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Bharat RASAYAN LIMITED

WORKS : UNIT-II: Plot No. 42/4, Amod Road, GIDC, Dahej, District-Bharuch, Gujarat-392130, Ph.: +91-2641-291123, +91-2642-241100

Reference Documents:
Proposal No.: IA/GJ/IND2/114039/2008 dated 07/10/2019, File No. J-11011/961/2008-IA-II (I) for prior EC for Proposed expansion in existing premises for manufacturing of Agrochemicals & their Intermediates at Plot no. 42/4, Amod Road, Dahej-I GIDC Industrial Estate, Dahej - 392 130, District – Bharuch, Gujarat, India by M/s. Bharat Rasayan Limited (Unit-II).
Minutes of 19th meeting of Expert Appraisal Committee (Industry-2) held on 13/05/2020 uploaded on official website of PARIVESH

Date: 02nd July, 2020

Ref. No. : BRL/Dahej/2020/07

To,
Ministry of Environment, Forest & Climate Change
Government of India,
Indira ParyavaranBhavan,
Vayu Wing, 3rd Floor,Aliganj
JorBagh, Road New Delhi – 110003.

Kind attention: Dr. R. B. Lal, Scientist E (Member Secretary)

Subject: **Regarding submission of documents required by Expert Appraisal Committee during the EC consideration of Expansion project of M/s. Bharat Rasayan Limited (Unit-II) in the 19th Meeting of EAC (Industry-2) held on 13th May, 2020 through Video Conferencing.**

Respected Sir,
Our unit, M/s. Bharat Rasayan Limited (Unit-II) at Plot No. 42/4, Amod Road, Dahej-I GIDC Industrial Estate, Dahej, District Bharuch, Gujarat, India has attended 19th Expert Appraisal Committee (Industry-2) Meeting held on 13th May, 2020 for consideration of EC of our Expansion project.

We hereby submit following documents as directed by committee:

Sr. No.	Direction	Submission
1	PI Diagram to show the chilling systems installed at various locations which have been realizing toxic VOC in environment and details regarding VOC monitoring and detection systems to be submitted.	PI Diagram showing details of modification done in chilling systems installed at various locations for better control of VOC is attached as **Annexure-1**.
2	A detailed risk management report by using Process Safety And Risk Management (PSMR) using advanced 3D modeling with location of detectors and number of detectors to be submitted.	A detailed report of Risk Management (PSMR) using advanced 3D modeling is attached as **Annexure-2**.

CIN : L24119DL1989PLC036264
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E-mail : info@bharatgroup.co.in • Website : www.bharatgroup.co.in

Sr. No.	Direction	Submission
3	The industry being hazardous in nature and considering the recent Chemical Accident that took place in Visakhapatnam and other places, it is required to comply above requirements first.	3D Modeling has been done by Gexcon India Pvt. Ltd. and detail study for the same has been completed. Detailed report of risk management using advanced 3D modeling is attached as **Annexure-2.**
4	Kindly show evidence of compliances as sought by the Sub-Committee and EAC- Industry –II. The excuse in the name of Pandemic is not acceptable and therefore the EC cannot be recommended at this stage for risking the community and infrastructure.	All point mentioned have been complied and detailed report is attached as **Annexure-3**.
5	Kindly justify how 33% greenery share with planted in light of very high TDS in the ground water.	The Species of plants used for developing greenbelt area are able to grow in light of very high TDS in the ground water. So it is possible to develop & maintain existing greenbelt area (33% of the plot area) at this location. Photographs of greenbelt with name & number of species attached as **Annexure-4**. As unit is within notified GIDC industrial estate hence bore well inside the premises is not allowed and so bore well water results of villages considered during baseline study period from 1st January, 2019 to 31st March, 2019 attached as **Annexure-4**.
6	Action taken on all the points indicated in the visit report to be submitted.	Action taken on all the points indicated in the visit report is attached as **Annexure-3**.
7	The Visit report has been alarming needing closure of the factory and thus, the points indicated in the visit report has to be complied with in letter and spirit.	All points have been studied in detail and after for compliance we hereby appraise again.

We request your good-self to kindly consider above proposal and grant EC and oblige.

Thanking you,

Yours faithfully,
For, Bharat Rasayan Limited (Unit-II), Dahej

Authorized Signatory
Enclosed: All above

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E-mail : info@bharatgroup.co.in • Website : www.bharatgroup.co.in

Summary according to P&ID

We have been taken additional actions to minimize VOC through HE Vent,

- Brine supply provided in Vent HE
- Brine Supply provided in 3rd HE
- Close Vacuum modified to Close vacuum instead of Open tank
- Chilling provided in many HE instead of Cooling water
- Brine Main Header size increased due to Low size-distribution point increased.
- All the up-gradation are highlighted as Green Mark in PID

Plant A

Brine	**Chilling**	**Cooling**
R-103 3rd HE	R-103 3rd HE	CVS-05
CVS-05	R-119 HE	CVS-09
CVS-09	STD-1	CVS-13
CVS-13	STD-2	
	R-112 HE	

Plant B

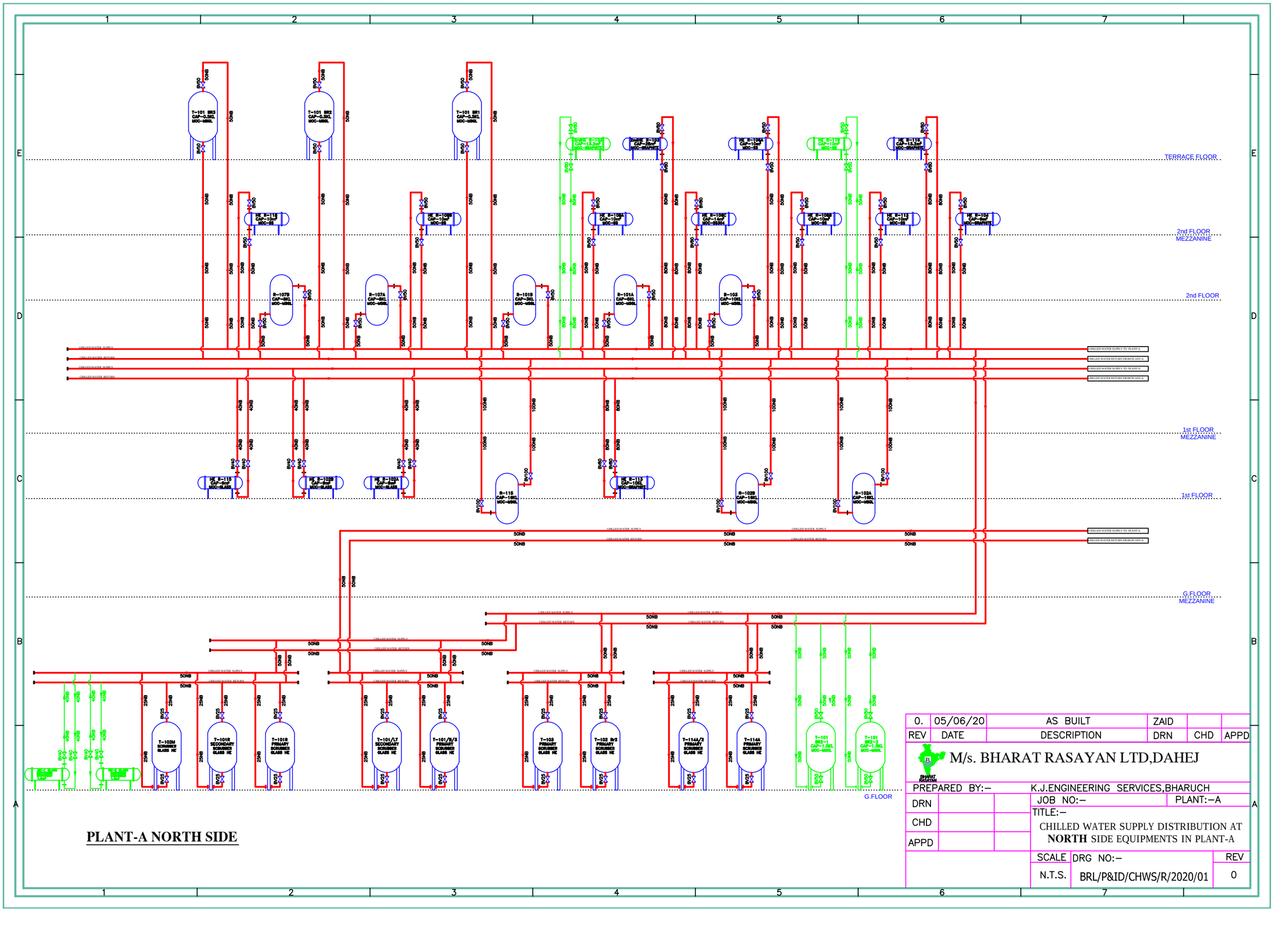
Brine	**Chilling**	**Cooling**
R-316B HE-3	R-306 HE-2	CVS-R-238
R-310 HE-3	R-301 HE-1	DVP HE
R-314 HE-2	R-313 HE-1	
R-302 HE	Scrubber HE-1	
R-331 HE-3	Scrubber HE-2	
R-316A HE-2		

Plant C

Brine	**Chilling**	**Cooling**
Xylene Vent HE	R-217 Pri HE	CVS -223
R-208 HE	R-226 HE	
R-225 HE	R-222 PRI HE	
	R-201 Pri HE	
	R-602 PRI HE	
	Scrubber SC-03	
	Scrubber SC-04	
	Scrubber SC-05	

Plant D

Brine	**Chilling**	**Cooling**
R-542 HE-3	HE-1 R-513	CVS Ejector HE-501
R-544 HE 3	HE-1 R-556	CVS Ejector HE-502
Vent HE-1	HE-1 R-547	
R-508/9 HE-1	HE-1 R 512	
R-525 HE-1	HE-1 R 515	
R-531 HE-3	HE-1 R 526	
R-516 HE-3	EJ-503 HE	
R-527 HE		
R-502 HE-3		



PLANT-A NORTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0.	05/06/20	AS BUILT	ZAID		

M/s. BHARAT RASAYAN LTD,DAHEJ

PREPARED BY:– K.J.ENGINEERING SERVICES,BHARUCH

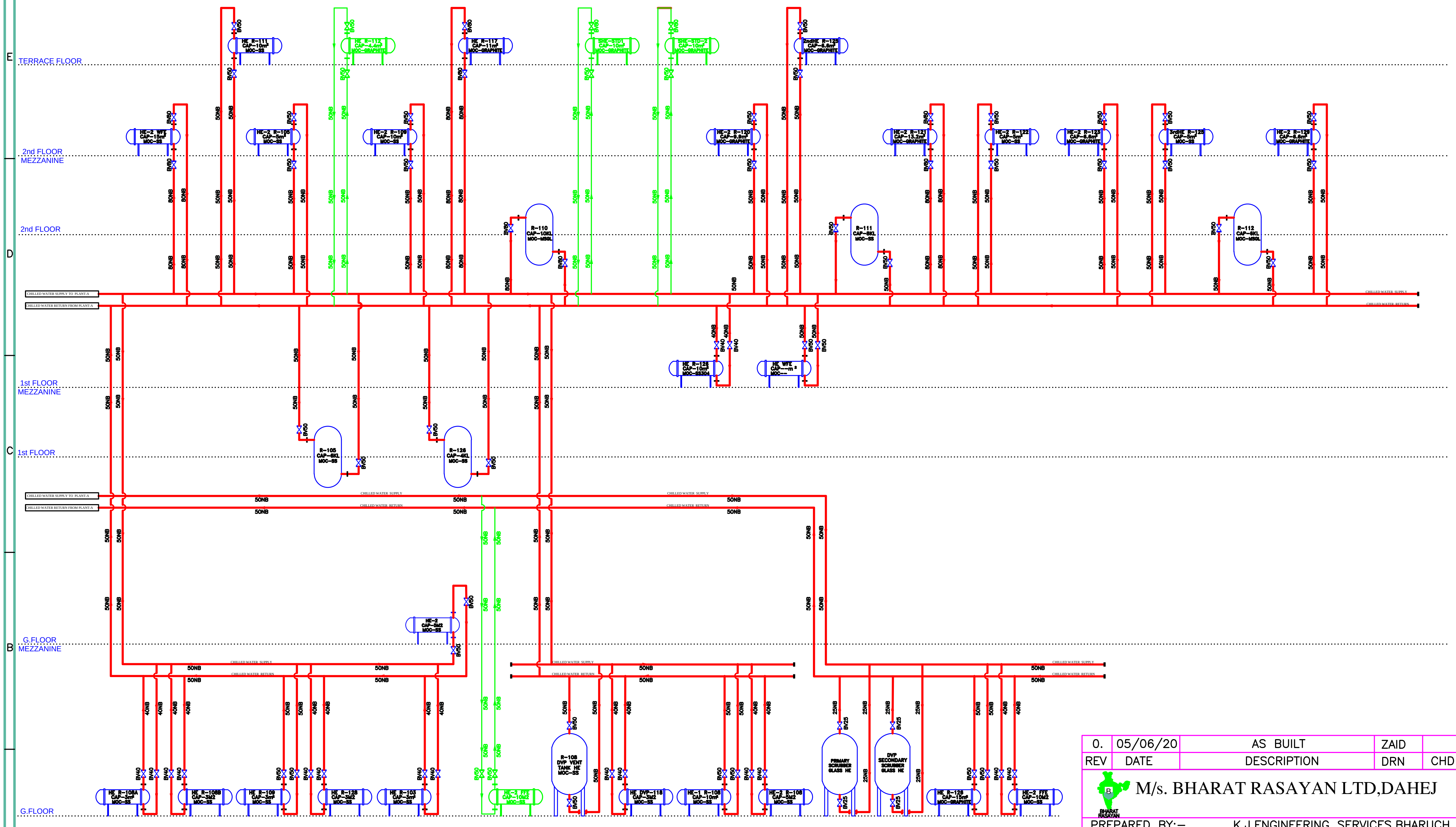
DRN | CHD | APPD

JOB NO:– PLANT:–A

TITLE:–

CHILLED WATER SUPPLY DISTRIBUTION AT **NORTH** SIDE EQUIPMENTS IN PLANT-A

SCALE N.T.S. | DRG NO:– BRL/P&ID/CHWS/R/2020/01 | REV 0

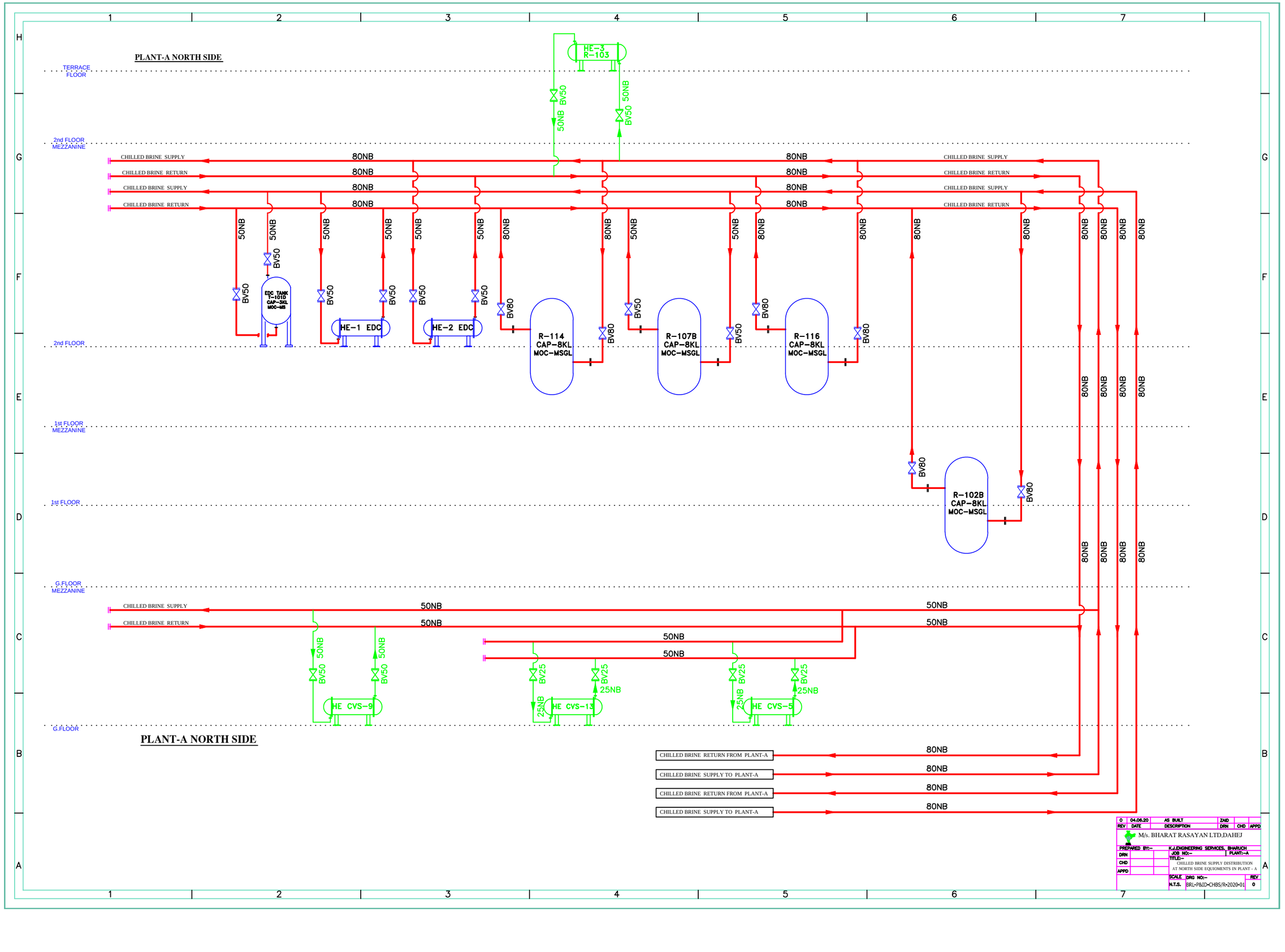


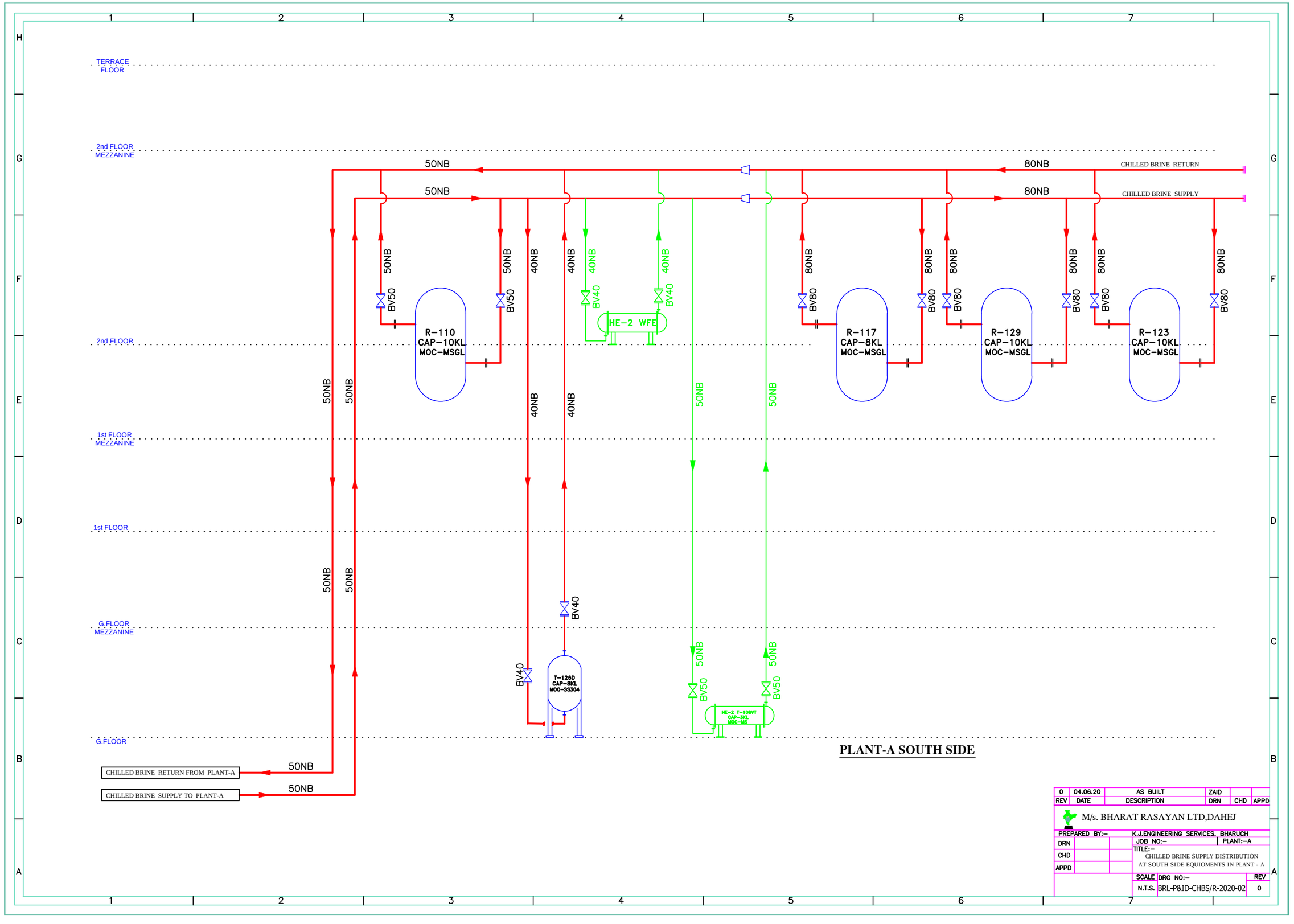
PLANT-A SOUTH SIDE

0.	05/06/20	AS BUILT	ZAID		
REV	DATE	DESCRIPTION	DRN	CHD	APPD

M/s. BHARAT RASAYAN LTD,DAHEJ

PREPARED BY:–		K.J.ENGINEERING SERVICES,BHARUCH	
DRN		JOB NO:–	PLANT:–A
CHD		TITLE:– CHILLED WATER SUPPLY DISTRIBUTION AT **SOUTH** SIDE EQUIPMENTS IN PLANT-A	
APPD			
SCALE	DRG NO:–		REV
N.T.S.	BRL/P&ID/CHWS/R/2020/02		0


PLANT-A NORTH SIDE
TERRACE FLOOR
2nd FLOOR MEZZANINE
2nd FLOOR
1st FLOOR MEZZANINE
1st FLOOR
G.FLOOR MEZZANINE
G.FLOOR
HE-3 R-103
CHILLED BRINE SUPPLY
CHILLED BRINE RETURN
80NB
50NB
BV50
BV80
BV25
25NB
EDC TANK T-101D CAP-3KL MOC-MS
HE-1 EDC
HE-2 EDC
R-114 CAP-8KL MOC-MSGL
R-107B CAP-8KL MOC-MSGL
R-116 CAP-8KL MOC-MSGL
R-102B CAP-8KL MOC-MSGL
HE CVS-9
HE CVS-13
HE CVS-5
PLANT-A NORTH SIDE
CHILLED BRINE RETURN FROM PLANT-A
CHILLED BRINE SUPPLY TO PLANT-A
CHILLED BRINE RETURN FROM PLANT-A
CHILLED BRINE SUPPLY TO PLANT-A
0 04.06.20 AS BUILT ZAID
REV DATE DESCRIPTION DRN CHD APPD
M/s. BHARAT RASAYAN LTD,DAHEJ
PREPARED BY:- K.J.ENGINEERING SERVICES, BHARUCH
DRN
CHD
APPD
JOB NO:-
PLANT:-A
TITLE:-
CHILLED BRINE SUPPLY DISTRIBUTION AT NORTH SIDE EQUIOMENTS IN PLANT - A
SCALE N.T.S.
DRG NO:- BRL-P&ID-CHBS/R-2020-01
REV 0



PLANT-A SOUTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0	04.06.20	AS BUILT	ZAID		

M/s. BHARAT RASAYAN LTD,DAHEJ

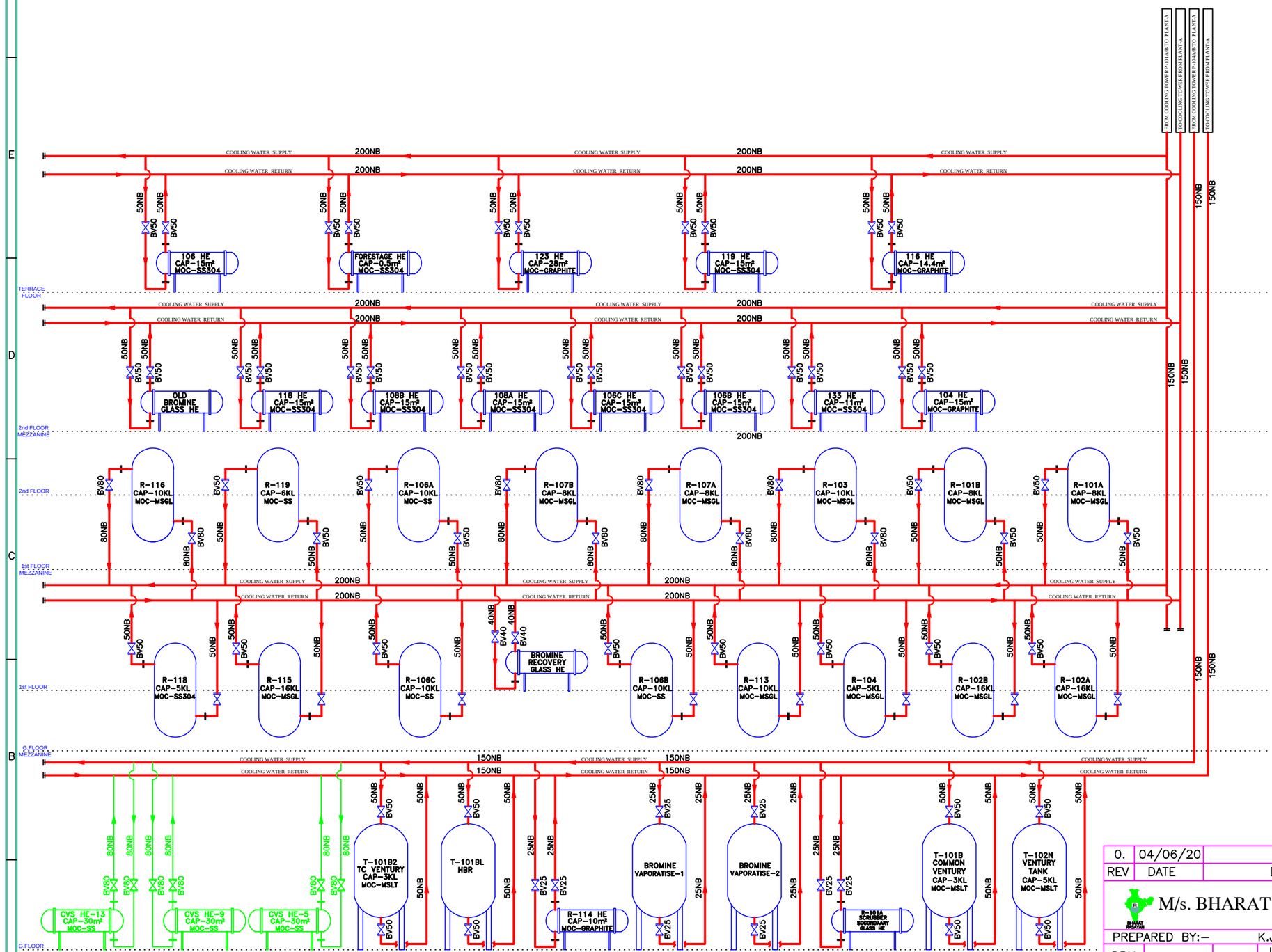
PREPARED BY:– K.J.ENGINEERING SERVICES. BHARUCH

DRN | CHD | APPD

JOB NO:– | PLANT:–A

TITLE:–
CHILLED BRINE SUPPLY DISTRIBUTION AT SOUTH SIDE EQUIOMENTS IN PLANT - A

SCALE	DRG NO:–	REV
N.T.S.	BRL-P&ID-CHBS/R-2020-02	0



PLANT-A NORTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0.	04/06/20	AS BUILT	ANIL		

M/s. BHARAT RASAYAN LTD,DAHEJ

PREPARED BY:– K.J.ENGINEERING SERVICES,BHARUCH

DRN

CHD

APPD

JOB NO:– PLANT:–A

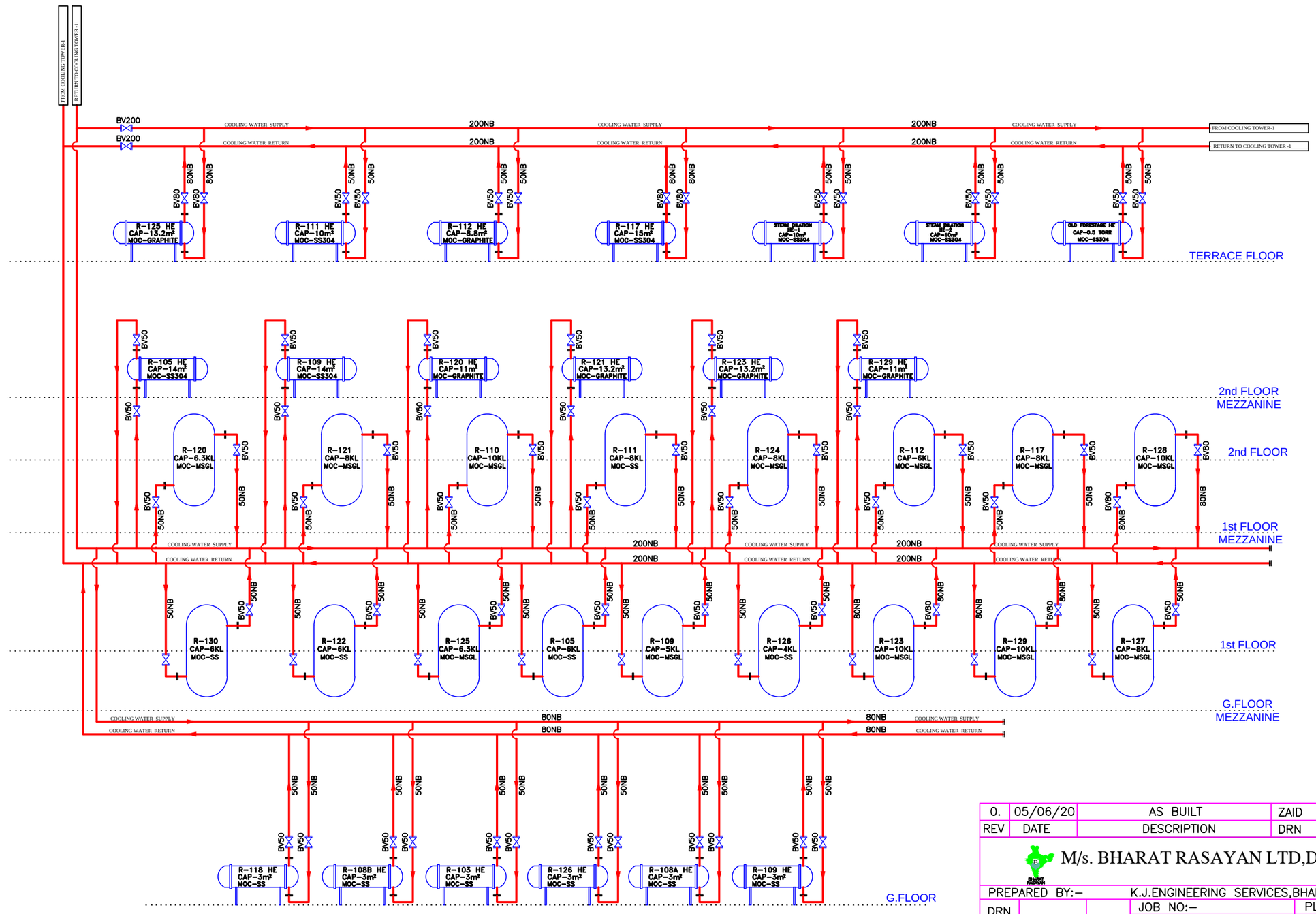
TITLE:–

COOLING WATER SUPPLY DISTRIBUTION AT **NORTH** SIDE EQUIPMENTS IN PLANT-A

SCALE N.T.S.

