
25	Percent Sodium, Max	-	60	60	-
26	Residual Sodium Carbonate, mg/L, Max	-	50	-	-
27	Cyanide (as CN^{-}), mg/L, Max	0.2	0.2	0.2	0.2
28	Chloride (as Cl^{-}), mg/L, Max	1000	600	-	1000
29	Fluoride (as F^{-}) mg/L, Max	2	-	15	15
30	Dissolved Phosphate (as P), mg/l, Max	5	-	-	-
31	Sulphate (as SO_4^{-2}) mg/L, Max	1000	1000	-	1000
32	Sulphide (as S^{-2}) mg/l, Max	2	-	5	-
33	Phenolic Compounds (as C_6H_5OH) Max	1	-	5	6

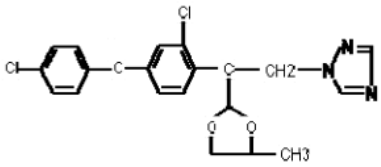
34	Radioactive materials a.) Alpha emitters µc/mL, Max b.) Beta emitters µc/mL, Max	 10-7 10-6	 10-8 10-7	 10-7 10-6	 10-7 10-6
35	Manganese (as Mn), mg/L	2	2	-	2
36	Iron (as Fe), mg/L	3	3	-	3
37	Vanadium (as V), mg/L	0.2	-	0.2	0.2
38	Nitrate Nitrogen, mg/L	18	20	-	0.2

ANNEXURE – 6
MSDS OF ALL THE RAW MATERIALS AND PRODUCTS

1. Difenaconazole

Difenoconazole -MATERIAL SAFETY DATA SHEET
Manufacturer/information service:
ZHEJIANG RAYFULL CHEMICALS CO.,LTD
ADD: NO.113 PUXING ROAD, PUZHOU INDUSTRIAL PARK, LONGWAN DISTRICT, WENZHOU ZHEJIANG P.R. CHINA
Tel: +86-577-88905587 Fax: +86-577-88905567
Email: info@rayfull.com sales@rayfull.com

1. Chemical Product Identification
Product Name: Difenoconazole
Molecular Formula: C19H17Cl2N3O3
Molecular Weight: 406.3
Structural Formula:



Chemical Name: 1H-1, 2, 4-Triazole, 1-[[2-[2-chloro-4-(4-chlorophenoxy) phenyl]-4-methyl-1, 3-dioxolan-2-yl] metyl]
Form: power
Color: gray white
Odor: Paint
CAS No.: 119446-68-3

2. Composition / Information on Ingredients
Composition CAS No. Content %
Difenoconazole 119446-68-3 95.0
Other ingredients 5.0

3. Hazards Identification
Symptoms of Acute Exposure: May cause eye irritation.
Hazardous Decomposition Products: Can decompose at high temperatures forming toxic gases.
Unusual Fire, Explosion and Reactivity Hazards: During a fire, irritating and possibly toxic gases may be generated by thermal decomposition or combustion.
4. First Aid Measures

General: Remove the affected person from the danger zone to a well-ventilated room or to fresh air, and protect from undercooling. In case of suspected poisoning: Immediately call a physician.
Eye Contact: Rinse eyes with clean water for several minutes and immediately call a physician.
Ingestion: Repeatedly administer medicinal charcoal in a large quantity of water. Note:
Never give anything by mouth to an unconscious person. Do not induce vomiting.
Skin Contact: Remove contaminated clothing and thoroughly wash the affected parts of the body with soap and water, including hair and under fingernails.
Medical Instructions
Antidote: No specific antidote is known! Apply symptomatic therapy. Experiences Specific to Man: No case of human poisoning is on recor
5. Fire-Fighting Measures
Suitable Extinguishing Media: Dry chemical extinguisher, foam, carbon dioxide or water spray (do not use direct jet of water).
Special Hazards during Fire Fighting: Combustion products are toxic and/or irritant.
Measures have to be taken to prevent the contaminated extinguishing agent from seeping into the ground or from spreading uncontrollably.
Protective Equipment for Fire Fighting: Use self contained breathing apparatus. Wear protective equipment.
6. Accidental Release Measures
Control the spill at its source. Contain the spill to prevent from spreading or contaminating soil or from entering sewage and drainage systems or any body of water. Clean up spills immediately, observing precautions outlined in Section 8. Cover entire spill with absorbing material and place into compatible disposal container. Scrub area with hard water detergent (e.g. commercial products such as Tide, Joy, Spic and Span). Pick up wash liquid with additional absorbent and place into compatible disposal container. Once all material is cleaned up and placed in a disposal container, seal container and arrange for disposition.
7. Handling and Storage
Store the material in a well-ventilated, secure area out of reach of children and domestic animals. Do not store food, beverages or tobacco products in the storage area. Prevent eating, drinking, tobacco use, and cosmetic application in areas where there is a potential for exposure to the material. Wash thoroughly with soap and water after handling.
8. Exposure Controls/Personal Protection
Ingestion: Prevent eating, drinking, tobacco usage and cosmetic application in areas where there is a potential for exposure to the material. Wash thoroughly with soap and water after handling.
Eye Contact: Where eye contact is likely, use chemical splash goggles.

Skin Contact: Where contact is likely, wear chemical-resistant (such as nitrile or butyl) gloves, coveralls, socks and chemical-resistant footwear. For overhead exposure, wear chemical-resistant headgear.
Inhalation: A respirator is not normally required when handling this substance. Use effective engineering controls to comply with occupational exposure limits.
9. Physical and Chemical Properties
Flash-Point: 64 ℃
Melting point : 78.6℃
Density: 1.40g/cm3@20℃
Vapor pressure; 3.3×10-5 mPa@25℃
PH Value: 5 - 8 (1 %; in deionised water) CIPAC MT 75
Solubility: 15mg/l@25℃
Partition coefficient; KowlogP=4.20@25℃
10. Stability and Reactivity
Stability: Stable under normal use and storage conditions.
Hazardous Polymerization: Will not occur.
Conditions to Avoid: None known.
Hazardous Decomposition Products: Can decompose at high temperatures forming toxic gases.
Materials to Avoid: Strong oxidizers.
11. Toxicological Information4
Acute Oral Toxicity: LD50: 1453 mg/kg (rat)
>2000mg/kg9mouse)
Acute Dermal Toxicity LD50: > 2010 mg/kg (rat)
Acute Skin Irritation: non-irritant (rabbit)
Acute Eye Irritation: on- irritant (rabbit)
Skin Sensitization: not sensitizing (guinea pig)
12. Ecological and Ecotoxicological Information
Acute oral LD50 :mallard (9-11d) >2150mg/kg
Bobwhite feeding LC50 (8d) >4760mg/kg
Mallard feeding LC50 >5000mg/l
Toxicity to fish
LC50 (96h): rainbow trout 0.8mg/l
Bluegill 1.2mg/l
Earthworm LC50 (14d) >610mg/l soil
Daphnia LC50 (14d): 0.77mg/l
Not toxic to bee: LD50 (oral) > 187μg /bee, LD50 (contact) >100μg/bee
13. Disposal Considerations
Do not reuse product containers. Dispose of product containers, waste containers, and residues according to local, state, and federal health and environmental regulations.
14. Transport Information

Not applicable.

15. Regulatory Information

Not applicable.

16. Other Information

All information and instructions provided in this Material Safety Data Sheet (MSDS) are based on the current state of scientific and technical knowledge at the date indicated on the present MSDS and are presented in good faith and believed to be correct. This information applies to the product as such. In case of new formulations or mixes, it is necessary to ascertain that a new danger will not appear. It is the responsibility of persons on receipt of this MSDS to ensure that the information contained herein is properly read and understood by all people who may use, handle, dispose or in any way come in contact with the product. If the recipient subsequently produce formulations containing this product, it is the recipients sole responsibility to ensure the transfer of all relevant information from this MSDS to their own MSDS.

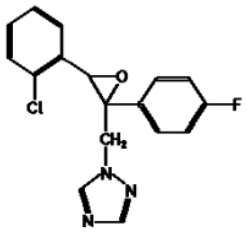
2. Epoxiconazole

Epoxiconazole -MATERIAL SAFETY DATA SHEET

Manufacturer/information service:
ZHEJIANG RAYFULL CHEMICALS CO.,LTD
ADD: NO.113 PUXING ROAD, PUZHOU INDUSTRIAL PARK, LONGWAN DISTRICT, WENZHOU ZHEJIANG P.R. CHINA
Tel: +86-577-88905587 Fax: +86-577-88905567
Email: info@rayfull.com sales@rayfull.com

1. Chemical Product Identification

Product Name: Epoxiconazole
Molecular Formula: C17H13ClFN3O
Molecular Weight:329.76
Structural Formula:



Chemical Name:
(2RS,3SR)-1-[3-(2-chlorophenyl)-2,3-epoxy-2-(4-fluorophenyl)propyl]-1H-1,2,4-triazole
Form: crystal solid
Colour: colourless
Odour:None
CAS No.: 106325-08-0

2. Composition / Information On Ingredients

Composition CAS No. Content %
Epoxiconazole 106325-08-0 95.0
Others ingredients 5.0 2

3. Hazards Identification

Signal word: caution
Toxicity class: III
Primary poute of entry: Inhalation, absorption sking contact.

4. First Aid Measures

General advice:
Remove contaminated clothing.
If inhaled:
Keep patient calm, remove to fresh air, and seek medical attention.
On skin contact:

Wash thoroughly with soap and water.
On contact with eyes:
Wash affected eyes for at least 15 minutes under running water with eyelids held open.
On ingestion:
Rinse mouth immediately and then drink plenty of water, seek medical attention.
Note to physician:
Treatment: Treat according to symptoms (decontamination, vital functions), no known specific antidote.

5. Fire-Fighting Measures

Flammable Limits: N/A
Lower explosive limit (LEL): N/A
Upper explosive limited (UEL): N/A
Fire extinguishing media: Water spray, foam, carbon dioxide, dry extinguishing media
Special fire fighting procedures: N/A
Unusual fire and explosion hazards: Water spray, foam, carbon dioxide, dry extinguishing media

6. Accidental Release Measures

Personal precautions:
Use personal protective clothing.
Environmental precautions:
Do not discharge into the subsoil/soil. Do not discharge into drains/surface waters/ groundwater.
Methods for cleaning up or taking up:
For large amounts: Pump off product.
For residues: Pick up with suitable absorbent material. Dispose of absorbed material in accordance with regulations.

7. Handling And Storage

Handling
No special measures necessary if stored and handled correctly.
Protection against fire and explosion:
No special precautions necessary. The substance/product is non-combustible.
Storage
Segregate from foods and animal feeds.
Storage stability:
Storage duration: 60 Months
Protect from temperatures below: -10 °C
Protect from temperatures above: 40 °C

8. Exposure Controls/personal protection

Personal protective equipment
Hand protection:

Suitable chemical resistant safety gloves (EN 374) also with prolonged, direct contact (Recommended: Protective index 6, corresponding > 480 minutes of permeation time according to EN 374): E.g. nitrile rubber (0.4 mm), chloroprene rubber (0.5 mm), polyvinyl chloride (0.7 mm) and other

Eye protection:

Safety glasses with side-shields (frame goggles) (EN 166)

Body protection: Protective suit

General safety and hygiene measures:

Handle in accordance with good industrial hygiene and safety practice. No eating, drinking, smoking or snuff taking at the place of work. Keep away from food, drink and animal feeding stuffs.

9. Physical And Chemical Properties

Crystal solid colourless

Density: 1.384(25℃)

Melting point : 136.2℃

Solubility (in water): 6.63(20℃, mg/l）

Soluble in acetone14.4, methylene chloride29.1

10. Stability And Reactivity

Thermal decomposition: No decomposition if stored and handled as prescribed/indicated.

Substances to avoid: No substances known that should be avoided.

Hazardous reactions: No hazardous reactions known.

Hazardous decomposition products: No hazardous decomposition products known.

11. Toxicological Information

LD50/oral/rat: > 5,000 mg/kg

LC50/by inhalation/rat: > 5,3 mg/l / 4 h

LD50/dermal/rat: > 2,000 mg/kg

Primary skin irritation/rabbit: non-irritant

Primary irritations of the mucous membrane/rabbit: non-irritant

Sensitization/guinea pig: Non-sensitizing.

Further information:

Information on: Epoxiconazole

Experiences in humans: Skin irritations described in isolated cases.

12. Ecological And Ecotoxicological Information

Toxicity to fish:

Rainbow trout/LC50 (96 h):2.2~2.4mg/l

Giant sunfish/LC50 (96 h):4.6~6.8 mg/l

Aquatic invertebrates:

Daphnia magna/LC50 (48 h): 8.7 mg/l

13. Disposal Considerations

Must be dumped or incinerated in accordance with local regulations.

Contaminated packaging:

Packs that cannot be cleaned should be disposed of in the same manner as the contents.

Contaminated packaging should be emptied as far as possible and disposed of in accordance with official regulations after being thoroughly cleaned.

Uncontaminated packaging may be treated as household waste.

14. Transport Information

Not applicable.

15. Regulatory Information

Not applicable.

16. Other Information

All information and instructions provided in this Material Safety Data Sheet (MSDS) are based on the current state of scientific and technical knowledge at the date indicated on the present MSDS and are presented in good faith and believed to be correct. This information applies to the product as such. In case of new formulations or mixes, it is necessary to ascertain that a new danger will not appear. It is the responsibility of persons on receipt of this MSDS to ensure that the information contained herein is properly read and understood by all people who may use, handle, dispose or in any way come in contact with the product. If the recipient subsequently produce formulations containing this product, it is the recipients sole responsibility to ensure the transfer of all relevant information from this MSDS to their own MSDS.

3. Hexaconazole

Hexaconazole-MATERIAL SAFETY DATA SHEET

Manufacturer/information service:

ZHEJIANG RAYFULL CHEMICALS CO.,LTD
ADD: NO.113 PUXING ROAD, PUZHOU INDUSTRIAL PARK, LONGWAN DISTRICT, WENZHOU ZHEJIANG P.R. CHINA
Tel: +86-577-88905587 Fax: +86-577-88905567
Email: info@rayfull.com sales@rayfull.com

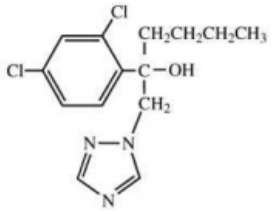
1. Chemical Product Identification

Product Name: Hexaconazole

Molecular Formula: C14H17Cl2N3O

Molecular Weight: 314.2

Structural Formula:



Chemical Name: α-butyl-α-(2, 4-dichlorophenyl)-1H-1, 2, 4-triazole-1-ethanol

Form: crystalline solid

Colour: white

Odour: odorless

CAS No.: 79983-71-4

2. Composition / Information on Ingredients

Composition CAS No. Content %

Hexaconazole 79983-71-4 95.0

Others ingredients 5.0

3. Hazards Identification

Primary Route of Entry:

Inhalation, absorption sking contact

4. First Aid Measures

Eyes: Flush immediately with fresh water for at least 15 minutes while holding eyes open.

Skin: Thoroughly wash with soap and ester.

Ingestion: Give water or milk to drink. Get medical aid before inducing vomiting.

5. Fire-Fighting Measures

Flammable Limits: N/A

Lower Explosive Limit (LEL): N/A

Upper Explosive Limited (UEL): N/A

Fire Extinguishing Media: Dry chemicals, carbon dioxide for small fires. Water spray or foam for large fires.
Special Fire Fighting Procedures:
Wear niosh/msha approved self-contained breathing apparatus and full protective clothing
Unusual Fire and Explosion Hazards:
Thermal decomposition (e.g. fire) may produce carbon monoxide, carbon dioxide, nitrogen oxides
6. Accidental Release Measures
Steps to be taken in case material is released or spilled:
Appropriate protective equipment must be worn when handling a spill of this material. See Section 8, Exposure Controls/personal protection for recommendations, if exposed to material during clean-up operations, see Section 4, First Aid Measures for actions to follow.
7. Handling and Storage
Avoid eye, skin, and mouth contact. Store in original containers away from food stuffs, animal feed.
8. Exposure Controls/personal protection
Engineering controls: Local exhaust or general ventilation to maintain exposure below PEL.
Personal Protective Equipment (PPE)
Protective gloves, long sleeve shirt when handing. Launder before reuse. Wear a dust mask while mixing or loading.
Work Practices: Wear appropriate personal protective equipment.
9. Physical and Chemical Properties
Appearance : white crystalline solid.
Melting point 111℃,
Vapor pressure : 0.01mPa@20℃
Relative density: 1.04
Partition coefficient KowlogP=3.9@20℃
Good stability.
Soluble in xylene, acetone, methanol, chloroform; less in xylene, hexane.
Solubility (IN WATER): slightly
10. Stability and Reactivity
Conditions to avoid: None
Incompatibility (MATERIALS TO AVOID): N/A
Stability: This material is well stable in normal condition.
Hazardous Polymerization: Will not occur.
11. Toxicological Information
Acute oral LD50 (rat): male 2189mg/kg, female 6071mg.kg
Dermal LD50 (rat): >2000mg/kg
Inhalation LC50 (4h): >5.9mg/l

Skin irritantion: no irritantion for rabbit

Eye irritantion: moderate irritantion for rabbit

Carcinogenic effects: Available evidence suggests that Hexaconazole is not carcinogenic

12. Ecological and Ecotoxicological Information

Quail acute oral LD50 : >4000mg/kg

Rainbow trout LC50 (96h):3.4mg/l

Daphnia LC50 (48h): 2.9mg/l

Bee LD50 (48h) : >0.1mg/bee (oral and contact)

Earthworm LC50 (41d): 414mg/kg in soil

13. Disposal Considerations

Pesticide Disposal: Pesticide wastes are slightly toxic, Incinerate all disposal material in accordance according to the local state regulations.

14. Transport Information

Not applicable.

15. Regulatory Information

Not applicable.

16. Other Information

All information and instructions provided in this Material Safety Data Sheet (MSDS) are based on the current state of scientific and technical knowledge at the date indicated on the present MSDS and are presented in good faith and believed to be correct. This information applies to the product as such. In case of new formulations or mixes, it is necessary to ascertain that a new danger will not appear. It is the responsibility of persons on receipt of this MSDS to ensure that the information contained herein is properly read and understood by all people who may use, handle, dispose or in any way come in contact with the product. If the recipient subsequently produce formulations containing this product, it is the recipients sole responsibility to ensure the transfer of all relevant information from this MSDS to their own MSDS.

4. Prothioconazole

Prothioconazole: MATERIAL SAFETY DATA SHEET

Section 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE

Product identifiers

Product name : Prothioconazole

CAS-No. : 178928-70-6

Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

Section 2. HAZARDS IDENTIFICATION

Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [EU-GHS/CLP]

Acute aquatic toxicity (Category 1)

Chronic aquatic toxicity (Category 1)

Classification according to EU Directives 67/548/EEC or 1999/45/EC

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Label elements

Labelling according Regulation (EC) No 1272/2008 [CLP]

Pictogram

Signal word Warning

Hazard statement(s)

H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P273 Avoid release to the environment.

P501 Dispose of contents/ container to an approved waste disposal plant.

Supplemental Hazard Statements none

According to European Directive 67/548/EEC as amended.

Hazard symbol(s)

R-phrase(s)

R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

S-phrase(s)

S61 Avoid release to the environment. Refer to special instructions/ Safety data sheets.

Caution - substance not yet tested completely.

Other hazards - none

Section 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substances

Formula : C14H15Cl2N3OS

Molecular Weight : 344,26 g/mol

Component Concentration

3H-1,2,4-Triazole-3-thione, 2-[2-(1-chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-1,2-dihydro-

CAS-No. 178928-70-6 -

Section 4. FIRST AID MEASURES

Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

Most important symptoms and effects, both acute and delayed

Indication of any immediate medical attention and special treatment needed

no data available

Section 5. FIREFIGHTING MEASURES

Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special hazards arising from the substance or mixture

Carbon oxides, Hydrogen chloride gas, nitrogen oxides (NOx), Sulphur oxides

Nature of decomposition products not known.

Carbon oxides, nitrogen oxides (NOx), Sulphur oxides, Hydrogen chloride gas

Advice for firefighters

Wear self contained breathing apparatus for fire fighting if necessary.

Further information

no data available

Section 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure

adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the

environment must be avoided.

Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed

containers for disposal.

Reference to other sections

For disposal see section 13.

Section 7. HANDLING AND STORAGE

Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.

Provide appropriate exhaust ventilation at places where dust is formed.Normal measures for preventive fire protection.

Conditions for safe storage, including any incompatibilities

Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

Specific end uses

no data available

Section 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Components with workplace control parameters

Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices.

Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Body Protection

impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator.For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator

cartridges.
Use respirators and components tested and approved under appropriate government standards
such as NIOSH (US) or CEN (EU).

Section 9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

a) Appearance Form: crystalline
Colour: white
b) Odour odourless
c) Odour Threshold no data available
d) pH no data available
e) Melting point/freezing point no data available
f) Initial boiling point and boiling range no data available
g) Flash point no data available
h) Evaporation rate no data available
i) Flammability (solid, gas) no data available
j) Upper/lower flammability or explosive limits no data available
k) Vapour pressure no data available
l) Vapour density no data available
m) Relative density 1,360 g/cm3 at 20 °C
n) Water solubility no data available
o) Partition coefficient: n-octanol/water log Pow: 4,05
p) Autoignition temperature no data available
q) Decomposition temperature no data available
r) Viscosity no data available
s) Explosive properties no data available
t) Oxidizing properties no data available

Other safety information

no data available

Section 10. STABILITY AND REACTIVITY

Reactivity

no data available

Chemical stability

no data available

Possibility of hazardous reactions

no data available

Conditions to avoid

no data available

Incompatible materials

Strong oxidizing agents

Hazardous decomposition products

Other decomposition products - no data available

Section 11. TOXICOLOGICAL INFORMATION

Information on toxicological effects

Acute toxicity

Skin corrosion/irritation

Serious eye damage/eye irritation

Eyes - rabbit - Mild eye irritation

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity

no data available

Specific target organ toxicity - single exposure

no data available

Specific target organ toxicity - repeated exposure

no data available

Aspiration hazard

no data available

Potential health effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.

Ingestion May be harmful if swallowed.

Skin May be harmful if absorbed through skin. May cause skin irritation.

Eyes Causes eye irritation.

Additional Information

RTECS: Not available

Section 12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish LC50 - Oncorhynchus mykiss (rainbow trout) - 1,83 mg/l - 96,0 h

Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia magna (Water flea) - 1,2 mg/l - 48 h

Toxicity to algae EC50 - Cyprinus carpio (Carp) -

0,88 mg/l - 96 h

Persistence and degradability

no data available

Bioaccumulative potential

no data available

Mobility in soil

no data available

Results of PBT and vPvB assessment

no data available

Other adverse effects

Very toxic to aquatic life.

Section 13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

Section 14. TRANSPORT INFORMATION

UN number

ADR/RID: 3077 IMDG: 3077 IATA: 3077

UN proper shipping name

ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (3H-1,2,4-Triazole-3-thione, 2-[2-(1-chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-1,2-dihydro-)

IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (3H-1,2,4-Triazole-3-thione, 2-[2-(1-chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-1,2-dihydro-)

IATA: Environmentally hazardous substance, solid, n.o.s. (3H-1,2,4-Triazole-3-thione, 2-[2-(1-chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-1,2-dihydro-)

Transport hazard class(es)

ADR/RID: 9 IMDG: 9 IATA: 9

Packaging group

ADR/RID: III IMDG: III IATA: III

Environmental hazards

ADR/RID: yes IMDG Marine pollutant: yes IATA: yes

Special precautions for user

Further information

EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination

packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

Section 15. REGULATORY INFORMATION

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

Safety, health and environmental regulations/legislation specific for the substance or mixture

no data available

Chemical Safety Assessment

no data available

Section 16. OTHER INFORMATION

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

5. Indoxacarb

Indoxacarb-MATERIAL SAFETY DATA SHEET

1.Identification

1.1GHS Product identifier

Product name	Indoxacarb

1.2Other means of identification

Product number	-

Other names	methyl 7-chloro-2-[methoxycarbonyl-[4-(trifluoromethoxy) phenyl]carbamoyl]-3,5-dihydroindeno[1,2-e][1,3,4]oxadiazine-4a-carboxylate

1.3Recommended use of the chemical and restrictions on use

Identified uses	For industry use only.
Uses advised against	no data available

1.4Supplier's details

Company	MOLBASE (Shanghai) Biotechnology Co., Ltd.
Address	Floor 5th, Building 12, No. 1001 North Qinzhou Road,Xuhui Distric
Telephone	86(21)54365062
Fax	86(21)54365166

1.5Emergency phone number

Emergency phone number	86(21)54365062
Service hours	Monday to Friday, 9am-5pm (Standard time zone: UTC/GMT +8 hours).

2.Hazard identification

2.1Classification of the substance or mixture

Acute toxicity - Oral, Category 3
Skin sensitization, Category 1B
Acute toxicity - Inhalation, Category 4
Specific target organ toxicity – repeated exposure, Category 1
Hazardous to the aquatic environment, short-term (Acute) - Category Acute 1
Hazardous to the aquatic environment, long-term (Chronic) - Category Chronic 1

2.2GHS label elements, including precautionary statements

Pictogram(s)

Signal word	Danger
Hazard statement(s)	H301 Toxic if swallowed H317 May cause an allergic skin reaction H332 Harmful if inhaled H372 Causes damage to organs through prolonged or repeated exposure H410 Very toxic to aquatic life with long lasting effects
Precautionary statement(s)	
Prevention	P264 Wash ... thoroughly after handling. P270 Do not eat, drink or smoke when using this product. P261 Avoid breathing dust/fume/gas/mist/vapours/spray. P272 Contaminated work clothing should not be allowed out of the workplace. P280 Wear protective gloves/protective clothing/eye protection/ face protection. P271 Use only outdoors or in a well-ventilated area. P260 Do not breathe dust/fume/gas/mist/vapours/spray. P273 Avoid release to the environment.
Response	P301+P310 IF SWALLOWED: Immediately call a POISON CENTER/ doctor/… P321 Specific treatment (see ... on this label). P330 Rinse mouth. P302+P352 IF ON SKIN: Wash with plenty of water/... P333+P313 If skin irritation or rash occurs: Get medical advice/ attention. P362+P364 Take off contaminated clothing and wash it before reuse. P304+P340 IF INHALED: Remove person to fresh air and keep com breathing. P312 Call a POISON CENTER/doctor/…if you feel unwell. P314 Get medical advice/attention if you feel unwell. P391 Collect spillage.
Storage	P405 Store locked up.
Disposal	P501 Dispose of contents/container to ...

2.3Other hazards which do not result in classification

none

3.Composition/information on ingredients

3.1Substances

Chemical name	Common names and synonyms	CAS number	EC number	Concentration
Indoxacarb	Indoxacarb	144171-61-9	none	100%

4.First-aid measures

4.1Description of necessary first-aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2Most important symptoms/effects, acute and delayed

no data available

4.3Indication of immediate medical attention and special treatment needed, if necessary

no data available

5.Fire-fighting measures

5.1Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2Specific hazards arising from the chemical

no data available

5.3Special protective actions for fire-fighters

Wear self-contained breathing apparatus for firefighting if necessary.

6.Accidental release measures

6.1Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3Methods and materials for containment and cleaning up

Pick up and arrange disposal. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7.Handling and storage

7.1Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Avoid exposure - obtain special instructions before use.Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2Conditions for safe storage, including any incompatibilities

Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

8.Exposure controls/personal protection

8.1Control parameters

Occupational Exposure limit values

no data available

Biological limit values

no data available

8.2Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

8.3Individual protection measures, such as personal protective equipment (PPE)

Eye/face protection

Safety glasses with side-shields conforming to EN166. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Wear impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace. Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique(without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands. The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Respiratory protection

Wear dust mask when handling large quantities.

Thermal hazards

no data available

9.Physical and chemical properties

Physical state	no data available
Colour	no data available
Odour	no data available
Melting point/ freezing point	139-141ºC
Boiling point or initial boiling point and boiling range	571.4ºC at 760 mmHg
Flammability	no data available
Lower and upper explosion limit / flammability limit	no data available
Flash point	299.3ºC
Auto-ignition temperature	no data available
Decomposition temperature	no data available
Ph	no data available

Kinematic viscosity	no data available
Solubility	no data available
Partition coefficient n-octanol/water (log value)	no data available
Vapour pressure	no data available
Density and/or relative density	1.53
Relative vapour density	no data available
Particle characteristics	no data available

10.Stability and reactivity

10.1Reactivity

no data available

10.2Chemical stability

Stable under recommended storage conditions.

10.3Possibility of hazardous reactions

no data available

10.4Conditions to avoid

no data available

10.5Incompatible materials

no data available

10.6Hazardous decomposition products

no data available

11.Toxicological information

Acute toxicity

- Oral: no data available
- Inhalation: no data available
- Dermal: no data available

Skin corrosion/irritation

no data available

Serious eye damage/irritation

no data available

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

no data available

Reproductive toxicity

no data available

STOT-single exposure

no data available

STOT-repeated exposure

no data available

Aspiration hazard

no data available

12.Ecological information

12.1Toxicity

- Toxicity to fish: no data available
- Toxicity to daphnia and other aquatic invertebrates: no data available
- Toxicity to algae: no data available
- Toxicity to microorganisms: no data available

12.2Persistence and degradability

no data available

12.3Bioaccumulative potential

no data available

12.4Mobility in soil

no data available

12.5Other adverse effects

no data available

13.Disposal considerations

13.1Disposal methods

Product

The material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.

Contaminated packaging

Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.

14.Transport information

14.1UN Number

ADR/RID: UN307 IMDG: UN3077 IATA: UN3077

14.2UN Proper Shipping Name

ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.

IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.

IATA: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.

14.3Transport hazard class(es)

ADR/RID: unknown IMDG: unknown IATA: unknown

14.4Packing group, if applicable

ADR/RID: unknown IMDG: unknown IATA: unknown

14.5Environmental hazards

ADR/RID: yes IMDG: yes IATA: yes

14.6Special precautions for user

no data available

14.7Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

no data available

15.Regulatory information

15.1Safety, health and environmental regulations specific for the product in question

Chemical name	Common names and synonyms	CAS number	EC number
Indoxacarb	Indoxacarb	144171-61-9	none
European Inventory of Existing Commercial Chemical Substances (EINECS)			Not Listed.
EC Inventory			Not Listed.
United States Toxic Substances Control Act (TSCA) Inventory			Not Listed.
China Catalog of Hazardous chemicals 2015			Not Listed.
New Zealand Inventory of Chemicals (NZIoC)			Not Listed.
Philippines Inventory of Chemicals and Chemical Substances (PICCS)			Not Listed.
Vietnam National Chemical Inventory			Not Listed.
Chinese Chemical Inventory of Existing Chemical Substances (China IECSC)			Not Listed.

16.Other information

Abbreviations and acronyms

- CAS: Chemical Abstracts Service
- ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
- RID: Regulation concerning the International Carriage of Dangerous Goods by Rail
- IMDG: International Maritime Dangerous Goods
- IATA: International Air Transportation Association
- TWA: Time Weighted Average
- STEL: Short term exposure limit
- LC50: Lethal Concentration 50%
- LD50: Lethal Dose 50%
- EC50: Effective Concentration 50%
-

6. Metalaxyl

MATERIAL SAFETY DATA SHEET

(MSDS)

Metalaxyl

1. Chemical Product Identification

Product Name: Metalaxyl

Content: 98%;35WP

Molecular Formula: C15H21NO4
Molecular Weight: 279.34
Structural Formula:
Chemical Name: Methyl N-(2,6-dimethylphenyl)-N-(methoxyacetyl)-DL-aalaninate
Color: white
Odor: slight specific odor
CAS No.: 57837-19-1
UN No.: 2588

2. Composition / Information On Ingredients

Composition CAS No. Content %
Metalaxyl 57837-19-1 98.0
Others ingredients 2.0

3. Hazards Identification

Component Sympol R phrases
Metalaxyl T R25/36/38
More important danger for the man: none
Dangers for the environment: toxic to fish and bees
Physical-chemical dangers: none

4. First Aid Measures

Skin: wash thoroughly with soap and water.
Eyes: flush with plenty of water for at least 15 minutes. See medical attention if irritation develops or persists.
Inhalation: move to fresh air.
Ingestion: if oral contamination, drink 1-2 glasses of water and milk. Call physician/poison control center immediately.

5. Fire-Fighting Measures

Extinguishing media:
To be used: dry chemical, foam, carbon dioxide.
Don't use: not applicable
Particular risk: not applicable
Measures of personal protection: safety glasses or goggles, rubber gloves, shoes plus socks, long-sleeved shirt, and long pants.
Environmental cautions
EX: prevent the contamination of the floor and of beds of water.

6. Accidental Release Measures

Personal cautions: safety glasses or goggles, rubber gloves, shoes plus socks, long-sleeved shirt, and long pants.
Cleaning methods
EX: pick up for sweeping or asplation avoiding the powder formation. Transfer to a properly labeled deposit that will be closed and sealed until the recovery of climination of the product.

7. Handling And Storage

Handling: do not apply to humans, their clothing, or beding. Do not contaminate food or use on household tanks.
Storage: Technical protective measures: store in original container only in cool, dry, well-ventilated, secure area at minimum storage temperatures and out of reach of children and animals.
Fire and explosion protection: the area must be far from fire and flammable materials
Enviromental cautions
EX: prevent the contamination of the floor and of beds of water.

8. Exposure Controls / Personal Protection

Personal protective equipment
Respiratory protection: approved respirator
Protective gloves: rubber gloves
Eye protection: goggles
Industrial hygiene: appropriate protective clothing.

9. Physical And Chemical Properties

Melting point: 63.5-72.3℃
Boiling point : 295.9℃
Relative Density: 1.20@20℃
Vapor pressure : 0.75mPa@25℃
Partition coefficient KowlogP=1.75@25℃
Water solubility: 7.1g/L
Other solubilities: petroleum ether v.s.; alcohol v.s.; benzene v.s.
PH value: 5-8
Flash point: 155 ℃
Ignition temperature: not applicable

10. Stability And Reactivity

Conditions to avoid: fire, feed, food and beds of water
Products to avoid: strong oxidizing agnets, alkalis and acids.
Thermal decomposition: not applicable
Hazardous decomposition products: oxides of carbon and nitrogen and other toxic nitrogen compounds on combustion.
Hazardous reaction: none

11. Toxicological Information

Contact with the skin: Irritive to skin
Contact with the eyes: Eyes become red
Inhalation: Irritative to respiratory tract
Ingestion: nausea, vomiting and breathing difficulty.
Sharp toxicity: not applicable
Effects for chronic exhibition
Chronic toxicity: A 90-day study of rats exposed to 0.1 to 2.5 mg/kg/day in diet, showed some cellular enlargement in the liver at the highest dose. In a similar study

with dogs fed diets of approximately 0.04 to 0.8 mg/kg/day for 6 months, the dogs were adversely affected by the highest dose. Manifestations included increase blood alkaline phosphatase and increased liver- to- brain weight ratio.

Reproductive effects: A three- generation rat study where animals were fed up to 2.5 mg/kg/day showed no compound related maternal toxicity or reproductive effects.

These data suggest that metalaxyl is unlikely to cause reproductive effects.

Teratogenic effects: Rats given a dosage of 120 mg/kg/day by stomach tube on days 6 to 15 of gestation exhibited no embryotoxicity or teratogenicity, nor did rabbits given a dosage of 20 mg/kg/day by the same route on day 6 to 8. These data suggest that metalaxyl is not teratogenic.

Mutagenic effects: Studies including a dominant lethal assay in male mice indicate that metalaxyl has no mutagenic potential.

Carcinogenic effects:Available studies of the carcinogenicity of metalaxyl are inconclusive.

Organ toxicity: The liver is the primary target organ for metalaxyl in animal systems.

Sensisation: non-sensitive

12. Ecological And Ecotoxicological Information

Fate in humans and animals:

Studies with rats and goats showed rapid metabolism and excretion via the urine and feces. Metalaxyl is metabolized to a variety of products before excretion. Forty-day feeding studies with dairy cattle at 15 ppm/day, showed less than 0.01 ppm was stored in the muscle and fat. The liver contained 0.13 to 0.20 ppm and the kidney 0.26 to 0.83 ppm. Chickens fed for 28 days at 5 ppm in the diet had less than 0.05 ppm in the eggs, skin, fat, breast, and thigh, and less than 0.1 ppm in the liver.

Effects on birds: Metalaxyl is reported to be practically nontoxic to birds.

Effects on aquatic organisms: Metalaxyl is practically nontoxic to freshwater fish. The 96-hours LC50 values in rainbow trout, carp, and bluegill are all above 100 mg/L.

Freshwater aquatic invertebrates are slightly more susceptible to metalaxyl. Daphnia magna, a small freshwater crustacean, has an LC50 of 12.5 to 28 mg/L, depending on the product formulation. This indicates that metalaxyl is slightly toxic to this organism.

There is little tendency for metalaxyl to accumulate in the edible portion of fish.

Metalaxyl did not accumulate beyond seven times the background concentration and it was quickly eliminated after exposed fish were placed in fresh (metalaxyl-free) water.

Effects on other organisms: Metalaxyl in nontoxic to bees.

13. Disposal Considerations

Product: dispose of in compliance with all state and local haws and regulation.

14. Transpor Information

PG: III

UN No.: 2588
CLASS: 6.1

15. Regulatory Information

Symbol: T
R phrases: R 23/25/36/38
S phrases: S 2/7/9/13/16/20/21/22/23

16. Other Information

All information and instructions provided in this Material Safety Data Sheet (MSDS) are based on the current state of scientific and technical knowledge at the date indicated on the present MSDS and are presented in good faith and believed to be correct. This information applies to the product as such. In case of new formulations or mixes, it is necessary to ascertain that a new danger will not appear. It is the responsibility of persons on receipt of this MSDS to ensure that the information contained herein is properly read and understood by all people who may use, handle, dispose or in any way come in contact with the product. If the recipient subsequently produce formulations containing this product, it is the recipients sole responsibility to ensure the transfer of all relevant information from this MSDS to their own MSDS.

7. Propiconazole

1. IDENTIFICATION

Product name: Quali-Pro®Propiconazole 14.3
Chemical name of active ingredient(s): Propiconazole: 1-[[2-(2,4-dichlorophenyl)-4-propyl-1 , 3-dioxolan-
2-yl]Methyl]-1H-1,2,4-triazole
Manufacturer/Registrant: Makhteshim Agan of North America, Inc.
4515 Falls of Neuse Road, Suite 300
Raleigh, NC 27609
Phone: 919-256-9300
For fire, spill, and/or leak emergencies, contact
Infotract:
Phone: 1-800-535-5053
For medical emergencies and health and safety inquiries, contact Prosar:
Phone: 1-877-250-9291

2. COMPOSITION/INFORMATION ON INGREDIENTS

COMMON NAME CAS NO. % OSHA PEL ACIGH TLV OTHER
NTP/IARC/OSHA
(Carcinogen)
Propiconazole 60207-90-1 14.3 NA NA NA NA
NA=Not applicable

3. HAZARDS IDENTIFICATION

PHYSICAL PROPERTIES:

Appearance: Clear amber liquid.
Odor: Slight solvent odor.
EMERGENCY OVERVIEW: Warning. Causes substantial, but temporary eye injury. Do not get in eyes or on clothing. Harmful if swallowed, inhaled, or absorbed through skin. Avoid contact with skin or clothing. Avoid breathing vapor or spray mist.
PHYSICAL OR CHEMICAL HAZARDS: Do not use or store near heart or open flame.
HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition may produce toxic carbon and nitrogen oxides, and hydrogen chloride.
PRIMARY ROUTES OF EXPOSURE: Eye, skin, ingestion and inhalation.
4. FIRST AID
FIRST AID
· Hold eye open and rinse slowly and gently with water for 15 to 20 minutes.
· Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.
IF IN EYES:
· Call a poison control center or doctor for treatment advice.
· Take off contaminated clothing.
· Rinse skin immediately with plenty of water for 15 to 20 minutes.
IF ON SKIN ORCLOTHING:
· Call a poison control center or doctor for treatment advice.
· Immediately call a poison control center or doctor.
· Do not give any liquid to the person.
· Do not induce vomiting unless told to do so by a poison control center or doctor.
IF SWALLOWED:
· Do not give anything by mouth to an unconscious person.
· Move person to fresh air.
· If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible.
IF INHALED:
· Call a poison control center or doctor for further treatment advice.
Have the product container or label with you when calling a poison control center or doctor or going for treatment.
For medical emergencies involving this product call Prosar at 1-877-250-9291.
NOTE TO PHYSICIAN: There is no specific antidote for this product. Induce emesis or lavage stomach, taking care to avoid aspiration of stomach contents into lungs.
5. FIRE FIGHTING MEASURES
FLASH POINT: 165°F (92°C) (TCC)
FLAMMABLE LIMITS (LFL-UFL): Not available.
EXTINGUISHING MEDIA: Foam, dry chemical, carbon dioxide, or water spray.
SPECIAL FIRE-FIGHTING PROCEDURES: Evacuate area and fight fire upwind from a safe distance to avoid hazardous vapors an decomposition products. Foam and/or dry chemical are preferred to minimize environmental contamination. If water is

used, dike and collect water to prevent run off. Wear self-contained breathing apparatus and full fire-fighting turn-out gear (Bunker gear).

HAZARDOUS THERMAL DECOMPOSITION PRODUCTS: Thermal decomposition may produce toxic carbon and nitrogen oxides, and hydrogen chloride.

6. ACCIDENTAL RELEASE MEASURES

Clean up spills immediately. Isolate hazard area. Keep unnecessary and unprotected personnel from entering.

SMALL SPILL: Absorb small spills or sand, vermiculite or other inert absorbent. Place contaminated material in appropriate container for disposal.

LARGE SPILL: Dike large spills using absorbent or impervious material such as clay or sand. Recover and contain as much free liquid as possible for reuse. Allow absorbed material to solidify, and scrape up for disposal.

Pick up wash liquid with additional absorbent and place in a disposable container. After removal, flush contaminated area thoroughly with water. This material should be prevented from contaminating soil or from entering sewage and drainage systems and bodies of water.

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Handle and open container in a manner as to prevent spillage.

Do not get on skin or in eyes. Do not eat, drink or smoke during work; wash hands and face thoroughly before doing so. Immediately wash off accidental splashes of the concentrate or spray mixture from skin, clothing and out of eyes.

PRECAUTIONS TO BE TAKEN IN STORAGE: To prevent contamination, store this product away from food or feed.

STORAGE TEMPERATURE (MIN/MAX): Do not store above 150°F(66°C) or below 20°F.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

THE FOLLOWING RECOMMENDATIONS FOR EXPOSURE CONTROLS/PERSONAL PROTECTION ARE INTENDED FOR THE MANUFACTURE, FORMULATION, PACKAGING AND USE OF THIS PRODUCT.

FOR COMMERCIAL APPLICATIONS AND/OR ON-FARM APPLICATIONS CONSULT THE PRODUCT

LABEL.

EYE PROTECTION: Protective goggles or full-face shield.

SKIN PROTECTION: Long-sleeved shirt, long pants, shoes plus socks. Chemical-resistant footwear and overalls.

HAND PROTECTION: Chemical-resistant gloves such as barrier laminate, butyl rubber, nitrile, neoprene rubber, polyvinyl chloride (PVC), or Viton.

ADDITIONAL PROTECTIVE MEASURES: Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning and maintaining PPE. If no such instructions for washables, use detergent and hot water.

Keep and wash PPE separately from other laundry.

USER SAFETY RECOMMENDATIONS:

Users should:

· Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.

· Remove clothing immediately after handling this product. Wash outside of gloves before removing. As

soon as possible, wash thoroughly and change into clean clothing.

EXPOSURE GUIDELINES: Refer to Section 2.

ENGINEERING CONTROLS: Refer to product label.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Clear amber liquid.

ODOR: Slight solvent odor.

FLASH POINT: 165°F (92°C)

pH: 5.6-6.0

DENSITY: 1 . 082

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal conditions.

CONDITIONS TO AVOID: Avoid temperatures above 150°F and below 20°F. Avoid contact with oxidizing alkaline and acidic conditions and materials.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition may produce toxic carbon and nitrogen oxides, and hydrogen chloride.

11. TOXICOLOGICAL INFORMATION

ACUTE TOXICITY:

Oral LD50 (rat) - > 3,000 mg/Kg

Dermal LD50 (rat) - > 2,000 mg/Kg

Inhalation LC50 (rat) - > 2.0 Mg/L/4 hour

Eye Irritation (rabbit) - Moderately

Skin Irritation (rabbit) - Slight

Sensitization (guinea pig) - Non-sensitizer

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL HAZARDS: This pesticide is toxic to fish. DO NOT apply directly to water, to areas where surface water is present, or to intertidal areas below the mean high water mark. DO NOT contaminate water when disposing of equipment washwater.

13. DISPOSAL CONSIDERATIONS:

END USERS MUST DISPOSE OF ANY UNUSED PRODUCT AS PER THE LABEL RECOMMENDATIONS.

PRODUCT DISPOSAL: Pesticide wastes are toxic. Improper disposal of unused pesticide, spray mixture, or rinse water is a violation of Federal law. If these wastes cannot be used according to label instructions, contact your

State Pesticide or Environmental Control Agency or the Hazardous Waste representative at the nearest EPA

Regional Office for guidance in proper disposal methods.

CONTAINER DISPOSAL: Dispose of product containers, waste containers, and residues according to label instructions and local, state, and federal health and environmental regulations.

14. TRANSPORT INFORMATION:

DOT CLASSIFICATION:

Not regulated

INTERNATIONAL TRANSPORTATION:

IMO (vessel): Not regulated

IATA (air): Not regulated

15. REGULATORY INFORMATION:MATERIAL SAFETY DATA SHEET

SARA TITLE III CLASSIFICATION:

Section 302: Not applicable.

Section 311/312: Acute health hazard (immediate)

Delayed health hazard (chronic)

Section 313: Propiconazole CAS #: 60207-9 0-1 (1 4 . 3%)

CA PROPOSITION 65: Not applicable.

CERCLA RQ: Not applicable.

RCRA CLASSIFICATION: Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste.

TSCA STATUS: The ingredients of this product are listed on the TSCA inventory or are exempt.

16. OTHER INFORMATION:

HAZARD RATINGS NFPA

HEALTH: 2 0 MINIMAL

FLAMMABILITY: 1 1 SLIGHT

REACTIVITY: 0 2 MODERATE

3 HIGH

4 SEVERE

MSDS Date: 8-24-09. Supercedes version dated 2-18-09. Changes made to Sections 1, 4, 13 and 14.

The information contained herein is given in good faith and is believed to be correct, but no warrant, express or implied, is made. Consult Makhteshim Agan of North America, Inc. for further information.

8. Prothioconazole

Prothioconazole: Material Safety Data Sheet
Version 4.0, Revision Date 03/12/2010
Print Date 10/02/2011
1. PRODUCT AND COMPANY IDENTIFICATION
Product name : Prothioconazole
Product Number : 34232
Brand : Fluka
Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone # : (314) 776-6555
2. HAZARDS IDENTIFICATION
Emergency Overview
OSHA Hazards
No known OSHA hazards
GHS Label elements, including precautionary statements
Pictogram
Signal word Warning
Hazard statement(s)
H320 Causes eye irritation.
H400 Very toxic to aquatic life.
H413 May cause long lasting harmful effects to aquatic life.
Precautionary statement(s)
P273 Avoid release to the environment.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
HMIS Classification
Health hazard: 0
Flammability: 0
Physical hazards: 0
NFPA Rating
Health hazard: 0
Fire: 0
Reactivity Hazard: 0
Potential Health Effects
Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Skin May be harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.

Ingestion May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : C14H15Cl2N3OS

Molecular Weight : 344.26 g/mol

CAS-No. EC-No. Index-No. Concentration

3H-1,2,4-Triazole-3-thione, 2-[2-(1-chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-1,2-
dihydro-

178928-70-6 - - -

4. FIRST AID MEASURES

If inhaled

If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters

Wear self contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions

Avoid dust formation. Ensure adequate ventilation.

Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling

Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage

Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment
Respiratory protection
Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Hand protection
For prolonged or repeated contact use protective gloves.
Eye protection
Safety glasses
Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.
Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
9. PHYSICAL AND CHEMICAL PROPERTIES
Appearance
Form crystalline
Colour white
Odour odourless
Safety data
pH no data available
Melting point no data available
Boiling point no data available
Flash point no data available
Ignition temperature no data available
Lower explosion limit no data available
Upper explosion limit no data available
Density 1.360 g/cm3 at 20 °C (68 °F)
Water solubility no data available
Partition coefficient:
n-octanol/water
log Pow: 4.05
10. STABILITY AND REACTIVITY
Chemical stability
Stable under recommended storage conditions.
Conditions to avoid
no data available
Materials to avoid
Strong oxidizing agents
Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas, nitrogen oxides (NOx), Sulphur oxides

11. TOXICOLOGICAL INFORMATION
Acute toxicity
Skin corrosion/irritation
Serious eye damage/eye irritation
Eyes - rabbit - Mild eye irritation
Respiratory or skin sensitization
no data available
Germ cell mutagenicity
no data available
Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
Reproductive toxicity
no data available
Specific target organ toxicity - single exposure (GHS)
no data available
Specific target organ toxicity - repeated exposure (GHS)
no data available
Aspiration hazard
no data available
Potential health effects
Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion May be harmful if swallowed.
Skin May be harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.
Additional Information
12. ECOLOGICAL INFORMATION
Toxicity
Toxicity to fish LC50 - Oncorhynchus mykiss (rainbow trout) - 1.83 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates.
EC50 - Daphnia magna (Water flea) - 1.2 mg/l - 48 h
Toxicity to algae EC50 - Cyprinus carpio (Carp) - 0.88 mg/l - 96 h
Persistence and degradability
no data available
Bioaccumulative potential
no data available

Mobility in soil
no data available
PBT and vPvB assessment
no data available
Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
13. DISPOSAL CONSIDERATIONS
Product
Observe all federal, state, and local environmental regulations.
Contaminated packaging
Dispose of as unused product.
14. TRANSPORT INFORMATION
DOT (US)
Not dangerous goods
IMDG
UN-Number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (3H-1,2,4-Triazole-3-thione, 2- [2-(1-chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-1,2-dihydro-)
Marine pollutant: No
IATA
UN-Number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (3H-1,2,4-Triazole-3-thione, 2-[2-(1- chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-1,2-dihydro-)
15. REGULATORY INFORMATION
OSHA Hazards
No known OSHA hazards
DSL Status
This product contains the following components that are not on the Canadian DSL nor NDSL lists.
3H-1,2,4-Triazole-3-thione, 2-[2-(1-chlorocyclopropyl)-3-(2- chlorophenyl)-2-hydroxypropyl]-1,2-dihydroCAS-No.
178928-70-6
SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
SARA 313 Components

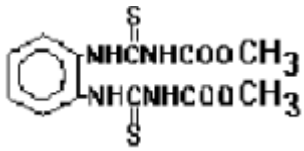
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold
(De Minimis) reporting levels established by SARA Title III, Section 313.
SARA 311/312 Hazards
No SARA Hazards
Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.
Pennsylvania Right To Know Components
3H-1,2,4-Triazole-3-thione, 2-[2-(1-chlorocyclopropyl)-3-(2- chlorophenyl)-2-hydroxypropyl]-1,2-dihydro CAS-No. 178928-70-6
Revision Date
New Jersey Right To Know Components
3H-1,2,4-Triazole-3-thione, 2-[2-(1-chlorocyclopropyl)-3-(2- chlorophenyl)-2-hydroxypropyl]-1,2-dihydro CAS-No. 178928-70-6
Revision Date
California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.
16. OTHER INFORMATION
Further information
Copyright 2010 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

9. Thiophanate Methyl

Thiophanate-methyl -MATERIAL SAFETY DATA SHEET
Manufacturer/information service:
ZHEJIANG RAYFULL CHEMICALS CO.,LTD
ADD: NO.113 PUXING ROAD, PUZHOU INDUSTRIAL PARK, LONGWAN DISTRICT, WENZHOU ZHEJIANG P.R. CHINA
Tel: +86-577-88905587 Fax: +86-577-88905567
Email: info@rayfull.com sales@rayfull.com

1. Chemical Product Identification
Product Name: Thiophanate-methyl

Molecular Formula: C12H14N4O4S2
Molecular Weight: 342.4
Structural Formula:



Chemical Name: dimethyl 4,4'-(o-phenylene)bis(3-thioallophanate) (IUPAC)
Color: Colorless
Form: Crystalloid
Odor: slight special odor
CAS No.: 23564-05-8
2. Composition / Information on Ingredients
Composition CAS No. Content %
Thiophanate-methyl 23564-05-8 97.0
Other ingredients 3.0
3. Hazards Identification
Component Symbol R phrases 2
Thiophanate-methyl Xn, Xi, N R68-20-43-50/53
More important danger for the man: None;
Dangers for the environment: Slight to moderately toxic to fish;
Physical-chemical dangers: Not applicable.
4. First Aid Measures
If poisoning occurs, immediately contact a doctor or Poisons Information Centre, and follow the advice given. Show this Material Safety Data Sheet to a doctor.
Eye: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for further treatment advice.
Skin: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.
Ingestion: If swallowed, drink 1 or 2 glasses of water (or milk) and induce vomiting by touching the back of the throat with finger. If possible, contact a physician, Poison Control Center, or emergency center before inducing vomiting. Do not induce vomiting or give anything by mouth to an unconscious person. Take person and product container to the nearest emergency treatment center.
Inhalation: If respiratory discomfort or irritation occurs, move the person to fresh air. See a doctor if discomfort or irritation continues. If not breathing, give artificial respiration, preferably mouth-to-mouth. Get medical attention.
Note to physician: No specific antidote. Treat symptomatically.
5. Fire-Fighting Measures
Extinguishing media: Powder, foam, and sand;
Don't use: not applicable;
Particular risk: not applicable;

Measures of personal protection: safety glasses or goggles, rubber gloves, shoes plus socks, long-sleeved shirt, and long pants.

6. Accidental Release Measures

Personal cautions: safety glasses or goggles, rubber gloves, shoes plus socks, long-sleeved shirt, and long pants.

Cleaning methods

EX: Clean up spill immediately. Absorb spill with inert material (such as dry sand or earth), then place in a chemical waste container. Wash area with soap and water. Pick up wash liquid with additional absorbent and place in a chemical waste container.

Environmental cautions

EX: prevent the contamination of the floor and of beds of water. Isolate contaminated water.

7. Handling and Storage

Handling: Avoid getting in eyes or on skin, or clothing and breathing dust. Remove contaminated clothing immediately. Wash thoroughly after handling.

Storage: Keep in original container. Do not store or transport near food or feed. Do not contaminate food or feed. Do not put concentrate into food or drink containers. Do not dilute concentrate in food or drink containers. Store in a cool, dry place, out of direct sunlight.

Fire and explosion protection: the area must be far from fire and flammable materials.

8. Exposure Controls/Personal Protection

Personal protective equipment

Respiratory protection: approved respirator;

Protective gloves: rubber gloves;

Eye protection: goggles;

Industrial hygiene: use good industrial hygiene. Wear face shield or goggles, elbow length PVC gloves, cotton overalls buttoned to the neck and wrist, washable hat and half face respirator with dust and vapor cartridge. After use and before eating, drinking or smoking, wash hands, arms and face thoroughly with soap and water.

9. Physical and Chemical Properties

Appearance: White powder;

Boiling point: Decomposes before boiling;

Vapor pressure: 0.0088mPa (25℃);

Melting point: Decomposes before melting;

Water solubility: 20mg/l (20℃);

Degradation point: 165℃;

Flash point: Not highly flammable;

Ignition temperature: Not applicable.

10. Stability and Reactivity

Stability: stable under the normal conditions;

Conditions to avoid: Fire, heat and high temperature;
Products to avoid: Incompatible with highly alkaline materials, oxidizing agents, lime sulfur, bordeux mixture, copper compounds;
Hazardous decomposition products: Thermal decomposition generates oxides of nitrogen, sulfur, and carbon.
11. Toxicological Information
Acute oral LD50 for rat: ＞5000mg/kg;
Acute dermal LD50 for rat: ＞2000mg/kg;
Inhalation LD50 (4h) for rat: 1.7mg/l;
Skin irritant for rabbit: Slight irritant;
Eye irritant for rabbit: Moderate irritant;
Sensisation for guinea pigs: Slight skin sensitiser.
Reproductive effects: Groups of Charles-River rats (10 males and 20 females per group) were fed levels of thiophanate-methyl in the diet at 0, 40, 160, 640 ppm in a three-generation, two-litters per generation reproduction study. There were no apparent effects of thiophanate-methyl at levels up to and including 640 ppm on any of the reproduction parameters measured in this experiment. In addition, gross and histological examinations of the F3b generation were performed on several tissues and organs of three-week-old rats and a further group of animals was examined for skeletal abnormalities. In no instance was there any effect of feeding thiophanate-methyl on reproduction. There was a definitive effect on the growth of animals fed dietary levels of 640 ppm.
Teratogenic effects: Thiophanate-methyl was administered to pregnant ICR mice from day 1 to day 15 of gestation at levels of 0, 40, 200, 500 and 1000 mg/kg/day. At 1000 mg/kg/day there was a significantly reduced number of living fetuses. No (significant) differences in the number of implantation sites, body weight of fetuses or fetal mortality or body weight were observed at the lower dosage levels. The administration of thiophanate-methyl did not produce gross internal or external abnormalities and the study did not reveal any teratogenic properties under these experimental conditions.
Mutagenic effects: Groups of 10 males ICR-strain mice were administered thiophanate-methyl intraperitoneally at a single dose level of 0, 8, 40, 200, 400 or 500 mg/kg and mated with virgin females which were replaced weekly for a period of eight weeks. At a dosage of 400 mg/kg and above there appeared to be a reduction in the incidence of pregnancies. However, there was no systematic variation indicative of a mutagenic potential over the entire eight-week mating period. Carcinogenic effects: There were no effects on tumor incidence in two-year feeding studies of mice or rats consuming the equivalent of up to 96 mg/kg body weight/day (640 ppm) or 32 mg/kg body weight/day of thiophanate-methyl, respectively. The metabolite MBC has produced liver tumors in two closely-related strains of mice which are susceptible to developing such tumors, but not in an unrelated mouse strain or in rats.

12. Ecological And Ecotoxicological Information
Effects on birds:
LD50 for wild duck : ＞4640mg/kg;
Effects on aquatic organisms:
LC50 (48h) for rainbow trout : 11.0mg/l;
Effects on other organisms:
LD50 for bees: ＞100μg/bee.
13. Disposal Considerations
Material that cannot be used at the site should be disposed of in an approved waste disposal facility following all applicable Federal, State and Local regulations. If burned, stay out of smoke. Do not contaminate water supplies by disposal of wastes or containers.
14. Transport Information
Not applicable.
15. Regulatory Information
Not applicable.
16. Other Information
All information and instructions provided in this Material Safety Data Sheet (MSDS) are based on the current state of scientific and technical knowledge at the date indicated on the present MSDS and are presented in good faith and believed to be correct. This information applies to the product as such. In case of new formulations or mixes, it is necessary to ascertain that a new danger will not appear. It is the responsibility of persons on receipt of this MSDS to ensure that the information contained herein is properly read and understood by all people who may use, handle, dispose or in any way come in contact with the product. If the recipient subsequently produce formulations containing this product, it is the recipients sole responsibility to ensure the transfer of all relevant information from this MSDS to their own MSDS.

10. Tricyclazole

Material Safety Data Sheet
Version 4.0
Revision Date 02/26/2010
Print Date 04/03/2011
1. PRODUCT AND COMPANY IDENTIFICATION
Product name : Tricyclazole
Product Number : 45808
Brand : Fluka
Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone : +1 800-325-5832

Fax : +1 800-325-5052
Emergency Phone # : (314) 776-6555
2. HAZARDS IDENTIFICATION
Emergency Overview
OSHA Hazards
Toxic by ingestion
GHS Label elements, including precautionary statements
Pictogram
Signal word Danger
Hazard statement(s)
H301 Toxic if swallowed.
H313 May be harmful in contact with skin.
H402 Harmful to aquatic life.
Precautionary statement(s)
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P273 Avoid release to the environment.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P312 Call a POISON CENTER or doctor/physician if you feel unwell.
P321 Specific treatment (see supplemental first aid instructions on this label).
P330 Rinse mouth.
P405 Store locked up.
P501 Dispose of contents/container to an approved waste disposal plant.
HMIS Classification
Health hazard: 2
Flammability: 0
Physical hazards: 0
NFPA Rating
Health hazard: 2
Fire: 0
Reactivity Hazard: 0
Potential Health Effects
Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Skin May be harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.
Ingestion Toxic if swallowed.
3. COMPOSITION/INFORMATION ON INGREDIENTS
Formula : C9H7N3S
Molecular Weight : 189.2 g/mol
CAS-No. EC-No. Index-No. Concentration

Tricyclazole
41814-78-2 255-559-5 611-007-00-9 -
4. FIRST AID MEASURES
General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.
If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.
In case of skin contact
Wash off with soap and plenty of water. Consult a physician.
In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.
If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.
5. FIRE-FIGHTING MEASURES
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.
6. ACCIDENTAL RELEASE MEASURES
Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation.
Environmental precautions
Do not let product enter drains.
Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Keep in suitable, closed containers for disposal.
7. HANDLING AND STORAGE
Precautions for safe handling
Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.
Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION
Contains no substances with occupational exposure limit values.
Personal protective equipment
Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a dust mask type N95 (US) or type P1 (EN 143) respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection

Handle with gloves.

Eye protection

Face shield and safety glasses

Skin and body protection

Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form solid

Safety data

pH no data available

Melting point no data available

Boiling point no data available

Flash point no data available

Ignition temperature no data available

Lower explosion limit no data available

Upper explosion limit no data available

Water solubility no data available

10. STABILITY AND REACTIVITY

Chemical stability

Stable under recommended storage conditions.