DRG NO:– BRL/P&ID/CWS/R/2020/01

REV 0



PLANT-A SOUTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0.	05/06/20	AS BUILT	ZAID		

M/s. BHARAT RASAYAN LTD,DAHEJ

PREPARED BY:– K.J.ENGINEERING SERVICES,BHARUCH

DRN		JOB NO:–	PLANT:–A
CHD		TITLE:– COOLING WATER SUPPLY DISTRIBUTION AT **SOUTH** SIDE EQUIPMENTS IN PLANT-A	
APPD		SCALE N.T.S.	DRG NO:– BRL/P&ID/CWS/R/2020/02
			REV 0

TERRACE FLOOR

2nd FLOOR MEZZANINE

2nd FLOOR

1st FLOOR MEZZANINE

1st FLOOR

G.FLOOR MEZZANINE

G.FLOOR

HE R-302 CAP- 7.5M² MOC- SS304

HE-3 R-331 CAP- 7.5M² MOC- SS304

HE-3 R-328 CAP- 5M² MOC- SS304

CHILLED BRINE SUPPLY

CHILLED BRINE RETURN

100NB

40NB

BV40

R-301 CAP-5KL MOC-MSGL

R-319 CAP-3KL MOC-MS

HE-2 R-316A CAP-16.5M² MOC-GRAPHITE

HE-3 R-316B CAP- 5M² MOC- SS

50NB

BV50

R-323 CAP-6KL MOC-SS304

R-302 CAP-10KL MOC-SS304

R-327 CAP-10KL MOC-SS

R-329 CAP-8KL MOC-SS

R-328 CAP-10KL MOC-SS316

R-330 CAP-8KL MOC-SS316

R-304 CAP-6KL MOC-SS304

R-316A CAP-6.3KL MOC-MSGL

R-316B CAP-10KL MOC-SS304

ANFD-304 CAP-5KL MOC-SS

CHILLED BRINE SUPPLY TO PLANT-A

CHILLED BRINE RETURN FROM TO PLANT-A

PLANT-B NORTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0	04.06.20	AS BUILT	ZAID		

M/s. BHARAT RASAYAN LTD,DAHEJ

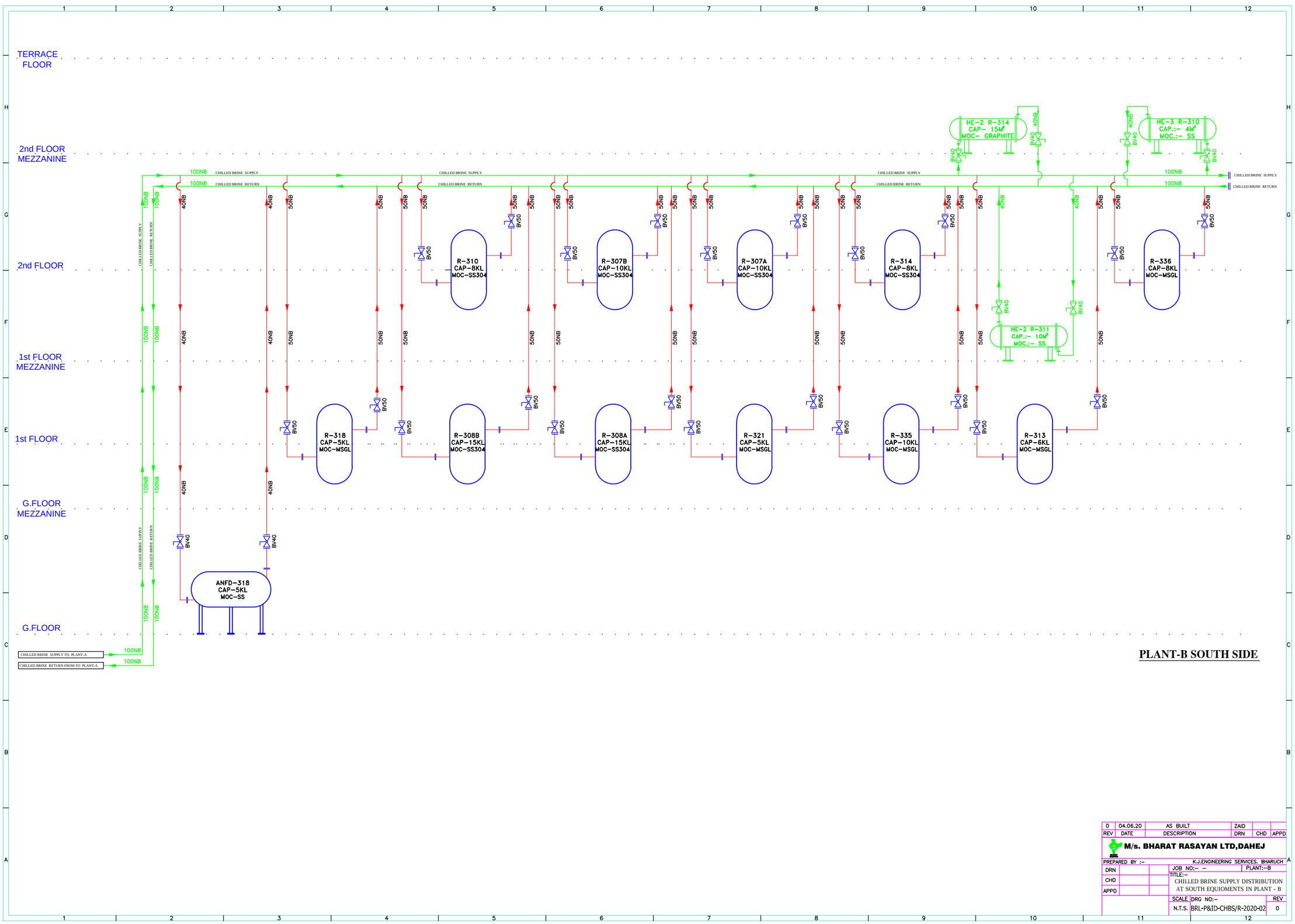
PREPARED BY :- K.J.ENGINEERING SERVICES. BHARUCH

DRN | CHD | APPD

JOB NO:- | PLANT:-B

TITLE:- CHILLED BRINE SUPPLY DISTRIBUTION AT NORTH EQUIOMENTS IN PLANT - B

SCALE N.T.S. | DRG NO:- BRL-P&ID-CHBS/R-2020-01 | REV 0



PLANT-B SOUTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0	04.06.20	AS BUILT	ZAID		

M/s. BHARAT RASAYAN LTD,DAHEJ

PREPARED BY :- K.J.ENGINEERING SERVICES, BHARUCH

DRN | CHD | APPD

JOB NO:- – | PLANT:-B

TITLE:- CHILLED BRINE SUPPLY DISTRIBUTION AT SOUTH EQUIOMENTS IN PLANT - B

SCALE N.T.S. | DRG NO:- BRL-P&ID-CHBS/R-2020-02 | REV 0

TERRACE FLOOR
2nd FLOOR MEZZANINE
2nd FLOOR
1st FLOOR MEZZANINE
1st FLOOR
GROUND FLOOR MEZZANINE
GROUND FLOOR

HE-2 R-331 CAP-10m³ MOC-SS
HE-2 R-319 CAP-5m³ MOC-SS
HE-2 R-308 CAP-5m³ MOC-SS
HE-2 R-323 CAP-5m³ MOC-SS
HE-2 R-305 CAP-5m³ MOC-SS
HE-2 R-302 CAP-10m³ MOC-SS
HE-2 R-303 CAP-5m³ MOC-SS
HE-2 R-319 CAP-10m³ MOC-SS
HE-1 R-301 CAP-10m³ MOC-SS
HE-2 R-327 CAP-10m³ MOC-SS
HE-2 R-329 CAP-10m³ MOC-SS
HE-2 R-328 CAP-10m³ MOC-SS

R-327 CAP-10KL MOC-SS
R-328 CAP-10KL MOC-SS316
R-329 CAP-10KL MOC-SS316
R-301 CAP-5KL MOC-MSGL
R-302 CAP-10KL MOC-SS304
R-303 CAP-8KL MOC-SS304
R-323 CAP-4KL MOC-SS304
R-319 CAP-8KL MOC-MS

HE ANFD-303 CAP-10m² MOC-SS
HE-2 R-304 MOC-SS
HE-2 R-316B CAP-5m² MOC-GRAPHITE
HE-2 R-316A CAP-16.5m² MOC-SS 304
HE-2 R-322

ANFD-303 HE CAP-10M2 MOC-SS
R-304 CAP-8KL MOC-SS304
R-316A CAP-6.3KL MOC-MSGL
R-316B CAP-10KL MOC-SS304
R-330 CAP-8KL MOC-SS316
R-331 CAP-8KL MOC-SS316
ANFD-303 HE CAP-10M2 MOC-SS

BV50
BV25
50NB
150NB
200NB

NORTH SIDE SUPPLY LINE
NORTH SIDE RETURN LINE

FROM UTILITY P-408/P-408A
CHILLED WATER RETURN FROM PLANT-B — NORTH SIDE RETURN LINE 200NB
CHILLED WATER SUPPLY TO PLANT-B — NORTH SIDE SUPPLY LINE 200NB

PLANT-B NORTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0.	04/06/20	AS BUILT	HEMANT		

M/s. BHARAT RASAYAN LTD,DAHEJ

PREPARED BY :– K.J.ENGINEERING SERVICES. BHARUCH

DRN		JOB NO:–	PLANT:–B
CHD		TITLE:– CHILLED WATER SUPPLE DISTRIBUTION AT NORTH SIDE EQUIPMENTS IN PLANT-B	
APPD		SCALE N.T.S.	DRG NO:– BRL/P&ID/CHWS/R/2020/01
			REV 0

PLANT-B SOUTH SIDE

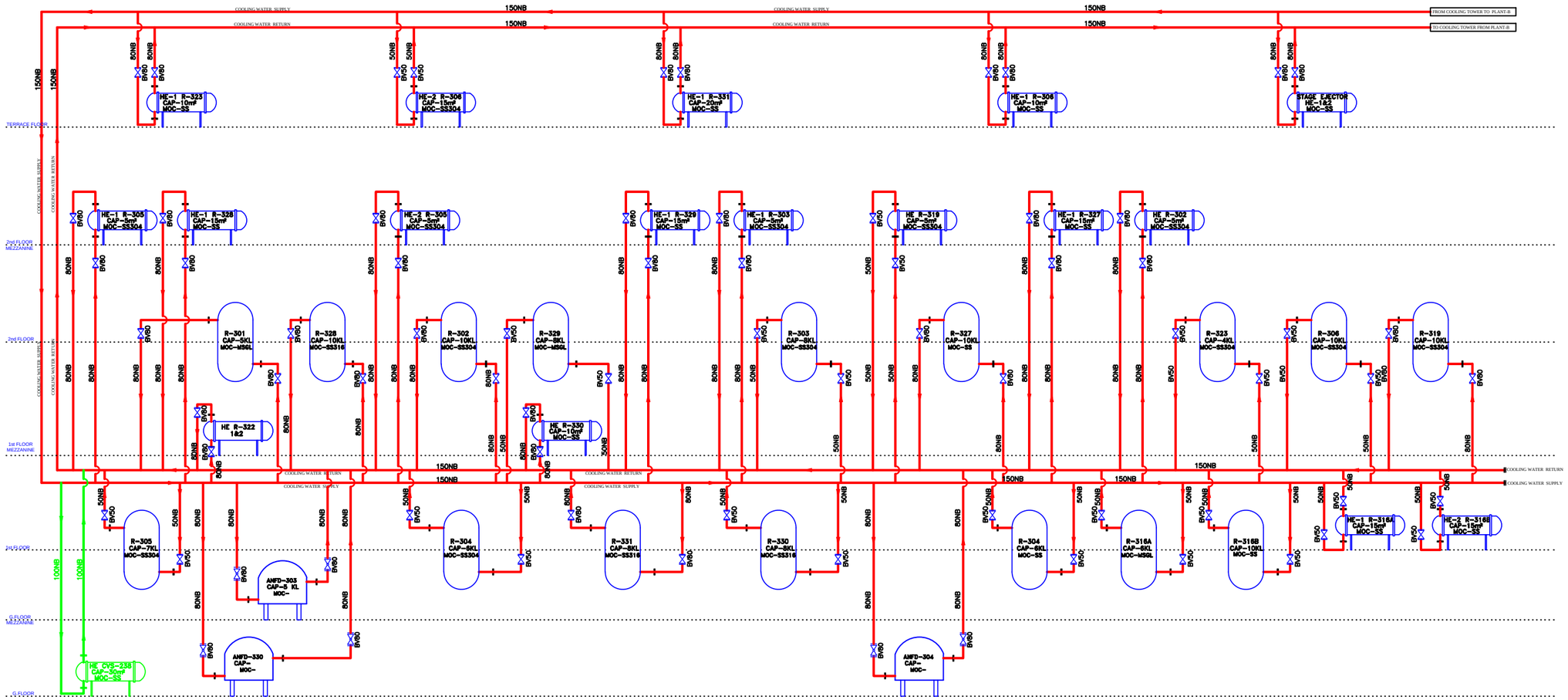
HYDROGINATION AREA

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0.	04/06/20	AS BUILT	HEMANT		

M/s. BHARAT RASAYAN LTD,DAHEJ

PREPARED BY :– K.J.ENGINEERING SERVICES. BHARUCH

DRN	JOB NO:–	PLANT:–B	
CHD	TITLE:– CHILLED WATER SUPPLE DISTRIBUTION AT SOUTH SIDE EQUIPMENTS IN PLANT-B		
APPD	SCALE: N.T.S.	DRG NO:– BRL/P&ID/CHWS/R/2020/02	REV: 0



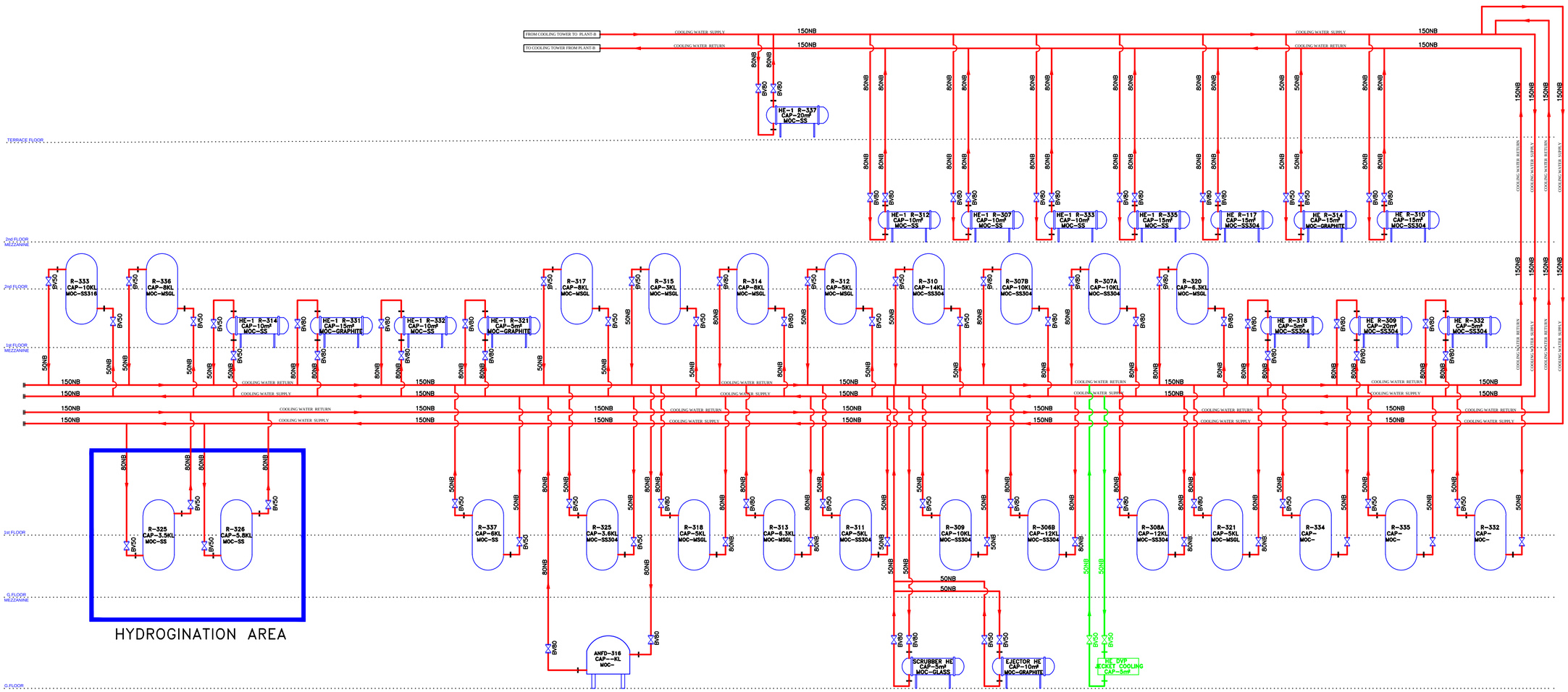
PLANT-B NORTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0.	04/06/20	AS BUILT	ANIL		

M/s. BHARAT RASAYAN LTD,DAHEJ

PREPARED BY:– K.J.ENGINEERING SERVICES,BHARUCH

DRN		JOB NO:–	PLANT:–B
CHD		TITLE:– COOLING WATER SUPPLY DISTRIBUTION AT **NORTH** SIDE EQUIPMENTS IN PLANT-B	
APPD			
		SCALE N.T.S.	DRG NO:– BRL/P&ID/CWS/R/2020/01
			REV 0



PLANT-B SOUTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0.	04/06/20	AS BUILT	ANIL		

M/s. BHARAT RASAYAN LTD,DAHEJ

PREPARED BY:— K.J.ENGINEERING SERVICES,BHARUCH

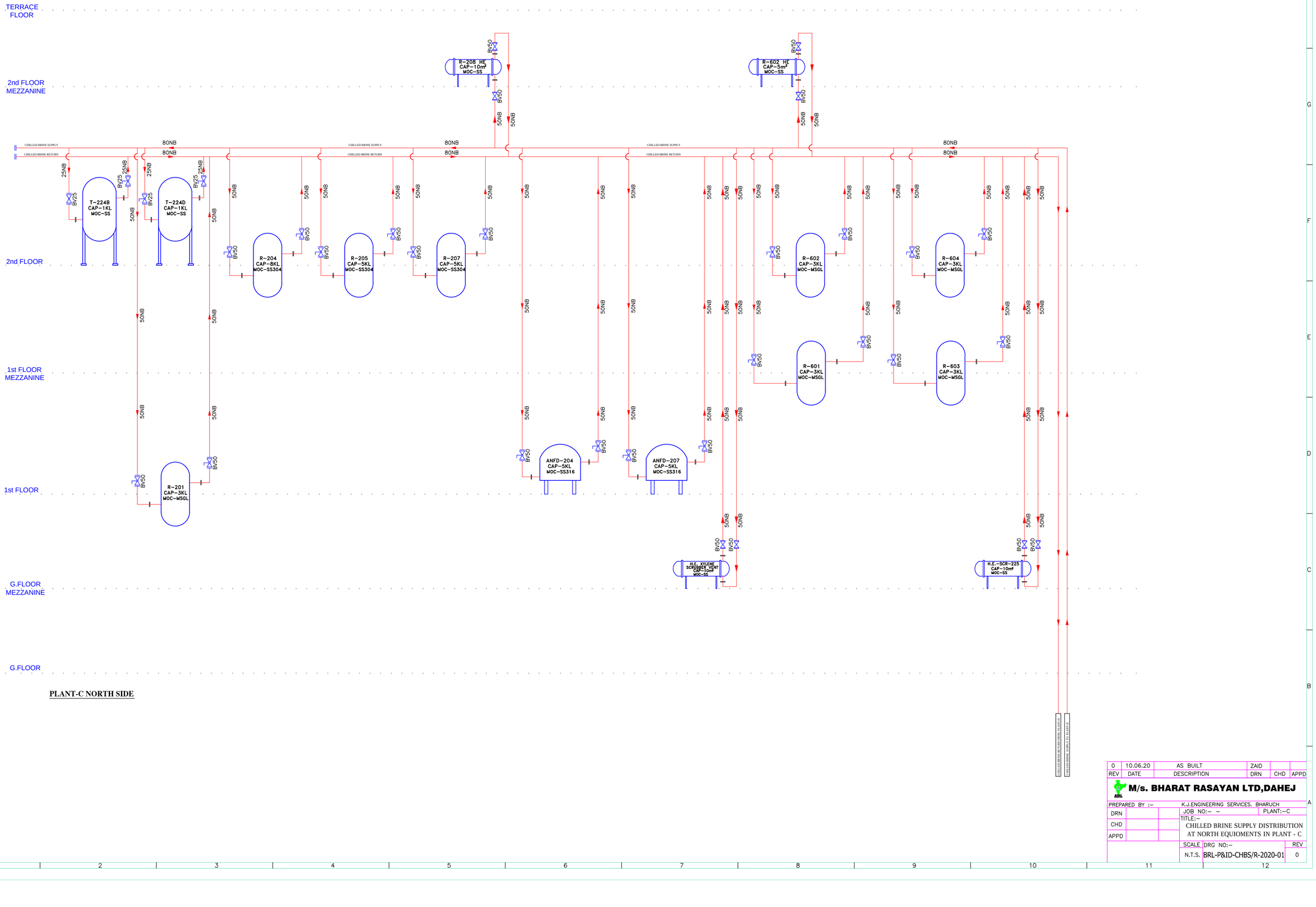
DRN | CHD | APPD

JOB NO:— PLANT:—B

TITLE:—

COOLING WATER SUPPLY DISTRIBUTION AT **SOUTH** SIDE EQUIPMENTS IN PLANT-B

SCALE	DRG NO:—	REV
N.T.S.	BRL/P&ID/CWS/R/2020/02	0



PLANT-C NORTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0	10.06.20	AS BUILT	ZAID		

M/s. BHARAT RASAYAN LTD,DAHEJ

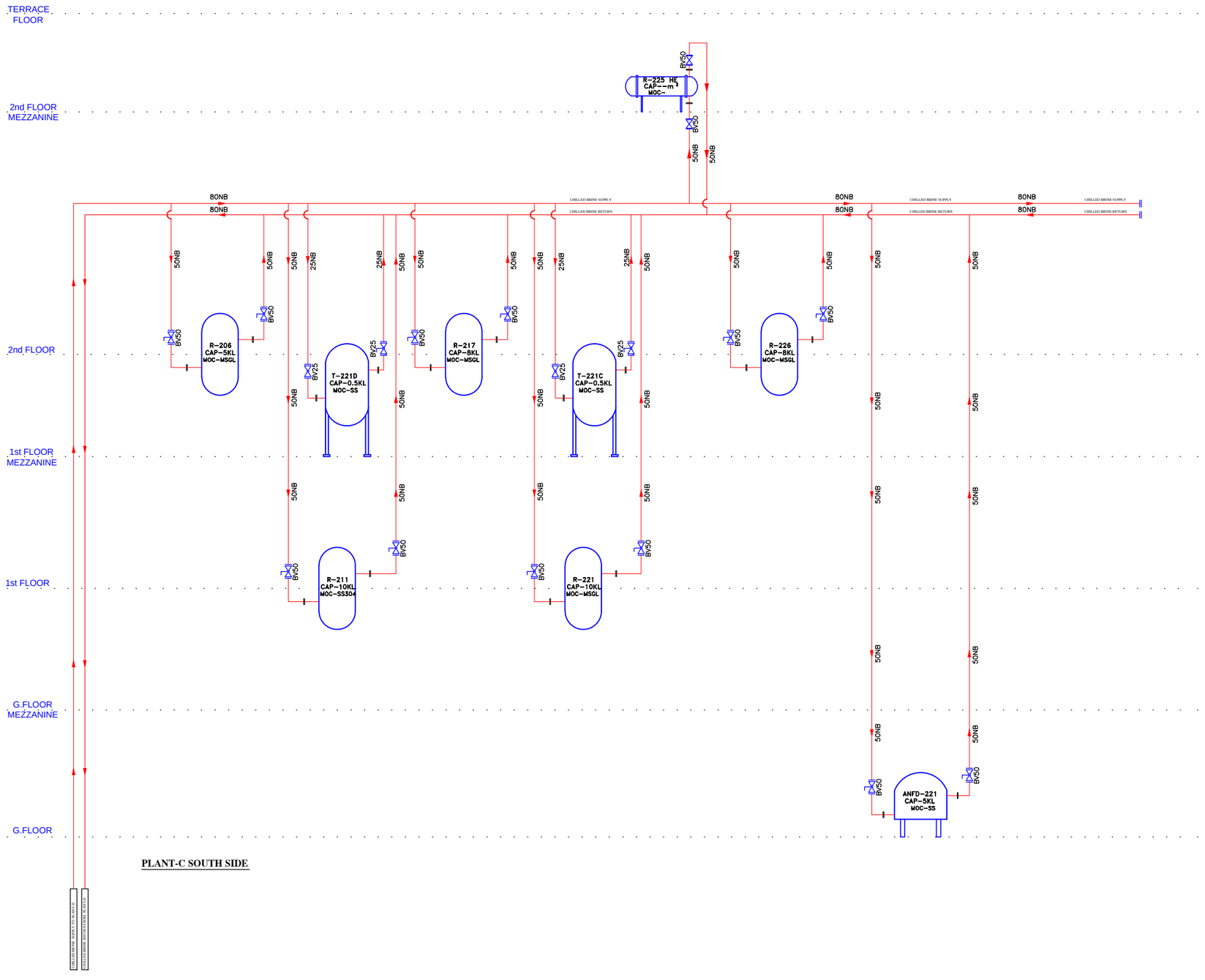
PREPARED BY :– K.J.ENGINEERING SERVICES. BHARUCH

DRN | CHD | APPD

JOB NO:– – PLANT:–C

TITLE:–
CHILLED BRINE SUPPLY DISTRIBUTION AT NORTH EQUIOMENTS IN PLANT - C

SCALE N.T.S. | DRG NO:– BRL-P&ID-CHBS/R-2020-01 | REV 0



PLANT-C SOUTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0	10.06.20	AS BUILT	ZAID		

M/s. BHARAT RASAYAN LTD,DAHEJ

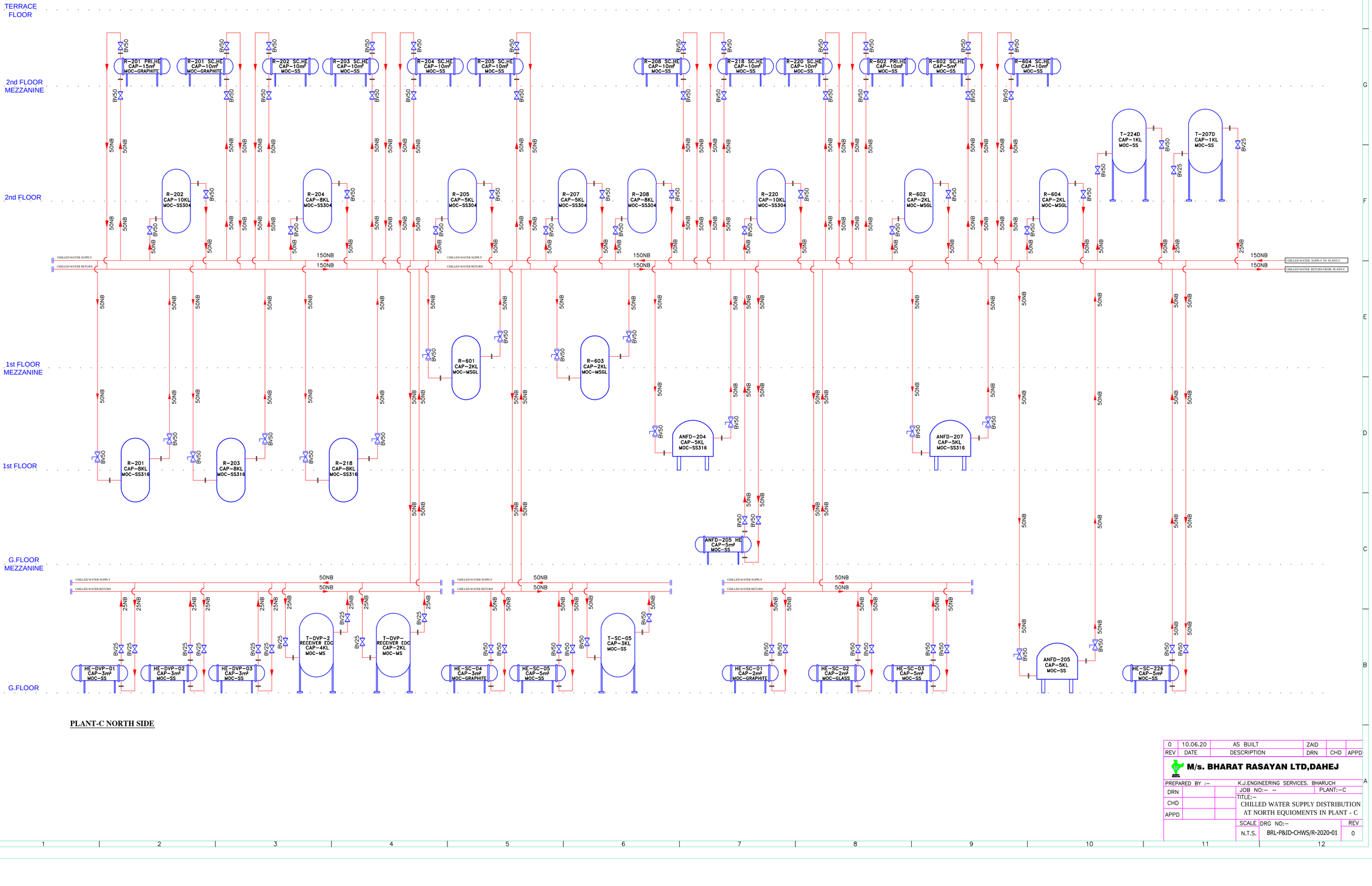
PREPARED BY :- K.J.ENGINEERING SERVICES. BHARUCH

DRN | CHD | APPD

JOB NO:- – PLANT:-C

TITLE:- CHILLED BRINE SUPPLY DISTRIBUTION AT SOUTH EQUIOMENTS IN PLANT - C

SCALE N.T.S. | DRG NO:- BRL-P&ID-CHBS/R-2020-02 | REV 0



PLANT-C NORTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0	10.06.20	AS BUILT	ZAID		

M/s. BHARAT RASAYAN LTD,DAHEJ

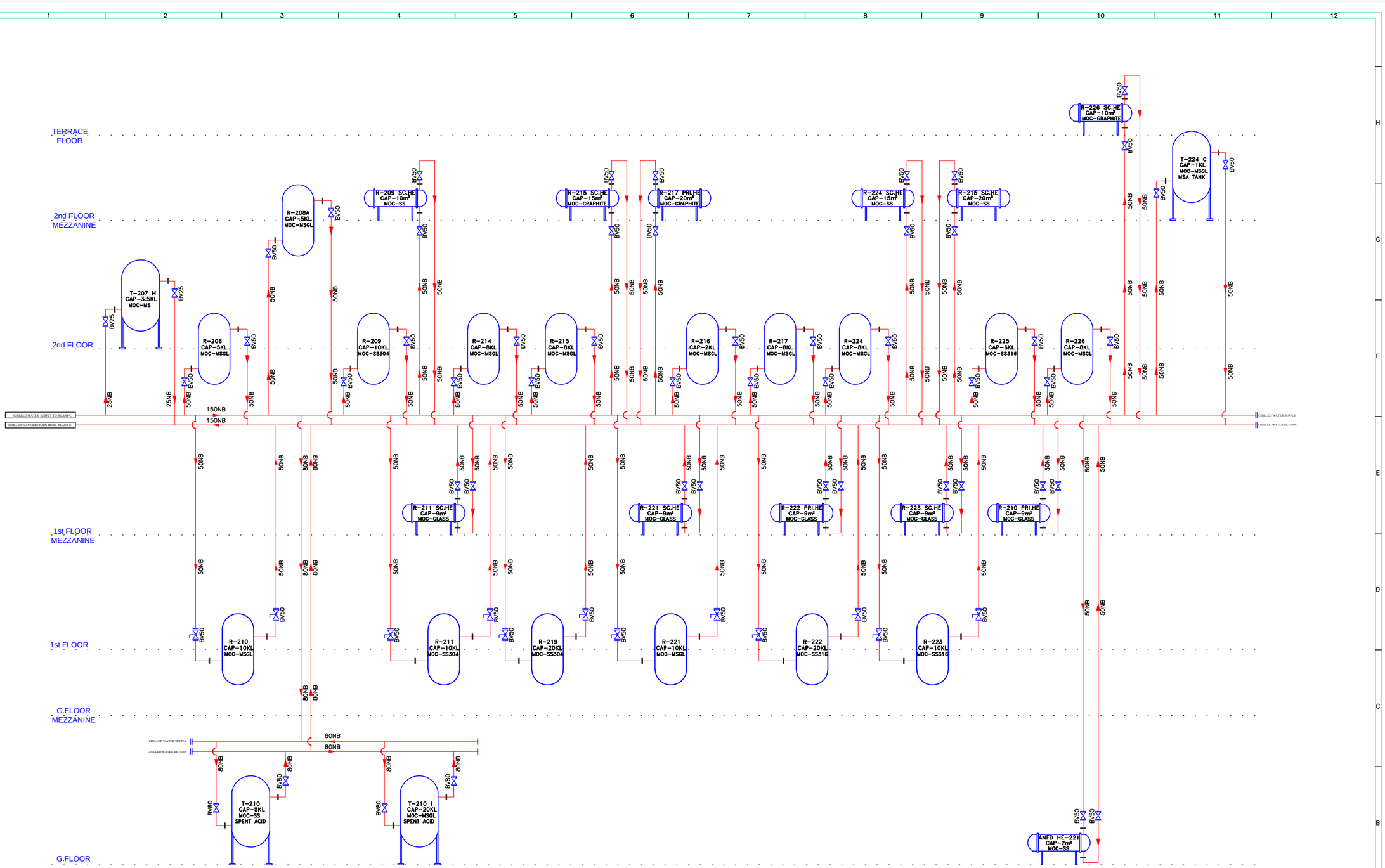
PREPARED BY :- K.J.ENGINEERING SERVICES. BHARUCH