Conditions to avoid

no data available

Materials to avoid

Strong oxidizing agents

Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, nitrogen oxides (NOx), Sulphur oxides

11. TOXICOLOGICAL INFORMATION

Acute toxicity

LD50 Oral - rat - 250 mg/kg

LD50 Dermal - rabbit - > 2,000 mg/kg

Skin corrosion/irritation

no data available

Serious eye damage/eye irritation
no data available
Respiratory or skin sensitization
no data available
Germ cell mutagenicity
Genotoxicity in vitro - Hamster - Lungs
Cytogenetic analysis
Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
Reproductive toxicity
no data available
Specific target organ toxicity - single exposure (GHS)
no data available
Specific target organ toxicity - repeated exposure (GHS)
no data available
Aspiration hazard
no data available
Potential health effects
Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion Toxic if swallowed.
Skin May be harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.
Additional Information
RTECS: XZ5475000
12. ECOLOGICAL INFORMATION
Toxicity
Toxicity to fish LC50 - Cyprinus carpio (Carp) - 11 - 17 mg/l - 96 h
Persistence and degradability
no data available
Bioaccumulative potential
no data available
Mobility in soil
no data available
PBT and vPvB assessment
no data available

Other adverse effects
no data available
Avoid release to the environment.
13. DISPOSAL CONSIDERATIONS
Product
Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.
Contaminated packaging
Dispose of as unused product.
14. TRANSPORT INFORMATION
DOT (US)
UN-Number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. (Tricyclazole)
Marine pollutant: No
Poison Inhalation Hazard: No
IMDG
UN-Number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (Tricyclazole)
Marine pollutant: No
IATA
UN-Number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. (Tricyclazole)
15. REGULATORY INFORMATION
OSHA Hazards
Toxic by ingestion
DSL Status
This product contains the following components listed on the Canadian NDSL list. All other components are on the Canadian DSL list.
Tricyclazole
CAS-No.
41814-78-2
SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold
(De Minimis) reporting levels established by SARA Title III, Section 313.
SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.
Pennsylvania Right To Know Components
Tricyclazole
CAS-No.
41814-78-2
Revision Date
New Jersey Right To Know Components
Tricyclazole
CAS-No.
41814-78-2
Revision Date
California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other
reproductive harm.
16. OTHER INFORMATION
Further information
Copyright 2010 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

11. Imazethapyr

Imazethapyr -MATERIAL SAFETY DATA SHEET
Manufacturer/information service:
ZHEJIANG RAYFULL CHEMICALS CO.,LTD
ADD: NO.113 PUXING ROAD, PUZHOU INDUSTRIAL PARK, LONGWAN DISTRICT, WENZHOU ZHEJIANG P.R. CHINA
Tel: +86-577-88905587 Fax: +86-577-88905567
Email: info@rayfull.com sales@rayfull.com

1. Chemical Product Identification
Product Name: Imazethapyr
Molecular Formula: C15H19N3O3
Molecular Weight: 289.3

Structural Formula:
Chemical Name: 5-Ethyl-2-(4-isopropyl-4-methyl-5-oxo-1H-imidazolin-2-yl)nicotinic acid
Form: Crystal
Color: White
Odor: Odourless
CAS No.: 81385-77-5
2. Composition / Information on Ingredients
Composition CAS No. Content %
Imazethapyr 81385-77-5 10.0
Other ingredients 90.0
3. Hazards Identification
May irritate eyes and skin. Not flammable. Not Classified as hazardous according to the criteria of Worksafe Australia
4. First Aid Measures
If poisoning occurs, immediately contact a doctor or Poisons Information Centre, and follow the advice given. Show this Material Safety Data Sheet to a doctor.
Swallowed: If swallowed, immediately contact a doctor or Poisons Information Centre, and follow the advice given. Keep under medical supervision.
Eye: Rinse immediately with clean water, including under eyelids, for at least 15 minutes and obtain medical advice.
Skin: Remove contaminated clothing. Wash affected areas with plenty of soap and water.
Inhaled: If inhaled, remove to fresh air and obtain medical advice.
5. Fire-Fighting Measures
Fire Fighting Procedures: Firefighters should wear full protective gear, including self-contained breathing apparatus. If possible and without risk, remove intact containers from exposure to fire. Otherwise, spray unopened containers with water to keep cool.
Whenever possible, contain fire-fighting water by bunding area with sand or earth to prevent it entering any bodies of water.
Extinguishing Media: Carbon dioxide, water spray, dry agent, foam.
Stability and Reactivity: Stable under normal conditions of use. No dangerous reaction known under normal conditions of use. Avoid extreme heat and fire. Toxic thermal decomposition products may include oxides of carbon, sulphur and nitrogen and compounds of chlorine and fluorine.
6. Accidental Release Measures
Dealing with spills and disposal may result in the potential for increased personal exposure. During such operations it is recommended that the following protective clothing is worn: Cotton overalls buttoned to the neck and wrist Waterproof gloves Contain spill, sweep up or shovel and place in properly labelled sealed drums for

safe disposal. Deal with all spillages immediately. If contamination of drains, streams, watercourses etc. is unavoidable, warn the local water authority.

7. Handling and Storage

Handling: Keep out of reach of children. Avoid contact with eyes, skin and clothing. Wear long sleeved overalls and gloves while handling. After handling and before eating, drinking or smoking, wash hands, arms and face thoroughly with soap and water.

Storage: Store in the closed original container in a cool, well ventilated, locked place out of the reach of children. Do not store in direct sunlight.

8. Exposure Controls/Personal Protection

Exposure standards: No occupational exposure standards have been established for the product or its ingredients.

Engineering controls: Control process conditions to avoid contact.

Personal Protective Equipment:

Eyes: Not normally required. Avoid touching eyes while handling product.

Clothing: Avoid skin contact; full-length work clothes should be worn when using this product.

Gloves: Avoid contact with skin; wear waterproof gloves.

Respiratory: Not required.

9. Physical and Chemical Properties

Appearance: yellow liquid

pH: 7.0-9.0

Boiling point: about 100℃

Density: about 1.04g/l

Solubility in water: miscible

10. Stability and Reactivity

Chemical stability: Stable under normal conditions of use. No dangerous reaction known under normal conditions.

Hazardous polymerisation: None

Conditions to avoid: Extreme heat and fire

Incompatible materials: None known

Hazardous decomposition products: Thermal decomposition may produce toxic by-products of carbon and nitrogen.

11. Toxicological Information

Acute oral LD50 (rat) : >5000 a.i.mg/kg

Acute dermal LD50(rat) : >2000 a.i.mg/kg

Acute InhalationLC50(rat, 4h): 3.27 a.i.mg/l air

Skin irritation: mild irritating to rabbit skin

Eye irritation: moderate irritating to rabbit eyes

Skin Sensitization: non-sensitive (Guinea Pig)

12. Ecological And Ecotoxicological Information

Rainbow trout: LC50(96h): 340 a.i.mg/L

Daphnia: LC50(48h): >1000 mg/L
Bobwhite Quail: LD50(8d): >2150 a.i.mg/kg
Mallard duck: LD50: >2150 a.i.mg/kg
Honeybees: LC50(contact):>0.1 a.i.mg/bee

13. Disposal Considerations

Triple or (preferably) pressure rinse containers before disposal. Add rinsings to the spray tank. Do not dispose of undiluted chemicals on-site. If recycling replace cap and return clean containers to recycler or designated collection point. If not recycling, break, crush or puncture and bury empty containers in a local authority landfill. If no landfill is available bury the containers below 500 mm in a disposal pit specifically marked and set up for this purpose clear of waterways, desirable vegetation and tree roots. Empty containers and product should not be burnt.

14. Transport Information

Not applicable.

15. Regulatory Information

Not applicable.

16. Other Information

All information and instructions provided in this Material Safety Data Sheet (MSDS) are based on the current state of scientific and technical knowledge at the date indicated on the present MSDS and are presented in good faith and believed to be correct. This information applies to the product as such. In case of new formulations or mixes, it is necessary to ascertain that a new danger will not appear. It is the responsibility of persons on receipt of this MSDS to ensure that the information contained herein is properly read and understood by all people who may use, handle, dispose or in any way come in contact with the product. If the recipient subsequently produce formulations containing this product, it is the recipients sole responsibility to ensure the transfer of all relevant information from this MSDS to their own MSDS.

Raw Material:

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS | J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

TOLUENE

1. Product Identification

Synonyms: Methylbenzene; Toluol; Phenylmethane
CAS No.: 108-88-3
Molecular Weight: 92.14
Chemical Formula: C6H5-CH3
Product Codes:
J.T. Baker: 5375, 5812, 9336, 9351, 9364, 9456, 9457, 9459, 9460, 9462, 9466, 9472, 9476
Mallinckrodt: 4483, 8092, 8604, 8608, 8610, 8611, V560

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Toluene	108-88-3	100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR HARMFUL. FLAMMABLE LIQUID AND VAPOR. MAY AFFECT LIVER, KIDNEYS, BLOOD SYSTEM, OR CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation may cause irritation of the upper respiratory tract. Symptoms of overexposure may include fatigue, confusion, headache, dizziness and drowsiness. Peculiar skin sensations (e. g. pins and needles) or numbness may be produced. Very high concentrations may cause unconsciousness and death.

Ingestion:
Swallowing may cause abdominal spasms and other symptoms that parallel over-exposure from inhalation. Aspiration of material into the lungs can cause chemical pneumonitis, which may be fatal.
Skin Contact:
Causes irritation. May be absorbed through skin.
Eye Contact:
Causes severe eye irritation with redness and pain.
Chronic Exposure:
Reports of chronic poisoning describe anemia, decreased blood cell count and bone marrow hypoplasia. Liver and kidney damage may occur. Repeated or prolonged contact has a defatting action, causing drying, redness, dermatitis. Exposure to toluene may affect the developing fetus.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or impaired liver or kidney function may be more susceptible to the effects of this substance. Alcoholic beverage consumption can enhance the toxic effects of this substance.

---

4. First Aid Measures

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. CALL A PHYSICIAN IMMEDIATELY.
Ingestion:
Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately. If vomiting occurs, keep head below hips to prevent aspiration into lungs.
Skin Contact:
In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician immediately.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Flash point: 7C (45F) CC
Autoignition temperature: 422C (792F)
Flammable limits in air % by volume:
lel: 3.3; uel: 19
Flammable liquid and vapor!
Dangerous fire hazard when exposed to heat or flame. Vapors can flow along surfaces to distant ignition source and flash back.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire or explosion. Sensitive to static discharge.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures.
Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Water spray may be used to keep fire exposed containers cool.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

---

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

Toluene:

- OSHA Permissible Exposure Limit (PEL):

200 ppm (TWA); 300 ppm (acceptable ceiling conc.); 500 ppm (maximum conc.).

- ACGIH Threshold Limit Value (TLV):

50 ppm (TWA) skin, A4 - Not Classifiable as a Human Carcinogen.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face

piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:

Clear, colorless liquid.

Odor:

Aromatic benzene-like.

Solubility:

0.05 gm/100gm water @ 20C (68F).

Specific Gravity:

0.86 @ 20C / 4 C

pH:

No information found.

% Volatiles by volume @ 21C (70F):

100

Boiling Point:

111C (232F)

Melting Point:

-95C (-139F)

Vapor Density (Air=1):

3.14

Vapor Pressure (mm Hg):

22 @ 20C (68F)

Evaporation Rate (BuAc=1):

2.24

---

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage. Containers may burst when heated.

Hazardous Decomposition Products:

Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Heat, flame, strong oxidizers, nitric and sulfuric acids, chlorine, nitrogen tetraoxide; will attack some forms of plastics, rubber, coatings.

Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

---

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 636 mg/kg; skin rabbit LD50: 14100 uL/kg; inhalation rat LC50: 49 gm/m3/4H; Irritation data: skin rabbit, 500 mg, Moderate; eye rabbit, 2 mg/24H, Severe. Investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
Has shown some evidence of reproductive effects in laboratory animals.

--------\Cancer Lists\----------

	---NTP Carcinogen---		
Ingredient	Known	Anticipated	IARC Category
Toluene (108-88-3)	No	No	3

---

12. Ecological Information

Environmental Fate:
When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day. This material is not expected to significantly bioaccumulate. This material has a log octanol-water partition coefficient of less than 3.0. Bioconcentration factor = 13.2 (eels).
Environmental Toxicity:
This material is expected to be toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

---

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TOLUENE
Hazard Class: 3
UN/NA: UN1294

Packing Group: II
Information reported for product/size: 390LB

International (Water, I.M.O.)

Proper Shipping Name: TOLUENE
Hazard Class: 3
UN/NA: UN1294
Packing Group: II
Information reported for product/size: 390LB

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15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient TSCA EC Japan Australia
---------- ---- --- ----- ---------
Toluene (108-88-3) Yes Yes Yes Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
--Canada--
Ingredient Korea DSL NDSL Phil.
---------- ----- --- ---- -----
Toluene (108-88-3) Yes Yes No Yes

--------\Federal, State & International Regulations - Part 1\----------------
-SARA 302- ------SARA 313------
Ingredient RQ TPQ List Chemical Catg.
---------- --- ----- ---- --------------
Toluene (108-88-3) No No Yes No

--------\Federal, State & International Regulations - Part 2\----------------
-RCRA- -TSCA-
Ingredient CERCLA 261.33 8(d)
---------- ------ ------ ------
Toluene (108-88-3) 1000 U220 No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Pure / Liquid)
WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 3[Y]E
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **2** Flammability: **3** Reactivity: **0**

Label Hazard Warning:

POISON! DANGER! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR HARMFUL. FLAMMABLE LIQUID AND VAPOR. MAY AFFECT LIVER, KIDNEYS, BLOOD SYSTEM, OR CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

Label Precautions:

Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.

Label First Aid:

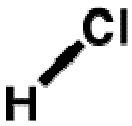
Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If vomiting occurs, keep head below hips to prevent aspiration into lungs. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician immediately.

Product Use:

Laboratory Reagent.

Hydrochloric acid

- Muriatic acid

Formula	HCl (Cl(2)H)
Structure	
Description	An aqueous solution of HCl. Colorless liquid with a pungent odor.
Uses	In the production of chlorides, refining ore in the production of tin and tantalum, for the neutralization of basic systems, as laboratory reagent, hydrolyzing of starch and proteins in the preparation of various food products, pickling and cleaning of metal products, as catalyst and solvent in organic synthesis, for oil- and gas-well treatment, in removing scale from boilers and heat-exchange equipment, pharmaceutic aid (acidifier).

Registry Numbers and Inventories.

CAS	7647-01-0
EC (EINECS/ELINCS)	231-595-7
EC Index Number	017-002-00-2
EC Class	Toxic; Corrosive
EC Risk Phrase	R:34-37
EC Safety Phrase	S:26-45
ENCS (MITI)	1-215
RTECS	MW4025000
RTECS class	Tumorigen (C); Mutagen (M); Reproductive Effector (T); Human Data (P); Primary Irritant (S)
UN (DOT)	1789
Merck	13,4801

Listed on the Toxic Substancs Control Act (TSCA).

Listed on Canadian Domestic Substances List (DSL).

Listed on Australian Inventory of Chemical Substances (AICS).

Properties.

Formula mass	36.46
Melting point, °C	-114.9
Boiling point, °C	-85.06
Vapor pressure, mm_{Hg}	88 torr (-115.5 °C)
Vapor density (air=1)	1.25

Critical temperature	51.4
Critical pressure	81.6 atm
Density	1.18 g/cm^3
Solubility in water	Miscible
Viscosity	0.311 cp (-100 °C)
Heat of fusion	1.98 kJ/mol
Heat of vaporization	178 btu/lb
Odor threshold	7.0 mg/m^3

Hazards and Protection.

Storage	Keep away from oxidizing agents, particularly nitric acid and chlorates. Safeguard containers against mechanical injury.
Handling	Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed. Emergency eyewash fountains and safety showers should be available in the immediate vicinity of potential exposure. Do not puncture or incinerate containers.
Protection	Wear appropriate chemical protective clothing.
Respirators	Wear positive pressure self-contained breathing apparatus.
Small spills/leaks	Keep material out of water sources and sewers. Attempt to stop leak if without undue personnel hazard. Use water spray to knock-down vapors. Neutralize spilled material with crushed limestone, soda ash, or lime. Do not use water on material itself. Vapor knockdown water is corrosive or toxic and should be diked for containment. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete.
Stability	Stable - contact with common metals produces hydrogen which may form explosive mixtures with air.
Incompatibilities	Reacts rapidly and exothermically with bases of all kinds. Reacts

	exothermically with carbonates (and hydrogen carbonates to generate carbon dioxide Reacts with sulfides, carbides, borides, phosphides, many metals (including aluminum, zinc, calcium, magnesium, iron, tin and all of the alkali metals) to generate flammable hydrogen gas Reacts violently with acetic anhydride, 2-aminoethanol, ammonium hydroxide, calcium phosphide, chlorosulfonic acid, 1,1-difluoroethylene, ethylenediamine, ethyleneimine, oleum, perchloric acid, b-propiolactone, propylene oxide, silver perchlorate/carbon tetrachloride mixture, sodium hydroxide, uranium(IV) phosphide, vinyl acetate, calcium carbide, rubidium carbide, cesium acetylide, rubidium acetylide, magnesium boride, mercury(II) sulfate.
Decomposition	When heated to decomposition it emits toxic fumes of hydrogen chloride.
Other hazards	Corrodes many metals. Iron and aluminum are attacked readily.

Fire.

Flash Point,°C	11
Fire fighting	Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty.) Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use water spray to knock-down vapors.
Fire potential	May burn but does not ignite readily.
Hazards	Vapors from liquefied gas are initially heavier than air and spread along ground. Some of these materials may react violently with water. Containers may explode when heated. Ruptured cylinders may rocket.
Combustion products	Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes.

NFPA	**Health**	3
	Flammability	0
	Reactivity	1
	Special	-

Health.	
Exposure limit(s)	TLV: 5 ppm; 7.5 mg/m^3 (ceiling values) (ACGIH 1992-1993). OSHA PEL: C 5 ppm (7 mg/m^3) NIOSH REL: C 5 ppm (7 mg/m^3) NIOSH IDLH: 50 ppm
Exposure effects	Shock, rapid breathing and pulse, circulatory collapse and other changes to pulse, blood pressure, and respirations may occur. Fetotoxicity, developmental abnormalities, and possible resistance to hydrogen chloride by inhalation during pregnancy have been noted.
Ingestion	Gastritis, burns, gastric hemorrhage, dilation, edema, necrosis, and strictures may occur.
Inhalation	Changes in breathing pattern, irritation, changes in pulmonary function, corrosion and edema of the respiratory tract, chronic bronchitis and noncardiogenic pulmonary edema have been observed.
Skin	Burns, ulceration, scarring, blanching, and irritation may occur.
First aid	
Ingestion	Have person drink water or milk; do NOT induce vomiting.
Inhalation	Remove person to fresh air; keep him warm and quiet and get medical attention immediately; start artificial respiration if breathing stops.
Skin	Remove and isolate contaminated clothing and shoes. Immediately flush with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin.

Transport.	
UN number	1789
Response guide	157
Hazard class	8

Packing Group	II; III
USCG CHRIS Code	HDC
USCG Compatatibility Group	1 Non-oxidizing mineral acids

Methyl alcohol

- Methanol
- Wood alcohol
- Columbian spirits
- Carbinol

Formula	CH_3OH (CH4O)
Structure	
Description	Colorless liquid, with a mild, characteristic alcohol odor, when pure.
Uses	Industrial solvent, raw material for formaldehyde, methyl esters, organic & inorg acids, antifreeze, fuel, extractant for animal & vegetable oils, to denature ethanol, manufacture pharmaceuticals, solvent in manufacture of streptomycin, vitamins, hormones, polymers, plastics.

Registry Numbers and Inventories.

CAS	67-56-1
EC (EINECS/ELINCS)	200-659-6
EC Index Number	603-001-00-X
EC Class	Highly flammable; Toxic
EC Risk Phrase	R 11-23/24/25-39/23/24/25
EC Safety Phrase	S 7-16-36/37-45
ENCS (MITI)	2-201
RTECS	PC1400000
RTECS class	Drug (D); Mutagen (M); Reproductive Effector (T); Human Data (P);

	Primary Irritant (S)
RCRA	U154
UN (DOT)	1230
Merck	13,5984
Beilstein ref.	4-01-00-01227

Listed on the Toxic Substancs Control Act (TSCA).

Listed on Canadian Domestic Substances List (DSL).

Listed on Australian Inventory of Chemical Substances (AICS).

Properties.

Formula mass	32.04
Melting point, °C	-98
Boiling point, °C	64.6
Vapor pressure, mm_{Hg}	127 (25 °C)
Vapor density (air=1)	1.11
Critical temperature	240.0 °C
Critical pressure	78.5 atm
Density	0.7918 g/cm^3 (20 °C)
Solubility in water	Miscible
Viscosity	0.614 MPa sec
Surface tension	22.61 dynes/cm (at 20°C)
Refractive index	1.33066 (20 °C)
Partition coefficient, pK_{ow}	-0.77

Heat of fusion	23.70 cal/g
Heat of vaporization	39.2 kj/mole
Heat of combustion	-723 kj/mole
Odor threshold	2,000 ppm

Hazards and Protection.

Storage	Keep away from sources of ignition. Store in a cool, dry place. Store in a tightly closed container. Flammables-area.
WHMIS	B2 - Flammable and combustible material - Flammable liquid D1B - Poisonous and infectious material - Immediate and serious effects - Toxic D2A - Poisonous and infectious material - Other effects - Very toxic D2B - Poisonous and infectious material - Other effects - Toxic
Handling	Use spark-proof tools and explosion proof equipment. Avoid breathing dust, vapor, mist, or gas. Avoid contact with skin and eyes. Use only in a chemical fume hood.
Protection	Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166. Skin: Wear appropriate protective gloves to prevent skin exposure. Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators	Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.
Small spills/leaks	Absorb spill with inert material, (e.g., dry sand or earth), then place into a chemical waste container. Remove all sources of ignition.
Disposal code	1
Stability	Stable at room temperature in closed containers under normal storage and handling conditions.
Incompatibilities	Reducing agents, acid chlorides, active metals, alkali metals, liquid chlorine, magnesium, sodium hypochlorite, potassium, chloroform, acids (mineral, oxidizing, e.g. chromic acid, hypochlorous acid, nitric acid, sulfuric acid), oxidizing agents (strong, e.g. bromine, hydrogen peroxide, nitrogen dioxide, potassium nitrate), acid anhydrides, cyanuric chloride, diethyl zinc, perchloric

	acid, potassium-tert-butoxide.
Decomposition	Carbon monoxide, carbon dioxide, formaldehyde.
Other hazards	Corrosive to lead and aluminum.

Fire.

Flash Point,°C	11
Autoignition, °C	455
Upper exp. limit, %	36
Lower exp. limit, %	7.3
Fire fighting	Wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors can travel to a source of ignition and flash back. Will burn if involved in a fire. To extinguish fire, use water fog, dry chemical, carbon dioxide, or regular foam.
Fire potential	Quite flammable, combustion probable. Will burn, may be ignited by heat, sparks and flames. Flammable vapor may spread away from spill. Container may explode in heat of fire. Flashback upon vapor trail may occur.
Hazards	Containers may explode.
Combustion products	Fire will produce irritating, corrosive and/or toxic gases.

NFPA	**Health**	1
	Flammability	3
	Reactivity	0
	Special	-

Health.

Exposure limit(s)	OSHA PEL: TWA 200 ppm (260 mg/m^3) NIOSH REL: TWA 200 ppm (260 mg/m^3) ST 250 ppm (325 mg/m^3) skin NIOSH IDLH: 6000 ppm
Exposure effects	Prolonged or repeated skin contact may cause dermatitis. Chronic inhalation and ingestion may cause effects similar to those of acute inhalation and ingestion.
Ingestion	Cannot be made non-poisonous. May cause irritation of the digestive tract. Poison by ingestion. May cause respiratory failure. May cause vascular collapse and damage. May cause kidney failure. Ingestion can cause blurred vision, narrowing of the visual field, or blindness.
Inhalation	May cause respiratory tract irritation. May cause adverse central nervous system effects including headache, convulsions, and possible death. May cause visual impairment and possible permanent blindness. May cause effects similar to those described for ingestion. Toxic if inhaled.
Skin	May cause skin irritation. May be harmful if absorbed through the skin.
First aid	
Ingestion	If victim is conscious and alert, give 2-4 cupfuls of milk or water. Get medical aid immediately. Induce vomiting by giving one teaspoon of Syrup of Ipecac.
Inhalation	Get medical aid immediately. Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Skin	Get medical aid. Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.

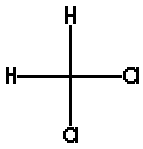
Transport.

UN number	1230
Response guide	131
Hazard class	3

Packing Group	II
USCG CHRIS Code	MAL
USCG Compatatibility Group	20 Alcohols, Glycols

Dichloromethane

- Methylene dichloride
- Methylene chloride

Formula	CH_2Cl_2 (CH2Cl2)
Structure	
Description	Colorless liquid with a penetrating ether-like odor.
Uses	Solvent, paint stripper, fumigant insecticide.

Registry Numbers and Inventories.

CAS	75-09-2
EC (EINECS/ELINCS)	200-838-9
EC Index Number	602-004-00-3
EC Class	Carcinogenic Category 3
EC Risk Phrase	R 40
EC Safety Phrase	S 23.2-24/25-36/37
ENCS (MITI)	2-36
RTECS	PA8050000
RTECS class	Agricultural Chemical and Pesticide (A); Tumorigen (C); Drug (D); Mutagen

	(M); Reproductive Effector (T); Human Data (P); Primary Irritant (S)
RCRA	U080
UN (DOT)	1593
Merck	12,6140
Beilstein ref.	4-01-00-00035

Listed on the Toxic Substancs Control Act (TSCA).

Listed on Canadian Domestic Substances List (DSL).

Listed on Australian Inventory of Chemical Substances (AICS).

Properties.	
Formula mass	84.93
Melting point, °C	-95
Boiling point, °C	39.8
Vapor pressure, mm_{Hg}	349 (20 °C)
Vapor density (air=1)	2.9
Critical temperature	237
Critical pressure	60.00 atm
Density	1.322 g/cm3 (20 °C)
Solubility in water	10-50 mg/ml
Viscosity	0.41 cp (25 °C)
Surface tension	27.36 dyne/cm (25 °C)
Refractive index	1.4244 (20 °C)

Partition coefficient, pK_{ow}	1.25
Heat of fusion	4.6 kJ/mol
Heat of vaporization	14.44 kJ/mol (40 °C)
Odor threshold	205-307 ppm

Hazards and Protection.

Storage	Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances. Store below 40C. Keep away from active metals.
WHMIS	D1B - Poisonous and infectious material - immediate and serious effects - toxic D2A - Poisonous and infectious material - other effects - very toxic D2B - Poisonous and infectious material - Other effects - Toxic
Handling	Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Loosen closure cautiously before opening. Avoid contact with eyes, skin, and clothing. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Avoid contact with heat, sparks and flame. Avoid ingestion and inhalation. Do not ingest or inhale.
Protection	Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166. Skin: Wear appropriate protective gloves to prevent skin exposure. Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators	A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.
Small spills/leaks	Absorb spill with inert material, (e.g., dry sand or earth), then place into a chemical waste container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, using the appropriate protective equipment. Remove all sources of ignition. Provide ventilation.
Disposal code	2
Stability	Stable at room temperature in closed containers under normal storage and handling conditions. May form explosive mixtures in atmospheres having high

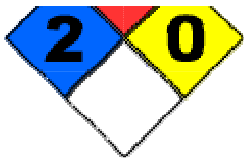
	oxygen content.
Incompatibilities	Strong oxidizing agents, liquid oxygen, nitric acid, potassium, lithium, sodium, caustics, potassium-tert-butoxide, sodium potassium alloys, powdered aluminum, Active metals (such as potassium and magnesium)., nitrogen tetroxide, N-methyl-N-nitososurea + potassium hydroxide, powdered magnesium.
Decomposition	Hydrogen chloride, phosgene, carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.

Fire.

Flash Point,°C	-4
Autoignition, °C	605
Upper exp. limit, %	22
Lower exp. limit, %	13
Fire fighting	Wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water spray to keep fire-exposed containers cool. Vapors mixed with air in proper proportion will propagate a flame. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Containers may explode when heated. Will form explosive mixtures in atmospheres having high oxygen contents. Extinguishing media: For small fires, use dry chemical, carbon dioxide, or water spray. For large fires, use dry chemical, carbon dioxide, alcohol-resistant foam, or water spray. Cool containers with flooding quantities of water until well after fire is out.
Fire potential	Nonflammable; but forms flammable vapor-air mixtures at > 212F.
Hazards	Air/vapor mixtures may explode when ignited. Container may explode in heat of fire.
Combustion products	Dissociation products generated in a fire may be irritating or toxic.

NFPA	**Health**	2
	Flammability	1

Reactivity	0
Special	-



Health.	
Exposure limit(s)	TLV: 50 ppm; 174 mg/m^3 (ACGIH 1992-1993). OSHA PEL: TWA 25 ppm ST 125 ppm NIOSH REL: Ca See Appendix A NIOSH IDLH: Potential occupational carcinogen 2300 ppm
Exposure effects	Possible cancer hazard based on tests with laboratory animals. Prolonged or repeated skin contact may cause dermatitis. May cause reproductive and fetal effects. Laboratory experiments have resulted in mutagenic effects. Chronic exposure may cause lung, liver, and pancreatic tumors. May cause conjunctivitis and/or corneal burns.
Ingestion	Causes gastrointestinal irritation with nausea, vomiting and diarrhea. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. May be harmful if swallowed.
Inhalation	Inhalation of high concentrations may cause central nervous system effects characterized by headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. May cause narcotic effects in high concentration. Vapors may cause dizziness or suffocation. May cause blood changes. Overexposure may cause an increase in carboxyhemoglobin levels in the blood. Can produce delayed pulmonary edema.
Skin	May be absorbed through the skin. Causes irritation with burning pain, itching, and redness. Prolonged exposure may result in skin burns.
First aid	
Ingestion	Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation	Get medical aid immediately. Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen. DO NOT use mouth-

	to-mouth respiration. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
Skin	Get medical aid. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

Transport.

UN number	1593
Response guide	160
Hazard class	6.1
Packing Group	III
USCG CHRIS Code	DCM
USCG Compatatibility Group	36 Halogenated hydrocarbons

Material Safety Data Sheet
Ethyl acetate MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ethyl acetate
Catalog Codes: SLE2452, SLE2317
CAS#: 141-78-6
Synonym: Ethyl Ester Acetic Ether
Chemical Formula: C4-H8-O2

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Ethyl acetate	141-78-6	100

Toxicological Data on Ingredients: Ethyl acetate: ORAL (LD50): Acute: 5620 mg/kg [Rat]. 4100 mg/kg [Mouse]. 4935 mg/kg [Rabbit]. VAPOR (LC50): Acute: 45000 mg/m 3 hours [Mouse]. 16000 ppm 6 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator), of eye contact (irritant).
Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to mucous membranes, upper respiratory tract. The substance may be toxic to blood, kidneys, liver, central nervous system (CNS).
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention.
Skin Contact:
Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops. Cold water may be used.
Serious Skin Contact: Not available.
Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.
Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.
Serious Ingestion: Not available.

Section 5: Fire and Explosion Data
Flammability of the Product: Flammable.
Auto-Ignition Temperature: 426.67°C (800°F)
Flash Points: CLOSED CUP: -4.4°C (24.1°F). (TAG) OPEN CUP: 7.2°C (45°F) (Cleveland).
Flammable Limits: LOWER: 2.2% UPPER: 9%
Products of Combustion: These products are carbon oxides (CO, CO2).
Fire Hazards in Presence of Various Substances:
Highly flammable in presence of open flames and sparks, of heat. Slightly flammable to flammable in presence of oxidizing materials, of acids, of alkalis. Non-flammable in presence of shocks.
Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of heat. Nonexplosive in presence of shocks.
Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.
Special Remarks on Fire Hazards:
Vapor may travel considerable distance to source of ignition and flash back. When heated to decomposition it emits acrid smoke and irritating fumes.
Special Remarks on Explosion Hazards:
The liquid produces a vapor that forms explosive mixtures with air at normal temperatures. Explosive reaction with lithium tetrahydroaluminate.

Section 6: Accidental Release Measures
Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.
Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, alkalis.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Moisture sensitive.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Safety glasses. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 400 (ppm) from OSHA (PEL) [United States] TWA: 400 from ACGIH (TLV) [United States] TWA: 1400 (mg/m3) from NIOSH [United States] TWA: 400 (ppm) from NIOSH [United States] TWA: 400 (ppm) [Canada] TWA: 1440 (mg/m3) [Canada] TWA: 1400 (mg/m3) from OSHA (PEL) [United States]3 Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Ethereal. Fruity. (Slight.)

Taste: Bittersweet, wine-like burning taste

Molecular Weight: 88.11 g/mole

Color: Colorless.

pH (1% soln/water): Not available.

Boiling Point: 77°C (170.6°F)

Melting Point: -83°C (-117.4°F)

Critical Temperature: 250°C (482°F)

Specific Gravity: 0.902 (Water = 1)

Vapor Pressure: 12.4 kPa (@ 20°C)

Vapor Density: 3.04 (Air = 1)
Volatility: Not available.
Odor Threshold: 3.9 ppm
Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 0.7
Ionicity (in Water): Not available.
Dispersion Properties: See solubility in water, diethyl ether, acetone.
Solubility: Soluble in cold water, hot water, diethyl ether, acetone, alcohol, benzene.

Section 10: Stability and Reactivity Data
Stability: The product is stable.
Instability Temperature: Not available.
Conditions of Instability: Heat, ignition sources (flames, sparks, static), incompatible materials
Incompatibility with various substances: Reactive with oxidizing agents, acids, alkalis.
Corrosivity: Non-corrosive in presence of glass.
Special Remarks on Reactivity:
Also incompatible with nitrates, chlorosulfonic acid, oleum, potassium-tert-butoxide, and lithium tetrahydroaluminate. Moisture sensitive. On storage, it is slowly decomposed by water.
Special Remarks on Corrosivity: Not available.
Polymerization: Will not occur.

Section 11: Toxicological Information
Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.
Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 4100 mg/kg [Mouse]. Acute toxicity of the vapor (LC50): 45000 mg/m3 3 hours [Mouse].
Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. Causes damage to the following organs: mucous membranes, upper respiratory tract. May cause damage to the following organs: blood, kidneys, liver, central nervous system (CNS).
Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).
Special Remarks on Toxicity to Animals: LD50 [Rabbit] - Route: skin; Dose >20,000 ml/kg
Special Remarks on Chronic Effects on Humans:
May affect genetic material (mutagenic). May cause adverse reproductive effects. based on animal test data. No human data found at this time.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: May cause skin irritation. Eyes: Causes eye irritation. May cause irritation of the conjunctivia. Inhalation: May cause respiratory tract and mucous membrane irritation. May affect respiration and may cause acute pulmonary edema. May affect gastrointestinal tract (nausea, vomiting). May affect behavior/central nervous system (mild central nervous system depression - exhilaration, talkativeness, boastfulness, belligerancy, vertigo, diplopia, drowsiness, slurred speech, slowed reaction time, dizziness, lightheadedness, somnolence, ataxia, unconciousness, irritability, fatigue, sleep disturbances, reduced memory and concentration, stupor, coma), cardiovascular system (peripheral vascular collapse (shock) - rapid pulse, hypotension, cold pale skin, hypothermia). Other symptoms may include: flushing of face and sweating.

Ingestion: May cause gastrointestinal tract irritation with nausea and vomiting. May affect blood, behavior/central nervous system (CNS depression - effects may be similar to that of inhalation). Chronic Potential Health Effects: Skin: Repeated or prolonged skin contact may cause drying and cracking of the skin. IngestIon: Prolonged or repeated ingestion may affect the liver. Inhalation: Prolonged inhalation may affect behavior/central nervous system (symptoms similar to those of acute inhalation), and cause liver, kidney, lung, and heart damage. It may also affect metabolism, and blood (anemia, leukocytosis).

Section 12: Ecological Information

Ecotoxicity:

Ecotoxicity in water (LC50): 220 mg/l 96 hours [Fish (Fathead minnow)]. 212.5 ppm 96 hours [Fish (Indian catfish)].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Material Safety Data Sheet
Thionyl chloride MSDS
Section 1: Chemical Product and Company Identification
Product Name: Thionyl chloride
Catalog Codes:
CAS#: 7719-09-7
RTECS: XM5150000
TSCA: TSCA 8(b) inventory: Thionyl chloride
CI#: Not available.
Synonym: Sulfurous oxychloride; Sulfinyl chloride; Sulfur chloride oxide; Sulfurous dichloride; Thionyl dichloride
Chemical Name: Thionyl chloride
Chemical Formula: Cl2OS

Contact Information:
Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**
Order Online: ScienceLab.com
CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300
International CHEMTREC, call: 1-703-527-3887
For non-emergency assistance, call: 1-281-441-4400
Section 2: Composition and Information on Ingredients
Composition:
Name CAS # % by Weight
Thionyl chloride 7719-09-7 100
Toxicological Data on Ingredients: Thionyl chloride: VAPOR (LC50): Acute: 500 ppm 1 hours [Rat].
Section 3: Hazards Identification
Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, permeator), of eye contact (corrosive). Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe overexposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.
Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to upper respiratory tract, skin, eyes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged

exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in
presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: When heated to decomposition it emits toxic fumes.

Special Remarks on Explosion Hazards:

It will explode in the presence of several chemicals : Azidoacetyl acid , Chloryl perchlorate , N,N-Dimethylformamide, Dimethyl sulfoxide and acyl halides, Hexafluoropropyplideneaminolithium, Linseed oil + quinoline, o-Nitrobenzoylacetic acid, p-Nitrobenzoyl and cold ammonia solution, o-Nitrophenylacetic acid; Sodium hydroxide,
Sulfur dioxide, Toluene + ethanol+ water, water.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material.

Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep container dry. Keep away from heat. Keep away from sources of ignition. Keep away from direct sunlight or strong incandescent light. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. Avoid shock and friction. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as metals, acids, alkalis, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

CEIL: 1 (ppm) from OSHA (PEL) [United States] CEIL: 1 from ACGIH (TLV) [United States] CEIL: 1 (ppm) from NIOSH [United States] TWA: 1 (ppm) [Denmark] STEL: 1 (ppm) [Belgium] STEL: 1 (ppm) [United Kingdom (UK)] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Fuming liquid.)

Odor: Suffocating.

Taste: Not available.

Molecular Weight: 118.98 g/mole
Color: Colorless to light yellow.
pH (1% soln/water): Not applicable.
Boiling Point: 76°C (168.8°F)
Melting Point:
-104.5°C (-156.1°F) Decomposition temperature: >140 deg. C
Critical Temperature: Not available.
Specific Gravity: 1.638 (Water = 1)
p. 4
Vapor Pressure: 13.3 kPa (@ 21°C)
Vapor Density: 4.1 (Air = 1)
Volatility: Not available.
Odor Threshold: Not available.
Water/Oil Dist. Coeff.: Not available.
Ionicity (in Water): Not available.
Dispersion Properties: Not available.
Solubility:
Insoluble in cold water. Miscible with chloroform, benzene, carbon tetrachloride
Section 10: Stability and Reactivity Data
Stability: The product is stable.
Instability Temperature: Not available.
Conditions of Instability: Incompatible materials, moisture/moist air, temperatures above 140 deg. C
Incompatibility with various substances:
Reactive with metals, acids, alkalis, moisture. The product may undergo hazardous decomposition, condensation or polymerization, it may react violently with water to emit toxic gases or it may become self-reactive under conditions of shock or increase in temperature or pressure.
Corrosivity: Non-corrosive in presence of glass.
Special Remarks on Reactivity:
Thionyl chloride fumes on exposure to moist air. In the presence of moisture/water it decomposes and liberates toxic gases
of hydrogen chloride and sulfur dioxide. Decomposes when heated above 140 deg. C forming chlorine, sulfur dioxide, sulfur monochloride, hydrogen chloride. Thionyl chloride decomposes in acids, alcohols, alkalies. It is also incompatible with amines, ammonia, chloryl perchlorate, dimethyl sulfoxide, hexafluoro isopropylidene amino lithium, linseed oil, quinoline, sodium,
sulfinyl chloride, N,N-Dimethylformamide, metals. It reacts with Grignard reagents to form suloxides.
Special Remarks on Corrosivity: Not available.
Polymerization: Will not occur.
Section 11: Toxicological Information
Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.
Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute toxicity of the vapor (LC50): 500 1 hours [Rat].

Chronic Effects on Humans: May cause damage to the following organs: upper respiratory tract, skin, eyes.

Other Toxic Effects on Humans:

Extremely hazardous in case of inhalation (lung corrosive). Very hazardous in case of skin contact (irritant), of ingestion,

Hazardous in case of skin contact (corrosive, permeator), of eye contact (corrosive).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Corrosive. Causes skin burns. May be absorbed through skin in harmful amounts. Eyes: Corrosive. Causes eye burns. Lachrymator. May cause conjunctivitis, corneal damage. Inhalation: Corrosive. Harmful if inhaled. Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Toxic exposure to fumes of Thionyl chloride reacting with water may result in delayed pulmonary response, bronchiolitis Oblitereans(inflammmation of the bronchioles). Ingestion: Corrosive. Harmful if swallowed. Causes gastrointestinal/digestive tract burns. May cause severe and permanent damage to the digestive tract.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Thionyl chloride UNNA: 1836 PG: I

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut hazardous material survey.: Thionyl chloride Illinois toxic substances disclosure to employee act: Thionyl chloride

Rhode Island RTK hazardous substances: Thionyl chloride Pennsylvania RTK: Thionyl chloride Florida: Thionyl chloride

Minnesota: Thionyl chloride Massachusetts RTK: Thionyl chloride Massachusetts spill list: Thionyl chloride New Jersey:

Thionyl chloride California Director's List of Hazardous Substances: Thionyl chloride TSCA 8(b) inventory: Thionyl chloride

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the
European Inventory of Existing Commercial Chemical Substances.
Other Classifications:
WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS E: Corrosive liquid. CLASS F:
Dangerously reactive material.
DSCL (EEC):
HMIS (U.S.A.):
Health Hazard: 3
Fire Hazard: 0
Reactivity: 2
Personal Protection:
National Fire Protection Association (U.S.A.):
Health: 4
Flammability: 0
Reactivity: 2
Specific hazard:
Protective Equipment:
Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator
when ventilation is inadequate. Face shield.
Section 16: Other Information
References: Not available.
Other Special Considerations: Not available.
Created: 10/10/2005 12:19 PM
Last Updated: 05/21/2013 12:00 PM
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Material Safety Data Sheet
N,N-Dimethylformamide MSDS
Section 1: Chemical Product and Company Identification
Product Name: N,N-Dimethylformamide
Catalog Codes: SLD4261, SLD3331
CAS#: 68-12-2
RTECS: LQ2100000
TSCA: TSCA 8(b) inventory: N,N-Dimethylformamide
CI#: Not applicable.
Synonym: DMF; Dimethyl Formamide
Chemical Name: N,N-Dimethylformamide
Chemical Formula: HCON(CH3)2
Contact Information:
Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**
Order Online: ScienceLab.com
CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300
International CHEMTREC, call: 1-703-527-3887
For non-emergency assistance, call: 1-281-441-4400
Section 2: Composition and Information on Ingredients
Composition:
Name CAS # % by Weight
{N,N-}Dimethylformamide 68-12-2 100
Toxicological Data on Ingredients: N,N-Dimethylformamide: ORAL (LD50): Acute: 2800 mg/kg [Rat]. 2900 mg/kg [Mouse].
5000 mg/kg [Rabbit]. DERMAL (LD50): Acute: 4720 mg/kg [Rabbit].
Section 3: Hazards Identification
Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.
Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Classified POSSIBLE for human.
DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive system/toxin/male [POSSIBLE].
The substance is toxic to kidneys, liver, central nervous system (CNS). The substance may be toxic to blood, the nervous system. Repeated or prolonged exposure to the substance can produce target organs damage.
Section 4: First Aid Measures
Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 445°C (833°F)

Flash Points: CLOSED CUP: 57.778°C (136°F). (Tagliabue.) OPEN CUP: 67°C (152.6°F).

Flammable Limits: LOWER: 2.2% UPPER: 15.2%

Products of Combustion: These products are carbon oxides (CO, CO2), nitrogen oxides (NO, NO2...).

Fire Hazards in Presence of Various Substances:

Flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards:

A mixture of triethylaluminum and DMF explodes when heated. DMF + potassium permanganate may explode.

Section 6: Accidental Release Measures

Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:

Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 10 (ppm) from ACGIH (TLV) [United States] TWA: 30 (mg/m3) from ACGIH (TLV) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Amine like. (Slight.)

Taste: Not available.

Molecular Weight: 73.09 g/mole

Color: Colorless to light yellow.

pH (1% soln/water): Not available.

Boiling Point: 153°C (307.4°F)

Melting Point: -61°C (-77.8°F)

Critical Temperature: 374°C (705.2°F)

Specific Gravity: 0.949 (Water = 1)

Vapor Pressure: 0.3 kPa (@ 20°C)

Vapor Density: 2.51 (Air = 1)

Volatility: Not available.
Odor Threshold: 100 ppm
Water/Oil Dist. Coeff.: The product is more soluble in water; log(oil/water) = -1
Ionicity (in Water): Not available.
Dispersion Properties: See solubility in water, diethyl ether, acetone.
Solubility:
Easily soluble in cold water, hot water. Soluble in diethyl ether, acetone. Miscible organic solvents. Soluble in benzene, and chloroform.
Section 10: Stability and Reactivity Data
Stability: The product is stable.
Instability Temperature: Not available.
Conditions of Instability: Heat, ignition sources (sparks, flames), incompatible materials
Incompatibility with various substances: Reactive with oxidizing agents, acids.
Corrosivity: Non-corrosive in presence of glass.
Special Remarks on Reactivity:
Can react vigorously with oxidizing agents, halogenated hydrocarbons, and inorganic nitrates. Incompatible with carbon tetrachloride, alkyl aluminums, sodium tetrahydroborate, nitrates, chromic acid, diisocyanatomethane, triethylaluminum, sodium hydride, lithium azide, metallic sodium, bromine, magnesium nitrate, potassium permanganate, nitric acid, chromium trioxide, borohydrides, phosphorus trioxide, diborane, octafluoroisobutyrate, sodium nitrite, perchloryl fluoride, postassium methyl 4,4'-dinitrobutyrate. Reaction with inorganic acid chlorides, such as phosphorous oxychloride and thionyl chloride, may form dimethylcarbamoyl, a suspect carcinogen. May release dimethylamine and carbon monoixde if heated above 350 C (662F).
Special Remarks on Corrosivity:
Pure dimethylformamide is essentially non-corrosive to metals. However copper, tin and their alloys should be avoided.
Polymerization: Will not occur.
Section 11: Toxicological Information
Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.
Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2800 mg/kg [Rat]. Acute dermal toxicity (LD50): 4720 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 9400
1 hours [Mouse].
Chronic Effects on Humans:
CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Classified POSSIBLE for human.
DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive system/toxin/male [POSSIBLE].
Causes damage to the following organs: kidneys, liver, central nervous system (CNS). May cause damage to the following organs: blood, the nervous system.
Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose: LCL[Rat] - Route: Inhalation; Dose: 5000 ppm/6H
Special Remarks on Chronic Effects on Humans:
May affect genetic material. May cause adverse reproductive effects(paternal and maternal) and birth defects. Embryotoxic and/or foetotoxic in animal. Passes through the placental barrier in animal. May cause cancer although IARC evidence for cancer in humans shows inadequate data.
Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes skin irritation with itching, burning, redness, swelling, or rash. It may be absorbed through the skin in toxic amounts and cause systemic effects similar to that of ingestion. It may facilitate the absorption of other chemical substances through the skin. If there is significant potential for skin contact, monitoring should be done to measure the level of DMF metabolites in urine specimans at the end of the shift. It is common practice to limit end-of shift metabolites at or below 40 ppm expressed as n-monomethylformamide or a single individual or at or below 20 ppm MMF for several workers doing the same job. Eyes: Causes eye irritation (possibly severe) with tearing pain or blurred vision. Inhalation: May cause respiratory tract irritation. Short-term overexposure by inhalation may affect behavior/central nervous system (convulsions, muscle weakness and other symptoms similar to that of acute ingestion), respiration (dyspnea).
Ingestion: It can cause gastrointestinal tract irritation with heartburn, abdominal pain, nausea, vomiting or diarrhea. It may also affect the cardiovascular system (hypertension, tachycardia, ECG abnormalities), blood (elevated white blood cell counts), and liver damage (hepatomegaly, jaundice, altered liver enzymes, fatty liver
Section 12: Ecological Information
Ecotoxicity: Not available.
BOD5 and COD: Not available.
Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.
Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.
Special Remarks on the Products of Biodegradation: Not available.
Section 13: Disposal Considerations
Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.
Section 14: Transport Information
DOT Classification: CLASS 3: Flammable liquid.
Identification: : N,N-Dimethylformamide UNNA: 2265 PG: III
Special Provisions for Transport: Not available.
Section 15: Other Regulatory Information
Federal and State Regulations:
Illinois toxic substances disclosure to employee act: N,N-Dimethylformamide Illinois chemical safety act: N,NDimethylformamide
New York release reporting list: N,N-Dimethylformamide Rhode Island RTK hazardous substances: N,NDimethylformamide

Pennsylvania RTK: N,N-Dimethylformamide Minnesota: N,N-Dimethylformamide Massachusetts RTK:
N,N-Dimethylformamide Massachusetts spill list: N,N-Dimethylformamide New Jersey: N,N-Dimethylformamide New Jersey
spill list: N,N-Dimethylformamide Louisiana spill reporting: N,N-Dimethylformamide California Director's List of Hazardous
Substances: N,N-Dimethylformamide TSCA 8(b) inventory: N,N-Dimethylformamide TSCA 8(d) H and S data reporting: N,NDimethylformamide:
12/19/95 SARA 313 toxic chemical notification and release reporting: N,N-Dimethylformamide CERCLA:
Hazardous substances.: N,N-Dimethylformamide: 100 lbs. (45.36 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the
European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F). CLASS D-2A: Material causing
other toxic effects (VERY TOXIC).

DSCL (EEC):

R20/21- Harmful by inhalation and in contact with skin. R36- Irritating to eyes. R61- May cause harm to the unborn child.
S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S53- Avoid
exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 2
Fire Hazard: 2
Reactivity: 0
Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 1
Flammability: 2
Reactivity: 0
Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.
Other Special Considerations: Not available.
Created: 10/09/2005 05:12 PM
Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume

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Material Safety Data Sheet
Ethyl alcohol 200 Proof MSDS
Section 1: Chemical Product and Company Identification
Product Name: Ethyl alcohol 200 Proof
Catalog Codes: SLE2248, SLE1357
CAS#: 64-17-5
RTECS: KQ6300000
TSCA: TSCA 8(b) inventory: Ethyl alcohol 200 Proof
CI#: Not applicable.
Synonym: Ethanol; Absolute Ethanol; Alcohol; Ethanol 200 proof; Ethyl Alcohol, Anhydrous; Ethanol, undenatured; Dehydrated Alcohol; Alcohol
Chemical Name: Ethyl Alcohol
Chemical Formula: CH3CH2OH
Contact Information:
Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**
Order Online: ScienceLab.com
CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300
International CHEMTREC, call: 1-703-527-3887
For non-emergency assistance, call: 1-281-441-4400
Section 2: Composition and Information on Ingredients
Composition:
Name CAS # % by Weight
Ethyl alcohol 200 Proof 64-17-5 100
Toxicological Data on Ingredients: Ethyl alcohol 200 Proof: ORAL (LD50): Acute: 7060 mg/kg [Rat]. 3450 mg/kg [Mouse].
VAPOR (LC50): Acute: 20000 ppm 8 hours [Rat]. 39000 mg/m 4 hours [Mouse].
Section 3: Hazards Identification
Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact
(permeator), of ingestion.
Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer). CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.
TERATOGENIC EFFECTS: Classified PROVEN for human. DEVELOPMENTAL TOXICITY: Classified Development toxin [PROVEN]. Classified Reproductive system/toxin/female, Reproductive system/toxin/male [POSSIBLE]. The substance is toxic to blood, the reproductive system, liver, upper respiratory tract, skin, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 363°C (685.4°F)

Flash Points: CLOSED CUP: 12.78°C (55°F). OPEN CUP: 17.78°C (64°F) (Cleveland).

Flammable Limits: LOWER: 3.3% UPPER: 19%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:

Highly flammable in presence of open flames and sparks, of heat. Slightly flammable to flammable in presence of oxidizing materials.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Slightly explosive in presence of open flames and sparks, of heat, of oxidizing materials, of acids.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:

Containers should be grounded. CAUTION: MAY BURN WITH NEAR INVISIBLE FLAME Vapor may travel considerable distance to source of ignition and flash back. May form explosive mixtures with air. Contact with Bromine pentafluoride is likely to cause fire or explosion. Ethanol ignites on contact with chromyl chloride. Ethanol ignites on contact with iodine heptafluoride gas. It ignites than explodes upon contact with nitrosyl perchlorate. Additon of platinum black catalyst caused ignition.

Special Remarks on Explosion Hazards:

Ethanol has an explosive reaction with the oxidized coating around potassium metal. Ethanol ignites and then explodes on contact with acetic anhydride + sodium hydrosulfate (ignites and may explode), disulfuric acid + nitric acid, phosphorous(III) oxide platinum, potassium-tert-butoxide+ acids. Ethanol forms explosive products in reaction with the following compound : ammonia + silver nitrate (forms silver nitride and silver fulminate), iodine + phosphorus (forms ethane iodide), magnesium perchlorate (forms ethyl perchlorate), mercuric nitrate, nitric acid + silver (forms silver fulminate) silver nitrate (forms ethyl nitrate) silver(I) oxide + ammonia or hydrazine (forms silver nitride and silver fulminate), sodium (evolves hydrogen gas). Sodium Hydrazide + alcohol can produce an explosion. Alcohols should not be mixed with mercuric nitrate, as explosive mercuric fulminate may be formed. May form explosive mixture with manganese perchlorate + 2,2-dimethoxypropane. Addition of alcohols to highly concentrate hydrogen peroxide forms powerful explosives. Explodes on contact with calcium hypochlorite

Section 6: Accidental Release Measures

Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:

Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids, alkalis, moisture.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Do not store above 23°C (73.4°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Use a respirator if the exposure limit is exceeded.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 1900 (mg/m3) from OSHA (PEL) [United States] TWA: 1000 (ppm) from OSHA (PEL) [United States] TWA: 1900 (mg/ m3) from NIOSH [United States] TWA: 1000 (ppm) from NIOSH [United States] TWA: 1000 (ppm) [United Kingdom (UK)]
TWA: 1920 (mg/m3) [United Kingdom (UK)] TWA: 1000 STEL: 1250 (ppm) [Canada]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Liquid.)

Odor:

Mild to strong, rather pleasant; like wine or whiskey. Alcohol-like; Ethereal, vinous.

Taste: Pungent. Burning.

Molecular Weight: 46.07 g/mole

Color: Colorless. Clear

pH (1% soln/water): Not available.

Boiling Point: 78.5°C (173.3°F)

Melting Point: -114.1°C (-173.4°F)

Critical Temperature: 243°C (469.4°F)

Specific Gravity: 0.789 (Water = 1)

Vapor Pressure: 5.7 kPa (@ 20°C)

Vapor Density: 1.59 (Air = 1)

Volatility: Not available.

Odor Threshold: 100 ppm

Water/Oil Dist. Coeff.: The product is more soluble in water; log(oil/water) = -0.3

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether, acetone.

Solubility:

Easily soluble in cold water, hot water. Soluble in methanol, diethyl ether, acetone.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, heat, sources of ignition.

Incompatibility with various substances: Reactive with oxidizing agents, acids, alkalis.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Ethanol rapidly absorbs moisture from the air. Can react vigorously with oxiders. The following oxidants have been demonstrated to undergo vigorous/explosive reaction with ethanol: barium perchlorate, bromine pentafluoride, calcium hypochlorite, chloryl perchlorate, chromium trioxide, chromyl chloride, dioxygen difluoride, disulfuryl difluoride, fluorine nitrate, hydrogen peroxide, iodine heptafluoride, nitric acid nitrosyl perchlorate, perchloric acid permanganic acid, peroxodisulfuric acid, potassium dioxide, potassium perchlorate, potassium permanganate, ruthenium(VIII) oxide, silver perchlorate, silver peroxide, uranium hexafluoride, uranyl perchlorate. Ethanol reacts violently/expodes with the following compounds: acetyl bromide (evolves hydrogen bromide) acetyl chloride, aluminum, sesquibromide ethylate,

ammonium hydroxide & silver oxide, chlorate, chromic anhydride, cyanuric acid + water, dichloromethane + sulfuric acid + nitrate (or) nitrite, hydrogen peroxide + sulfuric acid, iodine + methanol + mercuric oxide, manganese perchlorate + 2,2-dimethoxy propane, perchlorates, permanganates + sulfuric acid, potassium superoxide, potassium tert-butoxide, silver & nitric acid, silver perchlorate, sodium hydrazide, sulfuric acid + sodium dichromate, tetrachlorisilane + water. Ethanol is also incompatible with platinium, and sodium. No really safe conditions exist under which ethyl alcohol and chlorine oxides can be handled. Reacts vigorously with acetyl chloride

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 3450 mg/kg [Mouse]. Acute toxicity of the vapor (LC50): 39000 mg/m3 4 hours [Mouse].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Classified PROVEN for human.

DEVELOPMENTAL TOXICITY: Classified Development toxin [PROVEN]. Classified Reproductive system/toxin/female, Reproductive system/toxin/male [POSSIBLE]. Causes damage to the following organs: blood, the reproductive system, liver, upper respiratory tract, skin, central nervous system (CNS).

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator), of ingestion.

Special Remarks on Toxicity to Animals:

Lowest Published Dose/Conc: LDL[Human] - Route: Oral; Dose: 1400 mg/kg LDL[Human child] - Route: Oral; Dose: 2000 mg/ kg LDL[Rabbit] - Route: Skin; Dose: 20000 mg/kg

Special Remarks on Chronic Effects on Humans:

May affect genetic material (mutagenic) Causes adverse reproductive effects and birth defects (teratogenic), based on moderate to heavy consumption. May cause cancer based on animal data. Human: passes through the placenta, excreted in maternal milk.

Special Remarks on other Toxic Effects on Humans:

Acute potential health effects: Skin: causes skin irritation Eyes: causes eye irritation Ingestion: May cause gastrointestinal tract irritation with nausea, vomiting, diarrhea, and alterations in gastric secretions. May affect behavior/central nervous system (central nervous system depression - amnesia, headache, muscular incoordination, excitation, mild euphoria, slurred speech, drowsiness, staggaring gait, fatigue, changes in mood/personality, excessive talking, dizziness, ataxia, somnolence, coma/ narcosis, hallucinations, distorted perceptions, general anesthetic), peripherial nervous system (spastic paralysis)vision

(diplopia). Moderately toxic and narcotic in high concentrations. May also affect metabolism, blood, liver, respiration (dyspnea), and endocrine system. May affect respiratory tract, cardiovascular(cardiac arrhythmias, hypotension), and urinary systems.
Inhalation: May cause irritation of the respiratory tract and affect behavior/central nervous system with symptoms similar to ingestion. Chronic Potential Health Effects: Skin: Prolonged or repeated skin contact may casue dermatitis, an allergic reaction. Ingestion: Prolonged or repeated ingestion will have similiar effects as acute ingestion. It may also affect the brain.

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 14000 mg/l 96 hours [Rainbow trout]. 11200 mg/l 24 hours [fingerling trout].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

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Identification: : Ethanol UNNA: 1170 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Ethyl alcohol 200 Proof (in alcoholic beverages) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Ethyl alcohol 200 Proof (in alcoholic beverages) Connecticut hazardous material survey.: Ethyl alcohol 200 Proof Illinois toxic substances disclosure to employee act: Ethyl alcohol 200 Proof Rhode Island RTK hazardous substances: Ethyl alcohol 200 Proof Pennsylvania RTK: Ethyl alcohol 200

Proof Florida: Ethyl alcohol 200 Proof Minnesota: Ethyl alcohol 200 Proof Massachusetts RTK: Ethyl alcohol 200 Proof

Massachusetts spill list: Ethyl alcohol 200 Proof New Jersey: Ethyl alcohol 200 Proof Tennessee: Ethyl alcohol 200 Proof

California - Directors List of Hazardous Substances (8 CCR 339): Ethyl alcohol 200 Proof TSCA 8(b) inventory: Ethyl alcohol 200 Proof

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R11- Highly flammable. S7- Keep container tightly closed. S16- Keep away from sources of ignition - No smoking.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References:

-SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. HSDB, RTECS, and LOLI databases.

Other Special Considerations: Not available.

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Last Updated: 05/21/2013 12:00 PM

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ANNEXURE – 7
LIST OF DO'S & DON'T

DO'S AND DON'TS FOR SAFER OPERATION

Do's:

- Store used oil at proper place as per plant guidelines.
- Use lubricating oil carefully to avoid spillage on ground.
- Use lubricating oil as per requirement.
- Use minimum amount of water wherever it is required as per plant guidelines.
- Waste disposal system for all plants should be separate.
- Avoid spillage of liquid, hand gloves, cotton waste on road, which will cause pollution. Recycle or dispose that material.
- Use cleaning equipment carefully. (i.e. cotton waste, oil & chemicals)
- Place all the equipments (i.e. Fire Hose, Rubber Pipe and Chisel) at proper place.
- Handling of chemicals should be as per plant guidelines to avoid undesired chemical reaction.
- Safety training and correct use of PPE's must for all the employees.
- Environment guidelines should follow during cleaning of vessels, Tank, channels etc.
- Follow shift in charge's instructions during loading or unloading of chemicals.
- In case of fire or any accident, immediately inform responsible person,
- In case of emergency, inform operator as well as control room.
- Area of work during excavation, radiography, sand blasting shall be cordoned with warning tags of "work in progress", "no entry", "radiography" in progress' etc.
- Switch off lights and computers when not in use.
- Shut the water cock properly when not in use.
- Always follow safety rule during the plant operation.