DRN | CHD | APPD

JOB NO:- – PLANT:-C

TITLE:- CHILLED WATER SUPPLY DISTRIBUTION AT NORTH EQUIOMENTS IN PLANT - C

SCALE N.T.S. | DRG NO:- BRL-P&ID-CHWS/R-2020-01 | REV 0



PLANT-C SOUTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0	10.06.20	AS BUILT	ZAID		

M/s. BHARAT RASAYAN LTD,DAHEJ

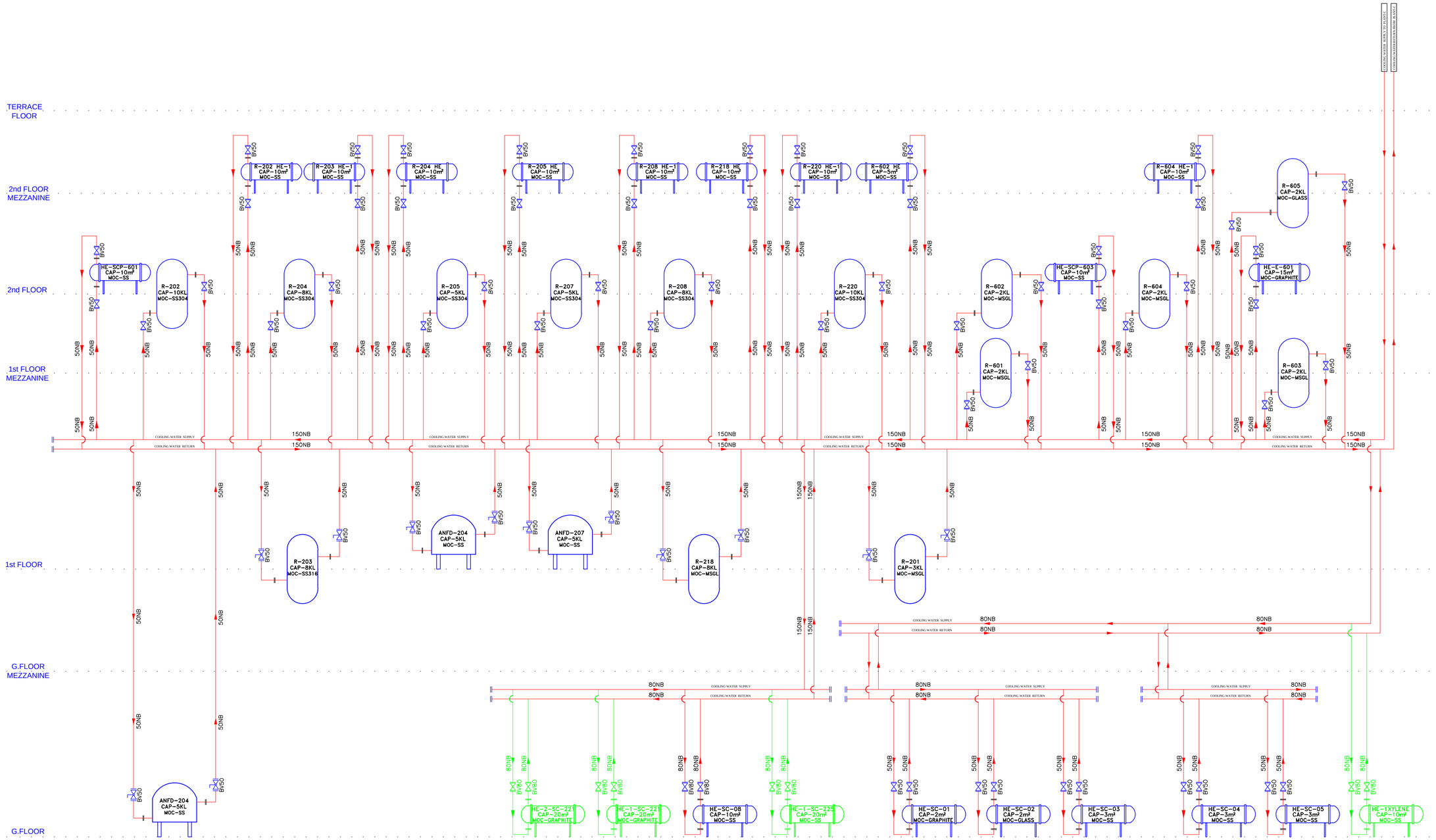
PREPARED BY :- K.J.ENGINEERING SERVICES. BHARUCH

DRN | CHD | APPD

JOB NO:- – PLANT:-C

TITLE:- CHILLED WATER SUPPLY DISTRIBUTION AT SOUTH EQUIOMENTS IN PLANT - C

SCALE N.T.S. | DRG NO:- BRL-P&ID-CHWS/R-2020-02 | REV 0



PLANT-C NORTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0	10.06.20	AS BUILT	ZAID		

M/s. BHARAT RASAYAN LTD,DAHEJ

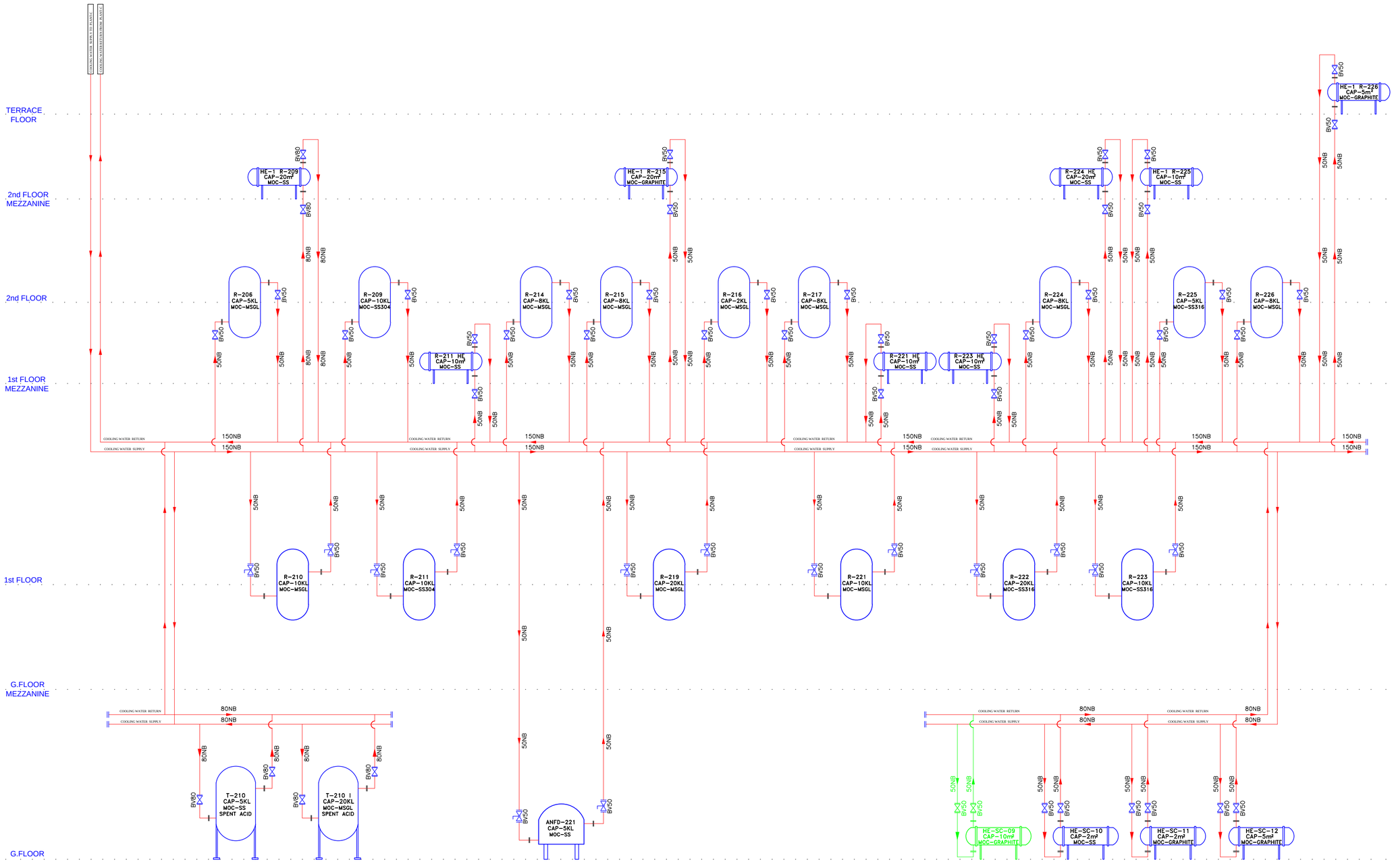
PREPARED BY :- K.J.ENGINEERING SERVICES. BHARUCH

DRN | CHD | APPD

JOB NO:- – PLANT:–C

TITLE:– COOLING WATER SUPPLY DISTRIBUTION AT NORTH EQUIOMENTS IN PLANT - C

SCALE N.T.S. | DRG NO:- BRL-P&ID-CWS/R-2020-01 | REV 0



PLANT-C SOUTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0	10.06.20	AS BUILT	ZAID		

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DRN | CHD | APPD

JOB NO:– – PLANT:–C

TITLE:–
COOLING WATER SUPPLY DISTRIBUTION AT SOUTH EQUIOMENTS IN PLANT - C

SCALE N.T.S. | DRG NO:– BRL-P&ID-CWS/R-2020-02 | REV 0

TERRACE FLOOR

2nd FLOOR MEZZANINE

2nd FLOOR

1st FLOOR MEZZANINE

1st FLOOR

G.FLOOR MEZZANINE

G.FLOOR

HE-3-R-542 CAP-10m² MOC-SS

HE-3-R-544 CAP-10m² MOC-SS

VENT CONDENSOR CAP-10M² MOC-SS

CHILLED BRINE SUPPLY

CHILLED BRINE RETURN

150NB

80NB

50NB

BV50

BV60

R-513 CAP-1KL MOC-MSGL

R-540 CAP-12KL MOC-SS

R-541 CAP-12KL MOC-SS

R-542 CAP-8KL MOC-SS

R-544 CAP-12KL MOC-SS

HE-2-R-550 CAP-10m² MOC-SS

HE-1-508/9 CAP-15m² MOC-GRAPHITE

HE-2-508/9 CAP-15m² MOC-GRAPHITE

R-510 CAP-20KL MOC-MSGL

R-529 CAP-26KL MOC-SS316

HE-T-508H CAP-5m² MOC-GRAPHITE

HE-T-508F CAP-5m² MOC-GRAPHITE

HE-T-508G CAP-5m² MOC-GRAPHITE

PLANT-D NORTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0	11.06.20	AS BUILT	ZAID		

M/s. BHARAT RASAYAN LTD,DAHEJ

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DRN | CHD | APPD

JOB NO:– – PLANT:–D

TITLE:–
CHILLED BRINE SUPPLY DISTRIBUTION AT NORTH EQUIOMENTS IN PLANT - D

SCALE N.T.S. | DRG NO:– BRL-P&ID-CHBS/R-2020-01 | REV 0

TERRACE FLOOR

2nd FLOOR MEZZANINE

2nd FLOOR

1st FLOOR MEZZANINE

1st FLOOR

G.FLOOR MEZZANINE

G.FLOOR

HE-1-R-525
CAP-15m²
MOC-SS

HE-2-R-512
CAP-10m²
MOC-SS

CP-T-512
CAP-0.5KL
MOC-SS

R-514
CAP-0.5KL
MOC-MSGL

CP-T-525
CAP-0.5KL
MOC-SS

ANFD-T-506D
CAP-0.5KL
MOC-SS

VC
CAP-10M²
MOC-SS

VC
CAP-10M²
MOC-SS

HE-3-R-531
CAP-10m²
MOC-GRAPHITE

R-526
CAP-16KL
MOC-SS316

HE-3-R-516
CAP-10m²
MOC-SS

HE-R-527
CAP-10m²
MOC-SS

HE-3-R-502
CAP-10m²
MOC-GRAPHITE

R-517
CAP-26KL
MOC-SS316

R-518
CAP-26KL
MOC-MSGL

R-519
CAP-26KL
MOC-MSGL

R-537
CAP-12KL
MOC-SS

BV50 BV100 BV40

50NB 100NB 150NB 40NB

CHILLED BRINE SUPPLY

CHILLED BRINE RETURN

CHILLED BRINE SUPPLY TO PLANT-C

CHILLED BRINE RETURN FROM PLANT-C

PLANT-D SOUTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0	11.06.20	AS BUILT	ZAID		

M/s. BHARAT RASAYAN LTD,DAHEJ

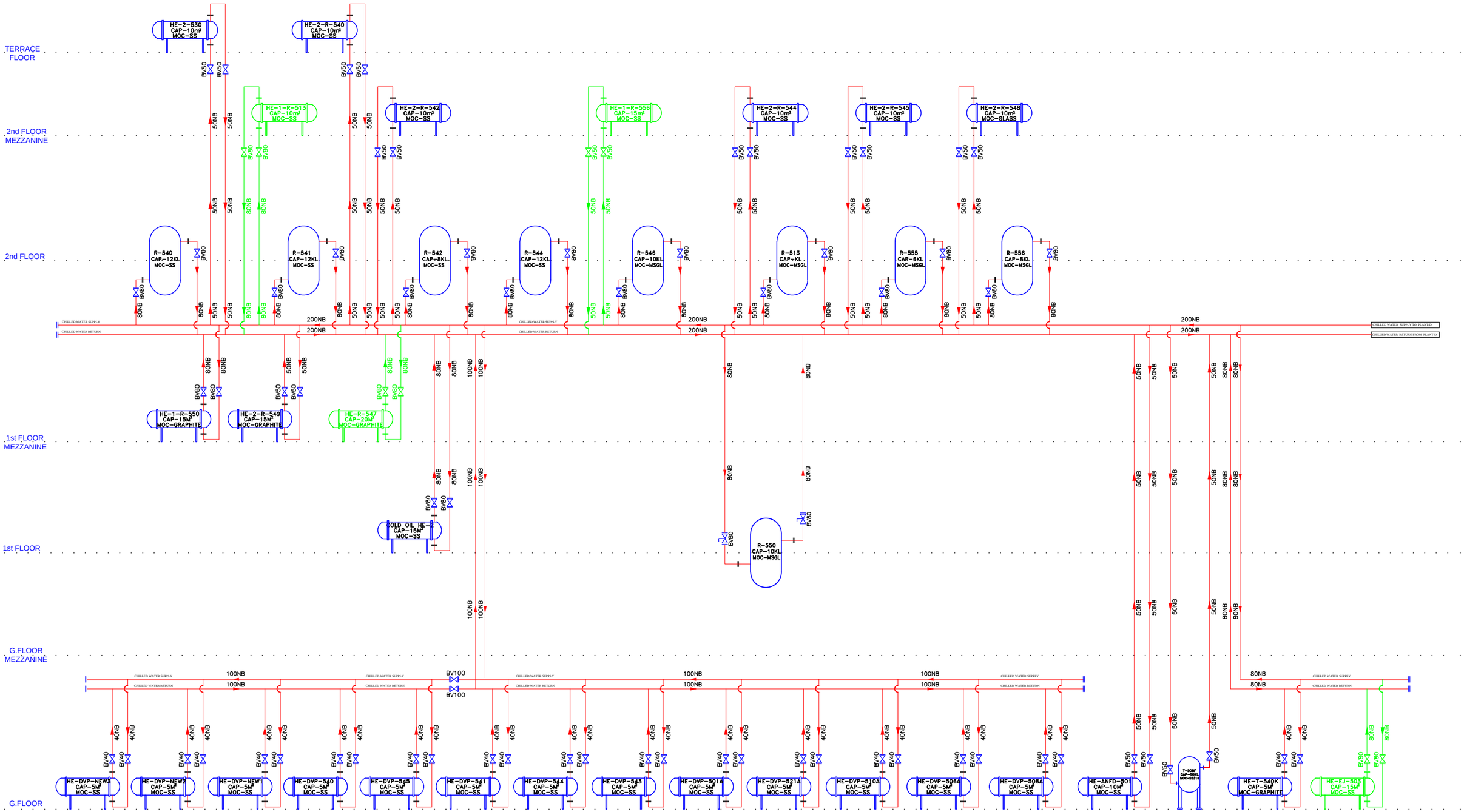
PREPARED BY :- K.J.ENGINEERING SERVICES. BHARUCH

DRN | CHD | APPD

JOB NO:- – PLANT:-D

TITLE:- CHILLED BRINE SUPPLY DISTRIBUTION AT SOUTH EQUIOMENTS IN PLANT - D

SCALE N.T.S. | DRG NO:- BRL-P&ID-CHBS/R-2020-02 | REV 0



PLANT-D NORTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0	11.06.20	AS BUILT	ZAID		

M/s. BHARAT RASAYAN LTD,DAHEJ

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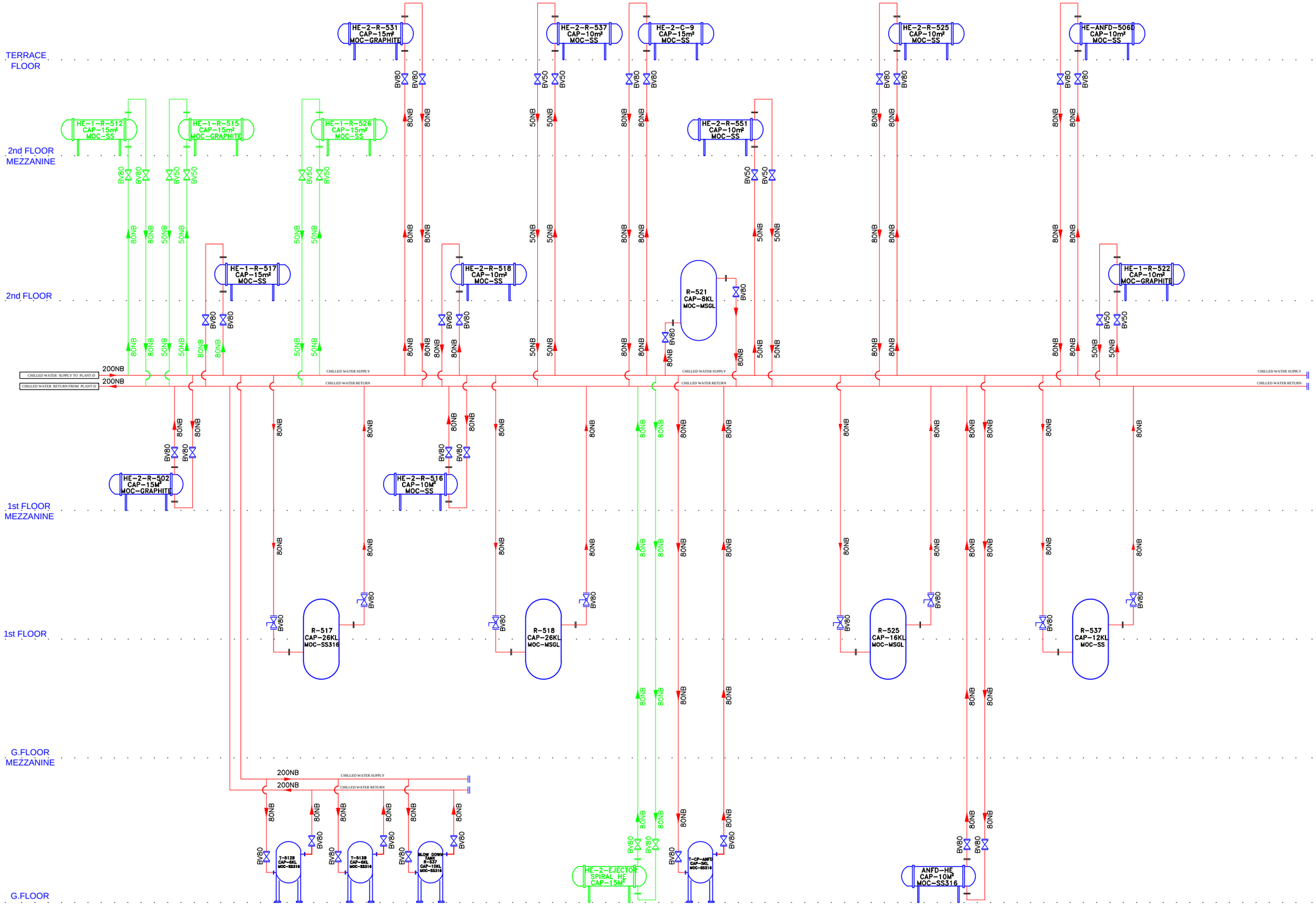
DRN | CHD | APPD

JOB NO:– – PLANT:–D

TITLE:– CHILLED WATER SUPPLY DISTRIBUTION AT NORTH EQUIOMENTS IN PLANT - D

SCALE N.T.S. DRG NO:– BRL-P&ID-CHWS/R-2020-01 REV 0



PLANT-D SOUTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0	11.06.20	AS BUILT	ZAID		

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DRN | CHD | APPD

JOB NO:- – PLANT:-D

TITLE:- CHILLED WATER SUPPLY DISTRIBUTION AT SOUTH EQUIOMENTS IN PLANT - D

SCALE N.T.S. | DRG NO:- BRL-P&ID-CHWS/R-2020-02 | REV 0

COOLING WATER SUPPLY TO PLANT-D

COOLING WATER RETURN FROM PLANT-D

TERRACE FLOOR

2nd FLOOR MEZZANINE

2nd FLOOR

1st FLOOR MEZZANINE

1st FLOOR

G.FLOOR MEZZANINE

G.FLOOR

HE-1-R-530 CAP-15M² MOC-SS

HE-1-R-540 CAP-15M² MOC-SS

HE-1-R-541 CAP-15M² MOC-SS

HE-2-R-541 CAP-10M² MOC-SS

HE-1-R-542 CAP-15m² MOC-SS

HE-1-R-544 CAP-15m² MOC-SS

HE-1-R-545 CAP-10m² MOC-SS

HE-1-R-548 CAP-10m² MOC-GLASS

R-513 CAP-KL MOC-MSGL

R-530 CAP-8KL MOC-SS304

R-540 CAP-12KL MOC-SS

R-541 CAP-12KL MOC-SS

R-542 CAP-8KL MOC-SS

R-548 CAP-5KL MOC-MSGL

R-544 CAP-12KL MOC-SS

R-552 CAP-8KL MOC-MSGL

R-553 CAP-10KL MOC-MSGL

R-555 CAP-6KL MOC-MSGL

R-556 CAP-8KL MOC-MSGL

R-508 CAP-20KL MOC-MSGL

R-509 CAP-20KL MOC-MSGL

R-510 CAP-20KL MOC-MSGL

R-529 CAP-26KL MOC-SS316

R-547 CAP-8KL MOC-MSGL

R-549 CAP-8KL MOC-SS

R-550 CAP-10KL MOC-MSGL

R-554 CAP-6.3KL MOC-MSGL

HE-1-COLD OIL CAP-15m² MOC-SS

HE-T-546C CAP-5m ² MOC-GRAPHITE

HE-DVP-COOLING CAP-5m² MOC-SS

ANFD-501 CAP-5KL MOC-SS

COOLING WATER SUPPLY

COOLING WATER RETURN

200NB

80NB

50NB

BV80

BV50

PLANT-D NORTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0	11.06.20	AS BUILT	ZAID		

M/s. BHARAT RASAYAN LTD,DAHEJ

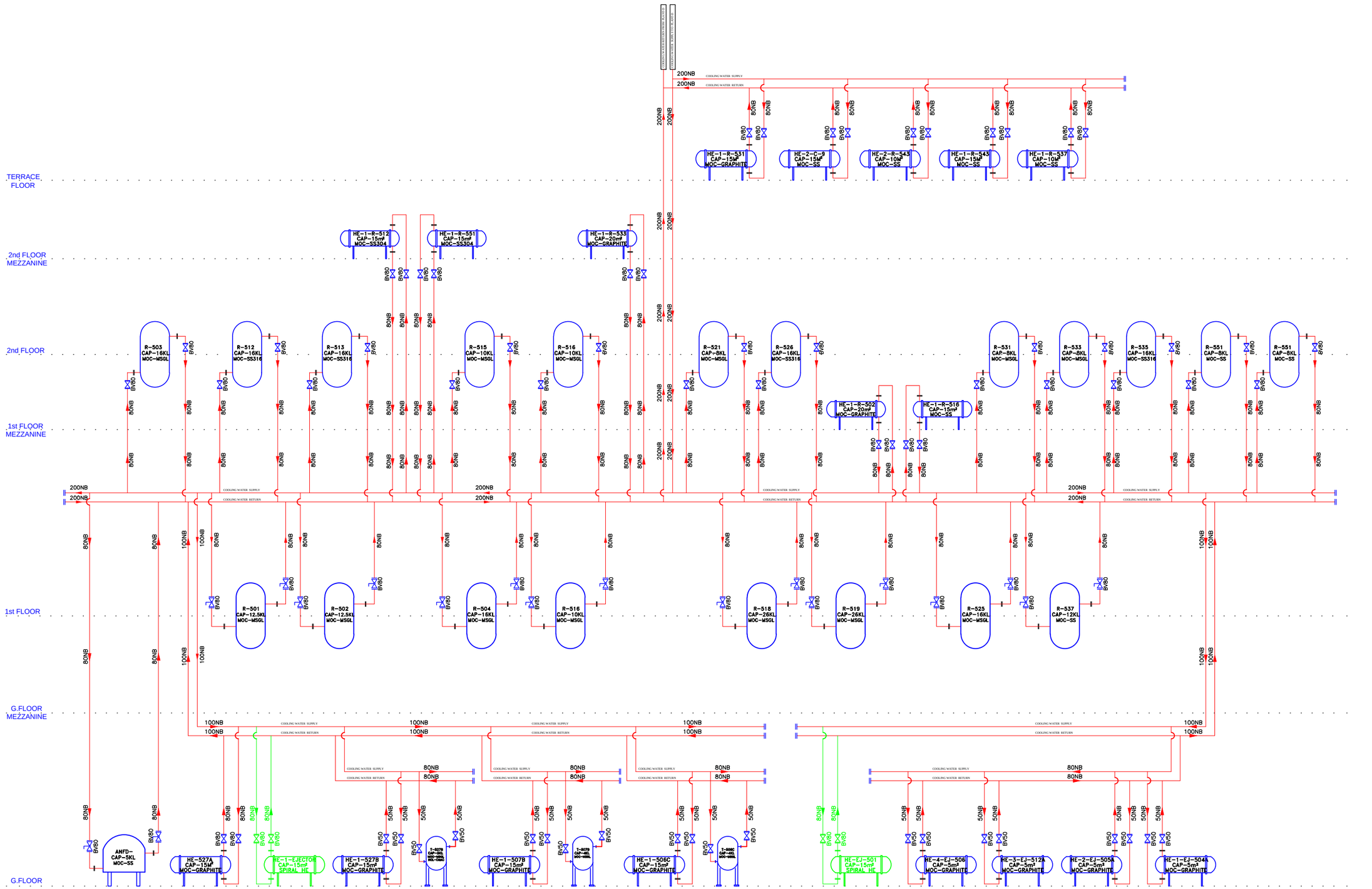
PREPARED BY :- K.J.ENGINEERING SERVICES. BHARUCH

DRN | CHD | APPD

JOB NO:- – PLANT:-D

TITLE:- COOLING WATER SUPPLY DISTRIBUTION AT NORTH EQUIPMENTS IN PLANT - D

SCALE N.T.S. | DRG NO:- BRL-P&ID-CWS/R-2020-01 | REV 0



PLANT-D SOUTH SIDE

REV	DATE	DESCRIPTION	DRN	CHD	APPD
0	11.06.20	AS BUILT	ZAID		

M/s. BHARAT RASAYAN LTD,DAHEJ

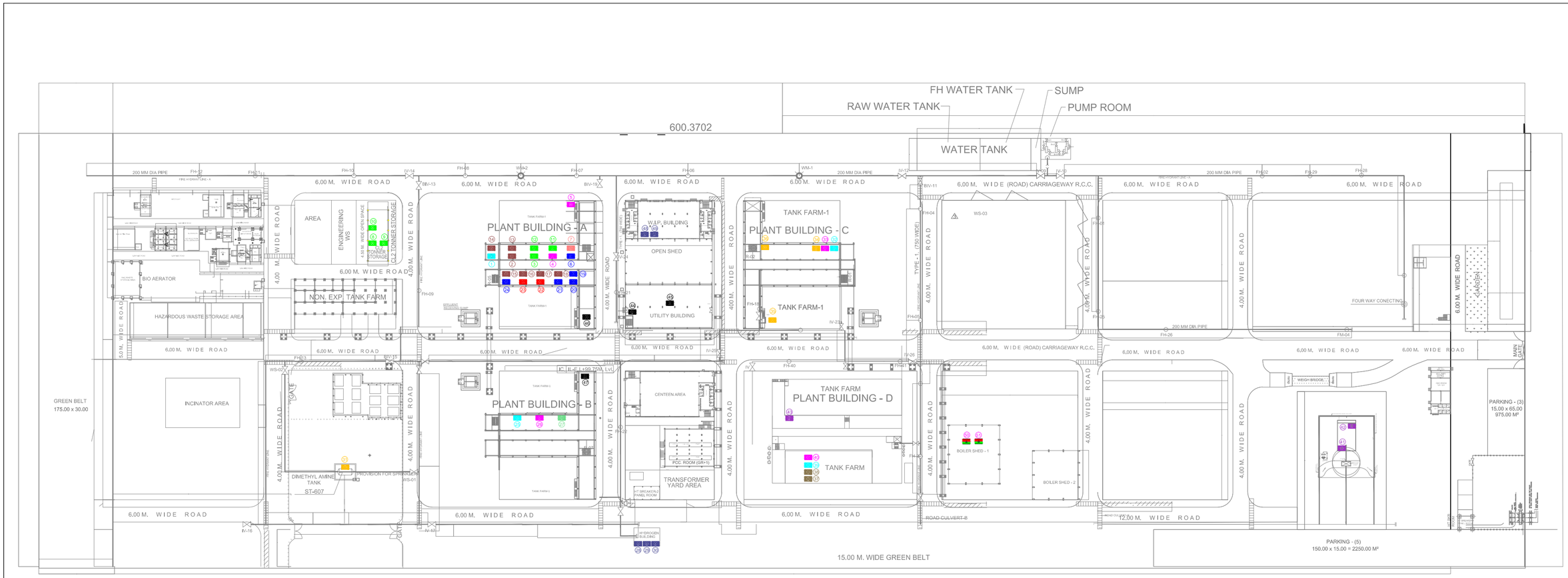
PREPARED BY :- K.J.ENGINEERING SERVICES. BHARUCH

DRN | CHD | APPD

JOB NO:- - PLANT:-D

TITLE:- COOLING WATER SUPPLY DISTRIBUTION AT SOUTH EQUIPMENTS IN PLANT - D

SCALE N.T.S. DRG NO:- BRL-P&ID-CWS/R-2020-02 REV 0



LEGEND	NAME OF GAS	QTY.
	DMA	04
	SO2	04
	HCL	05
	HCN	01
	H2	05
	2CB	02
	SOX	02
	HBR	07
	CL2	06
	H2S	05
	O2	02
	NH3	04
	IB	03