Do's during shut down:

- All equipment, vessels, lines where hot work is envisaged shall be purged, flushed thoroughly and positively isolated. Similar precautions should be taken for vessel entry also.
- Back flow of materials from sewers, drains should be avoided by proper isolations.
- In case of confined space entry and other cleaning jobs etc. which are to be carried out by the process department, vessel entry permit should be issued to immediate supervising officer/operator by shift in charge. This permit should be renewed by incoming shift in charge during every shift.

- Hoist, Platform, cages used for lifting persons or to send persons inside vessels by such means must be of sound construction with wire ropes slings, etc. to avoid failure.
- All steam, condensate, hot water connections should be made tight with clamps.
- Nitrogen hazard should be kept in mind. All nitrogen sources should be positively isolated from vessels/confined spaces to avoid oxygen deficiency where vessel entry is required.
- All nitrogen hoses used for purging before vessel entry should be removed from source/utility point.
- All underground sewers shall be flushed, protected from sparks.
- Full PPEs like PVC suits, gum boots, face shield & other required shall be used while draining, flushing and other reclaiming activities to avoid burn, poisoning etc.
- Wet asbestos cloth/metallic plate should be used to collect flying sparks.
- Water, steam flushing, nitrogen blanketing shall be continued where spontaneous combustion takes place. Precautions should be taken for pyrophoric nature of material.
- Temporary electrical connections, cords, boards and other electrical fixtures should be of sound material to prevent electrical shock.
- Oil spillage in the pit of oil slope tank should be cleaned with water/sand.
- Proper approach like aluminum ladder should be provided to reach to the platforms of scaffolding and ladder must be tied.
- All clumps of scaffolding should be tightened properly and planks should be tied at both ends and supported at proper distances along span to avoid sagging and failure.
- Always use safety belt while working at height of more than 2 meters and ensure tieing the life line of safety belt with firm support.
- Ensure area cordoning for hot work, X-ray, excavation, hazard material temporary storage.
- Ensure proper tagging of valves, switches etc to prevent its use.
- Ensure proper guidance to workman and make him aware about local area hazards before start of the job.
- All welding machines should be provided with power isolation switch of suitable rating.
- Portable electrical appliances/tools earthing should be in good working condition. Insulation portion should be free from damages.
- All electrical cables should be joints free and connection taken by using three pin plugs.
- While inserting fuse all care should be taken so that no one touches conductor to avoid the shock to the persons.

- During hydro jetting work workers should wear hand gloves, safety helmet goggles and PVC suit.

Don'ts:

- Do not use fire hydrant water for washing/bath purpose.
- Do not use water for cleaning purpose, use broomstick if possible.
- Do not wash or clean trolley, tractor or trucks which are used for chemical/fertilizer's transportation. Wash them at proper place.
- Smoking & carrying matchbox, cigarettes, lighter, bidis etc. are prohibited.
- Photography & carrying cameras/Mobile phones are strictly prohibited in all areas.
- Do not spill liquid or chemicals in open atmosphere.
- The use of Radio Active Source within the plant shall not be allowed without obtaining valid permission/work permit and intimation in the form of a circular to all plant persons shall be given in advance.
- Unauthorized entry into any battery limit of plant is strictly prohibited.
- Sitting or walking on rail tracks, crossing between wagons, taking rest under stabled wagons, crossing the rail through the openings underneath the stationary wagons are strictly prohibited.

Don'ts during shut down:

- Do not use gasket or other blinds as it can fail during job. All blinds should be metallic.
- No toxic/corrosive/irritating materials should remain plants or sections where hot work is to be carried out.
- No hot work should be permitted in battery limits near sewers till areas have been cleaned flushed properly.
- No hot work irrespective of place of area shall be done without valid permit.
- No combustible material shall be there in flare line for taking up of flare line job. Isolations shall be ensured.

ANNEXURE – 8

CERTIFIED COPY OF HON'BLE HIGH COURT OF GUJARAT'S STAY ORDER AGAINST IMPLEMENTATION OF NOTIFICATION DATED MARCH 3, 2016 OF MoEFCC, NEW DELHI

SPECIAL CIVIL APPLICATION - No. 5312 of 2016

Status : PENDING | **(Filing(Stamp) Number : SCA/5331/2016)** | **CNR No : GJHC240461492016**

Next Listing Date: 02/05/2019

Coram
- HONOURABLE THE ACTING CHIEF JUSTICE ANANT S. DAVE
- and HONOURABLE MR.JUSTICE BIREN VAISHNAV

S.NO.	Petitioner Name	Advocate On Record
1	JAYESHKUMAR SOMABHAI PATEL	ANSHUL N SHAH(5540) for: Petitioner(s) ⇒ 1 - 12
2	CHANDRASHEKHAR BHANUPRASAD UPASANI	MR NILESH P SHAH(3215) for: Petitioner(s) ⇒ 1 - 12
3	MALAV PRAFULBHAI DALWADI	
4	SNEHAL BHARATBHAI SATYAPATHI	
5	PRADEEP PRABHAKAR JOSHI	
6	GAURANG VINODBHAI PARMAR	
7	DARSHAN JITENDRABHAI PAREKH	
8	SURESH TULSHIBHAI MORADIA	
9	SUDHIR NARAISINGH VERMA	
10	SEEMA CHANDRAKANT ABHALE	
11	DILIP CHANDUBHAI THAKKAR	
12	BALU TRIBHOVAN PATEL	

S.NO.	Respondent Name	Advocate On Record
1	UNION OF INDIA	NOTICE SERVED(4) for :Respondent(s) ⇒ 1

Presented On : 30/03/2016 | **Registered On** : 04/04/2016
Bench Category : DIVISION | **District** : SURAT
Case Originated From : -

Purpose of Listing : 192-NOTICE & ADJOURNED MATTERS

Classification
- 2012-08 - VIRES CHALLENGED - VIRES CHALLENGED - CONSTITUTION OF INDIA - CENTRAL ACT / STATE ACT / RULE / STATUTORY NOTIFICATION / REGULATIONS

Act
- CONSTITUTION OF INDIA

Court Proceedings

S. No.	Notified Date	CourtCode	Board Sr. No.	Stage	Action	Coram
1	05/04/2016	1	6	111-URGENT ADMISSION (FRESH MATTERS)	4-FIXED NOTICE	• HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY • HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
2	13/06/2016	1	31	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	• HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY • HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
3	04/07/2016	1	35	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	• HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY • HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
4	21/07/2016	1	55	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	• HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY • HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
5	22/08/2016	1	36	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	• HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY • HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
6	14/09/2016	1	119	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	• HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY • HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
7	05/10/2016	1	119	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	• HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY • HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
8	07/11/2016	1	29	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	• HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY • HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI

S. No.	Notified Date	CourtCode	Board Sr. No.	Stage	Action	Coram
9	18/11/2016	1	73	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	o HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY o HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
10	19/12/2016	1	88	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	o HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY o HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
11	20/01/2017	1	69	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	o HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY o HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
12	21/02/2017	1	50	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	o HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY o HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
13	14/03/2017	1	86	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	o HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY o HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
14	20/04/2017	1	109	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	o HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY o HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
15	03/07/2017	1	97	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	o HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY o HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
16	04/09/2017	1	86	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	o HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY o HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
17	14/11/2017	1	74	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	o HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY o HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
18	12/01/2018	1	49	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	o HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY o HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
19	20/02/2018	1	65	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	o HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY o HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
20	27/03/2018	1	120	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	o HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY o HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
21	27/03/2018	1	120	192-NOTICE & ADJOURNED MATTERS		o HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY o HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
22	03/04/2018	1	140	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	o HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY o HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI

S. No.	Notified Date	CourtCode	Board Sr. No.	Stage	Action	Coram
23	13/04/2018	1	89	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	◦ HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY ◦ HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
24	10/07/2018	1	219	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	◦ HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY ◦ HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
25	07/09/2018	1	104	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	◦ HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY ◦ HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
26	27/11/2018	1	197	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	◦ HONOURABLE THE ACTING CHIEF JUSTICE ANANT S. DAVE ◦ HONOURABLE MR.JUSTICE BIREN VAISHNAV
27	11/01/2019	1	64	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	◦ HONOURABLE THE ACTING CHIEF JUSTICE ANANT S. DAVE ◦ HONOURABLE MR.JUSTICE BIREN VAISHNAV
28	18/02/2019	1	166	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	◦ HONOURABLE THE ACTING CHIEF JUSTICE ANANT S. DAVE ◦ HONOURABLE MR.JUSTICE BIREN VAISHNAV
29	25/03/2019	1	125	192-NOTICE & ADJOURNED MATTERS	1-NEXT DATE	◦ HONOURABLE THE ACTING CHIEF JUSTICE ANANT S. DAVE ◦ HONOURABLE MR.JUSTICE BIREN VAISHNAV

Available Orders

S. No.	Case Details	Judge Name	Order Date	CAV	Judgement	Questions	Transferred	Download
1	SCA/5312/2016	◦ HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY ◦ HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI	05/04/2016	N	ORDER	-	Y	Download
2	SCA/5312/2016	◦ HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY ◦ HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI	21/07/2016	N	ORDER	-	Y	Download
3	SCA/5312/2016	◦ HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY ◦ HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI	18/11/2016	N	ORDER	-	Y	Download
4	SCA/5312/2016	◦ HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY ◦ HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI	20/01/2017	N	ORDER	-	Y	Download

Connected Matters

S. No.	CaseDetail	Status Name	Disposal Date	Action/Coram
1	R/SCA/2702/2018	PENDING	-	◦ HONOURABLE THE ACTING CHIEF JUSTICE ANANT S. DAVE ◦ HONOURABLE MR.JUSTICE BIREN VAISHNAV
2	R/SCA/2720/2019	PENDING	-	◦ HONOURABLE THE ACTING CHIEF JUSTICE ANANT S. DAVE ◦ HONOURABLE MR.JUSTICE BIREN VAISHNAV

S. No.	CaseDetail	Status Name	Disposal Date	Action/Coram
3	R/SCA/4055/2018	PENDING	-	◦ HONOURABLE THE ACTING CHIEF JUSTICE ANANT S. DAVE ◦ HONOURABLE MR.JUSTICE BIREN VAISHNAV
4	R/SCA/7665/2018	PENDING	-	◦ HONOURABLE THE ACTING CHIEF JUSTICE ANANT S. DAVE ◦ HONOURABLE MR.JUSTICE BIREN VAISHNAV
5	R/SCA/11525/2018	PENDING	-	◦ HONOURABLE THE ACTING CHIEF JUSTICE ANANT S. DAVE ◦ HONOURABLE MR.JUSTICE BIREN VAISHNAV
6	R/SCA/17039/2016	PENDING	-	◦ HONOURABLE THE ACTING CHIEF JUSTICE ANANT S. DAVE ◦ HONOURABLE MR.JUSTICE BIREN VAISHNAV
7	R/SCA/11208/2017	PENDING	-	◦ HONOURABLE THE ACTING CHIEF JUSTICE ANANT S. DAVE ◦ HONOURABLE MR.JUSTICE BIREN VAISHNAV
8	R/SCA/20606/2017	PENDING	-	◦ HONOURABLE THE ACTING CHIEF JUSTICE ANANT S. DAVE ◦ HONOURABLE MR.JUSTICE BIREN VAISHNAV
9	R/SCA/15891/2018	PENDING	-	◦ HONOURABLE THE ACTING CHIEF JUSTICE ANANT S. DAVE ◦ HONOURABLE MR.JUSTICE BIREN VAISHNAV

Application / Appeal Matters

NO DATA FOR APPLICATION / APPEAL MATTERS

IA Details

Office Details

S. No.	Filing Date	Document Name	Advocate Name	Court Fee on Document	Document Details
1	30/03/2016	VAKALATNAMA	ANSHUL N SHAH for PETITIONER(s) →	0	-JAYESHKUMAR SOMABHAI PATEL
2	30/03/2016	MEMO OF PETITION/APPEAL/SUIT	MR NILESH P SHAH for PETITIONER(s) →	100	-JAYESHKUMAR SOMABHAI PATEL
3	30/03/2016	VAKALATNAMA	MR NILESH P SHAH for PETITIONER(s) →	5	-JAYESHKUMAR SOMABHAI PATEL
4	01/04/2016	ADDITIONAL FEE ON MEMO OF APPEAL/PETITION/SUIT	MR NILESH P SHAH for PETITIONER(s) →	500	-JAYESHKUMAR SOMABHAI PATEL

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Lowercourt Detail

NO DATA FOR LOWERCOURT DETAIL

FIR Details

NO DATA FOR FIR DETAILS

PAGES : 4 CHARGE :25

U/2292/2016 Read By :
Prepared By : MS. BITTAN RAJPUT
Applied on : 05/04/2016 Examined By :
Prepared on : 05/04/2016
Notified on : 7/4/16
Delivered on 11/4/16

Dy.S.O. Section Officer
Decree Department Decree Department

IN THE HIGH COURT OF GUJARAT AT AHMEDABAD
ORDER PASSED BY THE COURT IN THE CASE OF

1 JAYESHKUMAR SOMABHAI PATEL
AQUA-AIR ENVIRONMENTAL ENGINEERING P. LTD.
403, CENTRE POINT, NR.KADIWALA SCHOOL,
RING ROAD, SURAT - 395002

2 CHANDRASHEKHAR BHANUPRASAD UPASANI
JYOTI OM CHEMICAL RESEARCH CENTRE PVT. LTD.
60, DAKSHINAMURTI RESIDENCY, OPP.SUN PHARMA
RESEARCH CENTRE,
ATLADRA, VADODARA - 3900012

3 MALAV PRAFULBHAI DALWADI
T R ASSOCIATES
C/605 A, GANESH MERIDIAN, OPP.KARGIL PETROL PUMP.
S.G.HIGHWAY, AHMEDABAD- 380060

4 SNEHAL BHARATBHAI SATYAPATHI
VASUDEV ASSOCIATES
G-203, AKASH-3, NEAR SAHAJANAND COMPLEX,
132 FT RING ROAD, NARANPURA, AHMEDABAD - 380013

5 PRADEEP PRABHAKAR JOSHI
GREEN CIRCLE INC., GREEN EMPIRE (ANUPUSHPAM),
ABOVE AXIS BANK, NEAR YASH COMPLEX,
GOTRI ROAD, VADODARA- 390023

6 GAURANG VINODBHAI PARMAR
ECO-CARE SOLUTIONS, 306-307, 3RD FLOOR, DWARKESH COMPLEX,
SUN PHARMA ROAD, ATLADRA, VADODARA - 390020

7 DARSHAN JITENDRABHAI PAREKH
AKSHAR CONSULTANTS, 704 & 813, SAKAR-5,
NEAR MITHALHALI RAILWAY CROSSING,
OFF ASHRAM ROAD, AHMEDABAD - 380009

HIGH COURT OF GUJARAT AHMEDABAD CERTIFIED COPY

8 SURESH TULSHIBHAI MORADIA
EARTHCARE ENVIRO SOLUTIONS PVT. LTD.
B-1/106, 304 & 308, PUSHPRAJ APRTMENT, NR.CNG PETROL PUMP
KHATODARA, SURAT - 395002

9 SUDHIR NARAISINGH VERMA
RAAS ENVIROCARE, 93/94, MATRI MANDIR SCOIETY,
ISKON ROAD, OFF GOTRI ROAD, VADODARA

10 SEEMA CHANDRAKANT ABHALE
PRAKRUTI ENVIRONMENTAL ENGINEERS,
1, UTKANTH SOCIETY, B/H ALKAPURI CLUB,
ALKAPURI, VADODARA - 390007

11 DILIP CHANDUBHAI THAKKAR
SUNRISE ENVIROMENTAL CONSULTANT,
TF-4, THIRD FLOOR, KRISHNA ARCADE,
NEAR BSNL OFFICE, NARODA, AHMEDABAD - 382330

12 BALU TRIBHOVAN PATEL
NATURE ENVIRO CARE, SURVEY NO.274/4,
OPP. GUJARAT HIGH COURT BUILDING, B/H SATYAMEV COMPLEX,
NEAR CAR BOX, S.G.HIGHWAY, AHMEDABAD- 380060

Petitioner(s)

VERSUS

1 UNION OF INDIA
THROUGH SECRETARY, MINISTRY OF ENVIRONMENT, FOREST
&
CLIMATE CHANGE, INDIARA PRAYAVARAN BHAVAN,
JOR BAGH ROAD, NEW DELHI -110003

Respondent(s)

Being SPECIAL CIVIL APPLICATION No. 5312 of 2016

Appearance on Record:
MR NILESH P SHAH as ADVOCATE for the Petitioner(s) No. 1 - 12
ANSHUL N SHAH as ADVOCATE for the Petitioner(s) No. 1 - 12

COURT'S ORDER :

CORAM :
HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY
HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
Date of Decision: 05/04/2016
(COPY OF ORDER ATTACHED HEREWITH)

IN THE HIGH COURT OF GUJARAT AT AHMEDABAD

SPECIAL CIVIL APPLICATION NO. 5312 of 2016

JAYESHKUMAR SOMABHAI PATEL & 11....Petitioner(s)
Versus
UNION OF INDIA....Respondent(s)

Appearance:
MR ANSHUL N SHAH, ADVOCATE for the Petitioner(s) No. 1 - 12
MR NILESH P SHAH, ADVOCATE for the Petitioner(s) No. 1 - 12

CORAM: HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY
and
HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI

Date : 05/04/2016

ORAL ORDER
(PER : HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY)

Notice returnable on 13.06.2016. Implementation of the impugned Notification dated 03.03.2016 shall stand deferred till further orders.

(R. SUBHASH REDDY, CJ)

(VIPUL M. PANCHOLI, J.)

satish

TRUE COPY
DEPUTY / ASSISTANT REGISTRAR
THIS 7/4/16 DAY OF 07/04/2016
Page 1 of 1

ANNEXURE – 9

UNDERTAKING STATING THAT NO BANNED PESTICIDES WILL BE MANUFACTURED

ISO 9001, 14001 & OHSAS 18001
CERTIFIED COMPANY

Technical Plant : E-442, Riico Industrial Area
Chopanki (Bhiwadi) 301707 (Raj.)
Telefax : 01493 - 298189 - 91

insecticides (INDIA) LIMITED

Date: 25/07/2019

Undertaking

We undertake that, Company will not manufacture the banned pesticides.

For INSECTICIDES INDIA LIMITED

AUTHORIZED SIGNATORY

ANNEXURE – 10

EXISTING CC&A & ITS COMPLIANCE

Head Office (PDF)

Rajasthan State Pollution Control Board
4, Institutional Area, Jhalana Doongari, Jaipur-302 004
Phone: 0141-5159856 Fax: 0141-5159697

Registered

File No : F(PLG)/Alwar(Alwar)/36(1)/2015-2016/6090-6092
Order No : 2018-2019/PDF/3865 **Date:** 22/01/2019
Unit Id : 60760

M/s Insecticides (India) Limited

401-402, Lusa Tower, Azadpur Commercial Complex,
Azadpur , Delhi
District:Delhi

Sub: **Consent to Operate** under section 25/26 of the Water (Prevention & Control of Pollution) Act, 1974 and under section 21(4) of Air (Prevention & Control of Pollution) Act, 1981.

Ref: Your application for Consent to Operate dated 22/01/2018 and subsequent correspondence.

Sir,

Consent to Operate under the provisions of section 25/26 of the Water (Prevention & Control of Pollution) Act, 1974 (hereinafter to be referred as the Water Act) and under section 21 of the Air (Prevention & Control of Pollution) Act, 1981, (hereinafter to be referred as the Air Act) as amended to date and rules & the orders issued thereunder **is hereby granted** for your **Pesticide technical and formulation plant** situated at **E-442,Chopanki RIICO INDUSTRIAL AREA , Bhiwadi Tehsil:Tijara District:Alwar** , Rajasthan, subject to the following conditions:-

1 That this Consent to Operate is valid for a period from **01/06/2018** to **31/05/2023** .

2 That this Consent is granted for manufacturing / producing following products / by products or carrying out the following activities or operation/processes or providing following services with capacities given below.

Particular	Type	Quantity with Unit
PESTICIDES FORMULATION	Product	2,000.00 TPA
PESTICIDES TECHNICAL	Product	1,800.00 TPA

3 That this consent to operate is for existing plant, process & capacity and separate consent to establish/operate is required to be taken for any addition / modification / alteration in process or change in capacity or change in fuel.

4 That the quantity of effluent generation along with mode of disposal for the treated effluent shall be as under:

Page 1 of 7

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Rajasthan State Pollution Control Board

4, Institutional Area, Jhalana Doongari, Jaipur-302 004

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Registered

File No : F(PLG)/Alwar(Alwar)/36(1)/2015-2016/6090-6092

Order No : 2018-2019/PDF/3865 **Date:** 22/01/2019

Unit Id : 60760

Type of effluent	Max. effluent generation (KLD)	Recycled Qty of Effluent (KLD)	Disposed Qty of effluent (KLD)and mode of disposal
Trade Effluent	8.400	6.000	2.400 Multieffect Evaporation

5 That the sources of air emmissions along with pollution control measures and the emission standards for the prescribed parameters shall be as under:

Sources of Air Emmissions	Pollution Control Measures	Prescribed	
		Parameter	Standard
Boiler(2TPH)	Bag Filter , Stack	Particulate Matter	800 mg/Nm3
Incinerator (1 no.)(225KG/HOUR)	Scrubber , Stack	HCL	50 mg/Nm3
		SO2	200 mg/Nm3
		CO	100 mg/Nm3
		Particulate Matter	50 mg/Nm3

6 That the **Pesticide technical and formulation plant** will comply with the standards as prescribed vide MOEF notification No. GSR 826(E) dated 16th November, 2009 with respect to National Ambient Air Quality Standards.

7 That the trade effluent shall be treated before disposal so as to conform to the standards prescribed under the Environment (Protection) Act-1986 for disposal **Into Inland Surface Water .** The main parameters for regular monitoring shall be as under

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Order No : 2018-2019/PDF/3865 Date: 22/01/2019
Unit Id : 60760

Parameters	Standards
Total Suspended Solids	Not to exceed 100 mg/l
Oil and Grease	Not to exceed 10 mg/l
Biochemical Oxygen Demand (3 days at 27°C)	Not to exceed 30 mg/l
Bio-assay Test	90% suivival of fish after 96 hours in 100% effluent
pH Value	Between 6.5 to 8.5

8 That the industry shall comply with conditions of the Environmental Clearance issued by Ministry of Environment & Forest, Government of India vide letter no. J-11011/63/2009-IAII(I) dated 29/04/2009.

9 That the nature and quantity of all the products shall be in accordance with the Environment Clearance dated 29/04/2009.

10 That the industry shall not manufacture any product/by product which is not listed in Environmental Clearance dated 29/04/2009.

11 That this Consent to Operate shall be valid for production of technical grade pesticides as follows- 20 TPA of Phenoxy Herbicides (Quizalofop), 50 TPA of Imidazolinone Herbicides (Imazethayr), 20 TPA of Sulfonyl Urea Herbicides (Metsulfuron methyl, Sulfosulfuron), 200 TPA of Organochlorine Herbicides (Butachlore, Pretilachlor), 600 TPA of Other Herbicides (Glyphosate, Oxyfluorfen, Paraquate), 10 TPA of Carbamate insecticides (Thiodicarb), 100 TPA of Neo Nicotinoid insecticides (Acetamiprid, Imidacloprid, Thiacloprid, Thiamethoxam), 300 TPA of Organophosphorus insecticides (Attrazine, Chlorphyriphos, DDVP), 150 TPA of Pyrethroid insecticides (Allethrin, Alpha Cypermethrin, Cyfluthrin, Cypermethrin, Delta Cypermethrin, d-transllethrin, Lambda Cyhalothrin, Permethrin, Prallethrin, Transfluthrin), 100 TPA of Other Insecticides (Fipronil, Buprofezin, Cartap Hydrochloride, Metalaxyl, Novaluron), 75 TPA of Conazole fungicides (Difenconazole, Hexaconazole, Paclobutrazol, Propeconazole, Tebuconazole, Tricyclozoe), 75 TPA of Other Fungicides (Indoxacarb, Thiophenate methyl), 100 TPA of Fermentation technology (Abamectin, Azoxy strobin, Emmamectin benzoate, Ivermectin, Kresoxym methyl, Spinosad, Tecoxy, Validamycin).

12 That this Consent to Operate shall be valid for production of 1500 TPA of pesticide formulation & 500 TPA of emulsifier formulation from technicals listed in this consent.

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Order No : 2018-2019/PDF/3865 Date: 22/01/2019
Unit Id : 60760

13 That the total water consumption shall not exceed from 25 KLD and same shall be met from RIICO water supply only. No ground water extraction shall be carried out without prior permission from the Central Ground Water Authority (CGWA).

14 That the quantity of the total waste water shall not exceed 8.40 KLD including domestic effluent of 2.7 KLD. The entire effluent post treatment in Effluent Treatment Plant shall be fed to Multi Effect Evaporator (MEE). The condensate recovered from MEE (6 KLD) shall be reused in process or for plantation and other gainful purposes within the premises. The reject of the MEE shall be taken to Filter Press and then disposed through the installed incinerator.

15 That industry shall maintain water meters for measuring & recording of the amount of fresh water intake, water consumed in various processes, effluent generated, effluent treated in Effluent Treatment Plant, effluent recycled, effluent incinerated & effluent disposed/utilized in plantation for industrial as well as domestic usage. The daily record of the meters readings shall be maintained in separate log-book and monthly summary shall be submitted to Regional Office, Bhiwadi.

16 That the industry shall maintain zero liquid discharge (ZLD) status. No trade effluent (treated/untreated) shall be discharged within as well as outside the premises under any circumstance. The industry shall provide and maintain Multi Effect Evaporator (MEE) and Filter Press to achieve ZLD.

17 That the treated effluent of Effluent Treatment Plant must clear the bio-assay test for utilization in plantation (till the time industry installs the Multi Effect Evaporation). After installation of Multi Effect Evaporator direct treated water from ETP shall not be used directly for plantation.

18 That the industry shall complete the work of erection and commissioning of Multi Effect Evaporator for achieving the Zero Liquid Discharge Status (inside as well as outside) by 30-June-2019, for which a Bank Guarantee of Rs. 6.50 lacs bearing no. 0129ILG000618 has been submitted by the industry, failure to which Bank Guarantee shall be forfeited without any further notice in the matter.

19 That all the pipe lines carrying effluent/water/liquid shall be kept above ground level and with proper color coding. No flexible piping or drains shall be provided for carrying of liquids.

20 That the industry shall comply with the effluent standards prescribed under Environment (Protection) Rules, 1986 for Pesticide Manufacturing and Formulation Industry in addition to parameters mentioned in condition no. 7 above.

Rajasthan State Pollution Control Board
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Phone: 0141-5159856 Fax: 0141-5159697

Registered

File No : F(PLG)/Alwar(Alwar)/36(1)/2015-2016/6090-6092
Order No : 2018-2019/PDF/3865 Date: 22/01/2019
Unit Id : 60760

21 That the industry shall maintain adequate height of all the stacks connected with Boiler, Incinerator & D. G. Set along with adequate pollution control measures as prescribed under the Environment (Protection) Act, 1986.

22 That industry shall provide adequate & safe stack emission monitoring facilities with the Boiler & Incinerator.

23 That the industry shall comply with emission standards prescribed under Environment (Protection) Rules,1986 for Incinerator for Pesticide Industry.

24 That the industry shall provide & maintain separate energy meters at pollution control measures & effluent treatment plant. The daily record of the energy meter readings shall be maintained in separate log-book and monthly summary shall be submitted to Regional Office, Bhiwadi.

25 That the Boiler shall be operated with permitted fuel only. The ash generated from the boiler shall be stored adequately till transported for final disposal. The record of generation and disposal of ash shall be maintained in separate log-book.

26 That industry shall not use Petcoke and/or Furnace Oil for Boiler or any other purpose.

27 That all Hazardous waste, process residue, sludge of Effluent Treatment Plant and ash of the incinerator to be disposed to CTDF, Udaipur or to be incinerated in accordance with the provisions of the Hazardous Waste (Management , Handling & Transboundary Movement) Rules 2008.

28 That industry shall provide and maintain the centralized air cleaning system i.e fume collection hoods, alkali scrubber, activated carbon adsorption system etc., so as to remove the Volatile Organic Compounds emitted from the reactor vents etc.

29 That industry shall submit quarterly analysis/monitoring report of source emission/ambient air/waste water/noise from the State Board laboratory or any laboratory approved/ recognized by Ministry of Environment, Forest & Climate Change, Government of India.

30 That industry shall maintain the continuous online emission/effluent monitoring system along with PTZ cameras and flow meters and ensure regular connectivity with the State Board server. The monitoring system shall be established and maintained in accordance with guidelines issued by Rajasthan State Pollution Control Board/Central Pollution Control Board.

31 That industry shall ensure safe handling & storage of various hazardous chemicals.

Rajasthan State Pollution Control Board
4, Institutional Area, Jhalana Doongari, Jaipur-302 004
Phone: 0141-5159856 Fax: 0141-5159697

Registered

File No : F(PLG)/Alwar(Alwar)/36(1)/2015-2016/6090-6092
Order No : 2018-2019/PDF/3865 Date: 22/01/2019
Unit Id : 60760

32 That industry shall provide/ maintain the adequate pollution control measures to control the fugitive emission/ resuspension of fine particles/ particulate of pesticides dust during material handling, process operation, storage etc. The suspended particulate matter measured between 3m to 10m from any such process equipment shall not exceed 600 micrograms per cubic meter. The industry shall also explore and implement the ways to reduce the manual operations in packaging area so as to reduce the fugitive emissions.

33 The industry shall ensure that connectivity for PTZ cameras with the State Board server within one month of issuance of this letter for which a Bank Guarantee bearing number 0129ILG000818 dated 04/12/2018 of Rs. 1,00,000 has been submitted by the industry. The location of PTZ cameras shall be finalized in consultation with Regional Officer, Bhiwadi.

34 That the industry shall make arrangements for proper channelizing of storm water and storm water shall not be allowed to mix with process waste.

35 Minimum 33 % of the area for the industry should be covered by plantation and plantation shall be carried out to develop a green belt along the periphery.

36 That the industry shall maintain good housekeeping.

37 That the total capital cost of the project shall not exceed to Rs. 1606.34 Lacs.

38 That the industry shall comply with the provisions of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 and the Public Liability Insurance Act, 1991.

39 That, not withstanding anything provided hereinabove, the State Board shall have power and reserves its right, as contained **under section 27(2) of the Water Act and under section 21(6) of the Air Act** to review anyone or all the conditions imposed here in above and to make such variation as it deemed fit for the purpose of **Air Act & Water Act.**

40 That the grant of this **Consent to Operate** is issued from the environmental angle only, and does not absolve the project proponent from the other statutory obligations prescribed under any other law or any other instrument in force. The sole and complete responsibility to comply with the conditions laid down in all other laws for the time-being in force, rests with the industry/ unit/ project proponent.