GAS SENSOR LIST BRL DAHEJ -2020

SR. NO	Plant	Name of	Area	LOCATION
1	PLANT-A	SO2	Stack point -Terrece	Scrubber stack point at Terrace over head Water tank
2	PLANT-A	BR2	Stack point -Terrece	Scrubber stack point at Terrace over head Water tank
3	PLANT-A	CL2	Stack point -Terrece	Scrubber stack point at Terrace over head Water tank
4	PLANT-A	HCL	Stack point -Terrece	Scrubber stack point at Terrace over head Water tank
5	Non EX.T/F	HCL	NON-EXP Tank Farm	HCL Storage tank back side in Non EX.T/F
6	PLANT-A	H2S	Stack point -Terrece	Scrubber stack point at Terrace DVP vent
7	PLANT-A	HBR	Stack point -Terrece	Scrubber stack point at Terrace over head Water tank
8	CL2 Storage yard	CL2	CL2 Storage yard	CL2 Storage yard (Work shop side wall)
9	CL2 Storage yard	CL2	CL2 Storage yard	CL2 Storage yard (Plant A side wall)
10	CL2 Storage yard	CL2	CL2 Storage yard	CL2 Storage yard (Work shop side wall)
11	PLANT-A	CL2	Cl2 Operating Area	Cl2 tonner plant A operating area on wall North side
12	PLANT-A	CL2	Cl2 Operating Area	Cl2 tonner plant A operating area on wall South side
13	PLANT-A	BR2	Bromination reactor S/F	On Column near R-101A/B, S/Floor
14	PLANT-A	BR2	Bromine Recovery	Bromine recovery old column 1st Floor
15	PLANT-A	BR2	Bromine 3kl tank G/F	Back side of 3KL bromine tank, on Wall
16	PLANT-A	BR2	Bromine Vaporiser 0.25KL	Back side of 0.25KL bromine tank -3, on Wall
17	PLANT-A	BR2	Bromine batch tank-terrace	on terrace 0.5KL Bromine receiver-1 North side

GAS SENSOR LIST BRL DAHEJ -2020

SR. NO	Plant	Name of Gas	Area	LOCATION
18	PLANT-A	BR2	Bromine batch tank-terrace	on terrace 0.5KL Bromine receiver-2 South side
19	PLANT-A	H2S	R-121 Scrubber area	SR-121 Scrubber area near B/D tank G/Floor
20	PLANT-A	H2S	In P2S5 Charging Cabin R-120	In P2S5 Charging Cabin R-120
21	PLANT-A	H2S	In P2S5 Charging Cabin R-121	In P2S5 Charging Cabin R-121
22	PLANT-A	O2	In P2S5 Charging Cabin R-120	In P2S5 Charging Cabin R-120
23	PLANT-A	O2	In P2S5 Charging Cabin R-121	In P2S5 Charging Cabin R-121
24	PLANT-A	H2S	R-120 Scrubber area	SR-120 Scrubber area
25	PLANT-B	SO2	Stack point -Terrece	Scrubber stack point at Terrace over head Water tank
26	PLANT-B	HCL	Stack point -Terrece	Scrubber stack point at Terrace over head Water tank
27	PLANT-B	HCN	Stack point -Terrece	Scrubber stack point at Terrace over head Water tank
28	Hydrogenation	H2	Hydrogenation	Hydrogenation PRS at G/Floor
29	Hydrogenation	H2	Hydrogenation	R-325 Reactor top
30	Hydrogenation	H2	Hydrogenation	R-326 Reactor top
31	DMA Storage tank	DMA	Main tank 30KL	DMA Storage tank 30KL

GAS SENSOR LIST BRL DAHEJ -2020

SR. NO	Plant	Name of Gas	Area	LOCATION
32	PLANT-C	SO2	Stack point -Terrece	Scrubber stack point at Terrace
33	PLANT-C	HCL	Stack point -Terrece	Scrubber stack point at Terrace
34	PLANT-C	DVA	Stack point -Terrece	Scrubber stack point at Terrace
35	PLANT-C	DVA	DMA Hold tank	DVA Hold tank
36	PLANT-C	DVA	DMA Day tank	DVA Day tank
37	PLANT-D	2CB	Plant D Ground floor	North Side near IB scrubber
38	PLANT-D	2CB	Plant D Ground floor	South Side near T-526
39	PLANT-D	SO2	Scrubber Area	Scrubber Area
40	PLANT-D	HCL	Scrubber Area	Scrubber Area
41	IB Storage tank	IB	Storage tank area	IB Storage tank area
42	IB Storage tank	IB	Storage tank area	IB Storage tank area
43	PLANT-D	IB	Plant D Terrace floor	Terrace floor near T-508A
44	UTILITY	NH3	Chilling Plant	IBT Chiller top side
45	UTILITY	NH3	Chilling Plant	Main B/C Chiller top side
46	UTILITY	NH3	Brine plant	Brine system Plant A
47	UTILITY	NH3	Brine plant	Brine system Plant B
48	QA Lab	H2	QA Lab	Above GC machine South side wall
49	QA Lab	H2	QA Lab	Above GC machine South side wall
50	Boiler	SOX	Stack point	Boiler Chimney stack point
51	Boiler	SOX	Stack point	Boiler Chimney stack point

BHARAT RASAYAN LTD.
PLOT NO. 42/4 , G.I.D.C DAHEJ

TITLE :- LAYOUT OF GAS DETECTOR

DATE :- 08.06.20 SCALE :- N.T.S REV. 0.

DRG.NO. :- BRL/GAS DETECT/PLAN/01

Pune, India – 27.05.2020
Ref. No.: Gexcon-20-F700092-RA-01
Rev.: 01

GEXCON

FINAL REPORT

3D Modeling & Consequence Analysis Study for Bharat Rasayan Limited, Unit-II, Plot No. 42/4, Amod Road, GIDC, Dahej, Tal.: Vagra, Dist.: Bharuch, Gujarat-392130

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Document Info

Author(s)

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3D Modeling & Consequence Analysis Study for Bharat Rasayan Limited, Unit-II, Plot No. 42/4, Amod Road, GIDC, Dahej, Tal.: Vagra, Dist.: Bharuch, Gujarat-392130

Extract

3D Modeling & Consequence Analysis Study for Bharat Rasayan Limited, Unit-II, Plot No. 42/4, Amod Road, GIDC, Dahej, Tal.: Vagra, Dist.: Bharuch, Gujarat-392130

Project Info

Client

BRL, Unit-II, Dahej

Clients ref.

Mr. Ajay Gupta

Gexcon Project No.

700092

Gexcon Project Name

3D Modeling & Consequence Analysis Study for Bharat Rasayan Limited, Unit-II, Plot No. 42/4, Amod Road, GIDC, Dahej, Tal.: Vagra, Dist.: Bharuch, Gujarat-392130

Revision

Rev.	Date	Author	Checked by	Approved by	Reason for revision
01	27.05.2020	Neha Rane	Pratik Shinde	Prakash Dandwate	Incorporated Client's comments and issued as a final report
00	25.05.2020	Neha Rane	Pratik Shinde	Prakash Dandwate	Draft Report

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Executive Summery

Gexcon India Pvt. Ltd. were requested to perform 3D Modelling, Consequence Study for BRL Expansion Project at Plot No. 42/4, Amod Road, GIDC, Dahej, Tal.: Vagra, Dist.: Bharuch, Gujarat-392130. The 3D modelling and Consequences analysis were carried out using FLACS software version 10.9R2, developed by Gexcon.

Following Five accidental worst case scenarios of flammable and toxic chemicals are considered for this study

1. Leakage of Chlorine gas from Chlorine tonners.
2. Leakage of Hydrogen gas from Hydrogen cylinder (Trolley).
3. Leakage of Isobutylene gas from Isobutylene (Horizontal above ground) tank.
4. Leakage of Di-Methyl Amine gas from DMA (Horizontal above ground) tank.
5. Leakage of Hexane (Horizontal Underground Tank) inventory from Hexane Transfer Pipeline.

The annual probable average wind speed is **3 m/s** and wind direction at project site is from **North-East to South-West** as prevailing direction and **3.2 m/s** wind speed from **North to South** as effective wind direction. The **Pasquill class F** (Stable atmospheric condition) is used for this study. The results of toxic and flammable releases are explained in the report

The summary of 3D CFD consequence analysis is presented below

Table 01: Summary of conclusion for prevailing wind condition from NE to SW

Case No.	Chemical	Type of Hazard	Gas Dispersion from leak location	
			Horizontal Distance (m)	Vertical Distance (m)
1	Chlorine	Toxic	3350	14
2	Hydrogen	Flammable	80	18
3	Isobutylene	Flammable	50	5
4	Di-Methyl Amine	Flammable	86	5

Table 02: Summary of conclusion for effective wind condition from N to S

Case No.	Chemical	Type of Hazard	Gas Dispersion from leak location	
			Horizontal Distance (m)	Vertical Distance (m)
1	Chlorine	Toxic	2600	48
2	Hydrogen	Flammable	320	11
3	Isobutylene	Flammable	23	6.5
4	Di-Methyl Amine	Flammable	42	7.2

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Table 03: Summary of conclusion for Hexane pool fire result of prevailing wind condition from NE to SW

Case No.	Heat Flux for Hexane Fire (kW/m^2)	Distance (m)
5	0.7	24
	1.6	15.6
	4	10
	9.5	6.5
	12.5	5.6
	37.5	3.2

Table 04: Summary of conclusion for Hexane pool fire result of effective wind condition from N to S

Case No.	Heat Flux for Hexane Fire (kW/m^2)	Distance (m)
5	0.7	28.7
	1.6	15.4
	4	11.1
	9.5	7
	12.5	6
	37.5	3

It is concluded that safety of the plant will be achieved post implementation of the recommendations raised in this report. Hence the impact due to leakage will remain well within the boundary of BRL.

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1 Background

1.1 Company Profile

Bharat Rasayan Limited (BRL) currently has Four manufacturing plants equipped with state-of-art process systems located in the states of Haryana and Gujarat.

Unit II set up in 2012 is in Dahej, district Bharuch of Gujarat on the western coast of India. The plant worth $30 million is located on a plot measuring 105,000 sq. meters in an exclusive industrial estate created by the Gujarat Industrial Development Corporation (GIDC). Apart from the Dahej Port that has been bracketed with Chemical Approved Economic Zone, there are several other major and minor seaports (Maroli, Hazira, Pipavav, Bhavnagar, Veraval, Simar and Vansi Borsi) located in this region. Thus, it is very convenient for import of raw materials or export of finished products. Transport (rail and road) network and availability of manpower are excellent in Dahej.

The unit has a pilot plant facility to undertake process research on new products. With a commitment to promote health, safety and protect environment, BRL has equipped this unit with in-house systems for treatment of solid, liquid and gaseous effluents. All these factors have facilitated the company to obtain certifications of ISO 9001:2008 for Quality Management, ISO 14001:2004 for Environment Management system and OHS 18001:2007 for Occupational Health and Safety.

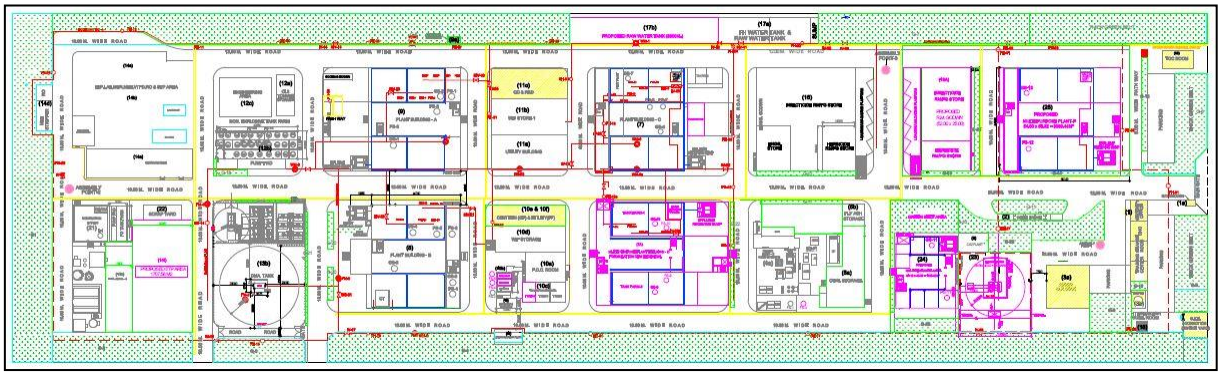

Figure 1-1: Plant facility showing all the Tank farms, Godown, Manufacturing plants, Parking area and the buildings.

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1.2 Abbreviations

BRL	Bharat Rasayan Limited
CASD	Computer Aided Scenario Design
CFD	Computational Fluid Dynamics
DMA	Di-Methyl Amine
EIA	Environment Impact Assessment
IB	Isobutylene
IDLH	Immediate Dangerous to Life and Health
KL	Kilo Litre
LFL	Lower Flammable Limit
N	North
NIOSH	National Institute of Occupational Safety and Health
NE	North-East
ppm	Parts Per Million
RA	Risk Assessment
S	South
SW	South-West
UFL	Upper Flammable Limit

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1.3 Project Scope and Overview

Gexcon India Private Limited were requested to perform a 3D consequence analysis to assess the consequence of the accidental scenarios on BRL, Unit-II, Dahej facility.

Modelling was conducted using the software tool FLACS, developed by Gexcon. Considering the IDLH values for toxicity, LFL and UFL values for flammability, Inventory, molecular weight of the gas and their leak locations are the main parameters to select the accident scenarios. The predominant focus was on toxic releases of Chlorine and flammable releases of Hydrogen, DMA, IB, Hexane.

Based on the issued assumption list from Gexcon and input data provided by the Client, following toxic and flammable gas release scenarios are decided to be modelled using 3D CFD technology for detailed dispersion analysis.

1. Leakage of Chlorine gas from Chlorine tonners.
2. Leakage of Hydrogen gas from Hydrogen cylinder (Trolley).
3. Leakage of Isobutylene gas from Isobutylene (Horizontal above ground) tank.
4. Leakage of Di-Methyl Amine gas from DMA (Horizontal above ground) tank.
5. Leakage of Hexane (Horizontal Underground Tank) inventory from Hexane Transfer Pipeline.

For conducting consequence analysis studies using computational fluid dynamics (CFD)**,** it is required to represent the relevant sections of the plant facilities in 3-dimensional format.

The Gexcon team was provided with the required plot plan, building dimensions and the other relevant updated technical details as an input from Client via email dated **04th February 2020 - 24th April 2020** to prepare 3-Dimensional geometry.

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2 FLACS Simulations

All simulation results presented in this report are obtained with the CFD code FLACS version 10.9R2.

This chapter describes the implemented geometry and the scenario investigated in the FLACS simulation.

2.1 Geometry and grid

Proposed plot plan for the facility shown in Figure 1-1 was selected and included in the CFD simulations. The 3D model has been developed from the plot plan, where the dimensions of the layout, tank farms and buildings were obtained. CASD is an acronym for *Computer Aided Scenario Design*. The pre-processor CASD for the CFD simulator FLACS is used to prepare the input data, or job data, that defines a FLACS simulation. This comprises the geometry model, computational grid, porosities, and scenario description.

The implemented geometry was based on drawings and other details provided by **BRL**.

- Figure 2-1 3D Geometry Modelling In-line with 2D Plot Plan
- Figure 2-2 shows selected domain extents and buildings with tags represented in the CFD model.
- Figure 2-3 Plant layout with Terrain Model
- Figure 2-4 shows geometry view from SW to NE.
- Figure 2-5 shows geometry view from NE to SW.
- Figure 2-6 shows geometry view from South to North.
- Figure 2-7 shows geometry view from West to East.
- Figure 2-8 shows geometry view from North to South.
- Figure 2-9 shows geometry view from East to West.
- Figure 2-10 shows geometry view for Tankfarms, Plants & Piperacks.
- Figure 2-11 shows geometry view for Main Gate, Security Office, Admin Building, Canteen and Parking Area.
- Figure 2-12 Geometry view for Proposed (Expansion) Plant E & F, Herbiside & Insecticide RM/FG Store.
- Figure 2-13 and Figure 2-14 shows the grid used in the entire domain used to capture wind and the pool coverage in the domain of interest at prevailing wind condition from NE to SW direction.
- Figure 2-15 and Figure 2-16 shows the grid used in the entire domain used to capture wind and the pool coverage in the domain of interest at effective wind condition from N to S direction.

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Figure 2-1: 3D Geometry Modelling In line with 2D Plot Plan

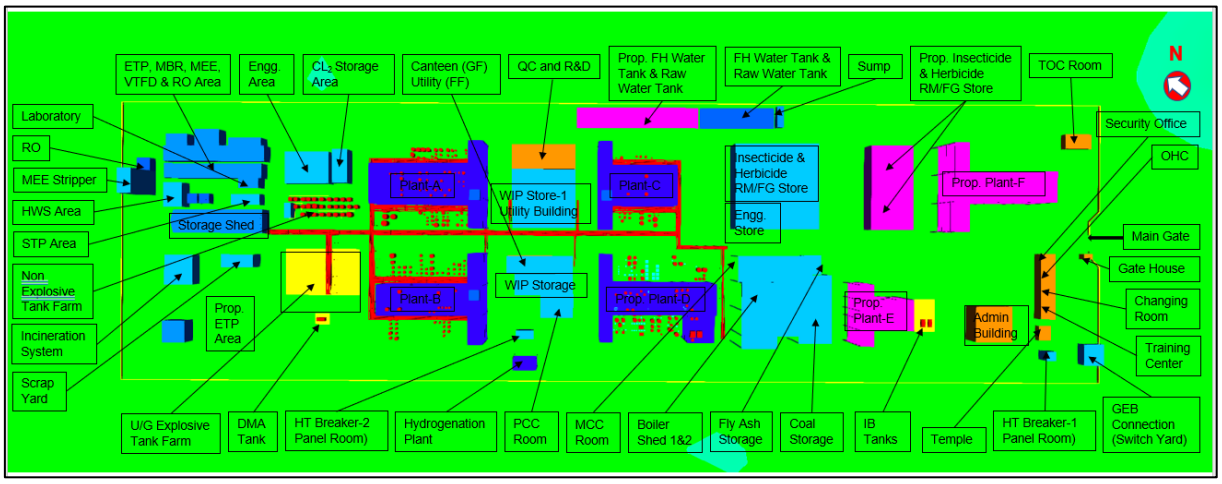

Figure 2-2: Selected domain extents and buildings with tags represented in the CFD model

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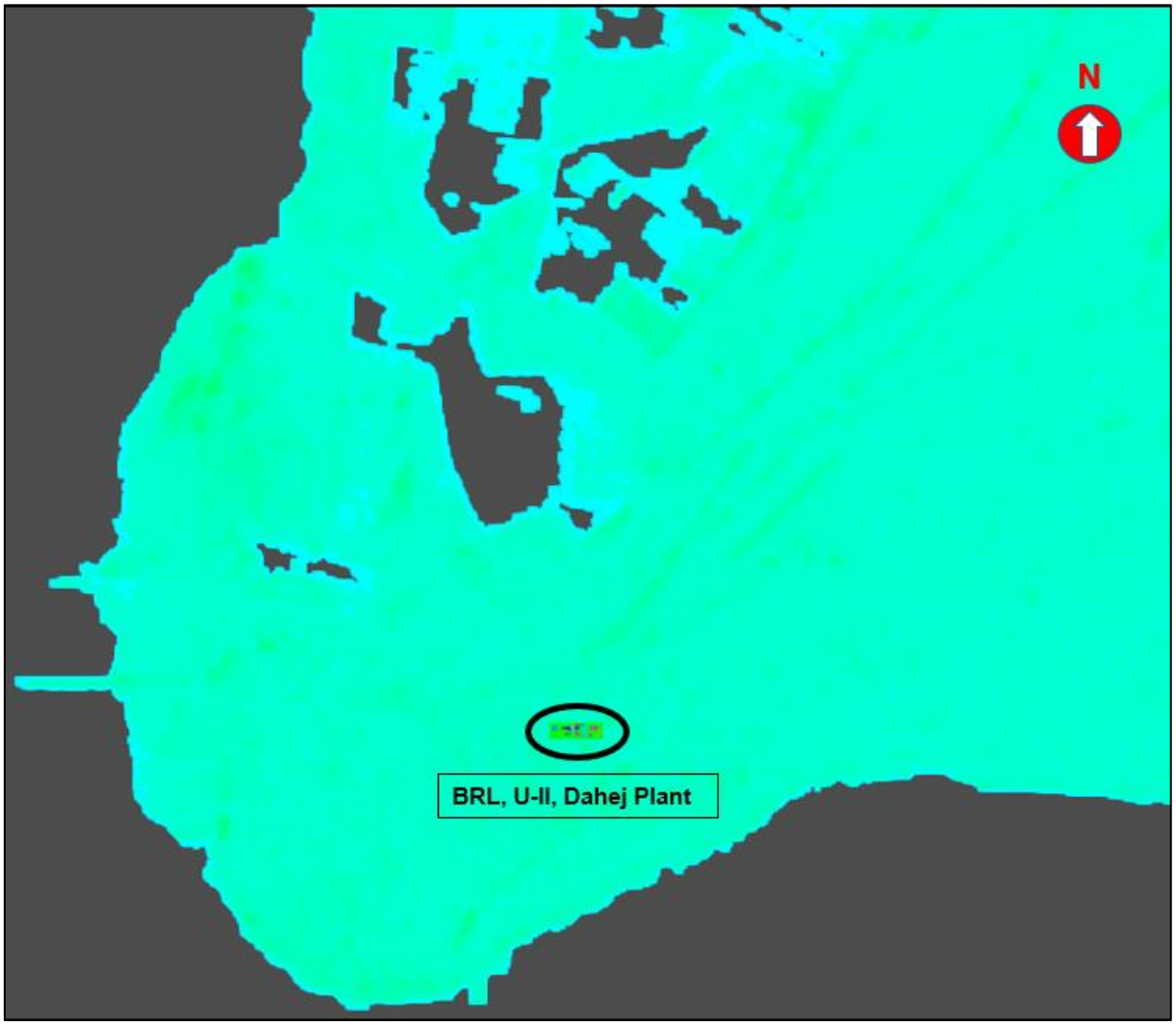

Figure 2-3: Plant layout with Terrain Model

It is important to account for the topography in the FLACS modelling for scenarios, where the terrain may significantly influence the flow. FLACS can import Digital Elevation Maps (DEM), which can be used for modelling the effects of terrain on the simulations, and for visualizing elevations both within and outside the simulation domain.

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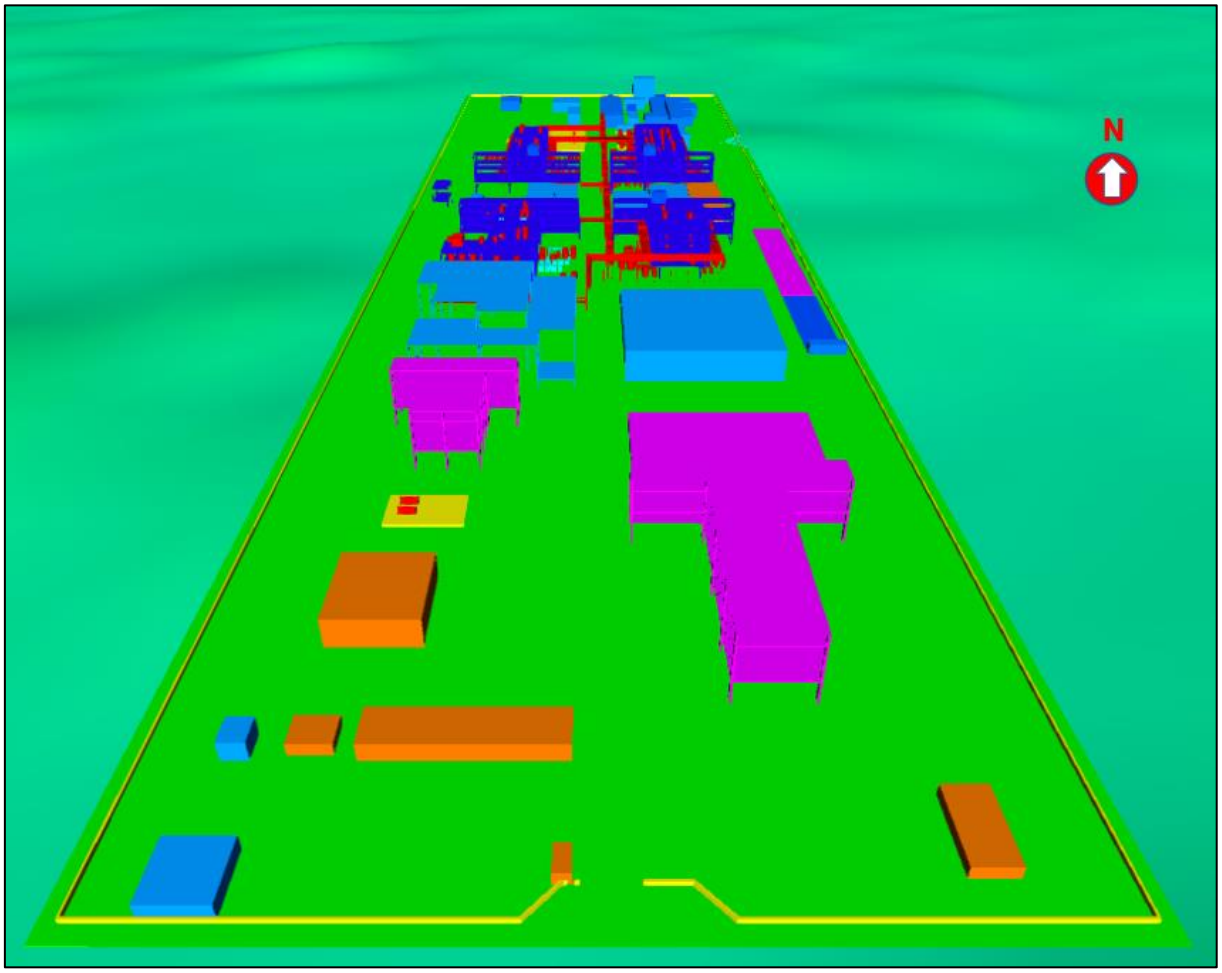

Figure 2-4: Geometry view from SW-NE

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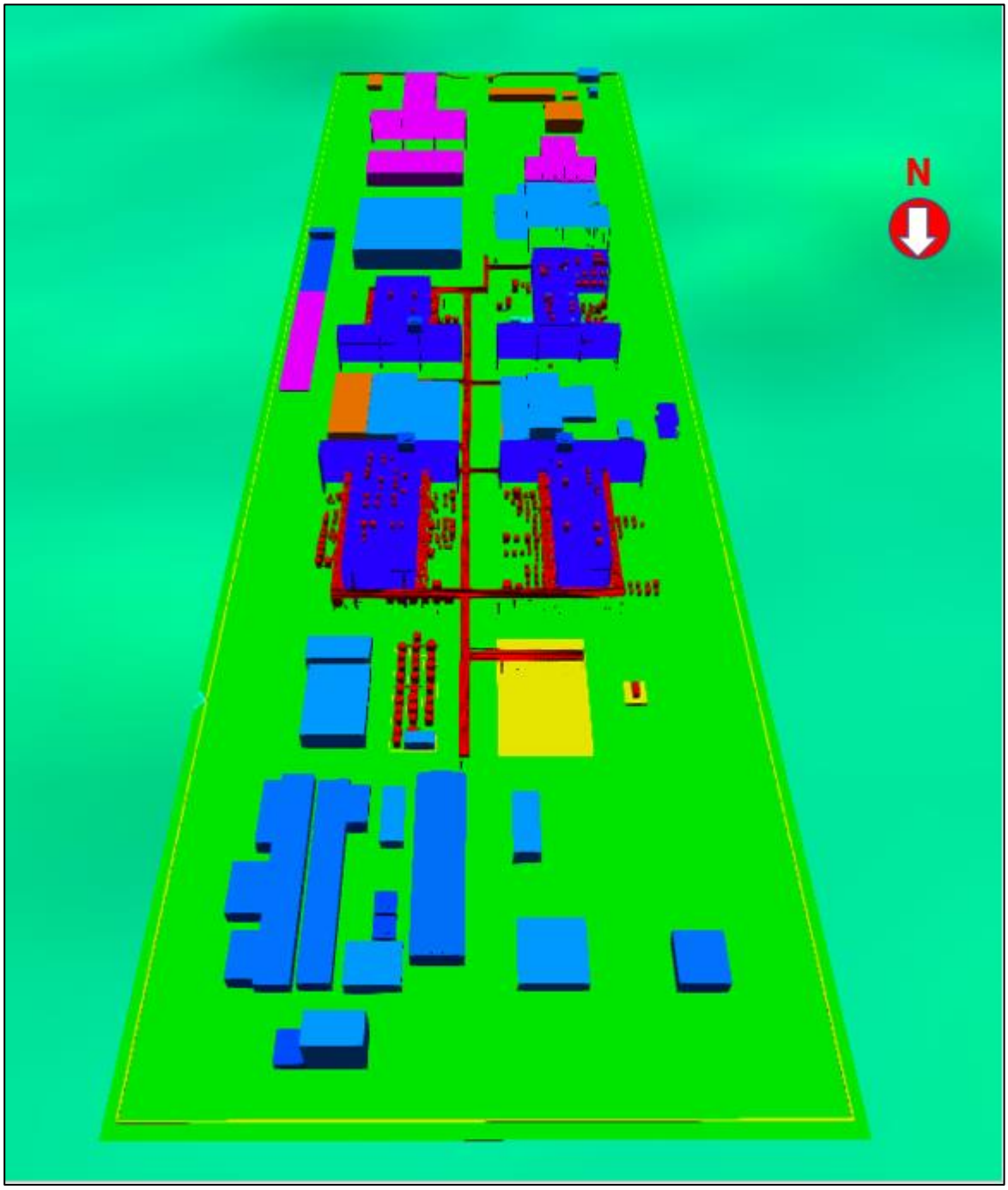

Figure 2-5: Geometry view from NE-SW

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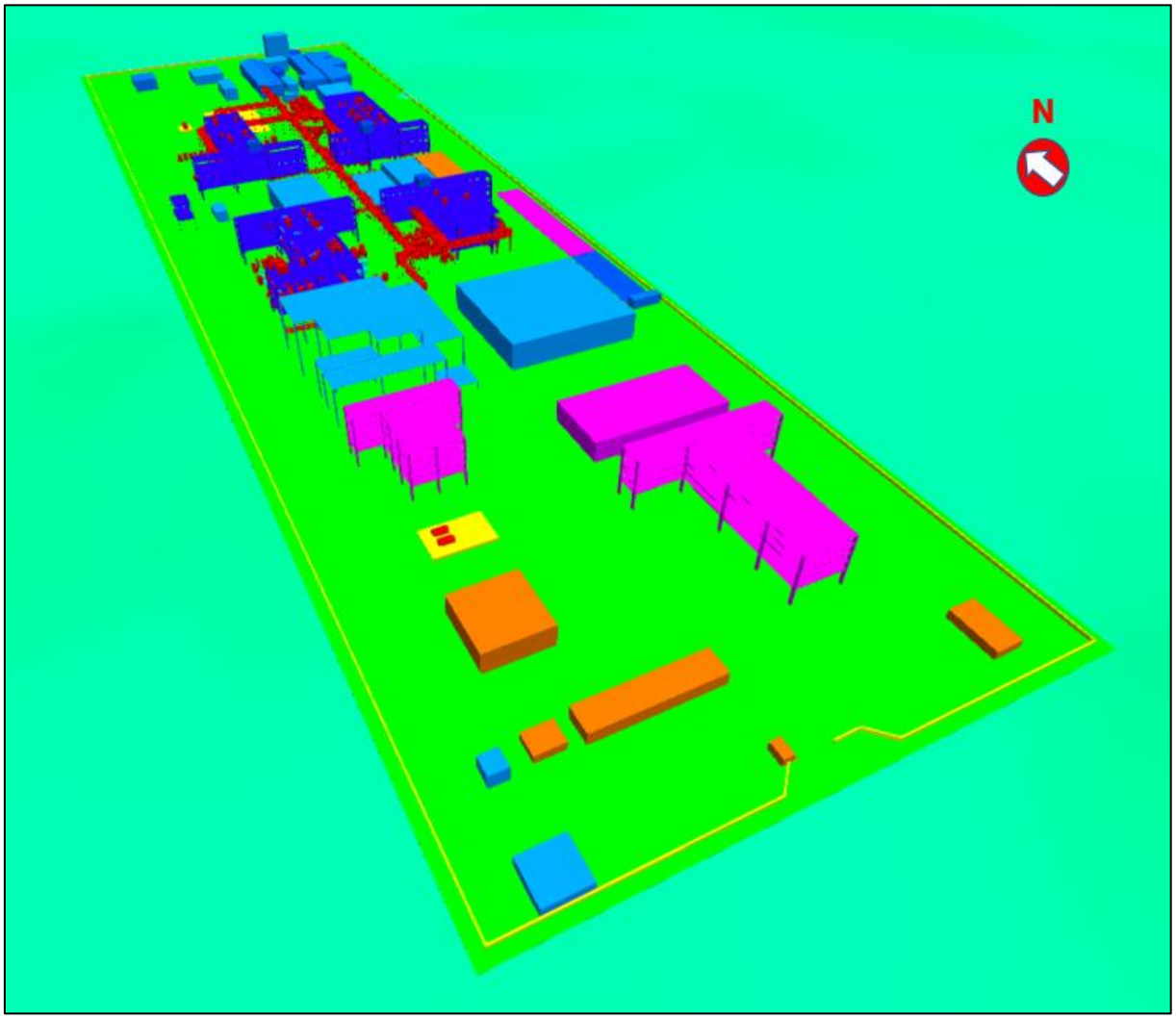

Figure 2-6: Geometry view from S-N

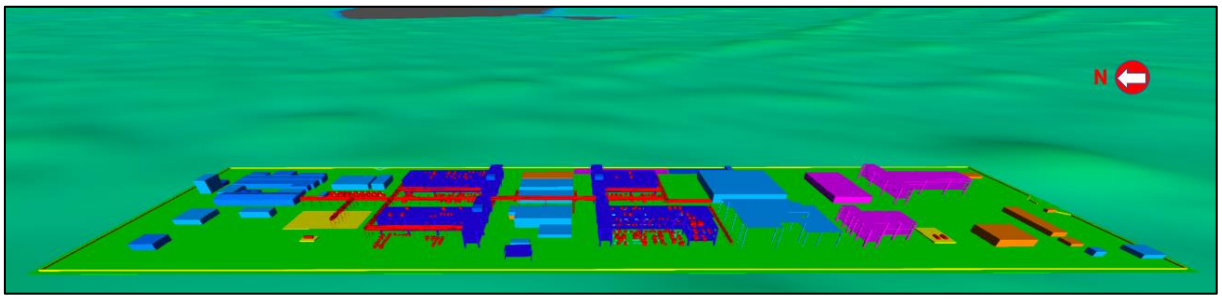

Figure 2-7: Geometry view from W-E

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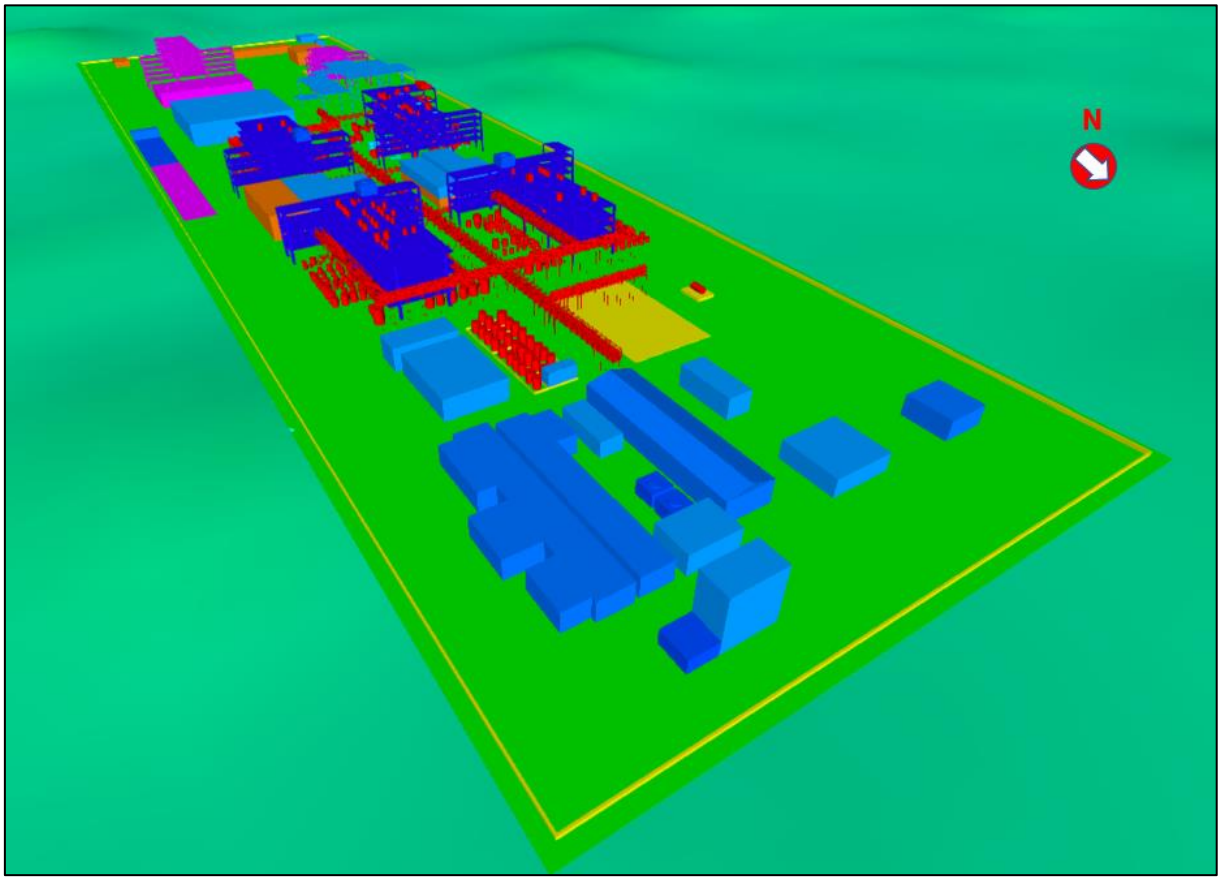

Figure 2-8: Geometry view from N-S

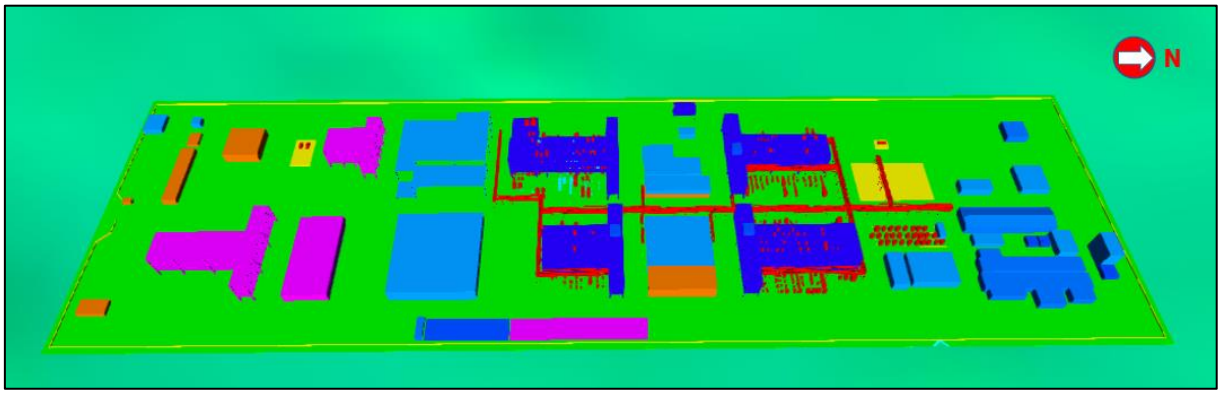

Figure 2-9: Geometry view from E-W

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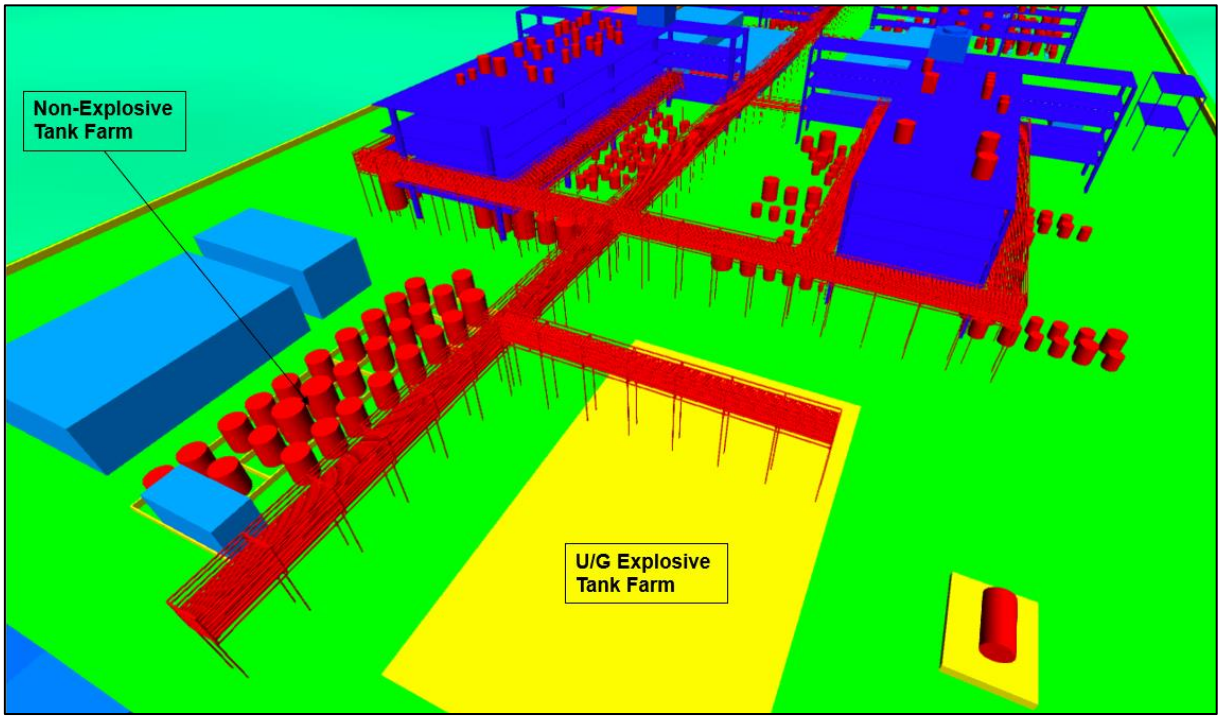

Figure 2-10: Geometry view for Tankfarms, Plants & Piperacks

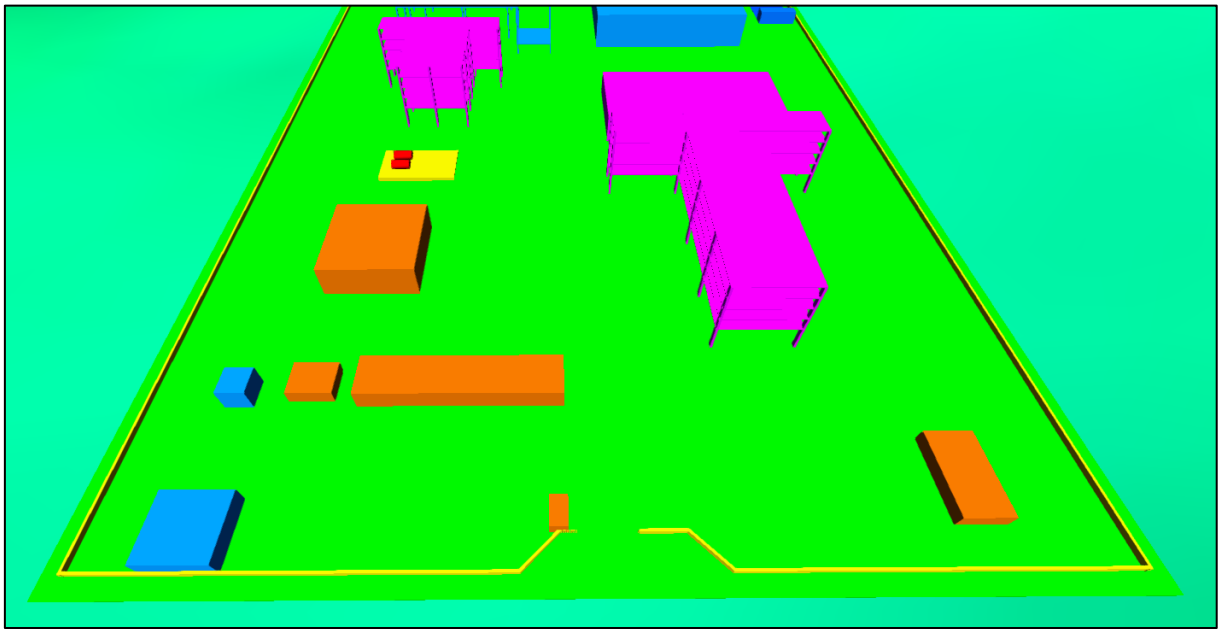

Figure 2-11: Geometry view for Main Gate, Security Office, Admin Building, Canteen and Parking Area

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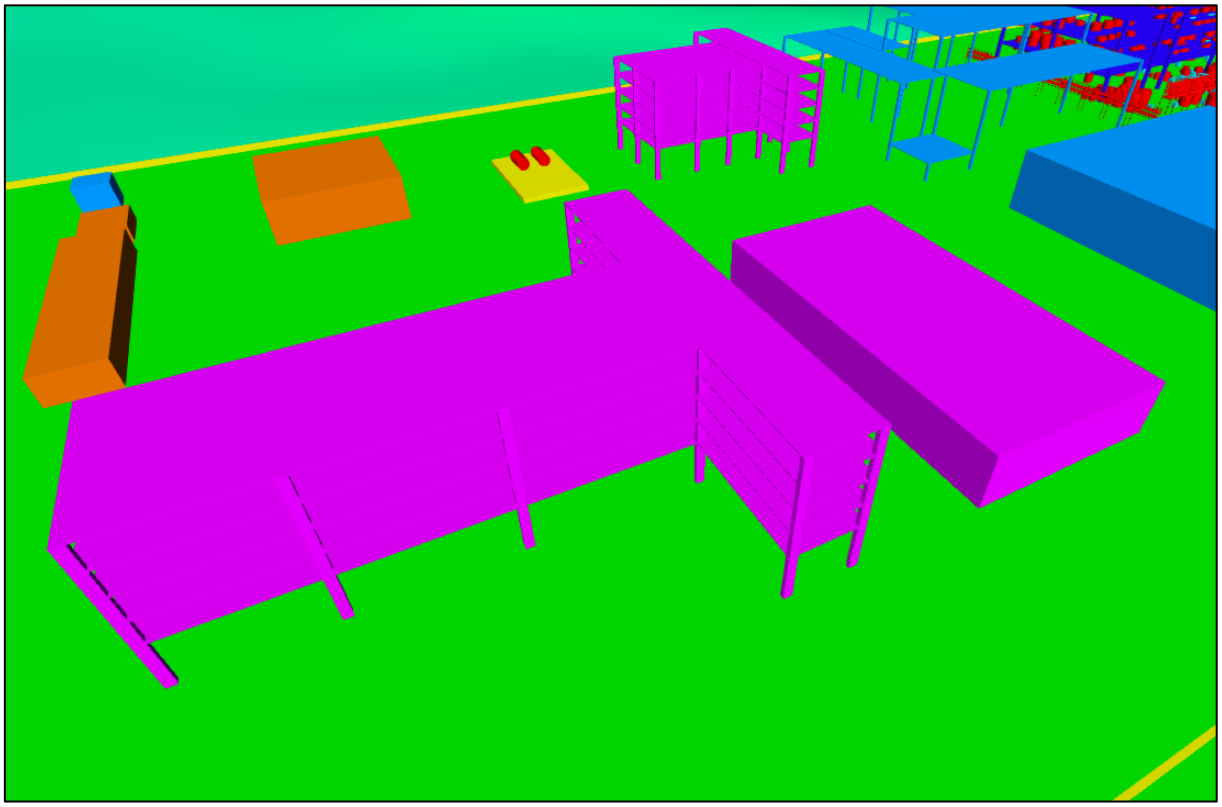

Figure 2-12: Geometry view for Proposed (Expansion) Plant E & F, Herbiside & Insecticide RM/FG Store

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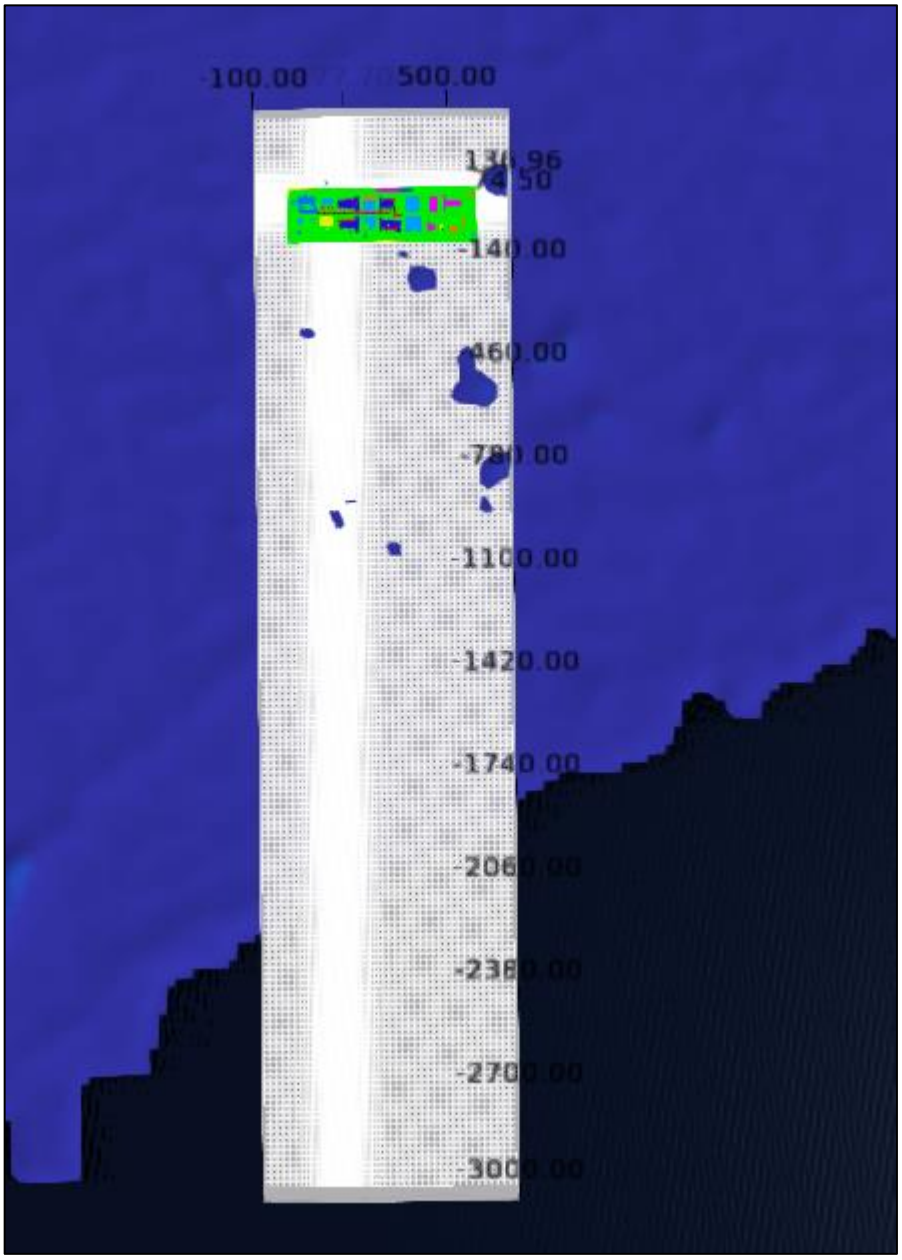

Figure 2-13: Numerical* grid used at prevailing wind condition (NE to SW direction) *in the entire domain to capture the wind flow around the buildings and the gas dispersion from leak in the domain of interest- Top View

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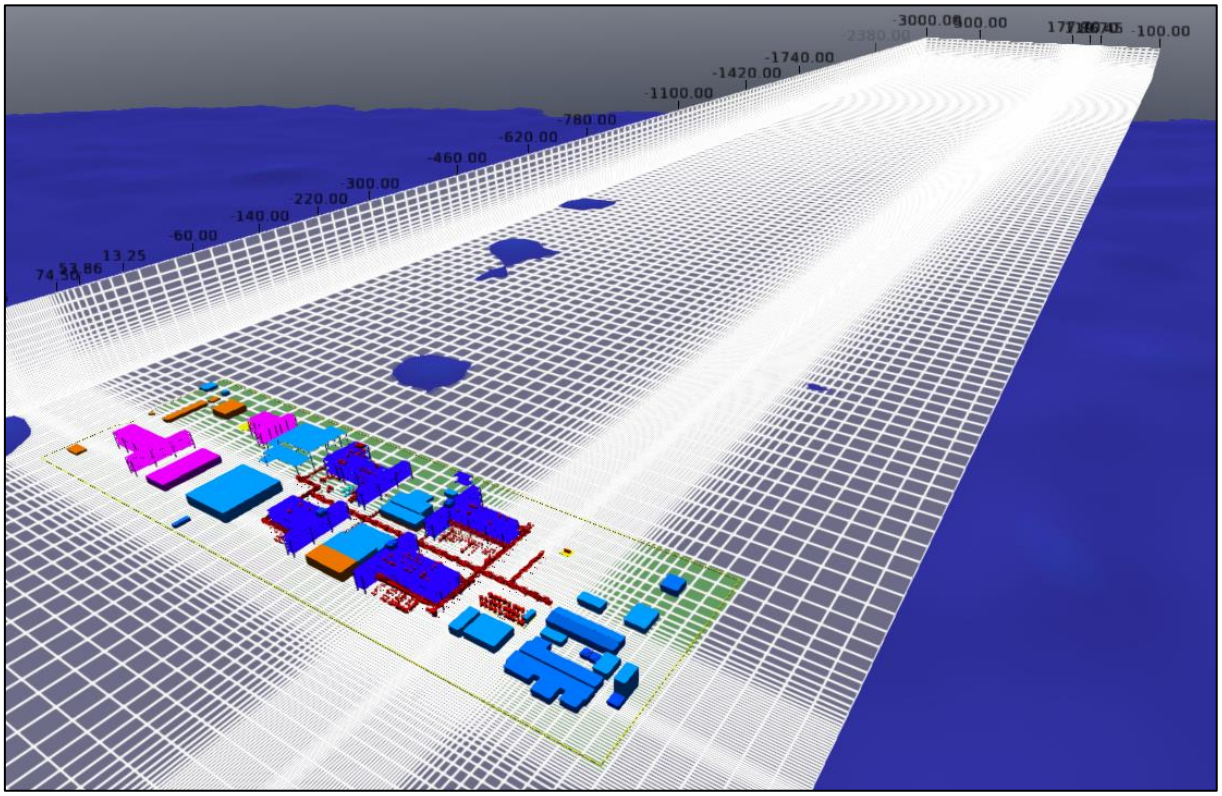

Figure 2-14: Numerical grid used* at prevailing wind condition (NE to SW direction) *in the entire domain to capture the wind flow around the buildings and the gas dispersion from leak in the domain of interest- Isometric view of full geometry

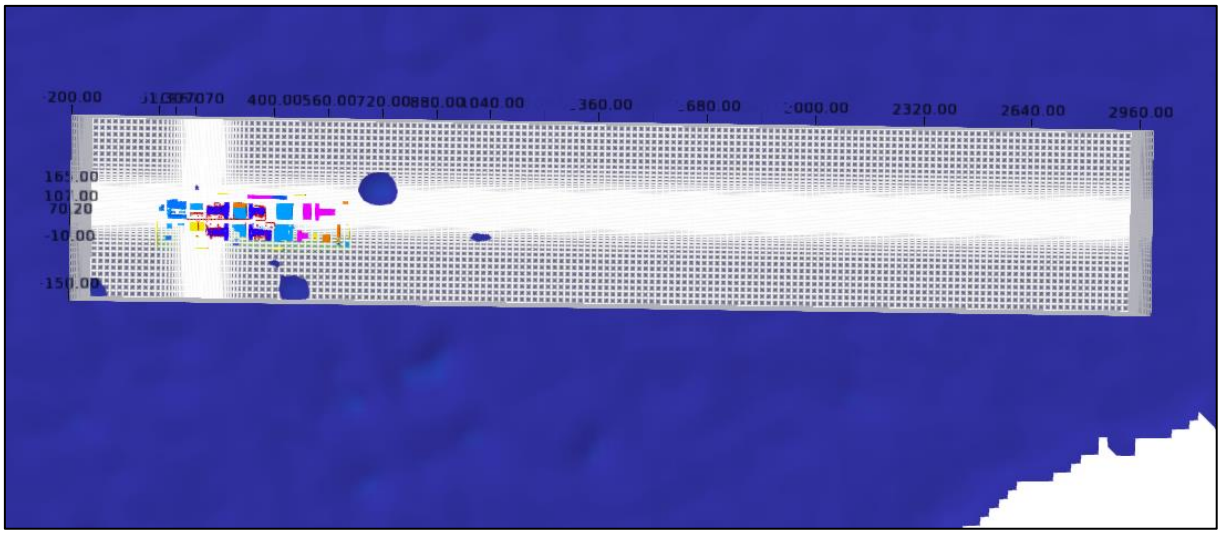

Figure 2-15: Numerical* grid used at effective wind condition (N to S direction) *in the entire domain to capture the wind flow around the buildings and the gas dispersion from leak in the domain of interest- Top View

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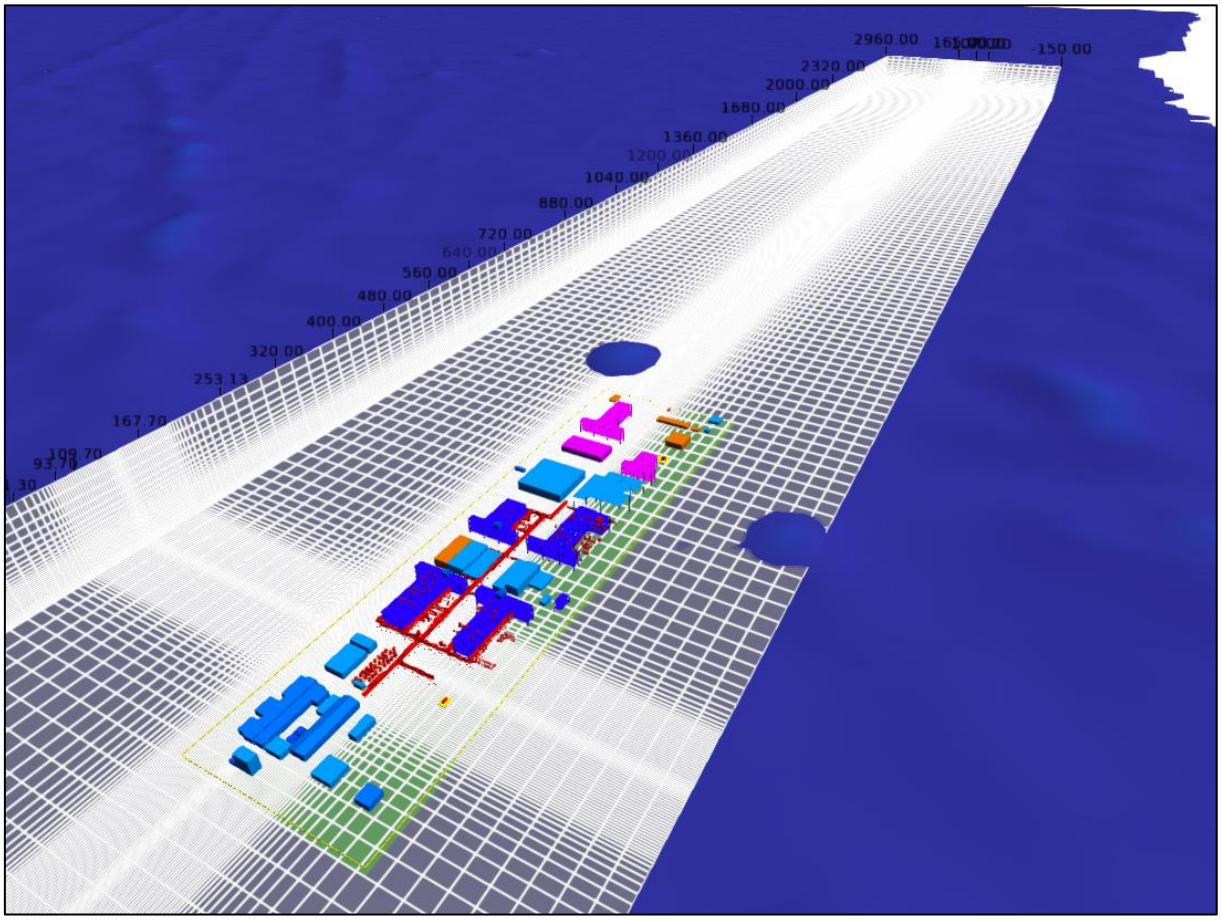

Figure 2-16: Numerical grid used* at effective wind condition (N to S direction)*in the entire domain to capture the wind flow around the buildings and the gas dispersion from leak in the domain of interest-Isometric view of full geometry

A representative grid for all the leak scenarios is shown in Figure 2-13 and Figure 2-14 to capture the toxic releases of Chlorine at prevailing wind direction from NE to SW.

Figure 2-15 and Figure 2-16 to capture the toxic releases of Chlorine at effective wind direction from N to S.

2 m grid cells were used within the plant facility. The grid is stretched by factor of 1.2 for overall domain outside the plant facility. The grid was refined by incorporating cell at each 0.25 m from 0 to 2 m distance in Z direction. This refinement for cells which are very close to ground provides an efficient grid size for leaks. The overall computational domain dimensions are 3100 m x 1200 m x 100 m (L x B X H).

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2.2 Wind Rose

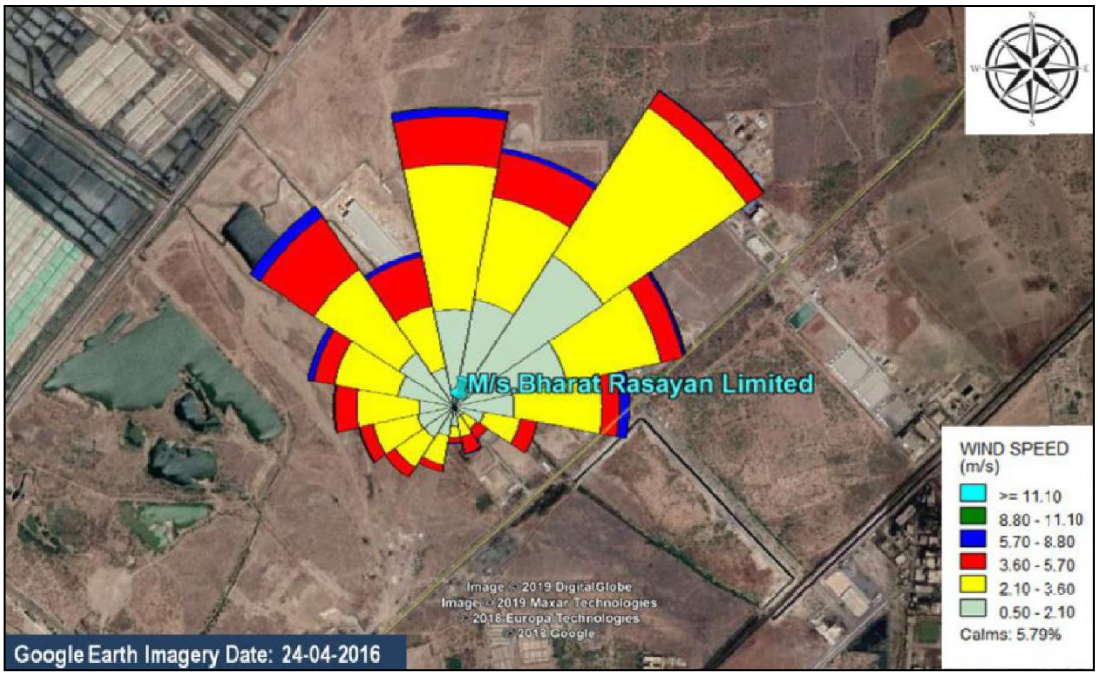

Figure 2-17: Wind rose – reference from Client's input

As shown in Figure 2-17, The wind rose is obtained for Dahej, Gujarat location. The annual probable average wind speed is **3 m/s** and wind direction at project site is from North-East to South-West as prevailing direction and wind speed **3.2 m/s** for North to South as effective wind direction. For all the dispersion scenarios defined in section 2.3, NE to SW and N to S directions are taken as probable wind directions. The Pasquill class F (Stable atmospheric condition) is used for this study.