41 That the grant of this **Consent to Operate** shall not, in any way, adversely affect or jeopardize the legal proceeding, if any, instituted in the past or that could be instituted againt you by the State Board for violation of the provisions of the Act or the Rules made thereunder.

This **Consent to Operate** shall also be subject, besides the aforesaid specific conditions, to

Head Office (PDF)

Rajasthan State Pollution Control Board
4, Institutional Area, Jhalana Doongari, Jaipur-302 004
Phone: 0141-5159856 Fax: 0141-5159697

Registered

File No : F(PLG)/Alwar(Alwar)/36(1)/2015-2016/6090-6092
Order No : 2018-2019/PDF/3865 **Date:** 22/01/2019
Unit Id : 60760

the general conditions given in the enclosed Annexure. The project proponent will comply with the provisions of the **Water Act and Air Act** and to such other conditions as may, from time to time , be specified, by the State Board under the provisions of the aforesaid Act(s). Please note that, non compliance of any of the above stated conditions would tantamount to revocation of **Consent to Operate** and project proponent / occupier shall be liable for legal action under the relevant provisions of the said Act(s).

This bears the approval of the competent authority.

Yours Sincerely

Group Incharge[PDF]

Copy To:-

1 Regional Officer, Regional Office, Rajasthan State Pollution Control Board, Bhiwadi to monitor compliance of the consent conditions.
2 Master File.

Group Incharge[PDF]

COMPLIANCE REPORT OF CONSOLIDATED CONSENTS & AUTHORIZATION

<table>
<tr><th>Sr. No.</th><th>Conditions</th><th>Remarks</th></tr>
<tr><td>1</td><td>That this Consent to Operate is valid for a period from 01/06/2018 to 31/05/2023.</td><td></td></tr>
<tr><td>2</td><td>That this Consent is granted for manufacturing / producing following products / by products or carrying out the following activities or operation/processes or providing following services with capacities given below.
<table>
<tr><th>Particular</th><th>Type</th><th>Quantity with unit</th></tr>
<tr><td>PESTICIDES FORMULATION</td><td>Product</td><td>2,000.00 TPA</td></tr>
<tr><td>PESTICIDES TECHNICAL</td><td>Product</td><td>1,800.00 TPA</td></tr>
</table></td><td>Complied.</td></tr>
<tr><td>3</td><td>That this consent to operate is for existing plant, process & capacity and separate consent to establish/operate is required to be taken for any addition / modification / alteration in process or change in capacity or change in fuel.</td><td></td></tr>
<tr><td>4</td><td>That the quantity of effluent generation along with mode of disposal for the treated effluent shall be as under:
<table>
<tr><th>Type of effluent</th><th>Max. effluent generation (KLD)</th><th>Recycled Qty of Effluent (KLD)</th><th>Disposed Qty of effluent (KLD) and mode of disposal</th></tr>
<tr><td>Trade Effluent</td><td>8.400</td><td>6.000</td><td>2.400
Multi effect Evaporation</td></tr>
</table></td><td>Complied.</td></tr>
<tr><td>5</td><td>That the sources of air emissions along with pollution control measures and the emission standards for the prescribed parameters shall be as under:
<table>
<tr><th rowspan="2">Sources of Air Emmissions</th><th rowspan="2">Pollution Control Measures</th><th colspan="2">Prescribed</th></tr>
<tr><th>Parameter</th><th>Standard</th></tr>
<tr><td>Boiler(2TPH)</td><td>Bag Filter , Stack</td><td>Particulate Matter</td><td>800 mg/Nm3</td></tr>
<tr><td>Incinerator(1NO.)</td><td>Scrubber , Stack</td><td>HCL
SO2
CO
Particulate Matter</td><td>50 mg/Nm3
200 mg/Nm3
100 mg/Nm3
50 mg/Nm3</td></tr>
</table></td><td>Complied.</td></tr>
<tr><td>6</td><td>That the Pesticide technical and formulation plant will comply with the standards as prescribed vide MOEF notification No. GSR 826(E) dated 16th November, 2009 with respect to National Ambient Air Quality Standards.</td><td>Complied.</td></tr>
<tr><td>7</td><td>That the trade effluent shall be treated before disposal so as to conform to the standards prescribed under the Environment</td><td>Complied.</td></tr>
</table>

<table>
<tr><td></td><td>(Protection) Act-1986 for disposal Into Inland Surface Water. The main parameters for regular monitoring shall be as under
<table>
<tr><th>Parameters</th><th>Standards</th></tr>
<tr><td>Total Suspended Solids</td><td>Not to exceed 100 mg/l</td></tr>
<tr><td>Temperature</td><td>shall not exceed 5°C above the receiving water temperature</td></tr>
<tr><td>Oil and Grease</td><td>Not to exceed 10 mg/l</td></tr>
<tr><td>Biochemical Oxygen Demand (3 days at 27°C)</td><td>Not to exceed 30 mg/l</td></tr>
<tr><td>Bio-assay Test</td><td>90% suivival of fish after 96 hours in 100% effluent</td></tr>
<tr><td>pH Value</td><td>Between 6.5 to 8.5</td></tr>
</table></td><td></td></tr>
<tr><td>8</td><td>That the industry shall comply with conditions of the Environmental Clearance issued by Ministry of Environment & Forest, Government of India vide letter no.J-11011/63/2009-IAII(I) dated 29/04/2009.</td><td>Complied.</td></tr>
<tr><td>9</td><td>That the nature and quantity of all the products shall be in accordance with the Environment Clearance dated 29/04/2009.</td><td>Complied.</td></tr>
<tr><td>10</td><td>That the industry shall not manufacture any product/by product which is not listed in Environmental Clearance dated 29/04/2009.</td><td></td></tr>
<tr><td>11</td><td>That this Consent to Operate shall be valid for production of technical grade pesticides as follows- 20 TPA of Phenoxy Herbicides (Quizalofop), 50 TPA of Imidazolinone Herbicides (Imazethayr), 20 TPA of Sulfonyl Urea Herbicides (Metsulfuron methyl, Sulfosulfuron), 200 TPA of Organochlorine Herbicides (Butachlore, Pretilachlor), 600 TPA of Other Herbicides (Glyphosate, Oxyfluorfen, Paraquate), 10 TPA of Carbamate insecticides (Thiodicarb), 100 TPA of Neo Nicotinoid insecticides (Acetamiprid, Imidacloprid, Thiacloprid, Thiamethoxam),300 TPA of Organophosphorus insecticides (Attrazine, Chlorphyriphos, DDVP), 150 TPA of Pyrethroid insecticides (Allethrin, Alpha Cypermethrin, Cyfluthrin, Cypermethrin, Delta Cypermethrin, d-transllethrin, Lambda Cyhalothrin, Permethrin, Prallethrin, Transfluthrin), 100 TPA of Other Insecticides (Fipronil, Buprofezin, Cartap Hydrochloride, Metalaxyl, Novaluron), 75 TPA of Conazole fungicides (Difenconazole, Hexaconazole, Paclobutrazol, Propeconazole, Tebuconazole, Tricyclozoe), 75 TPA of Other Fungicides (Indoxacarb, Thiophenate methyl), 100 TPA of Fermentation technology (Abamectin, Azoxy strobin, Emmamectin benzoate, Ivermectin, Kresoxym methyl, Spinosad, Tecoxy, Validamycin).</td><td>Complied.</td></tr>
<tr><td>12</td><td>That this Consent to Operate shall be valid for production of 1500 TPA of pesticide formulation & 500 TPA of emulsifier formulation from technicals listed in this consent.</td><td>Complied</td></tr>
<tr><td>13</td><td>That the total water consumption shall not exceed from 25 KLD and same shall be met from RIICO water supply only. No ground water extraction shall be carried out without prior permission from the Central Ground Water Authority (CGWA).</td><td>Complied</td></tr>
<tr><td>14</td><td>That the quantity of the total waste water shall not exceed 8.40 KLD including domestic effluent of 2.7 KLD. The entire effluent post treatment in Effluent Treatment Plant shall be fed to Multi Effect Evaporator (MEE). The condensate recovered from MEE (6 KLD) shall be reused in process or for plantation and other gainful purposes within the premises. The reject of the MEE shall be taken to Filter Press and then disposed through the installed incinerator.</td><td>Complied</td></tr>
</table>

15	That industry shall maintain water meters for measuring & recording of the amount of fresh water intake, water consumed in various processes, effluent generated, effluent treated in Effluent Treatment Plant, effluent recycled, effluent incinerated & effluent disposed/utilized in plantation for industrial as well as domestic usage. The daily record of the meters readings shall be maintained in separate log-book and monthly summary shall be submitted to Regional Office, Bhiwadi.	Complied
16	That the industry shall maintain zero liquid discharge (ZLD) status. No trade effluent (treated/untreated) shall be discharged within as well as outside the premises under any circumstance. The industry shall provide and maintain Multi Effect Evaporator (MEE) and Filter Press to achieve ZLD.	Complied
17	That the treated effluent of Effluent Treatment Plant must clear the bio-assay test for utilization in plantation (till the time industry installs the Multi Effect Evaporation). After installation of Multi Effect Evaporator direct treated water from ETP shall not be used directly for plantation.	Complied
18	That the industry shall complete the work of erection and commissioning of Multi Effect Evaporator for achieving the Zero Liquid Discharge Status (inside as well as outside) by 30-June-2019, for which a Bank Guarantee of Rs. 6.50 lacs bearing no. 0129ILG000618 has been submitted by the industry, failure to which Bank Guarantee shall be forfeited without any further notice in the matter.	Complied
19	That all the pipe lines carrying effluent/water/liquid shall be kept above ground level and with proper color coding. No flexible piping or drains shall be provided for carrying of liquids.	
20	That the industry shall comply with the effluent standards prescribed under Environment (Protection) Rules, 1986 for Pesticide Manufacturing and Formulation Industry in addition to parameters mentioned in condition no. 7above.	Complied
21	That the industry shall maintain adequate height of all the stacks connected with Boiler, Incinerator & D. G. Set along with adequate pollution control measures as prescribed under the Environment (Protection) Act, 1986.	
22	That industry shall provide adequate & safe stack emission monitoring facilities with the Boiler & Incinerator.	Complied
23	That the industry shall comply with emission standards prescribed under Environment (Protection) Rules,1986 for Incinerator for Pesticide Industry.	Complied
24	That the industry shall provide & maintain separate energy meters at pollution control measures & effluent treatment plant. The daily record of the energy meter readings shall be maintained in separate log-book and monthly summary shall be submitted to Regional Office, Bhiwadi.	Complied
25	That the Boiler shall be operated with permitted fuel only. The ash generated from the boiler shall be stored adequately till transported for final disposal. The record of generation and disposal of ash shall be maintained in separate log-book.	Complied
26	That industry shall not use Pet coke and/or Furnace Oil for Boiler or any other purpose.	
27	That all Hazardous waste, process residue, sludge of Effluent Treatment Plant and ash of the incinerator to be disposed to CTDF, Udaipur or to be incinerated in accordance with the provisions of the Hazardous Waste (Management , Handling & Transboundary Movement) Rules 2008.	Complied

28	That industry shall provide and maintain the centralized air cleaning system i.e fume collection hoods, alkali scrubber, activated carbon adsorption system etc., so as to remove the Volatile Organic Compounds emitted from the reactor vents etc.	Complied
29	That industry shall submit quarterly analysis/monitoring report of source emission/ambient air/waste water/noise from the State Board laboratory or any laboratory approved/ recognized by Ministry of Environment, Forest & Climate Change, Government of India.	Complied
30	That industry shall maintain the continuous online emission/effluent monitoring system along with PTZ cameras and flow meters and ensure regular connectivity with the State Board server. The monitoring system shall be established and maintained in accordance with guidelines issued by Rajasthan State Pollution Control Board/Central Pollution Control Board.	Complied
31	That industry shall ensure safe handling & storage of various hazardous chemicals.	Complied
32	That industry shall provide/ maintain the adequate pollution control measures to control the fugitive emission/ resuspension of fine particles/ particulate of pesticides dust during material handling, process operation, storage etc. The suspended particulate matter measured between 3m to 10m from any such process equipment shall not exceed 600 micrograms per cubic meter. The industry shall also explore and implement the ways to reduce the manual operations in packaging area so as to reduce the fugitive emissions.	Complied
33	The industry shall ensure that connectivity for PTZ cameras with the State Board server within one month of issuance of this letter for which a Bank Guarantee bearing number 0129ILG000818 dated 04/12/2018 of Rs. 1,00,000 has been submitted by the industry. The location of PTZ cameras shall be finalized in consultation with Regional Officer, Bhiwadi.	Complied
34	That the industry shall make arrangements for proper channelizing of storm water and storm water shall not be allowed to mix with process waste.	Complied
35	Minimum 33 % of the area for the industry should be covered by plantation and plantation shall be carried out to develop a green belt along the periphery.	Complied
36	That the industry shall maintain good housekeeping.	Complied
.37	That the total capital cost of the project shall not exceed to Rs. 1606.34 Lacs.	Complied
38	That the industry shall comply with the provisions of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 and the Public Liability Insurance Act, 1991.	Complied
39	That, not withstanding anything provided hereinabove, the State Board shall have power and reserves its right, as contained under section 27(2) of the Water Act and under section 21(6) of the Air Act to review anyone or all the conditions imposed here in above and to make such variation as it deemed fit for the purpose of Air Act & Water Act.	Complied
40	That the grant of this Consent to Operate is issued from the environmental angle only, and does not absolve the project proponent from the other statutory obligations prescribed under any other law or any other instrument in force. The sole and complete responsibility to comply with the conditions laid down in all other laws for the time-being in force, rests with the industry/ unit/ project proponent.	Complied

41	That the grant of this Consent to Operate shall not, in any way, adversely affect or jeopardize the legal proceeding, if any, instituted in the past or that could be instituted against you by the State Board for violation of the provisions of the Act or the Rules made thereunder.	Complied
	This Consent to Operate shall also be subject, besides the aforesaid specific conditions, to the general conditions given in the enclosed Annexure. The project proponent will comply with the provisions of the Water Act and Air Act and to such other conditions as may, from time to time , be specified, by the State Board under the provisions of the aforesaid Act(s). Please note that, non compliance of any of the above stated conditions would tantamount to revocation of Consent to Operate and project proponent / occupier shall be liable for legal action under the relevant provisions of the said Act(s).	Complied

Unit has applied for CTO Renewal dated 22/02/2019

Application Details

Industry Name	Insecticides (India) Limited(47786)
Plant Name	Insectiside (india) Limited
Address	**Address** E-443-444, RIA, Chopanki **City** Bhiwadi **District** Alwar **Tehsil** Tijara
Application ID	234962
Application Type	CTO AIR/WATER
Application For	CTO AIR/WATER
Application Date	22/02/2019
Received Date	22/02/2019
Applicant Name	Dr. Mukesh Kumar
Designation	Managing Director
Category	Orange
Dealing Group	PDF
Application For	CTO AIR/WATER
Disposal Date	
Consent Granted From	
Consent Valid Upto	
Stage	Pending at Dept. Level
Application	Active
Status of Application	Pending
Submitted By Industry	Submitted
Accepted By Board	Accepted
Sector Name	Formulation of pesticides, Agro Chemicals and so on
Remark	
Deficiency Letter	Defletter

original

Regional Office Alwar

Rajasthan State Pollution Control Board

8 / 43 -44 N. E. B. Housing Board Colony, Delhi Road, Alwar

Phone: 0144-2372996

www.rpcb.nic.in

Registered

File No : F(Tech)/Alwar(Tijara)/1710(1)/2013-2014/2439-2441/3800 Dt. 14/03/14

Order No : 2013-2014/Alwar/3063 Date: 14/03/2014

M/s Insecticides (India) Limited

E-443-444, RIA, Chopanki , Bhiwadi Tehsil:Tijara

District:Alwar

Sub: **Consent to Operate** under section 25/26 of the Water (Prevention & Control of Pollution) Act, 1974 and under section 21(4) of Air (Prevention & Control of Pollution) Act, 1981.

Ref: Your application for Consent to Operate dated 28/11/2013 and subsequent correspondence.

Sir,

Consent to Operate under the provisions of section 25/26 of the Water (Prevention & Control of Pollution) Act, 1974 (hereinafter to be referred as the Water Act) and under section 21 of the Air (Prevention & Control of Pollution) Act, 1981, (hereinafter to be referred as the Air Act) as amended to date and rules & the orders issued thereunder **is hereby granted** for your **Industry** situated at **E-443-444, RIA, Chopanki Bhiwadi Tehsil:Tijara District:Alwar** , Rajasthan, subject to the following conditions:-

1 That this Consent to Operate is valid for a period from **01/04/2014** to **31/03/2019** .

2 That this Consent is granted for manufacturing / producing following products / by products or carrying out the following activities or operation/processes or providing following services with capacities given below.

Particular	Type	Quantity with Unit
COATED GRANULES	Activity	7,500.00 MT PER ANNUM
EMULSIFIABLE CONCENTRATE(EC) AND SOLUBLE LIQUID (SL) FORMULATIONS	Product	6,000.00 KL/ANNUM
R & D Plant	Service	1.00 NO.
WETTABLE POWDER (WP) AND DUSTABLE POWDER (DP)	Activity	4,500.00 MT PER ANNUM

3 That this consent to operate is for existing plant, process & capacity and separate consent to establish/operate is required to be taken for any addition / modification / alteration in process or change in capacity or change in fuel.

4 That the quantity of effluent generation along with mode of disposal for the treated effluent shall be as under:

Regional Office Alwar
Rajasthan State Pollution Control Board
8 / 43 -44 N. E. B. Housing Board Colony, Delhi Road, Alwar
Phone: 0144-2372996
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Registered

File No : F(Tech)/Alwar(Tijara)/1710(1)/2013-2014/2439-2441
Order No : 2013-2014/Alwar/3063 Date: 14/03/2014

Type of effluent	Max. effluent generation (KLD)	Recycled Qty of Effluent (KLD)	Disposed Qty of effluent (KLD)and mode of disposal
Trade Effluent	1.100	NIL	1.100 Forced Evaporation
Domestic Sewage	2.700	NIL	2.700 Septic Tank and Soakpit

5 That the sources of air emmissions along with pollution control measures and the emission standards for the prescribed parameters shall be as under:

Sources of Air Emmissions	Pollution Control Measures	Prescribed	
		Parameter	Standard
CENTRAL ADSORPTION SYSTEM	ADEQUATE AIR POLLUTION CONTROL MEASURES , WITH ADEQUATE STACK HEIGHT	--	--
DG SET(125KVA)	ACOUSTIC ENCLOSURE , WITH ADEQUATE STACK HEIGHT	--	--
EXCESS/UN REACTED GAS VENT OF R & D PLANT	WET SCRUBBER , WITH ADEQUATE STACK HEIGHT	--	--

6 That the unit shall not establish any plant / process or does not carry out any activity which attracts environmental clearance under provisions of the Environmental Clearance notification Sep. 2006.

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File No : F(Tech)/Alwar(Tijara)/1710(1)/2013-2014/2439-2441
Order No : 2013-2014/Alwar/3063 Date: 14/03/2014

7 That the unit shall apply for renewal of this consent at least 120 days in advance prior to expiry date of this consent letter else additional fee shall have to be deposited in accordance with the Rajasthan Water & Air (Prevention & Control of Pollution) (Amendment) Rules 2010.

8 That the industry shall also comply with all the conditions of "Annexure" enclosed with this consent letter.

9 The power supply to all parts relating to operation of Water and Air pollution control systems, as applicable, shall be measured by separate electricity meters and respective log books maintained.

10 That the power supply of the production shall be so interlocked with the Air & Water pollution control equipments, that incase of non functioning of the pollution control equipment the production process will stop automatically.

11 That this consent to operate is being issued for existing plant, process & capacity, having investment in land, Building, plant & machinery as Rs 798.54 Lakh. In case of any addition/ modification/ alteration separate consent to establish/operate is required to be obtained.

12 That the unit shall apply & obtain membership of local trust constituted for operation & maintenance of common effluent treatment plant and submit a copy of membership document to this office within one month from the date of issuance of this consent letter.

13 That the unit shall comply with rest of the conditions as imposed vide last consent letter no. RPCB/RO/BWD/OR-352/528 dt. 24/06/2009 and F(Tech)/Alwar(Tijara)/1710(1)/2013-2014/737-739/ 270-271 dt. 30/07/2011.

14 That, not withstanding anything provided hereinabove, the State Board shall have power and reserves its right, as contained under section 27(2) of the Water Act and under section 21(6) of the Air Act to review anyone or all the conditions imposed here in above and to make such variation as it deemed fit for the purpose of Air Act & Water Act.

15 That the grant of this Consent to Operate is issued from the environmental angle only, and does not absolve the project proponent from the other statutory obligations prescribed under any other law or any other instrument in force. The sole and complete responsibility to comply with the conditions laid down in all other laws for the time-being in force, rests with the industry/ unit/ project proponent.

16 That the grant of this Consent to Operate shall not, in any way, adversely affect or jeopardize the legal proceeding, if any, instituted in the past or that could be instituted againt you by the State Board for violation of the provisions of the Act or the Rules made thereunder.

This Consent to Operate shall also be subject, besides the aforesaid specific conditions, to the general conditions given in the enclosed Annexure. The project proponent will comply with the provisions of the Water Act and Air Act and to such other conditions as may, from time to time, be specified, by the State Board under the provisions of the aforesaid Act(s). Please note

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File No : F(Tech)/Alwar(Tijara)/1710(1)/2013-2014/2439-2441
Order No : 2013-2014/Alwar/3063 Date: 14/03/2014

that, non compliance of any of the above stated conditions would tantamount to revocation of **Consent to Operate** and project proponent / occupier shall be liable for legal action under the relevant provisions of the said Act(s).

Yours Sincerely

Regional Officer

Copy To:-
1 Incharge, Registry Cell, RSPCB, Jaipur.
2 Master File.

Regional Officer

General Conditions related to both Air & Water Acts

1. That to achieve the prescribed standards of the consent order, adequate arrangement for pollution control shall have to be provided, maintained and operated all the time whenever the process/plant is in operation.
2. The power supply to all the pollution control measure/system shall be measured by separate power meters and separate log book shall be maintained for recording running hours of PCM, consumption of power, chemicals, every eight hours. The log books/records are to be shown to the officials of the Board during inspection or as and when asked for.
3. That the occupier shall make appropriate arrangement for interlocking the pollution control devices with D.G. set so that in the event of power failure the pollution control arrangements may remain in operation while the plant is being operated on the D.G.
4. That the power supply to the production/process shall be so interlocked with the pollution control equipments that in the event of none functioning of the pollution control equipment, the production process stops automatically.
5. That the industry shall submit compliance of the consent conditions along with analysis reports of the stack emissions/ambient air quality. The compliance report along with analysis report of the samples will be submitted to the Head Office of the Board at Jaipur and also concerned Regional Office of the Board office soon after it is carried out. For this, the paid sampling & analysis facilities with the Board can be availed. The frequency of compliance reporting for various types of units will be as under:

Sr. No.	Type of Industry	Compliance Reporting schedule by the industry
1	17 highly polluting industries (large & medium scale)	Once in 6 months
2	17 highly polluting industries (small Scale) and 17 highly polluting industries (other than 17 categories)	Once in 12 months
3	Small scale industries (small Scale)	Once in 18 months
4	Orange category industries (large & medium scale)	Once in 24 months
5	Orange category (small scale) and all the Other Category units.	Once in 36 months

6. That the industry shall comply with the provisions of Hazardous Waste (Management & Handling) Rules, 1989 and Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 and Battery Rules (Management & Handling) Rules 2001, amended to date as notified under Environment (Protection) Act-1986(if applicable).
7. That the management shall obtain and maintain valid insurance policy coverage under Public Liability Insurance Act (PLIA) and submit its copy to the Board every year (if applicable).
8. That Occupier shall ensure compliance of recommendations of Corporate Responsibility for Environment Protection (CREP) issued by Central Pollution Control Board (CPCB) for certain specific kind of industries (if applicable).
9. That the Occupier shall submit Environmental Statement every year in the month of September for the period April to March of the previous financial year.
10. That the management shall maintain good house keeping in the plant.
11. In case of consent to operate for the proposed project or expansion, the industry shall inform to this office and also the concerned Regional Office about the installation/ arrangement made for control of pollution so as to conform to the prescribed norms at least 4 weeks in advance of commissioning of the processing plant so that the same could be inspected and verified for its adequacy.
12. That any incorrect information submitted in the consent application form and its enclosures shall make the industry liable for legal action under section 43 of Water Act section 38 of the Air Act
13. The consent, under no circumstances shall be constructed as conferment of any property or any interest of the applicant unit. It is only confined for the purpose of regulation of the provisions of Water Act and Air Act.
14. That this consent is valid subject to fulfillment of other statutory requirement in other Laws/Acts/Rules as applicable.
15. The Occupier shall make an application for renewal of consent to operate in the prescribed form in

triplicate along with the requisite consent fees and compliance reports at least 120 days before the expiry of consent to operate. It may be noted that no post-facto consent will he issued in case the industry fails to apply for renewal within the time prescribed as above.

16. That this consent to operate is for existing plant and process and separate consent to establish is required to be obtained for any addition/ modification/ alteration or change before taking any step for such a change. Further, this consent to operate shall in no case be treated Consent to Establish for further expansion, if any.
17. That the industry will submit compliance report of the aforesaid conditions quarterly to the Head Office as well as the concerned Regional Office of the Board. However, compliance of the conditions in which specific time scheduled has been prescribed has to be submitted as per the prescribed time scheduled.
18. That 33% of the total area of factory premises shall be covered by the tree plantations. This area under plantation will be calculated as per circular No. F.14 (40) RPCB/Plg/Policy/5804-5825 dated 15.7.2004 or

General Conditions related to Air Act only

1. That, height of the stacks attached to all the major sources/D.G. sets shall be provided and maintained as per the norms prescribed.
2. That you shall provide and maintain necessary infrastructure facilities for the monitoring of stack emissions and ambient air quality parameters in accordance with the prescribed guidelines & suggestion given by the officials of the Pollution Control Board from time to time.
3. That the occupier shall provide and maintain above ground recycling tanks of adequate capacity with proper lining to avoid spillage or overflow of scrubbing media on land. In order to check the corrosion of the drains, anti-corrosive lining should be provided. Also the industry shall have to maintain proper record of water consumption in scrubbing system, scrubbed liquor, recycling, treatment, sale etc.
4. In case of 17 category highly polluting units and large scale red category air polluting units like major Power Plants, Cement Plants, Smelters, Petroleum Refineries, Fertilizer Plants and Chemical Units, the occupier shall provide at least three ambient air quality stations at the periphery of the factory premises for monitoring of ambient air parameters. Location of these stations shall be decided in consultation with concerned Regional Officer. The results of monitoring shall be submitted to the State Board every three month.
5. That, the Occupier shall provide the proper extraction and control system for the fugitive emission from the various activities/process. These are to be maintained in good condition and operated properly so as to maintain clean and safe environment in and around the premises of the unit.
6. That for the diesel generator sets acoustic enclosure/acoustic treatment shall be provided to meet the prescribed norms w.r.t noise as per the Gazette Notification dated of the Ministry of Environment & Forests, Government of India 02.01.99. Noise form the diesel Generator Sets shall be controlled by providing an acoustic enclosure or by treating the room acoustically. The acoustic enclosure/acoustic treatment of room should be designed for minimum 25 dB (A) Insertion Loss or for meeting the ambient noise standards, whichever is on the higher. The measurement for Insertion Loss may be done at different points at 0.5 meter from the acoustic enclosure/room and then averaged. The Diesel Generator Sets should also be provided with proper exhausts muffler with Insertion Loss of minimum 25 dB (A).
7. In case of D.G. Set of capacity more than 0.8 MW, the air emission standards as prescribed under GSR 489 (E) dated 09.02.02 shall be complied with.
8. The stack height for the Diesel Generator Sets shall be as below:
   Height of Stack (in Meters) = Height of Building + $0.2\sqrt{}$ (KVA of D G Set).
9. That the Occupier shall ensure that the noise from the operations in the unit does not exceed the prescribed ambient noise standards for the industrial area i.e. 75 dB (A)Leq during the day time and 70 dB(A)Leq. during the night. The day time is reckoned in between 6 am and 9 pm and the tight time is reckoned between 9 pm and 5 am.

General Conditions related to Water Act only

1. Samples of treated effluent shall be collected as per the schedule prescribed in condition no 2 at the terminal manhole during normal production and shall be analyzed for all the parameters in respect of which limits have been fixed. Report of analysis shall be submitted to the Board regularly/or immediately after the analysis is completed. Methods of sampling and testing shall be as per 18:4733 and IS; 2433 or methods approved by Board as the case may be for domestic and industrial effluent.
2. The efforts shall be made to recycle maximum quantity of the treated waste water into the process and utilities and the remaining be utilized in plantation in the premises. For utilization of the treated waste water in plantation, a well designed sprinkling system should be installed maintained and operated. Adequate land depending upon the applicable hydraulic loading criteria shall be arranged and maintained under plantation. The criteria is as follows:

   Hydraulic loading to be restricted depending on the nature of soil as stated below:- (subject to taking **into account** the nature of crop and its water requirement, climatic conditions and frequency of

Soil Texture Class	Dosage of settled sewage applied M3/Hectare/Day
Sandy	225 to 282
Sandy Loam	168 to225
Loam	112 to168
Clay Loam	56 to 112
Clayey	35 to 57

	Dosages of settled industrial waste applied M3/Hectare/Day	
Soil Texture Class	BOD up to 300 mg/l	BOD more that mg/l but less than 500 mg/l
Sandy	180 to 226	90 to 113
Sandy Loam	134 to 180	67 to 90
Loam	90 to 134	45 to 67
Clay Loam	44 to 90	22 to 45
Clayey	28 to 44	14 to 22

3. A holding tank of at least 24 hours capacity shall be provided and maintained to store the waste water in case of failure of any part of treatment plant or non-functioning of treatment system.
4. That the domestic waste water generated from the industry shall be treated as per 15:2470 (Pail-I & II) and shall be discharged into soak pit through septic tank. In case the industry is having its own housing colony having discharge more than 30 KLD, the industry should have Sewage treatment plant. The requirement of waste water treatment for hotels shall be according to specific circulars issued for hotels.
5. That the occupier shall provide and maintain above ground recycling/evaporation tanks of adequate capacity with proper lining to avoid spillage or overflow of scrubbing media on land. In order to check the corrosion of the drains, anti-corrosive lining should be provided. Also the industry shall have to maintain proper record of water consumption in scrubbing system, scrubbed liquor, recycling, treatment, sale etc.
6. In case of disposal of effluent through solar evaporation, industry is required to have solar evaporation pans for evaporation of the effluent at least one meter above the ground having proper lining to make

them impervious. They should have adequate evaporation surface area based on the evaporation rate in that particular area.