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2.3 The velocity vector plot for facility

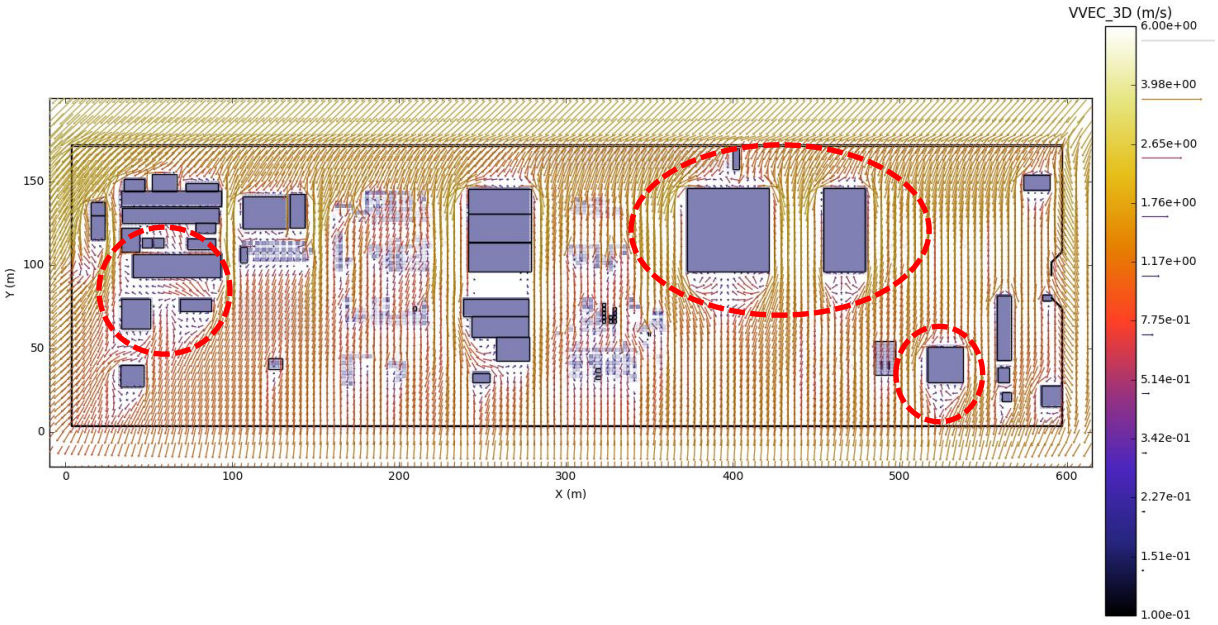

Figure 2-18: Velocity vector plot of prevailing wind direction (NE - SW) at 100 sec and wind speed 3 m/s.

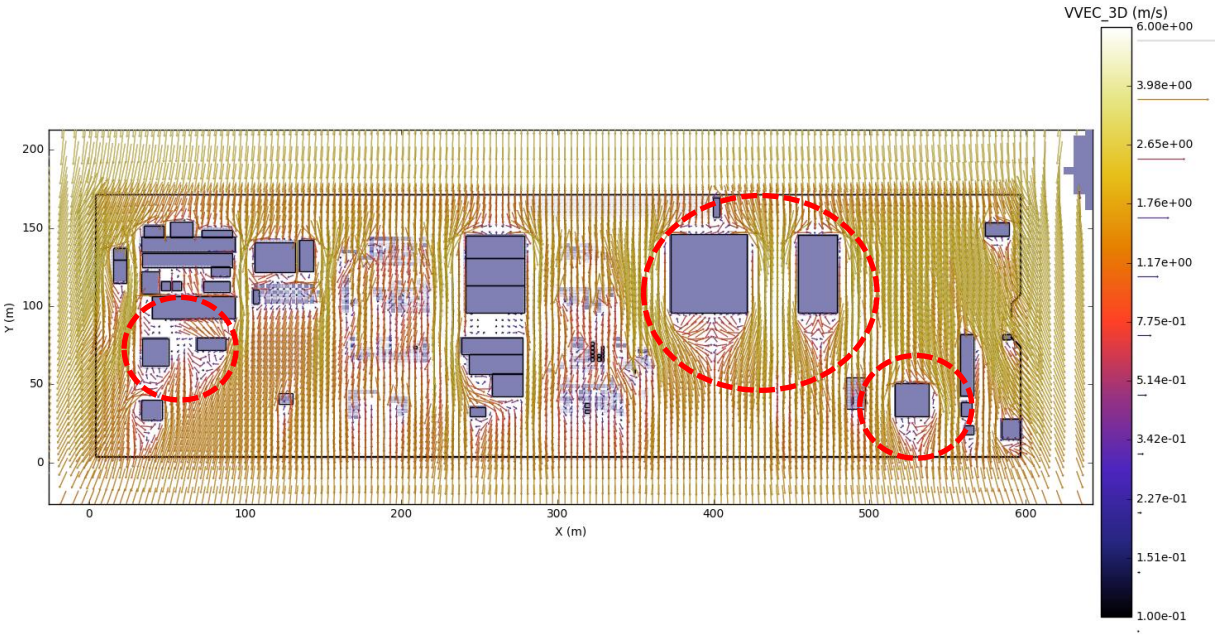

Figure 2-19: Velocity vector plot of effective wind direction (N - S) at 100 sec and wind speed 3.2 m/s.

At wind speeds 3 m/s for prevailing wind condition and 3.2 m/s for effective wind condition at 10 m above the ground, the mixing of air - gas mixture is largely dominated by the diffusion process and hence a large gas clouds were formed.

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For prevailing wind condition (NE – SW) and effective wind (N-S), the wake flow behind the Admin and canteen building, storage shed, Scrap yard, Proposed Plant-F, Proposed Herbicide RM / FG storage etc. The wind flow that further slows down the speed and results in less dilution of the toxic gas cloud as shown by dotted circle in Figure 2-18 & Figure 2-18.

2.4 Simulation scenarios

Five scenarios are considered for consequence analysis using CFD simulations.

1) Leakage of Chlorine gas from Chlorine tonners have been considered for 3D CFD modelling to predict the toxic dispersion of Chlorine within and around the plant boundary.

2) Leakage of Hydrogen gas from Hydrogen (Trolley) cylinder have been considered for 3D CFD modelling to predict the flammable dispersion of Hydrogen within and around the plant boundary.

3) Leakage of Isobutylene gas from Isobutylene (Horizontal above ground) tank have been considered for 3D CFD modelling to predict the flammable dispersion of Isobutylene within and around the plant boundary.

4) Leakage of Di-Methyl Amine gas from Di-Methyl Amine (Horizontal above ground) tank have been considered for 3D CFD modelling to predict the flammable dispersion of Di-Methyl Amine within and around the plant boundary.

5) Leakage of Hexane (Horizontal Underground Tank) inventory from Hexane Transfer Pipeline have been considered and due to external source of ignition 3D CFD modelling have been considered to predict the Pool Fire of Hexane within and around the plant boundary

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2.5 Case 1: Chlorine Dispersion Scenario Input

For Chlorine Dispersion scenario, following input data were considered and results are calculated based on inhouse **Flash Utility of FLACS software**.

Table 2-1: Modelling of Chlorine Dispersion in FLACS

Total Capacity per Tonner [Kg]	Leak Size [mm]	Mass flow rate [kg/s]	Pressure [kg/cm^2]	Temperature [°C]	Prevailing Wind Direction & Speed [m/s]	Effective Wind Direction & Speed [m/s]
900	16	19.33	5	Amb.	NE – SW 3	N – S 3.2

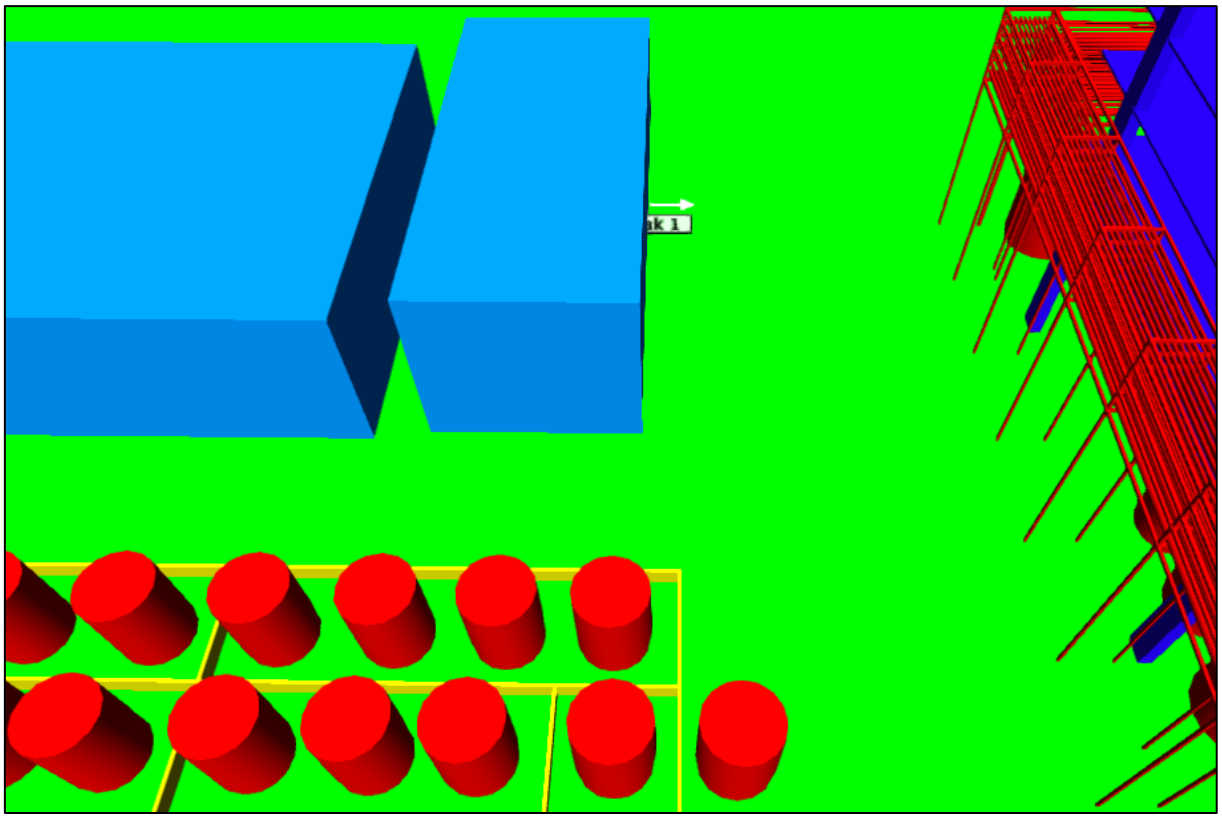

Figure 2-20: Leak Location for Chlorine at Chlorine Storage Area from tonner

2.6 Results from Chlorine Dispersion Simulations

Plot description

Simulated data are collected and presented in two types of plots, 2D cut plane plots and 3D volume plots. 2D cut plane plots show the variable value for every grid cell (in the selected 2D plane) at selected times and 3D volume plots show the boundaries of the concentration for the specified value.

2D cut plane plots have been used to illustrate the toxic and flammable gas concentration at various time instances on vertical and horizontal planes.

3D volume plots have been used to show the propagation of the concentrated cloud with wind at various time instances.

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The accidental leak scenario described in the section 2.4, was simulated. The accidental leak of Chlorine from Chlorine tonner was simulated. Simulations were performed to capture the dispersion of the toxic Chlorine, its mixing with air and dilution and then cloud movement based on prevailing wind condition which is NE to SW and effective wind condition which is N to S.

2.6.1 Chlorine Dispersion Case - Prevailing Wind Direction North-East to South-West

As the leak rate 19.33 kg/s, the tonner was emptied out in **46.5 sec** after the leak and leak started at **100 sec** of simulation time. Due to dilution and wash-off Chlorine gas with air, the discontinuation of gas started at **150 sec** as shown in Figure 2-21. The remaining concentrated gas cloud moves further and exit the facility at **810 sec** towards South-West side where the concentration was equal to the IDLH value of Chlorine, refer Figure 2-22 (10 ppm).

The term immediately dangerous to life or health (IDLH) is defined by the US National Institute for Occupational Safety and Health (NIOSH) as exposure to airborne contaminants that is "likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment.

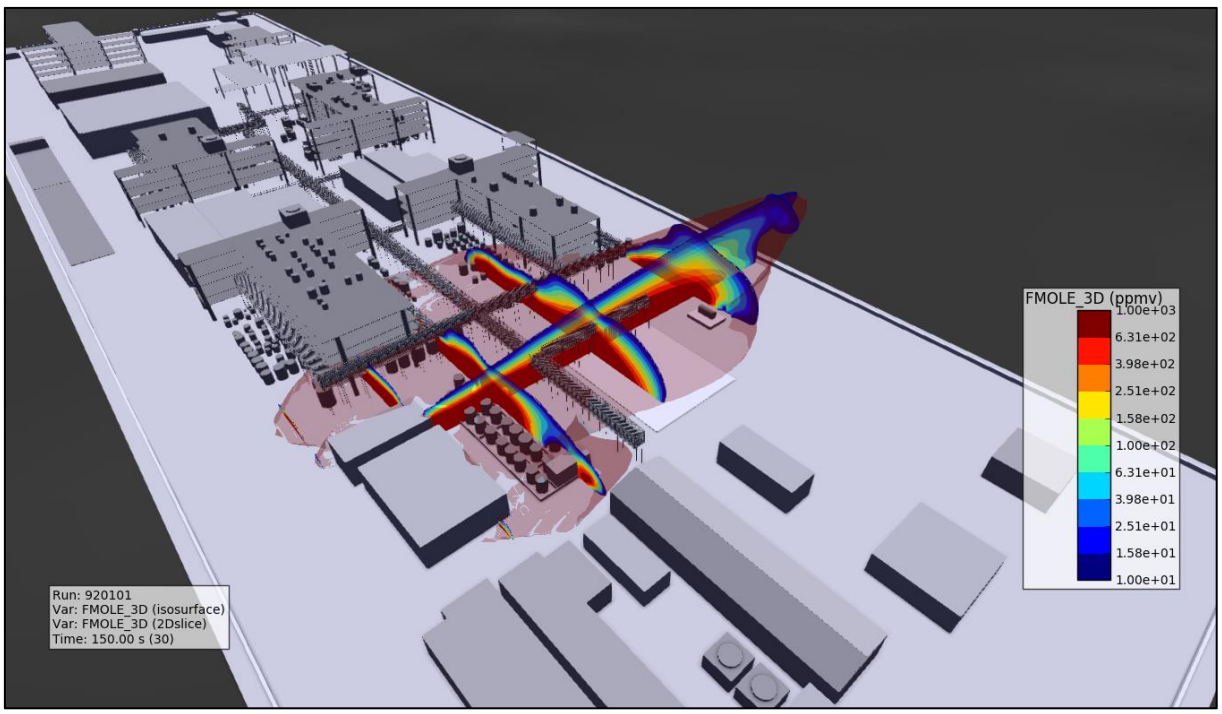

Figure 2-21: Chlorine cloud for IDLH 10 ppm exit the facility at 150 sec for wind direction from NE to SW, wind speed 3 m/s.

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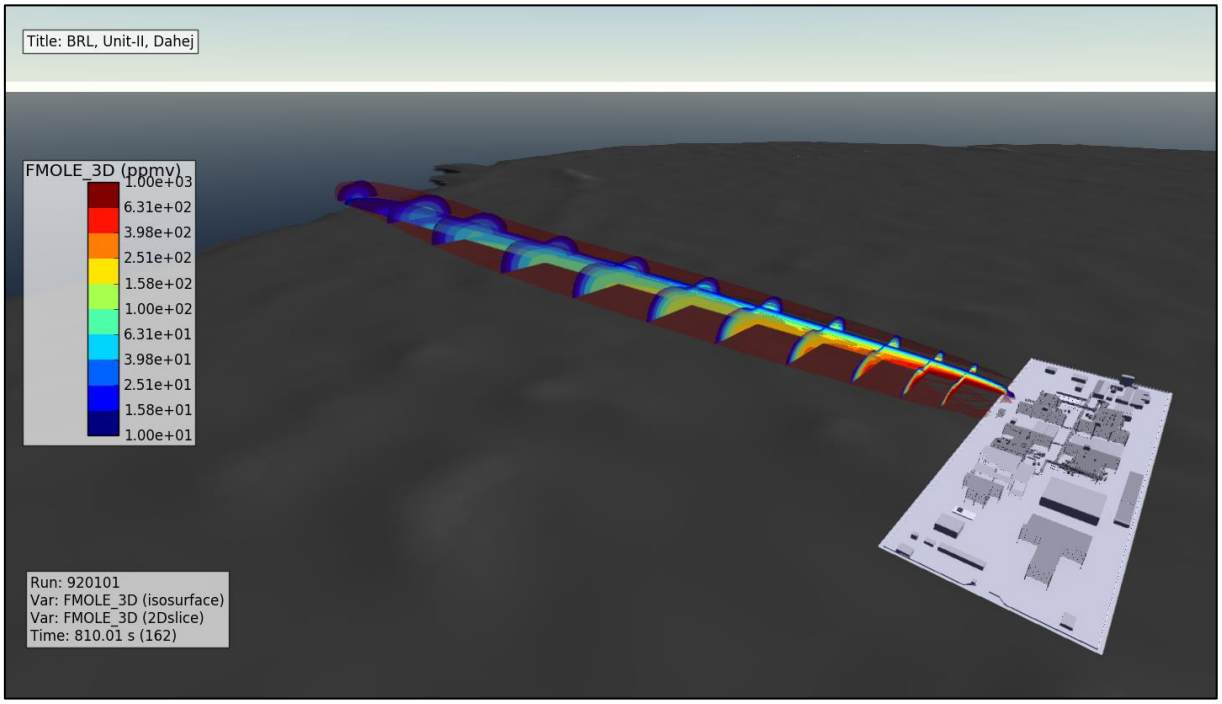

Figure 2-22: Chlorine cloud for IDLH 10 ppm at 810 sec for wind direction from NE to SW, wind speed 3 m/s.

As per shown in Figure 2-21 and Figure 2-22, the Engineering Area, Cl_2 Area, Non-Explosive Tank Farm, Underground Explosive Tank Farm, Plant A, Plant-B, DMA Tanks and most of the areas on SW side of the facilities are strongly affected by the gas cloud for this prevailing wind direction NE to SW.

2D Cut Plane of a Chlorine Dispersion

The 2D cut planes for Chlorine dispersion scenario are plotted on XY plane at Z= 1.05 m & XZ plane at Y= 114 m as shown in Figure 2-23 to Figure 2-25. The Chlorine gas with IDLH concentration congregated in the facility at **50 sec** after the leak towards prevailing wind SW direction as shown in Figure 2-23 and the remaining concentrated gas cloud moves further and exit the facility at **810 sec** reached up-to **3350 m** from the battery limit of facility to South-West direction refer Figure 2-24. As shown in Figure 2-25 IDLH concentration of gas is reached up-to height of **14 m** within the facility.

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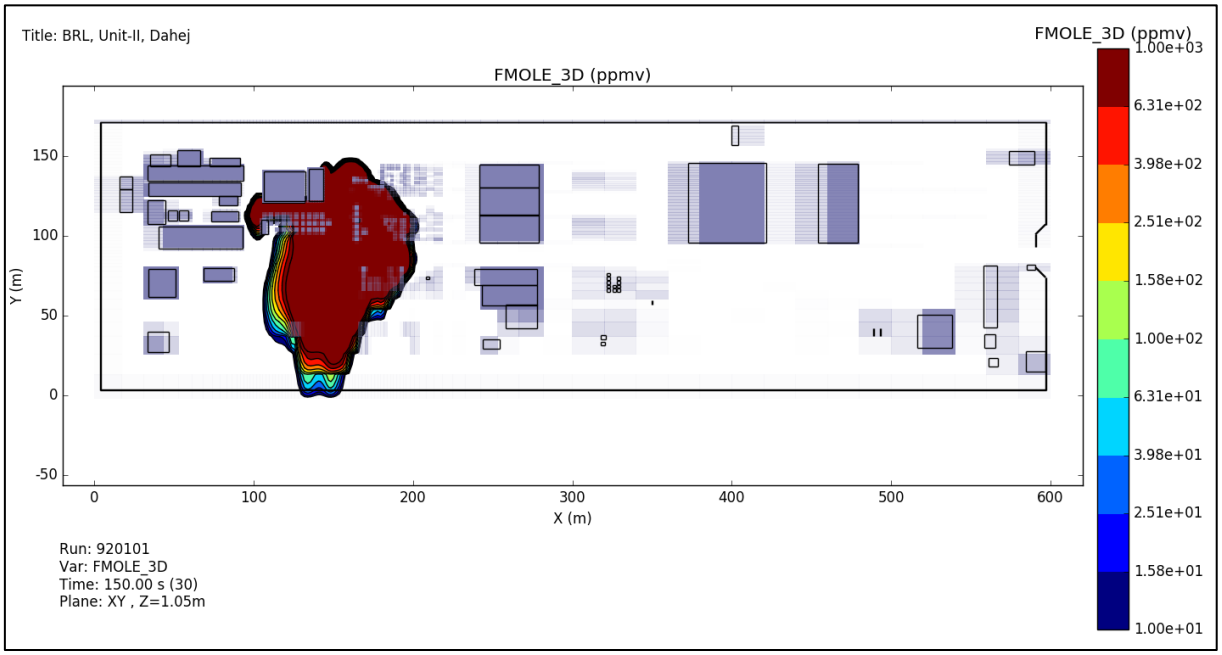

Figure 2-23: Chlorine cloud exit the facility at 150 sec wind speed 3 m/s, NE to SW direction.

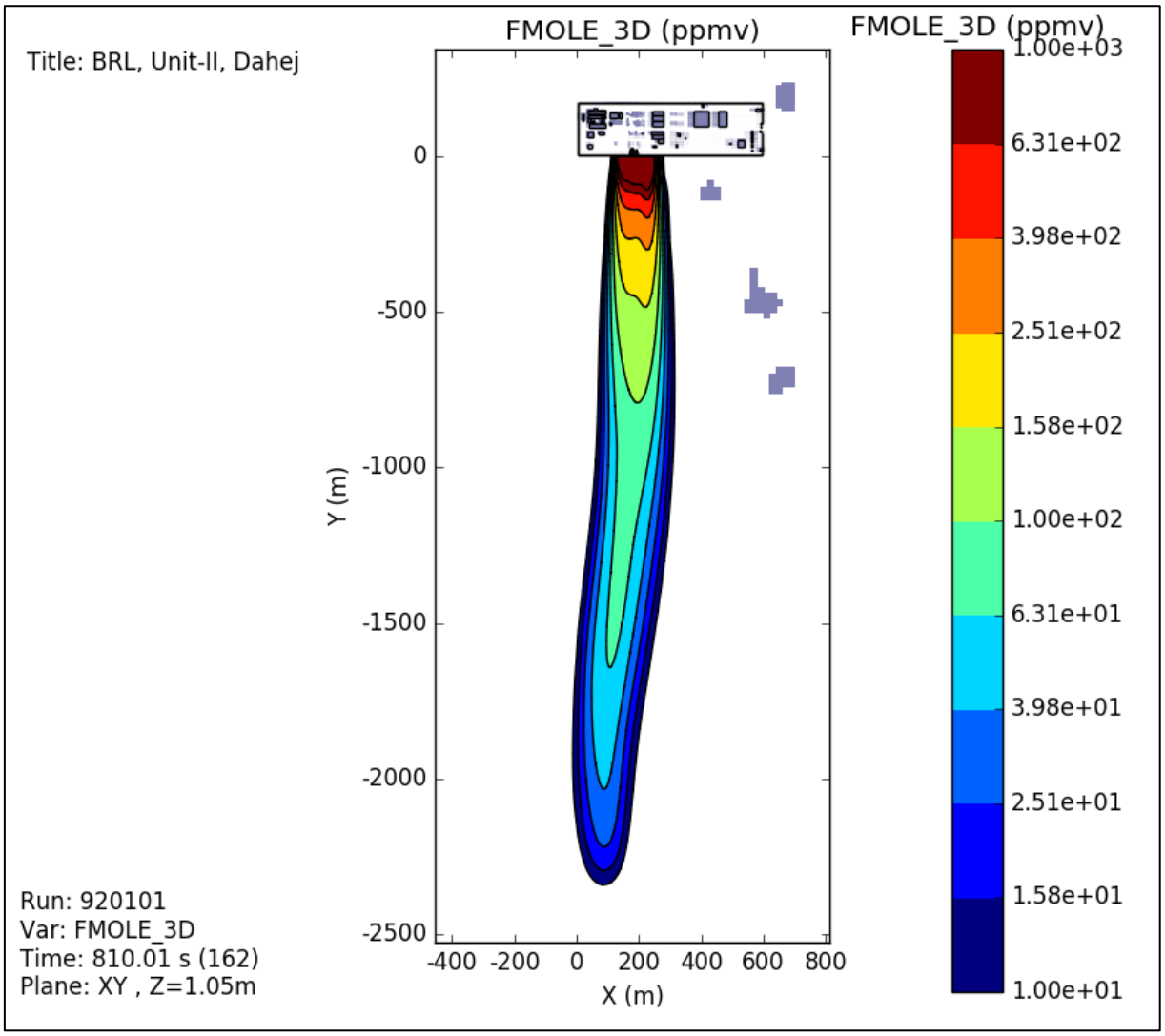

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Figure 2-24: Chlorine cloud for IDLH 10 ppm at 810 sec for wind direction from NE to SW, wind speed 3 m/s.

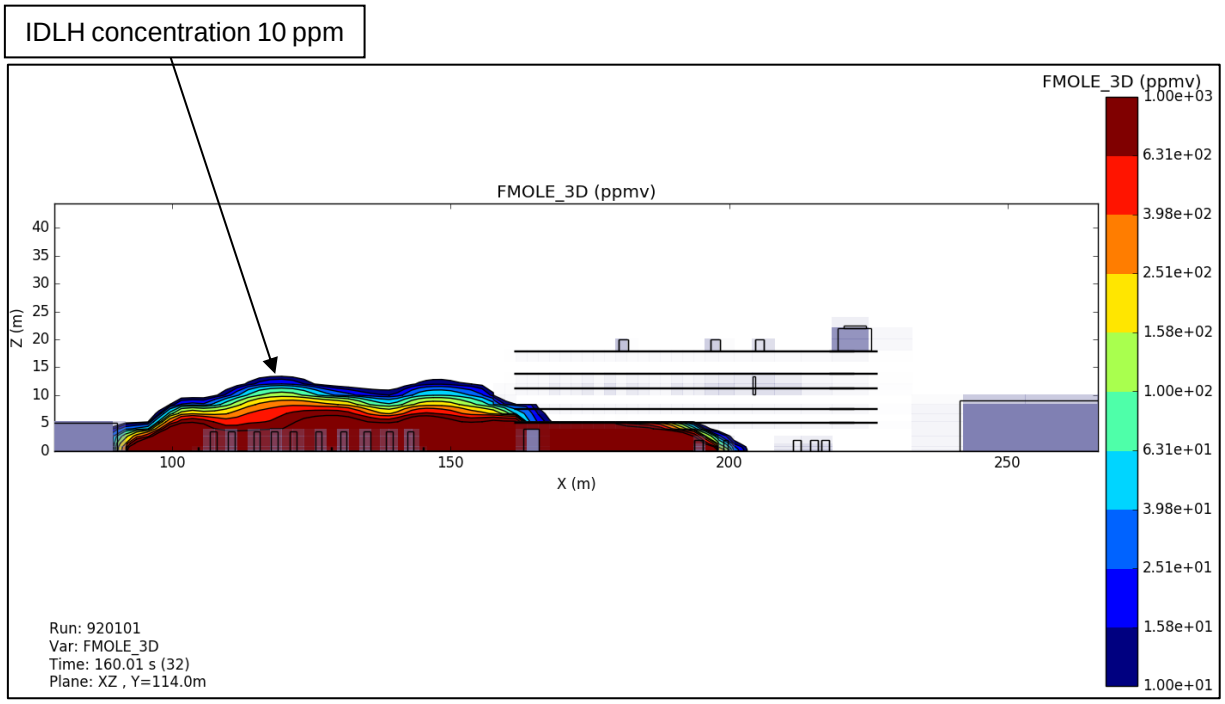

Figure 2-25: Chlorine cloud at 160 sec, wind speed 3 m/s in XZ plane at Y = 114 m

2.6.2 Chlorine Dispersion Case - Effective Wind Direction North to South

As the leak rate 19.33 kg/s, the tonner was emptied out in **46.5 sec** after the leak and leak started at **100 sec** of simulation time. The Chlorine gas cloud is spreads and exit the facility at **250 sec** from North to South direction as shown in Figure 2-26. Due to dilution and wash-off Chlorine gas with air, the discontinuation of gas started at **835 sec** (refer Figure 2-27) towards South side where the concentration was equal to the IDLH value of Chlorine (10 ppm).

The term immediately dangerous to life or health (IDLH) is defined by the US National Institute for Occupational Safety and Health (NIOSH) as exposure to airborne contaminants that is "likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment.

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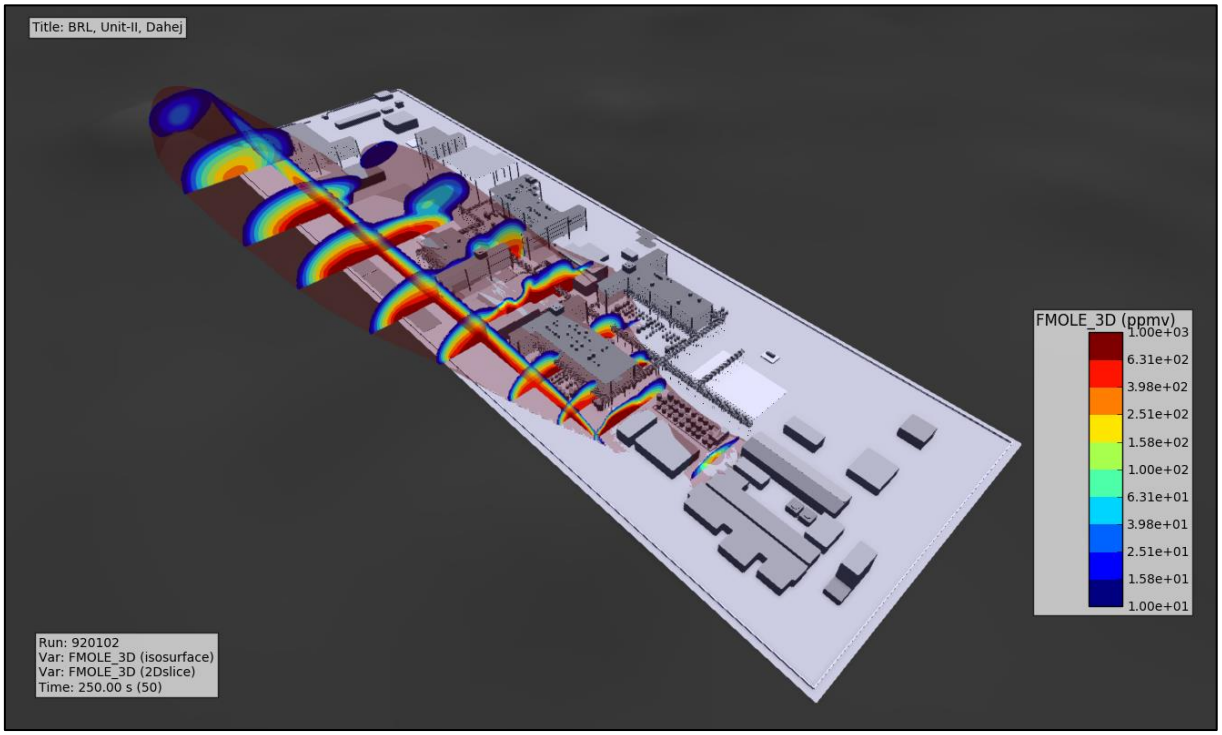

Figure 2-26: Strongly affected areas by Chlorine Gas cloud for IDLH 10 ppm at 250 sec for wind direction from N to S, wind speed 3.2 m/s.

Figure 2-27: Chlorine cloud for IDLH 10 ppm at 835 sec for wind direction from N to S, wind speed 3.2 m/s.

As per shown in Figure 2-26 and Figure 2-27, the Engineering Area, Cl_2 Area, Non-Explosive Tank Farm, Plant A-B-C-D-F, QC and R&D, Canteen, Utility Area, Utility Building, WIP Store, Existing and Proposed Insecticide & Herbicide RM/FG Store, Fire Water Tank, Sump, TOC Room, Security Office, OHC, Changing Room, Training Centre, Gate House and Main Gate and most of the areas on South side of the facilities are strongly affected by the gas cloud for this effective wind direction N to S.

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2D Cut Plane of a Chlorine Dispersion

The 2D cut planes for Chlorine dispersion scenario are plotted on XY plane at Z= 1.05 m & YZ plane at X= 710 m in Figure 2-28 to Figure 2-30, respectively. The Chlorine gas with IDLH concentration congregated in the facility towards effective wind South direction and the remaining concentrated gas cloud moves further and exit the facility at **250 sec** reached up-to **575 m** from the battery limit of facility refer Figure 2-28. The discontinuation of Chlorine gas cloud is reached up-to **2600 m** from the battery limit of facility at **835 sec** towards South direction refer Figure 2-29. As shown in Figure 2-30 IDLH concentration (10 ppm marked in blue colour) of gas is reached up-to height of **48 m** within the facility.

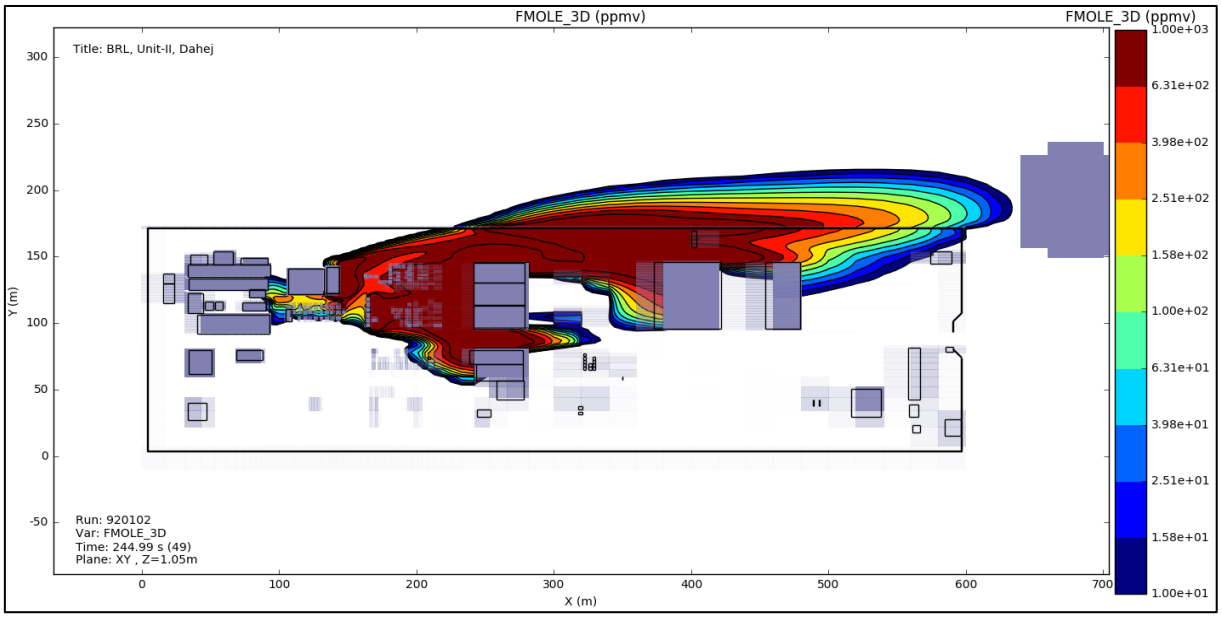

Figure 2-28: Chlorine cloud exit the facility at 250 sec wind speed 3.2 m/s, N to S direction.

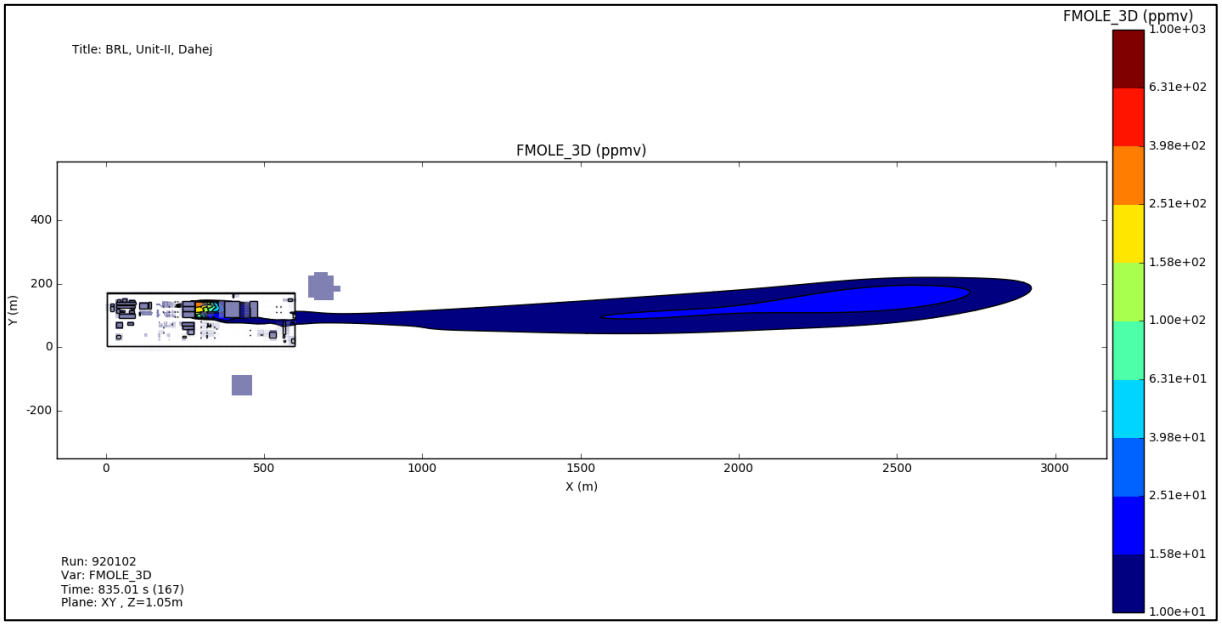

Figure 2-29: Chlorine cloud for IDLH 10 ppm at 835 sec for wind direction from N to S, wind speed 3.2 m/s.

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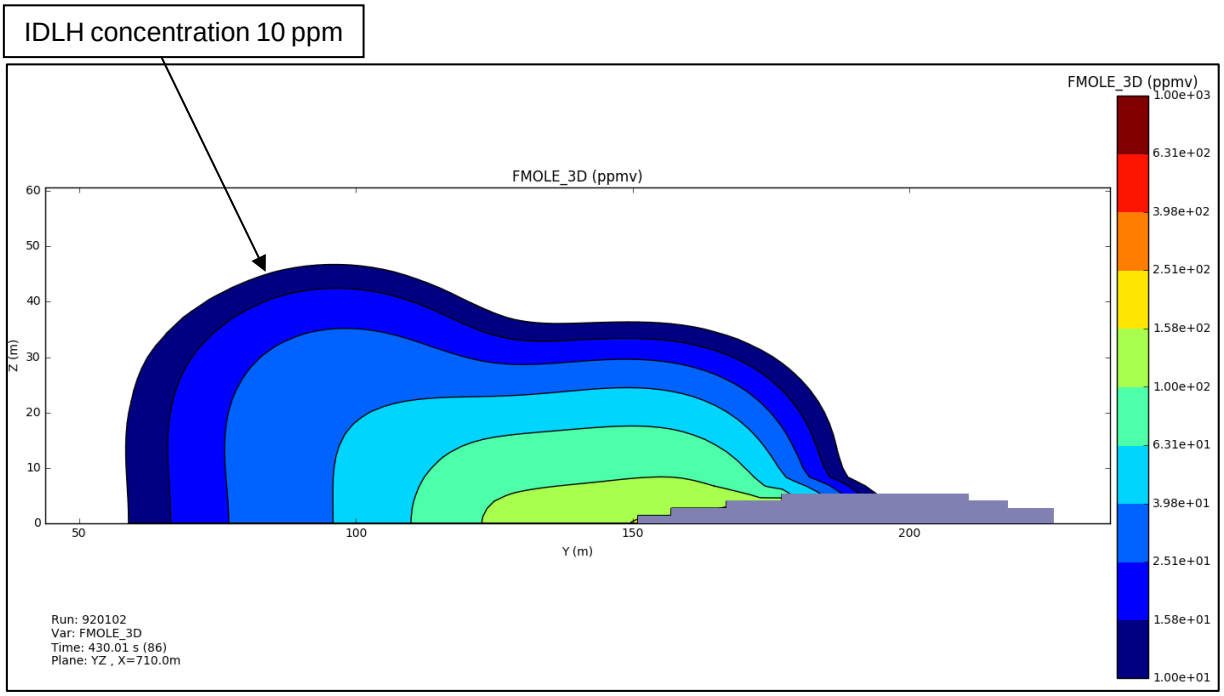

Figure 2-30: Chlorine cloud at 430 sec, wind speed 3.2 m/s in YZ plane at X = 710 m

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2.7 Case 2: Hydrogen Dispersion Scenario Input

For Hydrogen Dispersion scenario, following input data were considered and results are calculated based on inhouse **Jet Utility of FLACS software**.

Table 2-2: Modelling of Hydrogen Dispersion in FLACS

Total Capacity per Cylinder [Kg]	Leak Size [mm]	Mass flow rate [kg/s]	Pressure [bar]	Temperature [°C]	Prevailing Wind Direction & Speed [m/s]	Effective Wind Direction & Speed [m/s]
20	10	0.62	150	Amb.	NE – SW 3	N – S 3.2

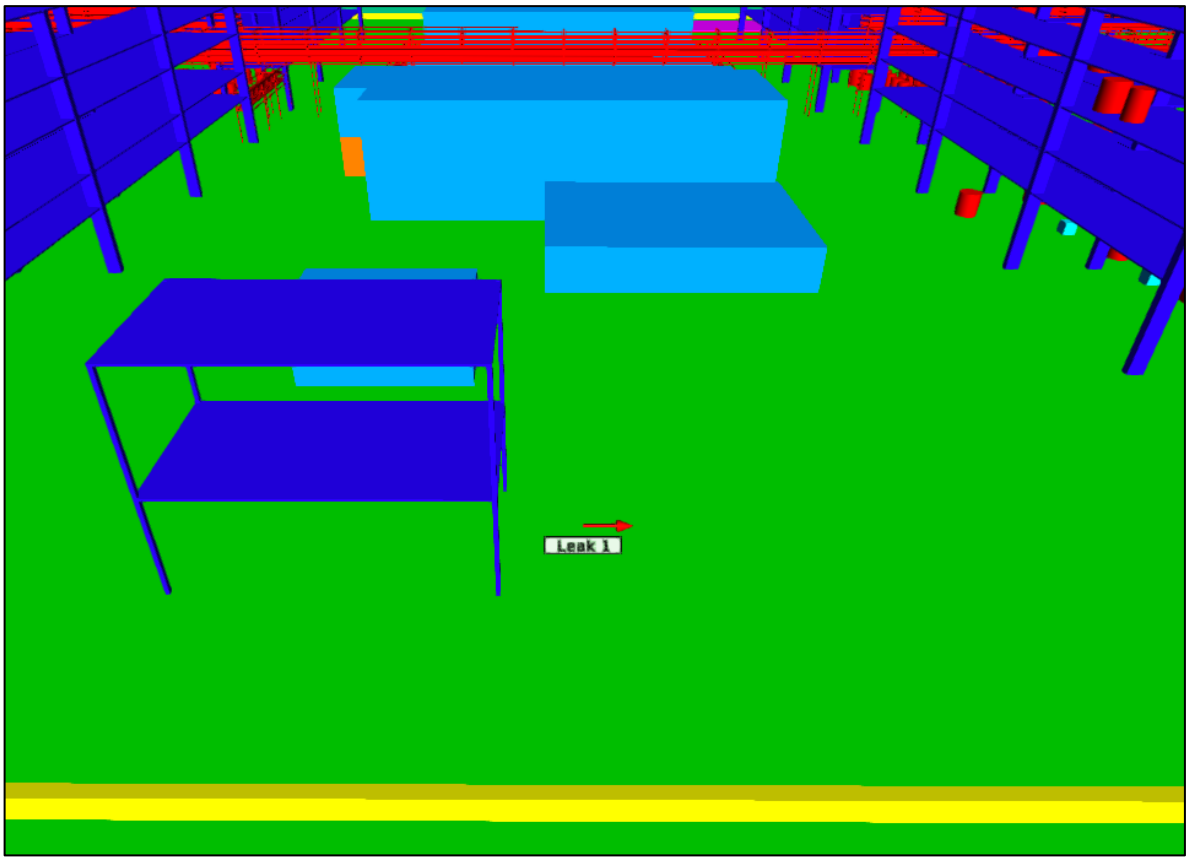

Figure 2-31: Leak Location for Hydrogen at Hydrogenation Plant Area from cylinder

2.8 Results from Hydrogen Dispersion Simulations

Plot description

Simulated data are collected and presented in two types of plots, 2D cut plane plots and 3D volume plots. 2D cut plane plots show the variable value for every grid cell (in the selected 2D plane) at selected times and 3D volume plots show the boundaries of the concentration for the specified value.

2D cut plane plots have been used to illustrate the toxic and flammable gas concentration at various time instances on vertical and horizontal planes.

3D volume plots have been used to show the propagation of the concentrated cloud with wind at various time instances.

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The accidental leak scenario described in the section 2.4, was simulated. The accidental leak of Hydrogen from Hydrogen Cylinder was simulated. Simulations were performed to capture the dispersion of the flammable Hydrogen, its mixing with air and dilution and then cloud movement based on prevailing wind condition which is NE to SW and effective wind condition which is N to S.

2.8.1 Hydrogen Dispersion Case - Prevailing Wind Direction North-East to South-West

The resulting cloud was simulated for **600 sec** after the leak. The leak started at **100 sec** of simulation time. The Hydrogen cloud is stabilized at **180 sec** after the leak is started for the flammable gas concentrations (10% LFL) as shown in Figure 2-32. The concentrations were scaled between 0.4 – 4 vol % which is 10 to 100% LFL of Hydrogen [2]. The maximum distance covered by cloud is **80 m** and height is up-to **18 m** at **280 sec** as shown in Figure 2-33 and Figure 2-34. In below Figure 2-34 the Blue colour represent the 10% flammable concentration contour. The flammable gas cloud spread nearby area towards the South-West direction.

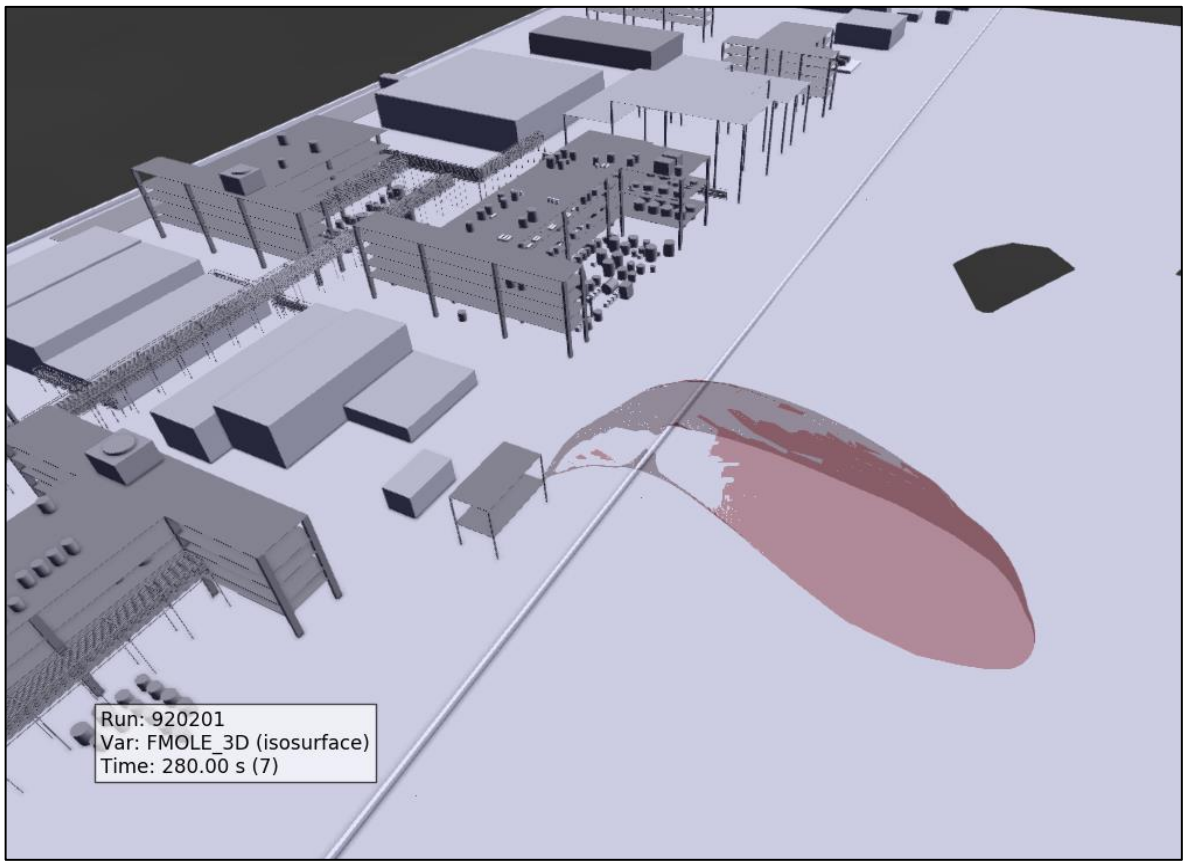

Figure 2-32: Hydrogen gas cloud at 280 sec, wind speed 3 m/s, NE to SW direction.

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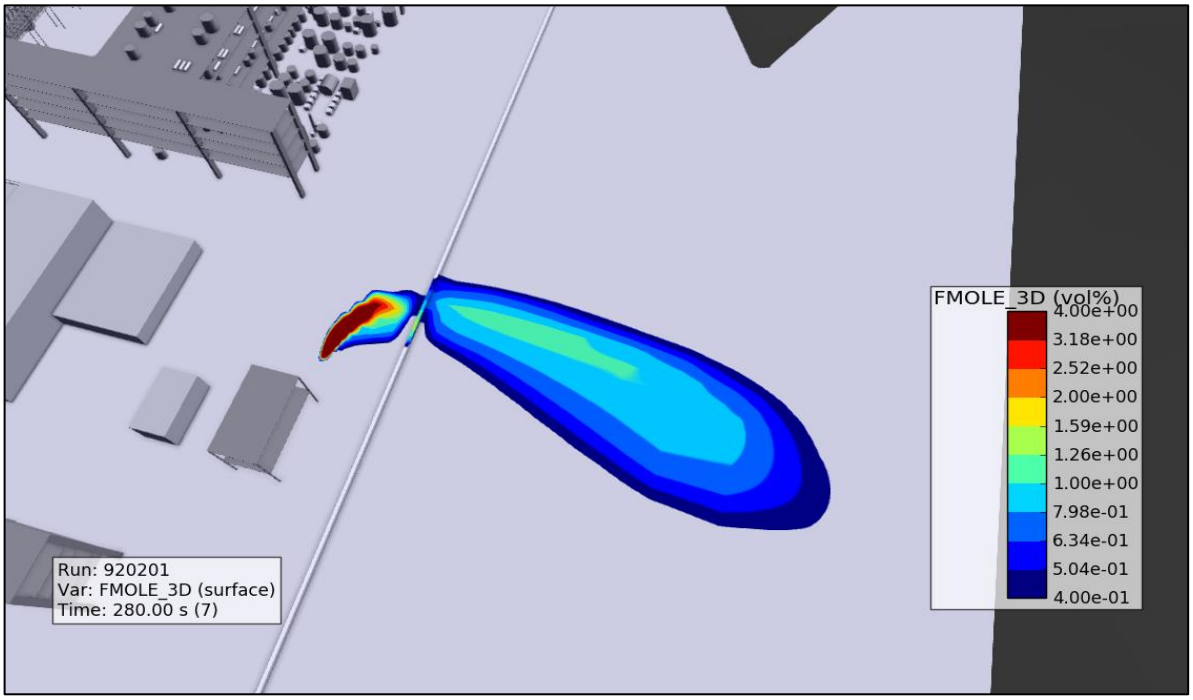

Figure 2-33: Hydrogen 10% to 100% LFL gas cloud at 280 sec, wind speed 3 m/s, NE to SW direction.

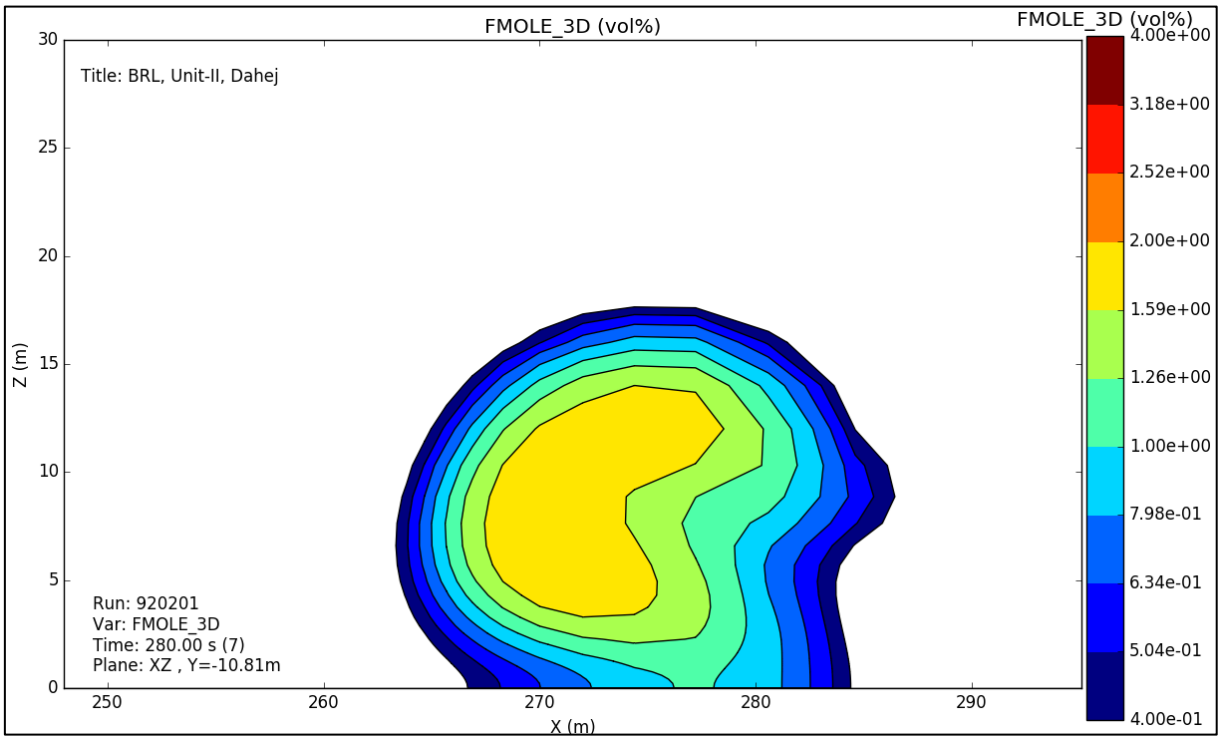

Figure 2-34: Hydrogen flammable gas cloud concentration at 280 sec for wind speed 3 m/s in XZ plane at Y= 10.81 m.

2.8.2 Hydrogen Dispersion Case - Effective Wind Direction North to South

The resulting cloud was simulated for **600 sec** after the leak. The leak started at **100 sec** of simulation time. The Hydrogen gas cloud is stabilized at **75 sec** after the leak is started for the flammable gas

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concentrations (10% LFL) as shown in Figure 2-35. The concentrations were scaled between 0.4 – 4 vol % which is 10 to 100% LFL of Hydrogen [2]. The maximum distance covered by cloud is **320 m** and height is up-to **11 m** at **175 sec** as shown in Figure 2-36 and Figure 2-37. In below Figure 2-37 the Blue colour represent the 10% flammable concentration contour. The flammable gas cloud spread nearby area towards the South direction.

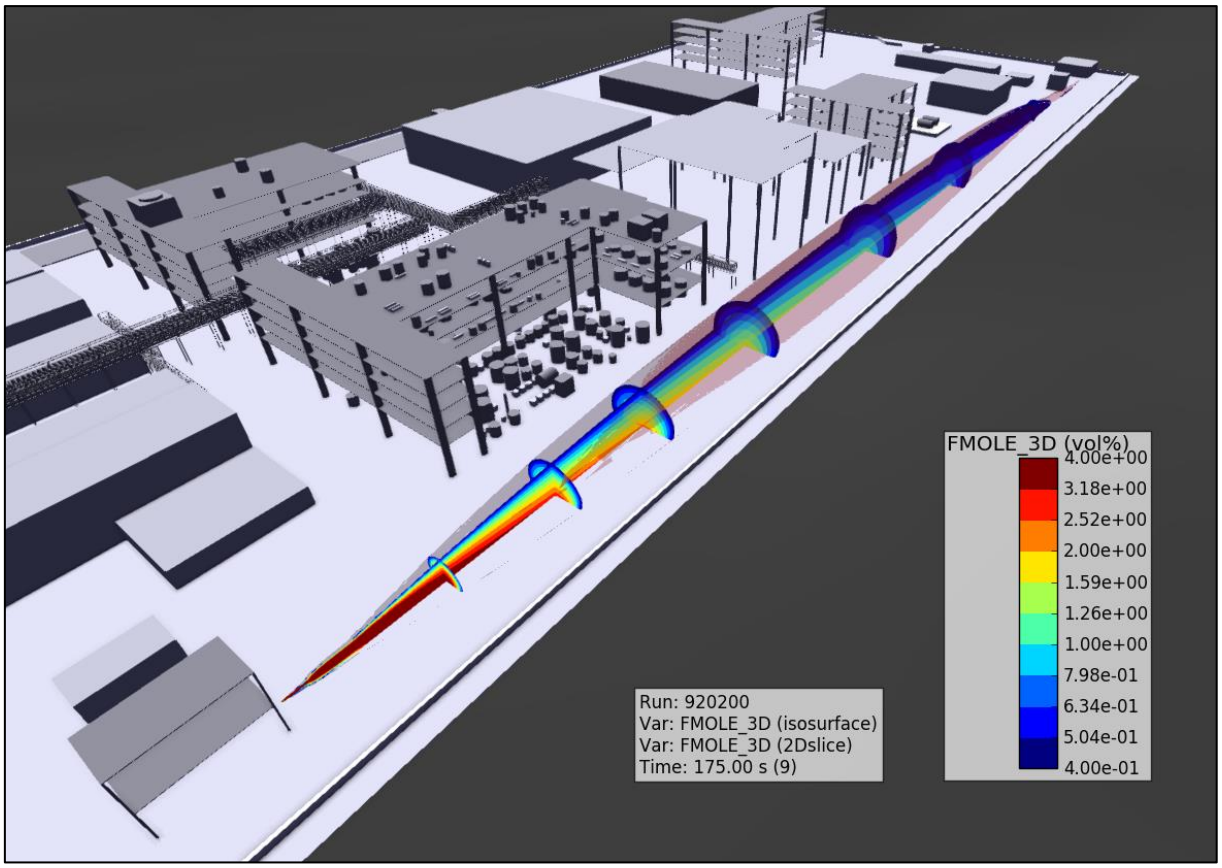

Figure 2-35: Hydrogen 10% LFL gas cloud at 175 sec, wind speed 3.2 m/s, N to S direction.

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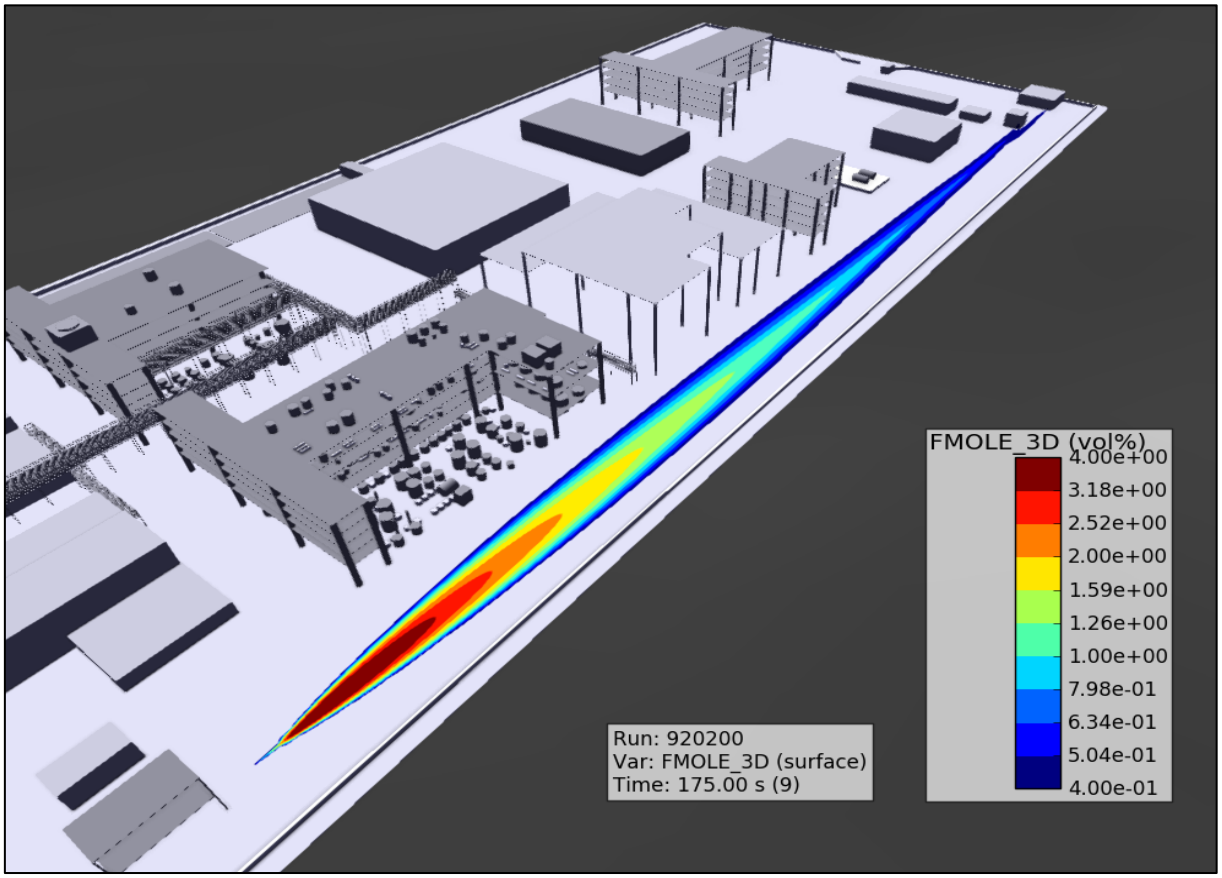

Figure 2-36: Hydrogen 10% to 100% LFL gas cloud at 175 sec, wind speed 3.2 m/s, N to S direction.

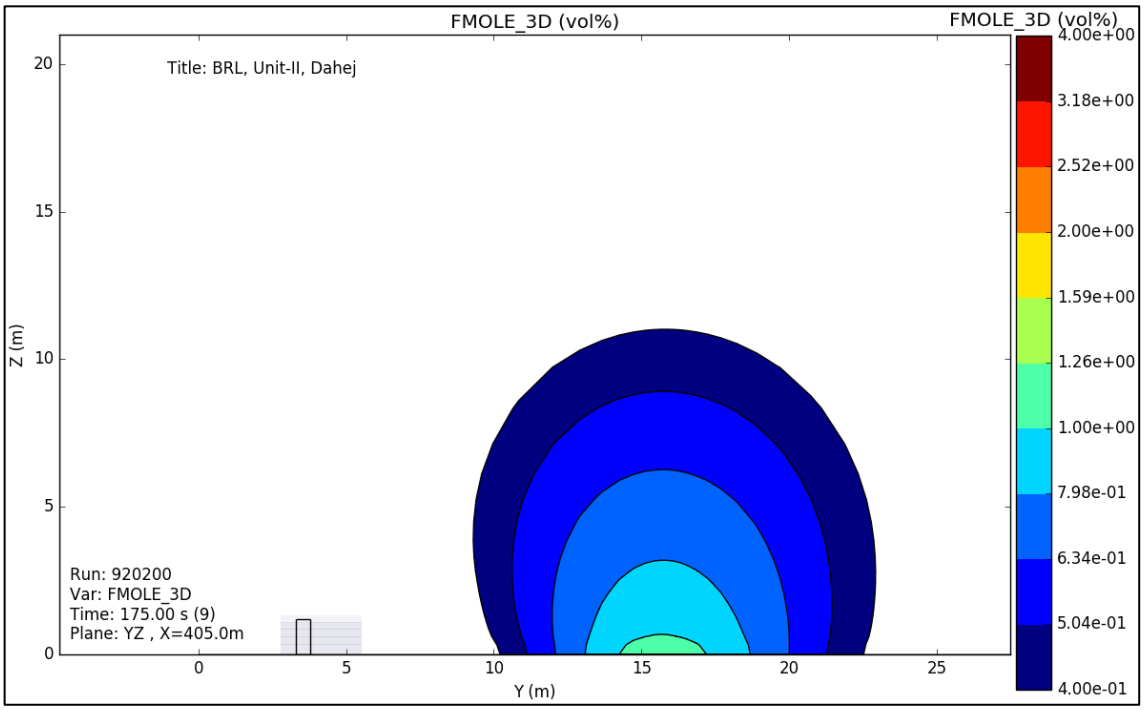

Figure 2-37: Hydrogen flammable gas cloud concentration at 175 sec for wind speed 3.2 m/s in YZ plane at X= 405 m.