7. That the occupier shall have to store the semi solid and solid waste if so generated in a proper manner on impervious platform along with facility for leachate collection which shall be collected and sent to the effluent treatment plant for proper treatment.
8. In case the water consumption is more than 10 KLD, the authorities shall comply with the provisions of Water (Prevention & Control of Pollution)Cess Act-1977 and industry shall regularly submit to the Board the returns in the prescribed from and will deposit the cess as specified under Section 3 of the said Act. In case the industry fails to submit the returns in time, the assessment of cess will be made considering the water consumption figures given in the consent application form or earlier return whichever is higher. Units covered under self assessment scheme (SAS) having annual cess amount up to Rs. 6000/-shall deposit the cess in the concerned Regional Office of the Board along with Self Assessment Form.
9. That the industry will install water meters at the source of water supply and will keep complete records

RAJASTHAN STATE POLLUTION CONTROL BOARD, JAIPUR

Notification on 28 June, 2010 & 10 Dec. 2010 for Amendment Rules (Water & Air), 2010

Consent to Establish/operate, the application shall be accompanied with the fee specified in column Number 3 of the following table, namely:-

Establish:

S. No.	Time of Making an application to the State Board for consent to operate	Consent Fee
1	If made, at least four months, before the expiry of period of consent to establish	Fee as per Schedule IV
2	If made, between four to three months, before the expiry of period of consent to establish	With additional fee of 25% of the fee, prescribed in Schedule IV
3	If made, between three to two months, before the expiry of period of consent to establish	With additional fee of 50% of the fee, prescribed in Schedule IV
4	If made, between two to one months, before the expiry of period of consent to establish	With additional fee of 75% of the fee, prescribed in Schedule IV
5	If made, within one months, before the expiry of period of consent to establish	With additional fee of 100% (double the amount)of the fee, prescribed in Schedule IV

Operate:

S. No.	Time of Making an application to the State Board for consent to operate	Consent Fee
1	If made, at least four months, before the expiry of period of consent to operate.	Fee as per Schedule IV
2	If made, between four to three months, before the expiry of period of consent to operate.	With additional fee of 25% of the fee, prescribed in Schedule IV
3	If made, between three to two months, before the expiry of period of consent to establish	With additional fee of 50% of the fee, prescribed in Schedule IV
4	If made, between two to one months, before the expiry of period of consent to operate.	With additional fee of 75% of the fee, prescribed in Schedule IV
5	If made, within one months, before the expiry of period of consent to operate.	With additional fee of 100% (double the amount)of the fee, prescribed in Schedule IV

Schedule- IV

Capital Investment of the Industry (In ₹)	For consent of Establish Industries/Processes/Projects/ Activities mentioned in Appendix-A,B and other than those mentioned in Appendix (In ₹)			For Consent to Operate Industries/Processes/Projects/ Activities mentioned in Appendix-A,B and other than those mentioned in Appendix (In ₹)					
	Appendix I	Appendix II	Appendix III	Appendix I		Appendix II		Appendix III	
				For 1st year	For 3 year	For 1st year	For 5 year	For 1st year	For 10 year
upto 5 Lac	3000	2000	1000	1400	4000	1200	5000	1000	9000
More than5 lac upto 10 Lac	4500	3000	1500	2100	6000	1800	8000	1500	13500
More than10 lac upto 25 Lac	6000	4000	2000	2800	8000	2400	11000	2000	18000
More than25 lac upto 50 Lac	9000	6000	3000	4000	11000	3500	16000	3000	27000
More than50 lac upto 1.0 Crore	15000	10000	5000	4800	13000	4200	19000	3600	32000
More than1.0 Crore upto 5.0 Crore	18000	12000	6000	6400	17000	5600	25000	4800	43000
More than5.0 Crore upto 10.0 Crore	24000	16000	8000	8000	22000	7000	32000	6000	54000
More than10.0 Crore upto 25.0 Crore	30000	20000	10000	9500	26000	8400	38000	7200	65000
More than25.0 Crore upto 50.0 Crore	37500	25000	12500	12000	33000	10500	48000	9000	81000
More than50.0 Crore upto 100.0 Crore	45000	30000	15000	22000	60000	19000	86000	15000	13500
More than100.0 Crore upto 250.0 Crore	105000	70000	35000	31000	84000	26000	120000	21000	189000
More than250.0 Crore upto 500.0 Crore	127500	85000	42500	44000	120000	38000	175000	30000	270000
More than500.0 Crore upto 750.0 Crore	150000	100000	50000	53000	145000	45000	205000	36000	324000
More than750.0 Crore upto 1000.0 Crore	187500	125000	62500	57000	155000	49000	225000	39000	351000
Above 1000 Crore	225000	150000	75000	61000	160000	53000	249000	42000	378000

COMPLIANCE REPORT OF CONSOLIDATED CONSENTS & AUTHORIZATION

<table>
<tr><th>Sr. No.</th><th>Conditions</th><th>Remarks</th></tr>
<tr><td>1</td><td>That this Consent to Operate is valid for a period from 01/04/2014 to 31/03/2019.</td><td></td></tr>
<tr><td>2</td><td>That this Consent is granted for manufacturing / producing following products / by products or carrying out the following activities or operation/processes or providing following services with capacities given below.

<table>
<tr><th>Particular</th><th>Type</th><th>Quantity with unit</th></tr>
<tr><td>COATED GRANULES</td><td>Activity</td><td>7,500.00 MT PER ANNUM</td></tr>
<tr><td>EMULSIFIABLE CONCENTRATE(EC) AND SOLUBLE LIQUID (SL) FORMULATIONS</td><td>Product</td><td>6,000.00 KL/ANNUM,</td></tr>
<tr><td>R & D Plant</td><td>Service</td><td>1.00 NO.</td></tr>
<tr><td>WETTABLE POWDER (WP) AND DUSTABLE POWDER (DP)</td><td>Activity</td><td>4,500.00 MT PER ANNUM</td></tr>
</table></td><td>Complied.</td></tr>
<tr><td>3</td><td>That this consent to operate is for existing plant, process & capacity and separate consent to establish/operate is required to be taken for any addition / modification / alteration in process or change in capacity or change in fuel.</td><td></td></tr>
<tr><td>4</td><td>That the quantity of effluent generation along with mode of disposal for the treated effluent shall be as under:
<table>
<tr><th>Type of effluent</th><th>Max. effluent generation (KLD)</th><th>Recycled Qty of Effluent (KLD)</th><th>Disposed Qty of effluent (KLD) and mode of disposal</th></tr>
<tr><td>Trade Effluent</td><td>1.100</td><td>NIL</td><td>1.100
Forced Evaporation</td></tr>
<tr><td>Domestic Sewage</td><td>2.700</td><td>NIL</td><td>2.700
Septic Tank and Soak pit</td></tr>
</table></td><td>Complied.</td></tr>
<tr><td>5</td><td>That the sources of air emissions along with pollution control measures and the emission standards for the prescribed parameters shall be as under:
<table>
<tr><th rowspan="2">Sources of Air Emmissions</th><th rowspan="2">Pollution Control Measures</th><th colspan="2">Prescribed</th></tr>
<tr><th>Parameter</th><th>Standard</th></tr>
<tr><td>CENTRAL ADSORPTION SYSTEM</td><td>ADEQUATE AIR POLLUTION CONTROL MEASURES , WITH ADEQUATE STACK HEIGHT</td><td></td><td></td></tr>
</table></td><td>Complied.</td></tr>
</table>

	DG SET(125KVA)	ACOUSTIC ENCLOSURE , WITH ADEQUATE STACK HEIGHT				
	EXCESS/UN REACTED GAS VENT OF R & D PLANT	WET SCRUBBER, WITH ADEQUATE STACK HEIGHT	--	--		
6	That the unit shall not establish any plant / process or does not carry out any activity which attracts environmental clearance under provisions of the Environmental Clearance notification Sep. 2006.					Complied.
7	That the unit shall apply for renewal of this consent at least 120 days in advance prior to expiry date of this consent letter else additional fee shall have to be deposited in accordance with the Rajasthan Water & Air (Prevention & Control of Pollution) (Amendment) Rules 2010.					Complied.
8	That the industry shall also comply with all the conditions of "Annexure" enclosed with this consent letter.					Complied.
9	The power supply to all parts relating to operation of Water and Air pollution control systems, as applicable, shall be measured by separate electricity meters and respective log books maintained,					Complied.
10	That the power supply of the production shall be so interlocked with the Air & Water pollution control equipments, that incase of non functioning of the pollution control equipment the production process will stop automatically.					
11	That this consent to operate is being issued for existing plant, process & capacity, having investment in land, Building, plant & machinery as Rs 798.54 Lath. In case of any addition/ modification/ alteration separate consent to establish/operate is required to he obtained.					Complied.
12	That the unit shall apply & obtain membership of local trust constituted for operation & maintenance of common effluent treatment plant and submit a copy of membership document to this office within one month from the date of issuance of this consent letter.					Complied
13	That the unit shall comply with rest of the conditions as imposed vide last consent letter no. RPCB/RO/BWD/OR- 352 / 528 dt. 2 4 / 0 6 / 2 0 0 9 and F(Tech)/Alwar(Tijara)/1710(1)/2013-2014/737-139/ 270-271 dt. 30/07/2011.					Complied
14	That, not withstanding anything provided hereinabove, the State Board shall have power and reserves its right, as contained under Section 27(2) of the Water Act and under section 21(6) of the Air Act to review anyone or all the conditions imposed here in above and to make such variation as it deemed fit for the purpose of Air Act & Water Act.					Complied
15	That the grant of this Consent to Operate is issued from the environmental angle Only, and does not absolve the project proponent from the other statutory obligations prescribed under any other law or any other instrument in force. The sole and complete responsibility to comply with the conditions laid down in all other laws for the time-being in force, rests with the industry/ unit/ project proponent.					Complied
16	That the grant of this Consent to Operate shall not, in any way, adversely affect or jeopardize the legal proceeding, if instituted in the past or that could be instituted against you by the State Board fir violation of the provisions of the Act or the					Complied

	Rules made thereunder.	
	This Consent to Operate shall also be subject, besides the aforesaid specific condtions to the general conditions given in the enclosed Annexure. The project proponent will comply with the previsions of the Water Act and Air Act and to such other conditions as may, from time to time, be specified by the State Board under the provisions of the aforesaid Act(s). Please note that, non compliance of any of the above stated conditions would tantamount to revocation of Consent to Operate and project proponent / occupier shall be liable for legal action under the relevant provisions of the said Act(s).	

ANNEXURE – 11

ToR Letter

No.J-11011/63/2009-IA-11(1)
Goverment of India
Minister of Enviroment,Forest and Climate Change
Impact Assessment Division
***

Indira Paryavaran Bhavan,
Vayu Wing,3rd Floor,Aliganj,
Jor Bagh Road,New Delhi-110003
18 Feb 2019

To,

M/s INSECTICIDES INDIA LIMITED
E-442,443,444, RIICO Industrial Area, Chopanki, Bhiwadi, Alwar, Rajasthan,
Alwar-301707
Rajasthan

Tel.No.01493-298189; Email:mukeshiilindia@gmail.com

Sir/Madam,

This has reference to the proposal submitted in the Ministry of Environment, Forest and Climate Change to prescribe the Terms of Reference (TOR) for undertaking detailed EIA study for the purpose of obtaining Environmental Clearance in accordance with the provisions of the EIA Notification, 2006. For this purpose, the proponent had submitted online information in the prescribed format (Form-1) along with a Pre-feasibility Report. The details of the proposal are given below:

1. Proposal No.:	IA/RJ/IND2/91777/2019
2. Name of the Proposal:	M/s. Insecticides India Limited
3. Category of the Proposal:	Industrial Projects - 2
4. Project/Activity applied for:	5(b) Pesticides industry and pesticide specific intermediates (excluding formulations)
5. Date of submission for TOR:	17 Jan 2019

In this regard, under the provisions of the EIA Notification 2006 as amended, the Standard TOR for the purpose of preparing environment impact assessment report and environment management plan for obtaining prior environment clearance is prescribed with public consultation as follows:

5(b): STANDARD TERMS OF REFERENCE FOR CONDUCTING ENVIRONMENT IMPACT ASSESSMENT STUDY FOR PESTICIDES INDUSTRY AND PESTICIDE SPECIFIC INTERMEDIATES (EXCLUDING FORMULATIONS)AND INFORMATION TO BE INCLUDED IN EIA/EMP REPORT

A. STANDARD TERMS OF REFERENCE

1) **Executive Summary**

2) **Introduction**

   i. Details of the EIA Consultant including NABET accreditation

   ii. Information about the project proponent

   iii. Importance and benefits of the project

3) **Project Description**

   i. Cost of project and time of completion.

   ii. Products with capacities for the proposed project.

   iii. If expansion project, details of existing products with capacities and whether adequate land is available for expansion, reference of earlier EC if any.

   iv. List of raw materials required and their source along with mode of transportation.

   v. Other chemicals and materials required with quantities and storage capacities

   vi. Details of Emission, effluents, hazardous waste generation and their management.

   vii. Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract)

   viii. Process description along with major equipments and machineries, process flow sheet (quantative) from raw material to products to be provided

   ix. Hazard identification and details of proposed safety systems.

   x. Expansion/modernization proposals:

      a. Copy of all the Environmental Clearance(s) including Amendments thereto obtained for the project from MOEF/SEIAA shall be attached as an Annexure. A certified copy of the latest Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 30th May, 2012 on the status of compliance of conditions stipulated in all the existing environmental clearances including Amendments shall be provided. In addition, status of compliance of Consent to Operate for the ongoing lexisting operation of the project from SPCB shall be attached with the EIA-EMP report.

b. In case the existing project has not obtained environmental clearance, reasons for not taking EC under the provisions of the EIA Notification 1994 and/or EIA Notification 2006 shall be provided. Copies of Consent to Establish/No Objection Certificate and Consent to Operate (in case of units operating prior to EIA Notification 2006, CTE and CTO of FY 2005-2006) obtained from the SPCB shall be submitted. Further, compliance report to the conditions of consents from the SPCB shall be submitted.

4) Site Details

i. Location of the project site covering village, Taluka/Tehsil, District and State. Justification for selecting the site, whether other sites were considered.

ii. A toposheet of the study area of radius of 10km and site location on 1:50,000/1:25,000 scale on an A3/A2 sheet. (including all eco-sensitive areas and environmentally sensitive places)

iii. Details w.r.t. option analysis for selection of site

iv. Co-ordinates (lat-long) of all four corners of the site.

v. Google map-Earth downloaded of the project site.

vi. Layout maps indicating existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities etc. If located within an Industrial area/Estate/Complex, layout of Industrial Area indicating location of unit within the Industrial area/Estate.

vii. Photographs of the proposed and existing (if applicable) plant site. If existing, show photographs of plantation/greenbelt, in particular.

viii. Landuse break-up of total land of the project site (identified and acquired), government/ private - agricultural, forest, wasteland, water bodies, settlements, etc shall be included. (not required for industrial area)

ix. A list of major industries with name and type within study area (10km radius) shall be incorporated. Land use details of the study area

x. Geological features and Geo-hydrological status of the study area shall be included.

xi. Details of Drainage of the project upto 5km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be provided. (mega green field projects)

xii. Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land.

xiii. R&R details in respect of land in line with state Government policy

5) Forest and wildlife related issues (if applicable):

i. Permission and approval for the use of forest land (forestry clearance), if any, and recommendations of the State Forest Department. (if applicable)

ii. Landuse map based on High resolution satellite imagery (GPS) of the proposed site delineating the forestland *(in case of projects involving forest land more than 40 ha)*

iii. Status of Application submitted for obtaining the stage I forestry clearance along with latest status shall be submitted.

iv. The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-ā-vis the project location and the recommendations or comments of the Chief Wildlife Warden thereon

v. Wildlife Conservation Plan duly authenticated by the Chief Wildlife Warden of the State Government for conservation of Schedule I fauna, if any exists in the study area

vi. Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972, to the Standing Committee of the National Board for Wildlife.

6) Environmental Status

i. Determination of atmospheric inversion level at the project site and site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall.

ii. AAQ data (except monsoon) at 8 locations for PM10, PM2.5, SO2, NOX, CO and other parameters relevant to the project shall be collected. The monitoring stations shall be based CPCB guidelines and take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests.

iii. Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAQQM Notification of Nov. 2009 along with - min., max., average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an annexure to the EIA Report.

iv. Surface water quality of nearby River (100m upstream and downstream of discharge point) and other surface drains at eight locations as per CPCB/MoEF&CC guidelines.

v. Whether the site falls near to polluted stretch of river identified by the CPCB/MoEF&CC, if yes give details.

vi. Ground water monitoring at minimum at 8 locations shall be included.

vii. Noise levels monitoring at 8 locations within the study area.

viii. Soil Characteristic as per CPCB guidelines.

ix. Traffic study of the area, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project, parking arrangement etc.

x. Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic and endangered species. If Schedule-I fauna are found within the study area, a Wildlife Conservation Plan shall be prepared and furnished.

xi. Socio-economic status of the study area.

7) Impact and Environment Management Plan

i. Assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features. In case the project is located on a hilly terrain, the AQIP Modelling shall be done using inputs of the specific terrain characteristics for determining the potential impacts of the project on the AAQ. Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be assessed. Details of the model used and the input data used for modelling shall also be provided. The air quality contours shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any.

ii. Water Quality modelling - in case of discharge in water body

iii. Impact of the transport of the raw materials and end products on the surrounding environment shall be assessed and provided. In this regard, options for transport of raw materials and finished products and wastes (large quantities) by rail or rail-cum road transport or conveyor-cum-rail transport shall be examined.

iv. A note on treatment of wastewater from different plant operations, extent recycled and reused for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E(P) Rules.

v. Details of stack emission and action plan for control of emissions to meet standards.

vi. Measures for fugitive emission control

vii. Details of hazardous waste generation and their storage, utilization and management. Copies of MOU regarding utilization of solid and hazardous waste in cement plant shall also be included. EMP shall include the concept of waste-minimization, recycle/reuse/recover techniques, Energy conservation, and natural resource conservation.

viii. Proper utilization of fly ash shall be ensured as per Fly Ash Notification, 2009. A detailed plan of action shall be provided.

ix. Action plan for the green belt development plan in 33 % area i.e. land with not less than 1,500 trees per ha. Giving details of species, width of plantation, planning schedule etc. shall be included. The green belt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated.

x. Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to use for the various activities at the project site to conserve fresh water and reduce the water requirement from other sources.

xi. Total capital cost and recurring cost/annum for environmental pollution control measures shall be included.

xii. Action plan for post-project environmental monitoring shall be submitted.

xiii. Onsite and Offsite Disaster (natural and Man-made) Preparedness and Emergency Management Plan including Risk Assessment and damage control. Disaster management plan should be linked with District Disaster Management Plan.

8) Occupational health

i. Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers

ii. Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, colour vision and any other ocular defect) ECG during pre placement and periodical examinations give the details of the same. Details regarding last month analyzed data of above mentioned parameters as per age, sex, duration of exposure and department wise.

iii. Details of existing Occupational & Safety Hazards. What are the exposure levels of hazards and whether they are within Permissible Exposure level (PEL). If these are not within PEL, what measures the company has adopted to keep them within PEL so that health of the workers can be preserved.

iv. Annual report of heath status of workers with special reference to Occupational Health and Safety.

9) Corporate Environment Policy

i. Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.

ii. Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA.

iii. What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.

iv. Does the company have system of reporting of non compliances / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report

10) Details regarding infrastructure facilities such as sanitation, fuel, restroom etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase.

11) Enterprise Social Commitment (ESC)

i. Adequate funds (at least 2.5 % of the project cost) shall be earmarked towards the Enterprise Social Commitment based on Public Hearing issues and item-wise details along with time

bound action plan shall be included. Socio-economic development activities need to be elaborated upon.

12) Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance/ATR to the notice(s) and present status of the case.

13) 'A tabular chart with index for point wise compliance of above TOR.

B. SPECIFIC TERMS OF REFERENCE FOR EIASTUDIES FOR PESTICIDES INDUSTRY AND PESTICIDE SPECIFIC INTERMEDIATES (EXCLUDING FORMULATIONS)

1. Commitment that no banned pesticides will be manufactured.
2. Detailsonsolvents to be used,measuresfor solventrecovery and for emissions control.
3. Details of process emissions from the proposed unit and its arrangement to control.
4. Ambient air quality data should include VOC, other process- specific pollutants* like NH3*, chlorine*, HCl*, HBr*, H2S*, HF*, CS2 etc., (*-as applicable)
5. Work zone monitoring arrangements for hazardous chemicals.
6. Detailed effluent treatment scheme including ssegregation for units adopting 'Zero' liquid discharge.
7. Action plan for odour control to be submitted.
8. A copy of the Memorandum of Understanding signed with cement manufacturers indicating clearly that they co-process organic solid/hazardous waste generated.
9. Authorizatiou/Membership for the disposal of liquid effluent in CETP and solid/hazardous waste in TSDF, if any.
10. Material Safety Data Sheet for all the Chemicals are being used/will be used.
11. Authorization/Membership for the disposal of solid/hazardous waste in TSDF.
12. Details of incinerator if to be installed.
13. Risk assessment for storage and handling of hazardous chemicals/solvents. Action plan for handling & safety system to be incorporated.
14. Arrangements for ensuring health and safety of workers engaged in handling of toxic materials.

***

ANNEXURE – 12

ACTION PLAN IN VIEW OF THE PROJECT SITE BEING IN CRITICALLY POLLUTED AREA

Sr. No.	Environment	Mitigation Measures	Measures to be taken
1.	Air	(i) Stack emission levels should be stringent than the existing standards in terms of the identified critical pollutants	Adequate stack height of 30 m is provided with Boiler and stack emission levels will be stringent than the existing standards as prescribed by CPCB.
		(ii) CEMS may be installed in all large/ medium red category industries (air polluting) and connected to SPCB and CPCB server.	We have already installed CEMS for Boiler and is connected to SPCB and CPCB server and in expansion scenario also we will install CEMS for Boiler and will be connected to SPCB and CPCB server.
		(iii) Effective fugitive emission control measures should be imposed in the process, transportation, packing, etc.	Measures to control fugitive emissions. (i) Airborne dust at all transfers operations/ points will be controlled either by spraying water or providing enclosures. (ii) Adequate ventilation will be provided. (iii) Regular maintenance of valves, pumps, flanges, joints and other equipment will be done to prevent leakages and thus minimizing the fugitive emissions of VOCs. (iv) Entire process will be carried out in the closed reactors with proper maintenance of pressure and temperature. (v) Periodic monitoring of work area will be carried out to check the fugitive emission. (vi) To eliminate chances of leakages from glands of pumps, mechanical seal will be provided at all solvent pumps. (vii) For dust emissions bag filter will be provided. (viii) Dedicated scrubber will be provided are used for fugitive emissions to control. (ix) Regular inspection of floating roof seals and proper preventive maintenance of roofs and seals for tanks. (x) Close feeding system will be provided for centrifuges. Centrifuge and filtrate tank vents will be connected to vent chillers.
		(iv) Transportation of material by rail/ conveyor belt, wherever feasible.	Not Applicable, all the local raw material will be transported by road and imported materials will be transported by sea and then the material shall reach the site by road.
		(v) Encourage use of	(i) We have proposed for using Briquettes as fuel

		cleaner fuels (pet coke/ furnace oil/ LSHS may be avoided).	because of non-availability of Natural Gas in Chopanki area and will provide Multi-Cyclone Separator with Bag Filter and Scrubber as APCM for the Boiler using Briquettes as fuel. (ii) Provision of Adequate Scrubbers to control process gas emissions.
		(vi) Best available technology may be used. For example, usage of EAF/ SAF/ IF in place of Cupola furnace. Usage of Supercritical technology in place of sub-critical technology.	Not Applicable as we are not using any furnace.
		(vii) Increase of green belt cover by 40% of the total land area beyond the permissible requirement of 33%, wherever feasible.	Increase in green belt to 4784 m^2 (40%) from 4000 m^2 (33%) of the total area of 11958 m^2.
		(viii) Stipulation of green belt outside the project premises such as avenue plantation, plantation in vacant areas, social forestry, etc.	We have planted green belt outside the premises within the periphery of the project site.
		(ix) Assessment of carrying capacity of transportation load on roads inside the industrial premises. If the roads required to be widened, shall be prescribed as a condition.	We have well developed 8-9 m width roads for carrying transportation load and there is no requirement of road widening and moreover the site is located within notified industrial area of RIICO having well developed road infrastructure.
2.	Water	(i) Reuse/ recycle of treated wastewater, wherever feasible.	Total raw water requirement will be is 188.0 KL/day. Total waste water generation will be 136 KL/Day. Total effluent will be treated in Stripper, MEE and ETP and 126 KL/Day final treated effluent will be recycled for industrial operations. Hence our Unit is Zero Liquid Discharge Unit.
		(ii) Continuous monitoring of effluent quality/ quantity in large and medium Red Category Industries (water polluting).	We have installed TOC analyzer, pH meter & flow meter for Continuous monitoring of effluent quality/ quantity in our plant and is connected to SPCB and CPCB server.
		(iii) A detailed water harvesting plan may be submitted by the project proponent.	Rain water harvesting is not possible in pesticide industries. Company has made the storm water drainage to collect rain water and also made guard pond for rain water then company shall

			check the pH and COD value of rain water. If result of rain water will find within norms, then company will utilize the rain water in plant premise otherwise it will be sent to ETP for further treatment.
		(iv) Zero Liquid discharge wherever techno-economically feasible.	Total waste water generation will be 136 KL/Day. Total effluent will be treated in Stripper, MEE and ETP and 126 KL/Day final treated effluent will be recycled for industrial operations. Hence our Unit is Zero Liquid Discharge Unit.
		(v) In case, domestic waste water generation is more than 10 KLD, the industry may install STP.	Domestic wastewater (7 KL/Day) will be sent to septic tank and then mixed with industrial effluent in ETP for further treatment and then will be re-used within premises.
3.	Land	(i) Increase of green belt cover by 40% of the total land area beyond the permissible requirement of 33%, wherever feasible.	Increase in green belt to 4784 m^2 (40%) from 4000 m^2 (33%) of the total area of 11958 m^2.
		(ii) Stipulation of green belt outside the project premises such as avenue plantation, plantation in vacant areas, social forestry, etc.	We have planted green belt outside the premises within the periphery of the project site.
		(iii) Dumping of waste (fly ash, slag, red mud, etc.) may be permitted only at designated locations approved by SPCBs/ PCCs.	We will send the generated hazardous waste to RSPCB approved TSDF/ CHWIF site of M/s. UCCI, Udaipur.
		(iv) More stringent norms for management of hazardous waste. The waste generated should be preferably utilized in co-processing.	We will explore the possibility for disposal of waste generated to be preferably utilized in co-processing.
4.	Other Conditions (Additional)	(i) Monitoring of compliance of EC conditions may be submitted with third party audit every year.	Monitoring of compliance of EC conditions will be submitted with third party audit every year.
		(ii) The % of CER may be at least 1.5 times the slabs given in the OM dated 01.05.2018 for SPA and 2 times for CPA in case of Environment Clearance	We will contribute 2 % of the proposed project cost (2 times % of CER as per OM dated 01.05.2018) for socio economic development activities for 2 year.

ANNEXURE – 13

EXISTING EC

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F. No. J-11011/63/2009- IA II (I)
Government of India
Ministry of Environment and Forests
(I.A. Division)

Paryavaran Bhawan
CGO Complex, Lodhi Road
New Delhi – 110 003
E-mail : plahujarai@yahoo.com
Telefax: 011 – 2436 3973
Dated: 29th April, 2009

To,

The Deputy General Manager (Tech & R&D)
M/s Insecticides (India) Limited
401-02, Lusa Tower
Azadpur Comercial Complex,
New Delhi-110033

E-mail : info@insecticidesindia.com

Sub: Expansion of pesticide unit at E-442, RIICO industrial area, Chopanki, Bhiwadi, Dist. Alwar, Rajasthan by M/s Insecticides (India) Limited- Environmental Clearance reg.

Sir,

This has reference to your letter no. IIL/TECH/2008-09/21 dated 21st January, 2009 along with form -1 and pre- feasibility report seeking environmental clearance under the Environment Impact Assessment Notification, 2006.

2.0 The Ministry of Environment and Forests has examined your proposal. It is noted M/s Insecticides (India) Limited have proposed for expansion of production capacity from 400 TPA to 1800 TPA of pesticides technical and 2000 TPA of pesticide and emulsifier formulations. The unit is located at RIICO industrial area, Chopanki, Bhiwadi, Dist. Alwar, Rajasthan. The unit is located in RICCO industrial area. No eco-sensitive areas are located within 10 km radius of the plant. Proposed expansion will be within the existing unit having land area of 3958 m2. 33% of the land area will be developed as green belt. The cost of the project will be Rs. 2.50 Crores of which Rs 105.00 lacs will be spent on environmental protection measures and recurring cost will be Rs. 33.00 lacs.
that

3.0 Details of products and their production capacities are given below:

S. No.	Product	Capacity (TPA)
	A- Pesticides Technical	
1.	Phenoxy Herbicides	20
	Quizalofop	

2.	Imidazolinone Herbicides	50
	Imazethapyr	
3	Sulfonyl Urea Herbicides	20
	Met Sulfuron methyl	
	Sulfosulfuron	
4	Organochlorine Herbicides	200
	Butachlore	
	Pretilachlor	
5.	Other Herbicides	600
	Glyphosate	
	Oxyfluorfen	
	Paraquate	
6	Carbamate insecticide	10
	Thiodicarb	
7	Neo Nicotinoid insecticide	100
	Acetamiprid	
	Imidacloprid	
	Thiacloprid	
	thiamethoxam	
8.	Organophosphorus insecticide	300
	Attrazine	
	Chlorpyriphos	
	DDVP	
9	Pyrethroid insecticides	150
	Allethrin	
	Alpha Cypermethrin	
	Cyfluthrin	
	Cypermethrin	
	Delta Cypermethrin	
	d- transallethrin	
	Lambda Cyhalothrin	
	Permethrin	
	prallethrin	
	Transfluthrin	
10	OTHER INSECTICIDES	100
	fipronil	
	Buprofezin	
	Cartap Hydrochloride	
	Metalexyl	
	Novaluron	
11	Conazole fungicides	75
	Difenconazole	
	Hexaconazole	
	Ipconazole	
	Paclobutrazol	
	propeconazole	
	tebuconazole	
	Tricyclozole	
12	Other fungicides	75

	Indoxacarb	
	Thiophenate methyl	
13	Fermentation technology	100
	Abamectin	
	Azoxy strobin	
	Emmamectin benzoate	
	Ivermectin	
	Kresoxym methyl	
	Spinosad	
	Tecoxy	
	Validamycin	
	Total	**1800**
B Formulations		
1	Pesticide Formulation	1500
2	Emulsifier Formulation	500
	Total	**2000**

4.0 It is noted that water requirement of 25 m3/day will be sourced from RIICO water supply. The wastewater generation will be 9 m3/day. Out of total effluent generation 8.4m3/day will be treated in ETP and treated effluent will be used for green belt development to achieve zero discharge.0.6 m3/day of effluent will be sent to incinerator. The domestic effluent will be treated through septic tanks/ soak pit. The existing power requirement of 600 KVA is sourced form the RSEB which is sufficient for the proposed expansion. DG set of 380 KVA is proposed as stand by power supply. Fuel for the boiler will be wood and for the incinerator will be LDO/HSD. Fuel for DG set will be HSD. Process emissions will be controlled by ventury scrubbers. Bag filters and stack height of 30 m is proposed for the 2 TPH wood fired boiler. Scrubber and stack height of 30 m is proposed for the incinerator.

5.0 Solid waste generation will be in the form of process waste/residue (8 TPA) and ash from incinerator (3.5 TPA) will be sent to CTDF at Udaipur. Process waste/residue (122.5 TPA) and ETP waste (7.2 TPA) will be sent for incineration. Used/spent oil (0.4 TPA) will be sold to authorized recyclers.

6.0 The pesticides manufacturing units have been listed at Sl.no. 5(b) under category 'A' of Environmental Impact Assessment Notification, 2006. The proposal was considered by the Expert Appraisal Committee (Industry) in the 92nd meeting held on 18-20th March, 2009. The committee recommended the proposal for grant of environmental clearance as per para 7 (ii) of EIA Notification, 2006 exempting the project from preparation of EIA report. As the unit is located in the industrial estate, the public hearing/ consultation of the project is not required as per para 7 (i)-III (b) Stage (3) – public consultation of EIA Notification, 2006.

7.0 Based on the information submitted by the project authorities, the Ministry of Environment and Forests hereby accords environmental clearance to above project under the provisions of EIA Notification, dated 14th September 2006 subject to the compliance of the following Specific and General Conditions:

A. SPECIFIC CONDITIONS:

(i) The process effluent generation shall not exceed 9.0 m3/d of which 8.4 m3/d of effluent shall be treated in the ETP and treated effluent after conforming to the prescribed standards shall be used for green belt development. Bio-assay test shall be carried in the holding pond for the treated effluent before using the effluent for green belt. About 0.6 m3/d of effluent shall be incinerated in the incinerator.

(ii) The gaseous emissions (SO_2, NOx , VOC and HC) along with SPM and RSPM from various process units shall conform to the standards prescribed by the concerned authorities from time to time. At no time, the emission levels shall go beyond the stipulated standards. In the event of failure of pollution control system(s) adopted by the unit, the respective unit shall not be restarted until the control measures are rectified to achieve the desired efficiency.

(iii) The proponent shall upload the status of compliance of the stipulated environmental clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional office of MOEF, the respective Zonal office of CPCB and the State Pollution Control Board. The criteria pollutant levels namely; SPM, RSPM, SO2, NOx (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the project shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.

(iv) The process emissions from the reactors and incinerator shall be scrubbed scrubbed with scrubbers. The spent scrubber solution shall be treated in the ETP. The particulate emissions from the boiler shall be controlled by bag filter and shall be dispersed through stack of adequate height as per CPCB standards.

(v) The gaseous emissions from the DG sets shall be dispersed through stack height as per CPCB standards. Acoustic enclosures shall be provided to mitigate the noise pollution.

(vi) Standards notified for pesticides unit under the Environment (Protection) Act, 1986 and amended time to time shall be followed by the Unit.

(vii) The company shall obtain Authorization for collection, storage and disposal of hazardous waste under the Hazardous Waste (Management, Handling and Trans-Boundary Movement) Rules, 2008 for management of Hazardous wastes and prior permission from GPCB shall be obtained for disposal of solid / hazardous waste in the TSDF. Measures shall be taken for fire fighting facilities in case of emergency.

(viii) Fugitive emissions in the work zone environment, product, raw materials storage area etc. shall be regularly monitored. The emissions shall conform to the limits imposed by GPCB.

(ix) All the storage tanks shall be under negative pressure to avoid any leakages. Breathers, N_2 blanketing and condensers will be provided for all the storage tanks. Closed handling systems for chemicals and solvents will be provided. Magnetic seals will be provided for pumps/agitators for reactors for reduction of fugitive emissions. Chilled Brine based condensers shall be used to prevent VOC emissions. Solvent traps shall be installed wherever necessary.

(x) All venting equipment shall have vapour recovery system. All the pumps and other equipment`s where there is a likelihood of HC leakages shall be provided with Leak Detection and Repair (LDAR) system and LEL indicators and Hydrocarbon detectors. Provision for immediate isolation of such equipment, in case of a leakage will also be made. The company shall provide a well defined Leak Detection and Repair (LDAR) programme for quantification and control of fugitive emissions. The detectors sensitivity will be in ppm levels.

(xi) During transfer of materials, spillages shall be avoided and garland drains be constructed to avoid mixing of accidental spillages with domestic waste and storm drains.

(xii) The company shall make adequate arrangement for control of odour nuisance from the plant premises.

(xiii) The adequate financial provisions shall be made in the budget of the project for implementation of the above suggested environmental safeguards. Fund so earmarked shall not be diverted for any other purposes.

(xiv) Occupational health surveillance of the workers shall be done on a regular basis and records maintained as per the Factories Act.

(xv) The company shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling.

(xvi) Training shall be imparted to all employees on safety and health aspects of chemicals handling. Pre-employment and routine periodical medical examinations for all employees shall be undertaken on regular basis. Training to all employees on handling of chemicals shall be imparted.

(xvii) Usage of PPEs by all employees/ workers shall be ensured.

(xviii) The company shall strictly follow all the recommendations mentioned in the Charter on Corporate Responsibility for Environmental Protection (CREP).

(xix) The company shall adopt waste minimization /cleaner production techniques to reduce the pollution load and action plan in this regard submitted to the Ministry.

(xx) The company shall undertake rainwater harvesting measures to recharge the ground water as well as reduced consumption of water.

B. GENERAL CONDITIONS

i. The project authorities shall strictly adhere to the stipulations of the SPCB/state government or any statutory body.

ii No further expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment and Forests. In case of deviations or alterations in the project proposal from those submitted to this Ministry for clearance, a fresh reference shall be made to the Ministry to assess the adequacy of conditions imposed and to add additional environmental protection measures required, if any.

iii. The project authorities shall strictly comply with the rules and regulations under Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 as amended. Authorization from the SPCB shall be obtained for collection, treatment, storage, and disposal of hazardous wastes.

iv. Ambient air quality monitoring stations shall be set up in the downwind direction as well as where maximum ground level concentration are anticipated in consultation with the State Pollution Control Board.

v. For control of process emissions, stacks of appropriate height as per the Central Pollution Control Board guidelines shall be provided. The scrubbed water shall be sent to ETP for further treatment.

vi. The company shall undertake following Waste Minimization measures :-

- Metering of quantities of active ingredients to minimize waste.
- Reuse of by-products from the process as raw materials or as raw material substitutes in other processes.
- Maximizing recoveries
- Use of automated material transfer system to minimize spillage.
- **Use of "Closed Feed" system into batch reactors.**

vii) The overall noise levels in and around the plant area shall be kept well within the standards (85 dBA) by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels shall conform to the standards prescribed under Environment (Protection) Act, 1986 Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time).

viii) A separate Environmental Management Cell equipped with full fledged laboratory facilities shall be set up to carry out the environmental management and monitoring functions.

ix) The project authorities shall develop greenbelt in 33% of project area as per the guidelines of CPCB to mitigate the effect of fugitive emission.

x) The implementation of the project vis-à-vis environmental action plans shall be monitored by Ministry's Regional Office at Lucknow/SPCB / CPCB. A six monthly compliance status report shall be submitted to monitoring agencies.

xi) The project proponent shall inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the SPCB and may also be seen at Website of the Ministry at http://envfor.nic.in. This shall be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same shall be forwarded to the Ministry's Regional Office.

xii) The project authorities shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start of the project.

8.0 The Ministry may revoke or suspend the clearance, if implementation of any of the above conditions is not satisfactory.

9.0 The Ministry reserves the right to stipulate additional conditions, if found necessary. The company in a time bound manner will implement these conditions.

10.0 Any appeal against this environmental clearance shall lie with the National Environment Appellate Authority, if preferred within a period of 30 days as prescribed under Section 11 of the National Environment Appellate Authority Act, 1997.

11.0 The above conditions will be enforced, inter-alia under the provisions of the Water (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 Hazardous Wastes (Management and Handling) Rules, 2003 and the Public Liability Insurance Act, 1991 along with their amendments and rules.

P. Ahujarai

(Dr.P. L. Ahujarai)
Director

Copy to:

i) Secretary, Department of Environment and Forests, Government of Rajasthan, Jaipur.
ii) Chief Conservator of Forests, Central Region, Ministry of Environment and Forests, B-1/72, Sector-A, Aliganj, Lucknow-226020.
iii) Chairman, Central Pollution Control Board, Parivesh Bhavan, CBD-cum-Office complex, East Arjun Nagar, New Delhi-1100032.
iv) Chairman, Rajasthan State Pollution Control Board, 4, Institutional area, Jhalana, Doongri, Jaipur.
v) Adviser (EI).
vi) Director (Monitoring Cell), Ministry of Environment & Forests.
vii) Monitoring file/Guard File/Record File.

(Dr.P. L. Ahujarai)
Director

भारत सरकार
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
क्षेत्रीय कार्यालय (मध्य)
Ministry of Environment, Forest & Climate Change
Regional Office (Central Region)
केन्द्रीय भवन, पंचम तल, सेक्टर-एच, अलीगंज, लखनऊ-226024
Kendriya Bhawan, 5th Floor, Sector-H, Aliganj, Lucknow-226024, Telefax-2326696
Email: rocz.lko-mef@gov.in, m_env@rediffmail.com

File No.: IV/ENV/R/Ind-107/740/2005 /322

Dated: 05.07.2019

To,

Shri S.K. Srivastava,
Addl. Director (Industries),
IA Division,
Ministry of Environment Forest & Climate Change,
Indira Paryavaran Bhawan,
Jor Bagh Road, Aliganj, New Delhi-110 003.
E-mail: sk.srivas66@nic.in

Subject: Certified Compliance Report of Insecticides india limited, Chopanki, tal: bhiwadi, dist: alwar (raj.) – 301 707.

Ref: Environmental Clearance No.: J-11011/253/2005-IA II (I) dated 20-10-2005 & J-11011/63/2009-IA II (I) dated 29.04.2009

Sir,

I am directed to attached herewith copy of certified compliance report for the above mentioned project of, Insecticides india limited, Plot no. E-442, 443 & 444, RIICO industrial area, Chopanki, tal: bhiwadi, dist: alwar (raj.) – 301 707.

Sincerely,

5/7

(Dr. A. K. Gupta)
Joint Director(S)

Copy to:

1. **Dr. Shruti Bhardwaj, Addl. Director (Monitoring Cell), Ministry of Environemnt Forest and Climate Change, Indira Paryavaran Bhawan, Jor Bagh Road, Aliganj, New Delhi-110 003. E-mail: shruti.rai@nic.in.**
2. **Mr. M.Koteshwar Rao (DGM), Insecticides india limited, Plot no. E-442, 443 & 444, riico industrial area,Chopanki, tal: bhiwadi, dist: alwar (raj.) – 301 707.**

5/7

(Dr. A. K. Gupta)
Joint Director(S)

भारत सरकार
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
क्षेत्रीय कार्यालय (मध्य)
Ministry of Environment, Forest & Climate Change
Regional Office (Central Region)
केन्द्रीय भवन, पंचम तल, सेक्टर-एच, अलीगंज, लखनऊ-226024
Kendriya Bhawan, 5th Floor, Sector-H, Aliganj, Lucknow-226024, Telefax-2326696
Email: rocz.lko-mef@gov.in, m_env@rediffmail.com

Certified Compliance Report

SN	Items	Details
1.	परियोजना का नाम Name of Project	Insecticides india limited, Chopanki, tal: bhiwadi, dist: alwar (raj.) – 301 707
2.	परियोजना प्राधिकरण का पता Address of project authorities	Mr. M.Koteshwar Rao (DGM), insecticides india limited, Plot no. E-442, 443 & 444, riico industrial area,Chopanki, tal: bhiwadi, dist: alwar (raj.) – 301 707
3.	पर्यावरणीय स्वीकृति पत्र सं 0एवं तिथी Env. Clearance letter no. & Date	a. J-11011/253/2005-IA II (I) dated 20-10-2005, b. J-11011/63/2009-IA II (I) dated 29.04.2009
4.	क्षेत्रीय कार्यालय पत्र सं0 Regional Office File no.	IV/ENV/R/Ind-44/372/2005 IV/ENV/R/Ind-107/740/2005
5.	स्थल दौरा तिथी Date of site visit	29.05.2019
6.	परियोजना की स्थिति Status of Project	Operational.

7. **स्थल दौरा के दौरान अवलोकन / Observations made during the site visit:**

During monitoring of the project various officers were present including Shri Pateswasr Rao, Unit Head, DrMukesh Kumar GM (Env and Safety), Shri Adesh Kumar, Shri Sonu Gupta, HR, Shri S.K.Patahk, Quality Control, Shri Kuldeep Sharma, Safety, etc. M/s Insecticides India limited, obtained first Environmental Clearance from the ministry vide letter no. J-11011/253/2005-IA II (I) dated 20-10-2005, under EIA notification 27.01.1994, they had expanded the plant vide EC no. J-11011/63/2009-IA II (I) dated 29.04.2009, which was accorded under EIA notification 14.06.2006 for Pesticide formulation (200000 TPA) and pesticide

technical (180000 TPA). It has come to our notice that PAs are having another formulation unit which are adjacent to exiting plant.

They have obtained consent to operate (CTO) from Rajasthan Pollution control Board (RSPCB) vide order no. 2018-2019/PPF/3865, dated 22.01.2019, which is valid up to 31.05.2023and hazardous authorization vide letter no. F (HWH)/alwar (tijara)/2679(i)/2016-2017/2982-2984 dated 03.06.2016 and valid up to 30/11/2021. They have taken Public liability Insurance (PLI) vide policy no. 310300361933000000l valid up to 03.04.2020.They are having two DGs with capacity of 340 & 500 KVA capacity with proper stacks heights. They also have 2 ton boiler for steam generation using scrap wood & brackish agro waste. Ground water they have obtained permission from CGWB vide letter no. 21-4/1781/RJ/Ind/2017-5079 dated 06.06.2018 for the harnessing of the ground water 23 m^3/day. They have also obtained permission from RIICO vide letter dated RM/WS/DWD 5378 dated 14.10.2005. They have recently obtained TOR for the expansion of the project from Ministry vide letter no. J-11011/63/2009-IA-II (I) dated 18.02.2019, by whichPPs are in planning to increase the production capacity by adding new plant in the adjacent plot no. 443 and 444, where formulation unit is found running with valid CTO.

The PAs have complied or are in process of complying with the conditions stipulated by the Ministry. In this context, information/action plans have been sought on following points:

a) It has been found that various workers working on the project not using required PPEs. It is utmost important to ensure the usage of the required PPEs by all employee working in the plant.
b) It has been found that PAs are not uploaded the six monthly compliance on the company website http://www.insecticidesindia.com/. It is therefore requested to upload the six monthly compliance report on priority basis and being updated regularly,
c) It has been found that develop green belt is insignificant, therefore, it is required to strengthen green belt specially around the boundary wall during ongoing monsoon period,
d) It has been found that PAs are comply or in process to complying various stipulation of the CREP guidelines of pesticide industry. Point wise compliance of the CREP guidelines has not been submitted so far. It is therefore, requested to submit the above report to this office along with six monthly reports,
e) It has been found that PAs have constructed rain water harvesting dams out of the premises in Tijara district. It is required to consult with CGWA and RSPCB for setting of the rain water harvesting pit in the pesticide plant.

8. **निर्णय लिया (यदि कोई)/Action taken (if any) :** Letter has been issued to PAs to take corrective measures on the above non-compliance issues.

Sincerely,

(डा० ए० के० गुप्ता)

संयुक्त निदेशक "वै०"

	Specific Conditions	Compliance Status
(i)	**The process effluent shall not exceed 9.0 m^3/d of which 8.4 m^3/d of effluent shall be treated in the ETP and treated effluent after conforming to the prescribed standards shall be used for green belt development. Bio-assay test shall be carried in the holding pond for the treated effluent before using the effluent for green belt. About 0.6 m^3/d of effluent shall be incinerated in the incinerator.**	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs having well designed 35 KLD ETP to treat the effluent generated from the plant. The treated effluents are used for green belt development. Bio-assay test is carried out. Process effluent is incinerated.PAs are conducting third party analysis of the various parameters by M/s JM Envirolab Pvt. Ltd, which is which is NABL and MOEF accredited laboratory. As per the submitted monitoring reports dated 07.03.2019 depicted that the values of all parameters are found within the prescribe limits.

SN	Parameters	Unit	Values
1.	pH	-	7.31
2.	BOD (3 days)	mg/l	12.80
3.	TSS	mg/l	15.40
4.	Oil and Grease	mg/l	bdl
5.	Nitrate	mg/l	0.16
6.	Phosphate	mg/l	0.12
7.	Cynaide	mg/l	ND
8.	Phenol	mg/l	ND
9.	Mercury	mg/l	ND
10.	Copper	mg/l	0.10
11.	Mangnese	mg/l	ND
12.	Zinc	mg/l	ND
13.	Nickle	mg/l	ND
14.	Tin	mg/l	ND
15.	BHC	µg/l	ND
16.	DDT	µg/l	ND
17.	Dimethoate	µg/l	ND
18.	COC	µg/l	ND
19.	Ziram,	µg/l	ND

20.	2,4D	µg/l	ND
21.	Paraquat	µg/l	
22.	Propanil	µg/l	
23.	Nitrofen	µg/l	ND

Being complied

(ii)	**The gaseous emissions (SO_2, NO_x, VOC and HC) along with SPM and RSPM from various process units shall conform to the standard prescribed by the concerned authorities from time to time. At no time, the emission levels shall go beyond the stipulated standards. In the event of failure of pollution control systems adopted by the unit, the respective unit shall not be restarted until the control measures are rectified to achieve the desired efficiency.**	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs are conducting third party analysis of the various parameters by M/s JM Envirolab Pvt. Ltd, which is which is NABL and MOEF accredited laboratory. As per the submitted monitoring reports dated 07.03.2019 depicted that the values of all parameters are found within the prescribe limits.

Locations	$PM_{2.5}$	PM_{10}	NO_2	SO_2	CO
	µg/m³				
Boiler house	40.40	80.77	28.00	13.20	0.92
Near caustic soda tank	44.82	82.34	26.15	14.20	0.79
Near solvent tank	35.97	79.25	25.91	13.11	0.78
Near Main Gate	43.10	85.61	26.30	13.51	0.90
Near sludge tank	34.60	76.00	25.97	12.76	0.80

Being complied

(iii)	**The proponent shall upload the status of compliance of the stipulated environmental clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MOEF, the respective Zonal office of CPCB and the State Pollution Control Board. The criteria pollutant levels namely; SPM, RSPM,**	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs have not uploaded or display compliance report on company website http://www.insecticidesindia.com. As per record they are submitting six monthly compliance report to this office regular basis. It is therefore requested to upload six monthly compliance report and being updated regularly. **Partially complied**

	SO_2, NO_x (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the project shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.	
(iv)	**The process emissions from the reactors and incinerator shall be scrubbed with scrubbers. The spent scrubber solution shall be treated in the ETP. The particulate emissions from the boiler shall be controlled by bag filter and shall be dispersed through stack of adequate height as per CPCB standards.**	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs have provided 30 meter height of the boiler stack. The process emissions are treated through scrubber. The SMP of boiler are controlled by cyclone system. As per the third party analysis report values of the SPM content are found 269.80 mg /Nm^3 **Being complied**
(v)	**The gaseous emissions from the DG sets shall be dispersed through stack height as per CPCB standards. Acoustic enclosures shall be provided to mitigate the noise pollution.**	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs have two DG sets with capacity of 340 & 500 KVA with proper stacks heights. As per the submitted analysis report data of emission are found within the limits. **Being complied**
(vi)	**Standards notified for pesticides unit under the Environment (Protection) Act, 1986 and amended time to time shall be followed by the unit.**	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs are follow the above standard. **Being complied**
(vii)	**The company shall obtain authorization for collection, storage and disposal of hazardous waste under the Hazardous Waste (Management Handling and Trans-Boundary Movement) Rules, 2008 for management of Hazardous wastes. Measures shall be taken for firefighting facilities in case of emergency.**	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs have obtained hazardous authorization vide letter no. F (HWH)/alwar (tijara)/2679(i)/2016-2017/2982-2984 dated 03.06.2016 and valid up to 30/11/2021. They are also follow the guidelines for storage and handling of the hazardous waste. **Being complied**
(viii)	**Fugitive emissions in the work zone environment, product, raw materials storage area etc. shall be regularly monitored. The emissions shall conform to the limits imposed by RPCB.**	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs have conducted third party analysis of the various parameters by M/s JM EnvirolabPvt Ltd, which is NABL and MOEF accredited laboratory. As per the submitted report dated 24.12.2018 of VOC analysis, which is found BDL **Being complied**
(ix)	**All the storage tanks shall be under negative pressure to avoid any leakages, breathers, N_2 blanketing and condensers will be provided**	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs have closed handling system for chemicals and solvent is

	for all the storage tanks. Closed handling systems for chemicals and solvents will be provided. Magnetic seals will be provided for pumps/agitators for reactors for reduction of fugitive emissions. Chilled Brine based condensers shall be used to prevent VOC emissions. Solvent traps shall be installed wherever necessary.	provided, chilled Brine based condensers are used to prevent VOC emissions, Solvent traps are installed wherever necessary. **Being complied**
(x)	All venting equipment shall have vapour recovery system. All the pumps and other equipment's where there is a likelihood of HC leakages shall be provided with leak detection and repair (LDAR) system and LEL indicators and Hydrocarbon detectors. Provision for immediate isolation of such equipment, in case of a leakage will also be made. The company shall provide a well defined leak detection and Repair (LDAR) programme for quantification and control of fugitive emissions. The detectors sensitivity will be in ppm levels.	As per discussion held during monitoring and report submitted by PAs, it has been found that all venting equipment is having vapour recovery system. All the pumps and vessels are provided with mechanical seal to prevent leakage. **Being complied**
(xi)	During transfer of materials, spillages shall be avoided and garland drains be constructed to avoid mixing of accidental spillages with domestic waste and storm drains.	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs have constructed drains to control spillage in case of accident. **Being complied**
(xii)	The company shall make adequate arrangement for control of odour nuisance from the plant premises.	As per discussion held during monitoring and report submitted by PAs, it has been found that all the equipment's are connected with venting system. **Being complied**
(xiii)	The adequate financial provisions shall be made in the budget of the project for implementation of the above suggested environmental safeguards. Fund so earmarked shall not be diverted for any other purposes.	As per discussion held during monitoring and report submitted by PAs, it has been found that he total funds 130 lacs are adequate for environmental safeguards and no fund is diverted for any other purposes. **Being complied**
(xiv)	Occupational health surveillance of the workers shall be done on a regular basis and records maintained as per the factories Act.	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs engaged 55 employee on company roll and 40 working as contractual staff. They have conducted occupation health examination of the all workers once in six months and data being maintain. **Being complied**

(xv)	**The company shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling.**	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs have taken suitable measure for controlling of the any fire hazard. PAs have fire hydrant with 1 lac liter water storage capacity. As stated they have also conducted routine mock drill. **Being complied**
(xvi)	**Training shall be imparted to all employees on safety and health aspects of chemicals handling. Pre-employment and routine periodical medical examinations for all employees shall be undertaken on regular basis. Training to all employees on handling of chemicals shall be imparted.**	As per discussion held during monitoring and report submitted by PAs, it has been stated that they have conducted safety training of the all employee during its induction. They have also conducted some routine awareness cum training on health & safety aspects. **Being complied**
(xvii)	**Usage of PPEs by all employees/workers shall be ensured.**	As per discussion held during monitoring and report submitted by PAs, it has been found that various workers working on the project not using required PPEs. It is therefore, requested to ensure the uses of various PPEs while working in the project site. It is utmost important to ensure the usage of the required PPEs by all employee working in the plant. **Partially complied**
(xviii)	**The company shall strictly follow all the recommendations mentioned in the Charter on Corporate Responsibility for Environmental Protection (CREP).**	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs are comply or in process to complying various stipulation of CREP. Point wise compliance of the CREP guidelines of pesticide industry has not been submitted so far. It is therefore, requested to submit the above report to this office along with six monthly reports. **Partially complied**
(xix)	**The company shall adopt waste minimization/cleaner production techniques to reduce the pollution load and action plan in this regard submitted to the Ministry.**	As per discussion held during monitoring and report submitted by PAs, it has been stated that they are producing lambda cyhalothrin technical, where very less water is used. **Being complied**
(xx)	**The company shall undertake rainwater harvesting measures to recharge the ground water as well as reduced consumption of water.**	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs have constructed rain water harvesting dams out of the premises in Tijara district.It is required to consult with CGWA and RSPCB for setting of the rain water harvesting pit in the pesticide plant.

		Not Complied
General Conditions		
(i)	**The project authorities shall strictly adhere to the stipulations of the SPCB/state government or any statutory body**	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs have obtained various permission viz., consent to operate (CTO) from Rajasthan Pollution control Board (RSPCB) vide order no. 2018-2019/PPF/3865, dated 22.01.2019, which is valid up to 31.05.2023and hazardous authorization vide letter no. F (HWH)/alwar (tijara)/2679(i)/2016-2017/2982-2984 dated 03.06.2016 and valid up to 30/11/2021. They have taken Public liability Insurance (PLI) vide policy no. 310300361933000000l valid up to 03.04.2020. **Being complied**
(ii)	**No further expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment and Forest. In case of deviations or alterations in the project proposal from those submitted to this Ministry for clearance, a fresh reference shall be made to the Ministry to assess the adequacy of conditions imposed and to add additional environmental protection measures required, if any.**	As stated above PAs have obtained TOR, for the expansion of the project from Ministry vide letter no. J-11011/63/2009-IA-II (I) dated 18.02.2019, by whichPPs are in planning to increase the production capacity by adding new plant in the adjacent plot no. 443 and 444, where formulation unit is found running with valid CTO. **Being complied**
(iii)	**The project authorities shall strictly comply with the rules and regulations under Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 as amended. Authorization from the SPCB shall be obtained for collection, treatment, storage, and disposal of hazardous wastes.**	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs have obtained hazardous authorization vide letter no. F (HWH)/alwar (tijara)/2679(i)/2016-2017/2982-2984 dated 03.06.2016 and valid up to 30/11/2021. They are also follow the guidelines for storage, handling & disposal of the hazardous waste. **Being complied**
(iv)	**Ambient air quality monitoring stations shall be set up in the downwind direction as well as where maximum ground level concentration are anticipated in consultation with the State Pollution Control Board.**	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs have conducted third party monitoring of the ambient air quality by M/s JM Envirolab Private Ltd. Results dated 07.03.2019 depicted that the values of all parameters are found within the prescribe limits.

	$PM_{2.5}$	PM_{10}	NO_2	SO_2	CO
	$\mu g/m^3$				
Boiler house	40.40	80.77	28.00	11.20	0.92
Near caustic	44.82	82.34	26.15	14.20	0.7

		soda tank				9
		Near solvent tank	35.97	79.25	25.91	13.11	0.78
		Near Main Gate	43.10	85.61	26.30	13.51	0.90
		Near sludge tank	34.60	76.00	25.97	12.76	0.80

Being complied

(v)	**For control of process emissions, stacks of appropriate height as per the Central Pollution Control Board guidelines shall be provided. The scrubbed water shall be sent to ETP for further treatment.**	As per discussion held during monitoring and report submitted by PAs, it has been found that height of 30 meter the stack is as per the CPCB norms and scrubbed water is being treated in ETP. **Being complied**
(vi)	**The company shall undertake following Waste Minimization measures: –** • **Metering of quantities of active ingredients to minimize waste.** • **Reuse of by-products from the process as raw materials or as raw material substitutes in other processes.** • **Maximizing recoveries** • **Use of automated material transfer system to minimize spillage** **Use of "Closed Feed" system into batch reactors.**	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs are undertaking various Waste Minimization measuresincluding :Active ingredients quantity is measured in each batch, Vent condenser is used for solvent recovery, There is no spillage during transfer, Closed feed system is being used. **Being complied**
(vii)	**The overall noise levels in and around the plant area shall be kept well within the standard (85 dBA) by providing noise control measures including acoustic hood, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels shall conform to the standard prescribed under Environment (Protection) Act, 1986 Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time)**	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs have using acoustic silencers, enclosures for controlling of noise level. As per the submitted analysis report reflected that the values of day and night noise levels are found within the limits. Day time 72.84dBA Night time 62.92dBA **Being complied**
(viii)	**A separate Environmental Management Cell equipped with full fledged laboratory, facilities shall be set up to carry out the environmental management and monitoring functions.**	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs have EMC cell with dedicated and qualified officer. They also have basic lab. **Being complied**

(ix)	**The project authorities shall develop greenbelt in 33% of project area as per the guidelines CPCB to mitigate the effect of fugitive emission.**	As per discussion held during monitoring and report submitted by PAs, it has been found that PAs have develop insignificant green belt in the project site. Therefore, It is required to strengthen green belt especially around the boundary wall during ongoing monsoon period. **Not complied**
(x)	**The implementation of the project vis-à-vis environmental action plans shall be monitored by Ministry's Regional Office at Lucknow/SPCB/CPCB. A six monthly compliance status report shall be submitted to monitoring agencies.**	As per the record PAs are submitting six monthly compliance report to this office. **Being complied**
(xi)	**The project proponent shall inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the SPCB and may also be seen at Website of the Ministry at http://envfor.nic.in. This shall be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same shall be forwarded to the Ministry's Regional Officer.**	As stated that the public was informed through RAJASTAN PATRIKA dated 12.09.2009 and THE TIMES OF INDIA dated 13.05.2009 above the project. **Complied**
(xii)	**The project authorities shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start of the project.**	PAs are agreeing with above condition. **Agreed**
Additional conditions		
1.	**Public liability Insurance, 1991**	It has been found that PAs have taken Public liability Insurance (PLI) vide policy no. 310300361933000001 valid up to 03.04.2020. **Being complied**

Conclusion: Project authorities have complied or are in process of complying the environmental conditions stipulated for this project. The compliance status could be termed as satisfactory.

a) It has been found that various workers working on the project not using required PPEs. It is utmost important to ensure the usage of the required PPEs by all employee working in the plant.
b) It has been found that PAs are not uploaded the six monthly compliance on the company website http://www.insecticidesindia.com/. It is therefore requested to upload the six monthly compliance report on priority basis and being updated regularly.
c) It has been found that develop green belt is insignificant, therefore, it is required to strengthen green belt

specially around the boundary wall during ongoing monsoon period,

d) It has been found that PAs are comply or in process to complying various stipulation of the CREP guidelines of pesticide industry. Point wise compliance of the CREP guidelines has not been submitted so far. It is therefore, requested to submit the above report to this office along with six monthly reports,

e) It has been found that PAs have constructed rain water harvesting dams out of the premises in Tijara district. It is required to consult with CGWA and RSPCB for setting of the rain water harvesting pit in the pesticide plant.

Recommendations:

This project can be put up in the following tick-marked category of compliance status.

- Compliance status could not be judged as the project was not operational during the site visit.
- No violation detected. No any further action is required.
- ✓ Minor violations detected (not of immediate danger to health & safety of the people). Letter issued to project authorities for taking corrective measures.
- Serious violation detected. Show-Cause Notice issued to project authorities (copy enclosed)

5/7

(डा० ए० के० गुप्ता)

संयुक्त निदेशक "बै०"