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2.9 Case 3: Isobutylene Dispersion Scenario Input

For Isobutylene Dispersion scenario, following input data were considered and results are calculated based on inhouse **TNOs EFFECTS software**.

Table 2-3: Modelling of Isobutylene Dispersion in FLACS

Total Capacity [KL]	Leak Size [mm]	Mass flow rate [kg/s]	Pressure [kg/cm^2]	Temperature [°C]	Prevailing Wind Direction & Speed [m/s]	Effective Wind Direction & Speed [m/s]
19.9	50	0.5	1.8	Amb.	NE – SW 3	N – S 3.2

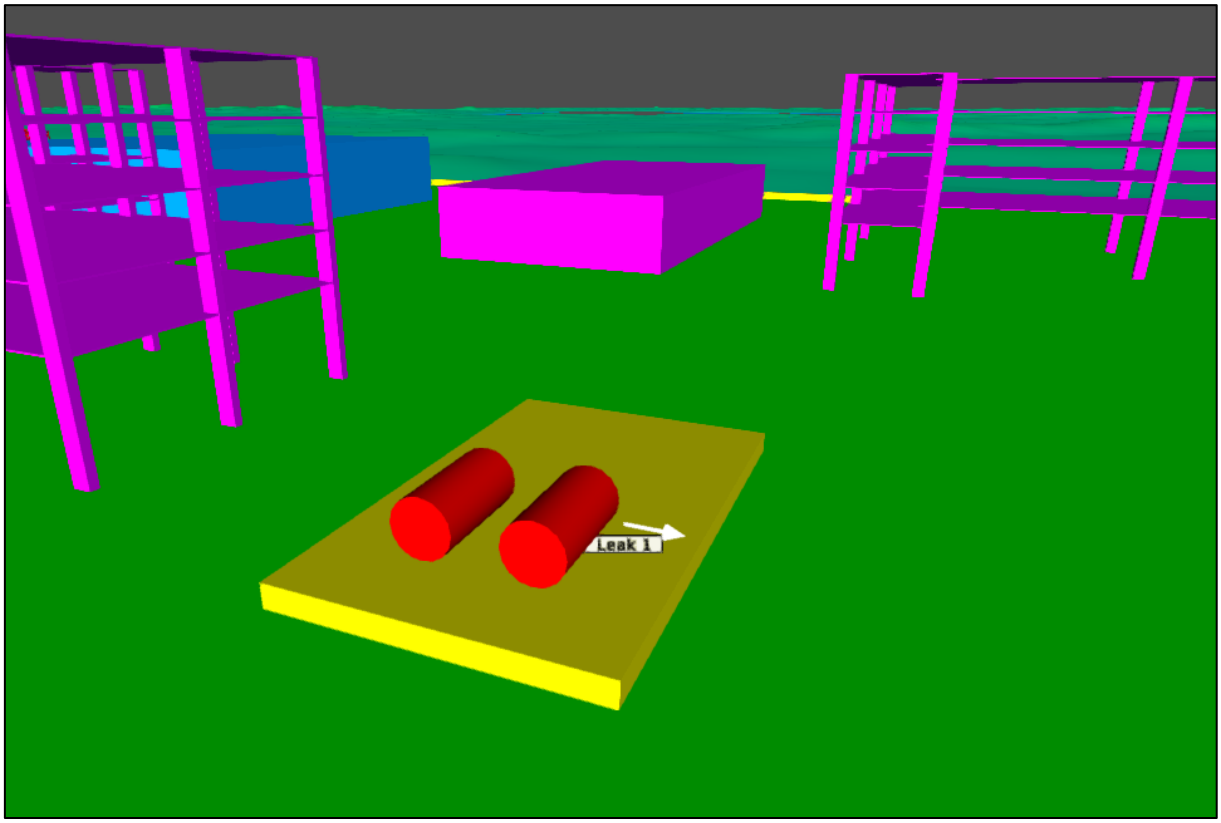

Figure 2-38: Leak location for Isobutylene dispersion at storage tank leak

2.10 Results from Isobutylene Gas Dispersion

Plot description

Simulated data are collected and presented in two types of plots, 2D cut plane plots and 3D volume plots. 2D cut plane plots show the variable value for every grid cell (in the selected 2D plane) at selected times and 3D volume plots show the boundaries of the concentration for the specified value.

2D cut plane plots have been used to illustrate the toxic and flammable gas concentration at various time instances on vertical and horizontal planes.

3D volume plots have been used to show the propagation of the concentrated cloud with wind at various time instances.

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The accidental leak from tank of Isobutylene inventory was consider for the simulations. Simulations were performed to capture the Isobutylene gas dispersion, its mixing with air and further dilution for the prevailing wind condition which is NE to SW and effective wind condition which is N to S.

2.10.1 Isobutylene Dispersion Case - at Prevailing Wind Direction North-East to South-West

As the release rate is relatively less hence the flammable gas cloud spread near to Admin building towards SW direction. The Isobutylene gas cloud is stabilized at **160 sec** with lesser gas concentrations as shown in Figure 2-39. The flammable concentrations were scaled between 0.18 – 1.8 volume % which 10% - 100% of LFL value respectively [2], refer Figure 2-40.

The maximum flammable cloud length is **50 m** and height **5 m** as shown in Figure 2-40 and Figure 2-41 at **160 sec** from prevailing wind condition which is from NE to SW. In below Figure 2-41 shows the Blue colour which represent the 10% of LFL concentration contour.

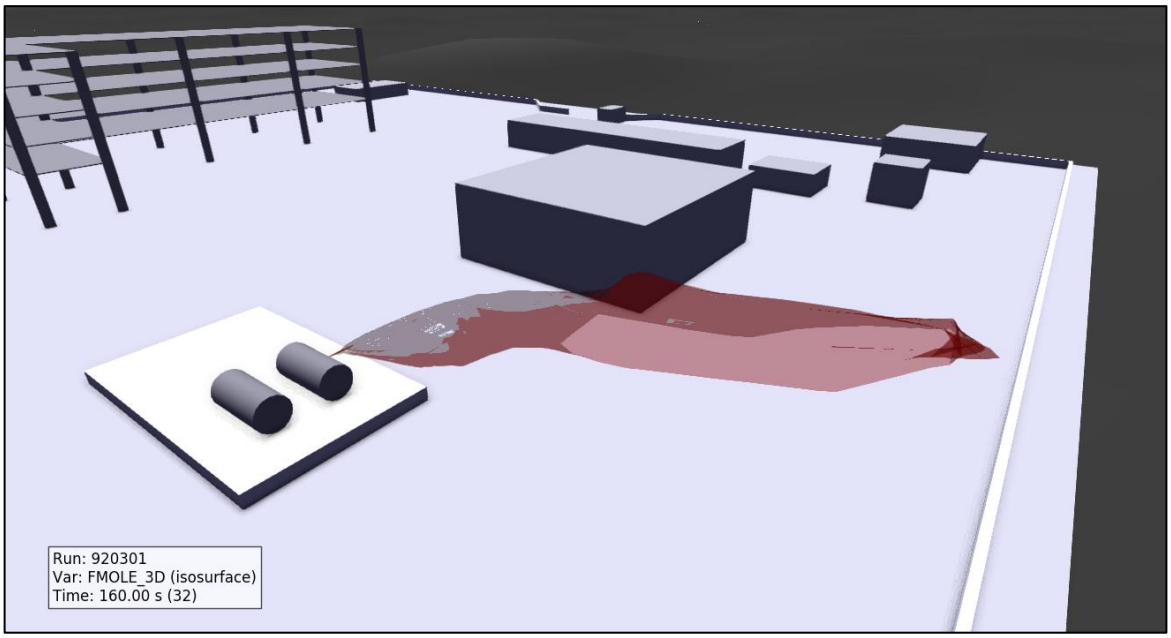

Figure 2-39: Isobutylene flammable concentration at 160 sec at wind speed 3 m/s towards SW direction.

2.10.2 Isobutylene Dispersion Case- Effective Wind Direction North to South

As the release rate is relatively less hence the flammable gas clouds spread near to Admin building towards South direction. The Isobutylene gas cloud is stabilized at **250 sec** with lesser gas concentrations as shown in Figure 2-42. The flammable concentrations were scaled between 0.18 – 1.8 volume % which 10% - 100% of LFL value respectively [2], refer Figure 2-43.

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The maximum flammable cloud length is **23 m** and height **6.5 m** as shown in Figure 2-43 and Figure 2-44 at **250 sec** from effective wind condition which is from N to S. In below Figure 2-44 shows the Blue colour represent the 10% of LFL concentration contour.

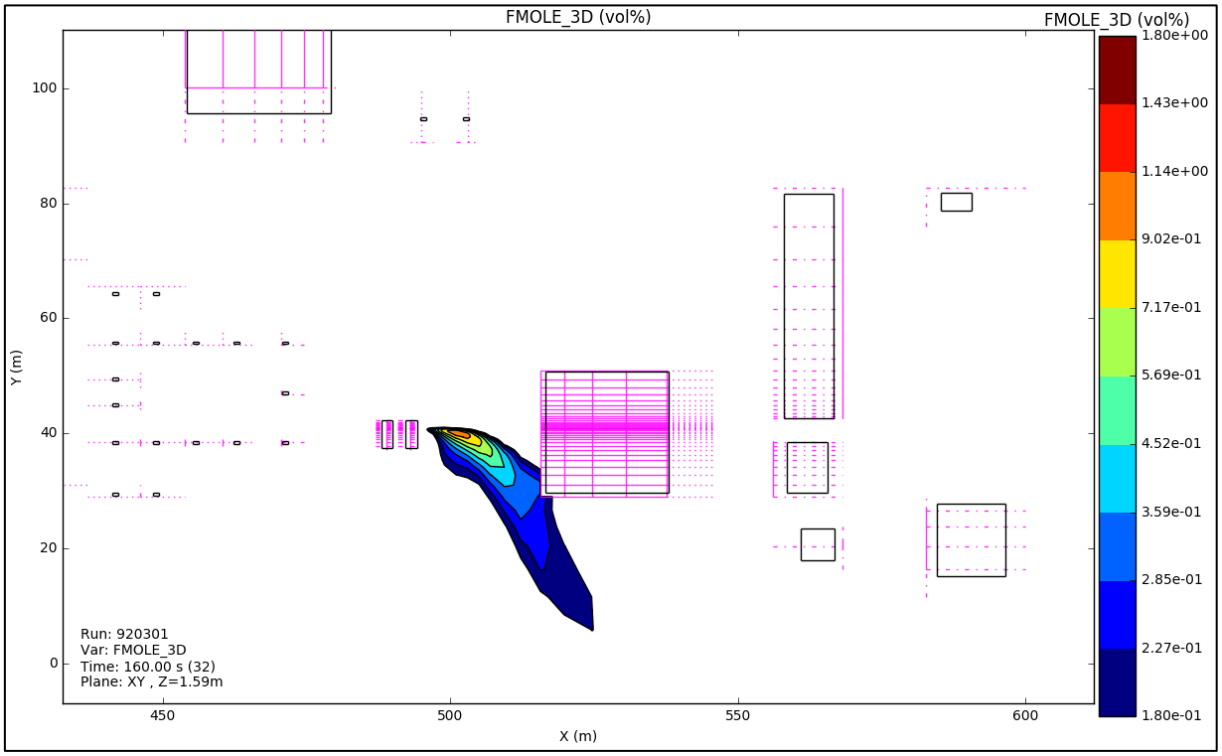

Figure 2-40: Isobutylene flammable concentration of 10-100% LFL at 160 sec at wind speed 3 m/s towards SW direction.

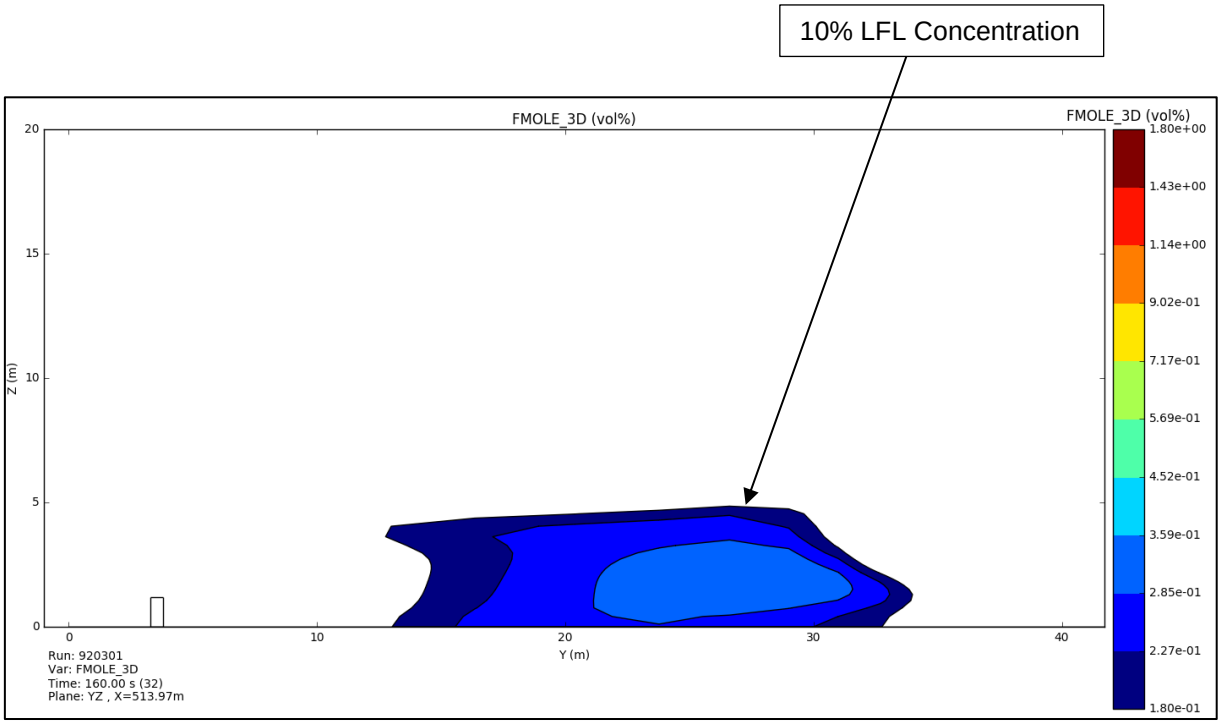

Figure 2-41: Sectional view YZ of Isobutylene gas at 160 sec with wind speed 3 m/s, NE to SW direction, Y= 513.97 m

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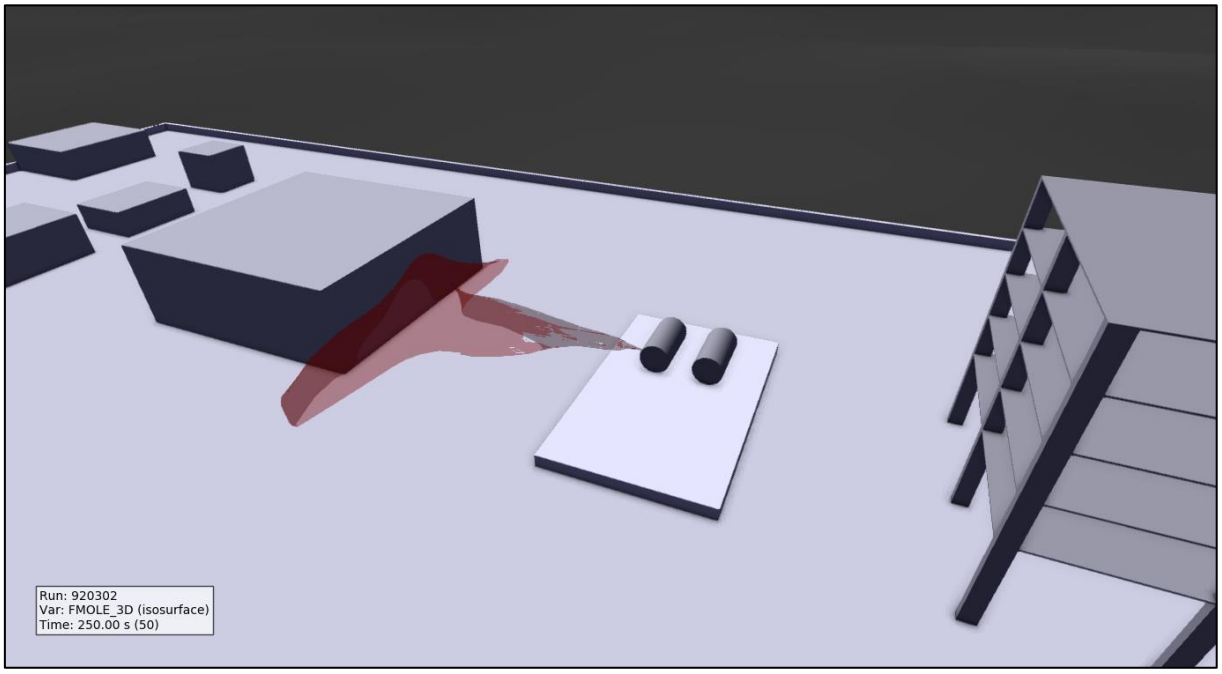

Figure 2-42: Isobutylene flammable concentration at 250 sec at wind speed 3.2 m/s towards South direction.

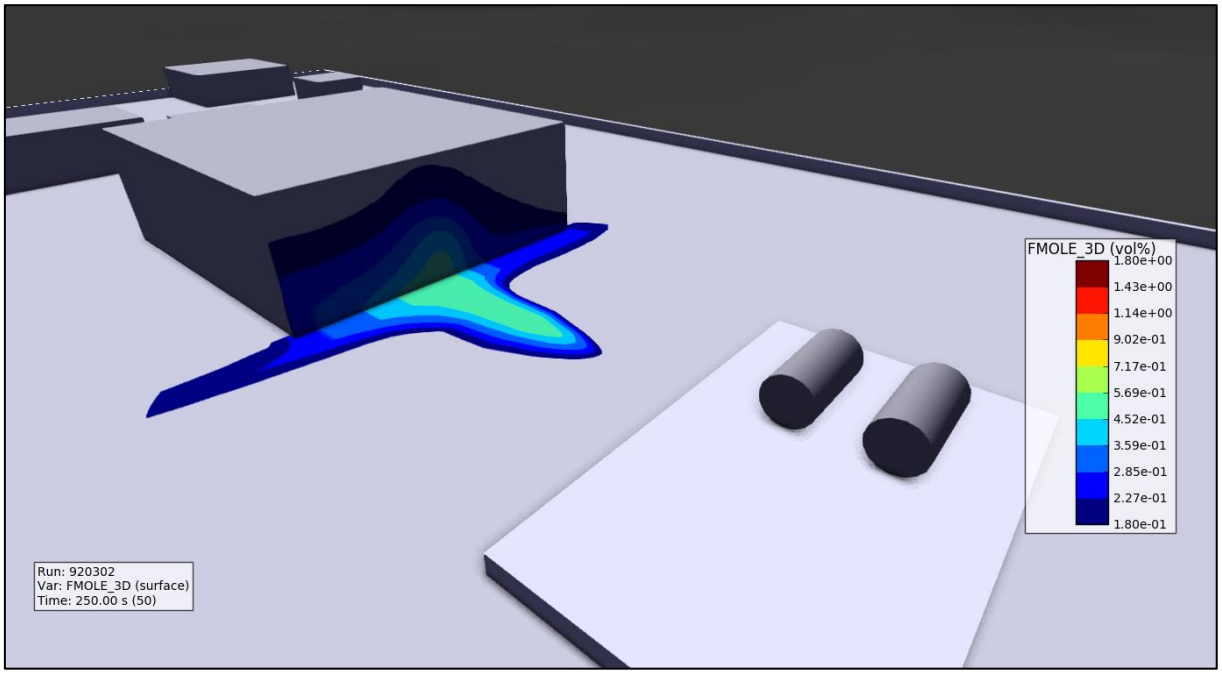

Figure 2-43: Isobutylene flammable concentration of 10-100% LFL at 250 sec at wind speed 3.2 m/s towards South direction.

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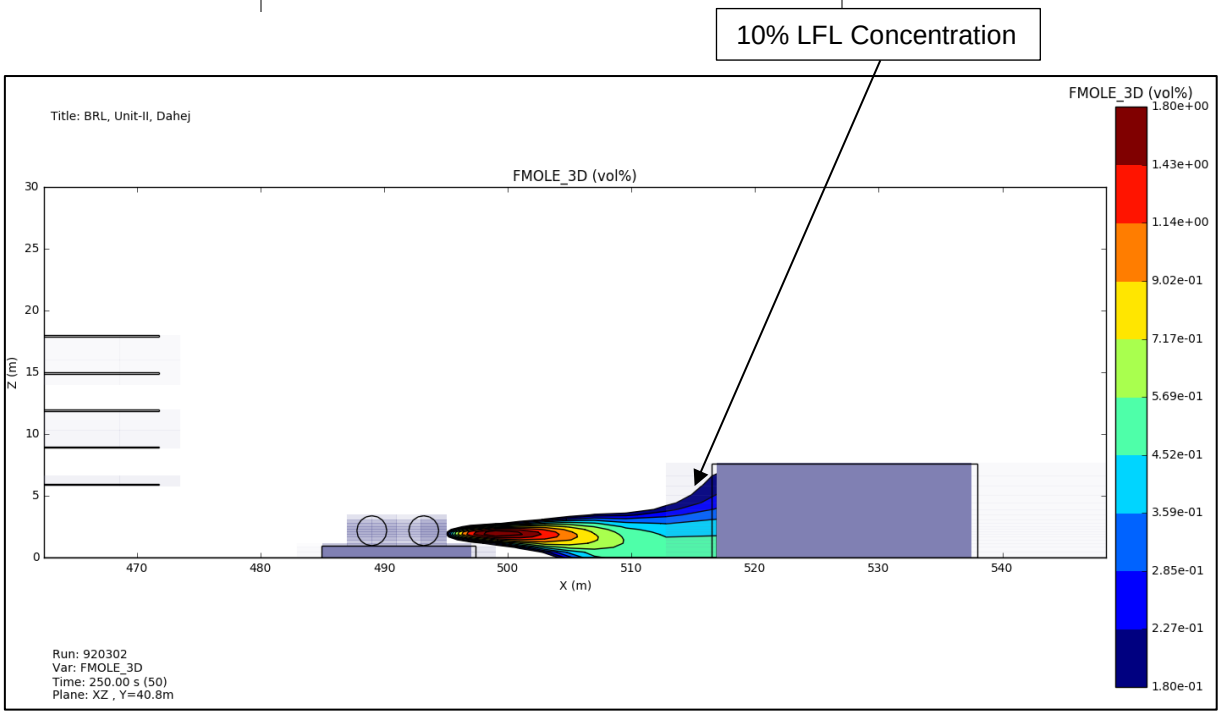

Figure 2-44: Sectional view XZ of Isobutylene gas at 250 sec with wind speed 3.2 m/s, N to S direction, Y= 40.8 m.

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2.11 Case 4: Di-Methyl Amine Dispersion Scenario Input

For Di-Methyl Amine Dispersion scenario, following input data were considered and results are calculated based on inhouse **TNOs EFFECTS software**.

Table 2-4: Modelling of Di-Methyl Amine Dispersion in FLACS

Total Capacity [KL]	Leak Size [mm]	Mass flow rate [kg/s]	Pressure [kg/cm^2]	Temperature [°C]	Prevailing Wind Direction & Speed [m/s]	Effective Wind Direction & Speed [m/s]
30	50	6.183	3.5	Amb.	NE – SW 3	N – S 3.2

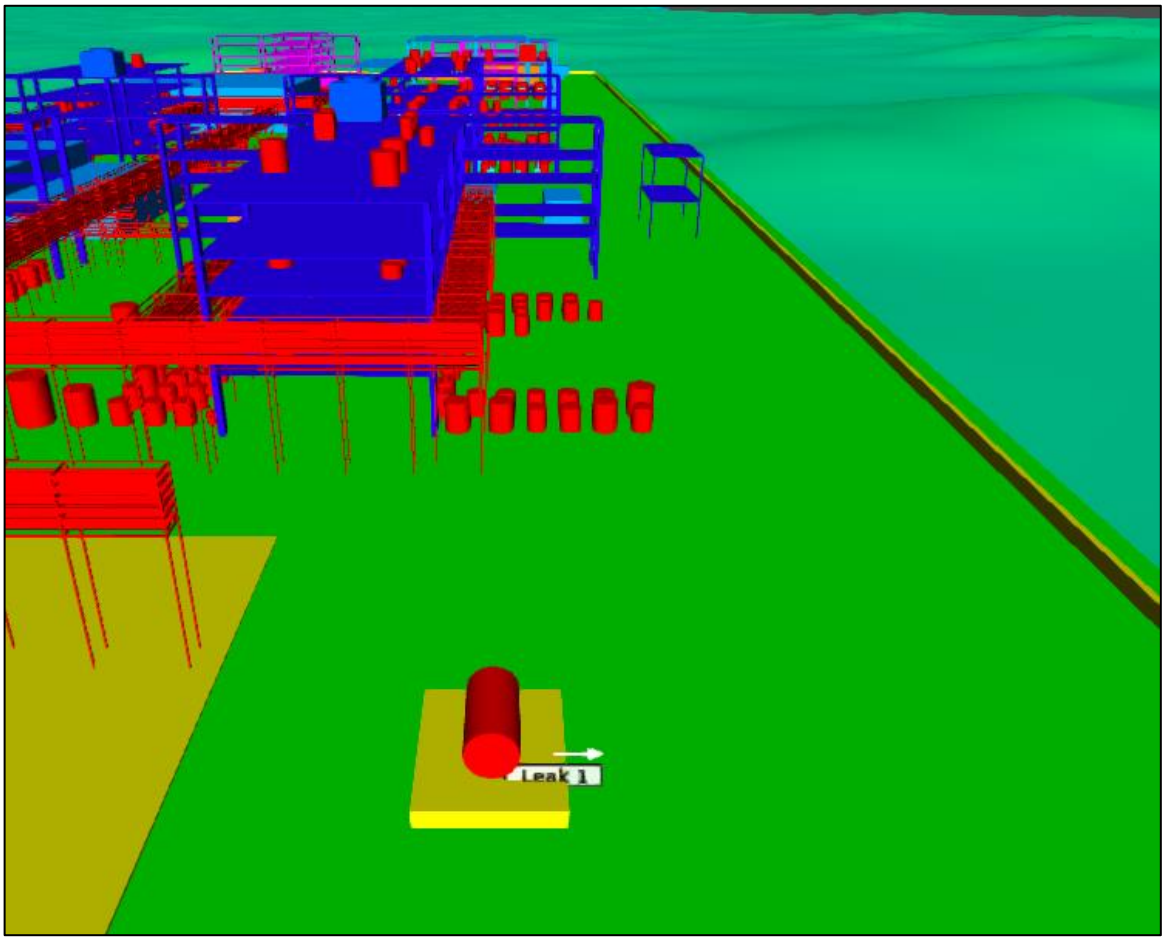

Figure 2-45: Leak location for Di-Methyl Amine dispersion at storage tank

2.12 Results from Di-Methyl Amine Dispersion Simulations

Plot description

Simulated data are collected and presented in two types of plots, 2D cut plane plots and 3D volume plots. 2D cut plane plots show the variable value for every grid cell (in the selected 2D plane) at selected times and 3D volume plots show the boundaries of the concentration for the specified value.

2D cut plane plots have been used to illustrate the toxic and flammable gas concentration at various time instances on vertical and horizontal planes.

3D volume plots have been used to show the propagation of the concentrated cloud with wind at various time instances.

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The accidental leak scenario described in the section 2.4, was simulated. The accidental leak of DMA from DMA tank was simulated. Simulations were performed to capture the dispersion of the flammable DMA, its mixing with air and dilution and then cloud movement based on prevailing wind condition which is NE to SW and effective wind condition which is N to S.

2.12.1 Di-Methyl Amine Dispersion Case - Prevailing Wind Direction North-East to South-West

The resulting cloud was simulated for **300 sec** after the leak. The leak started at **100 sec** of simulation time. The DMA cloud is stabilized at **80 sec** after the leak is started for the flammable gas concentrations (10% LFL) as shown in Figure 2-46. The concentrations were scaled between 0.28 – 2.8 vol % which is 10 to 100% LFL of Di-Methyl Amine as shown in Figure 2-47 [2]. The maximum distance covered by cloud is **86 m** and height is up-to **5 m** at **180 sec** as shown in Figure 2-47 and Figure 2-48. In below Figure 2-48, the Blue colour represent the 10% flammable concentration contour. The flammable gas cloud spread nearby area towards the South-West direction.

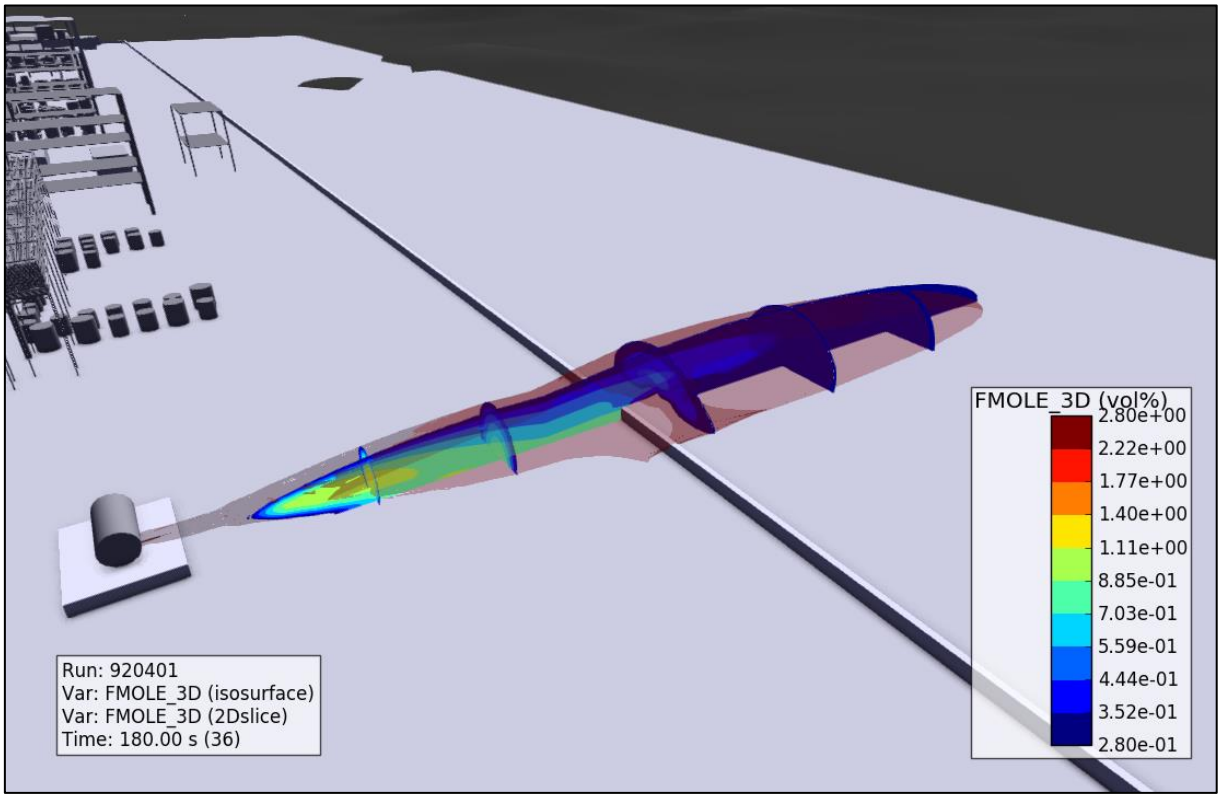

Figure 2-46: Di-Methyl Amine gas cloud at 180 sec, wind speed 3 m/s, NE to SW direction.

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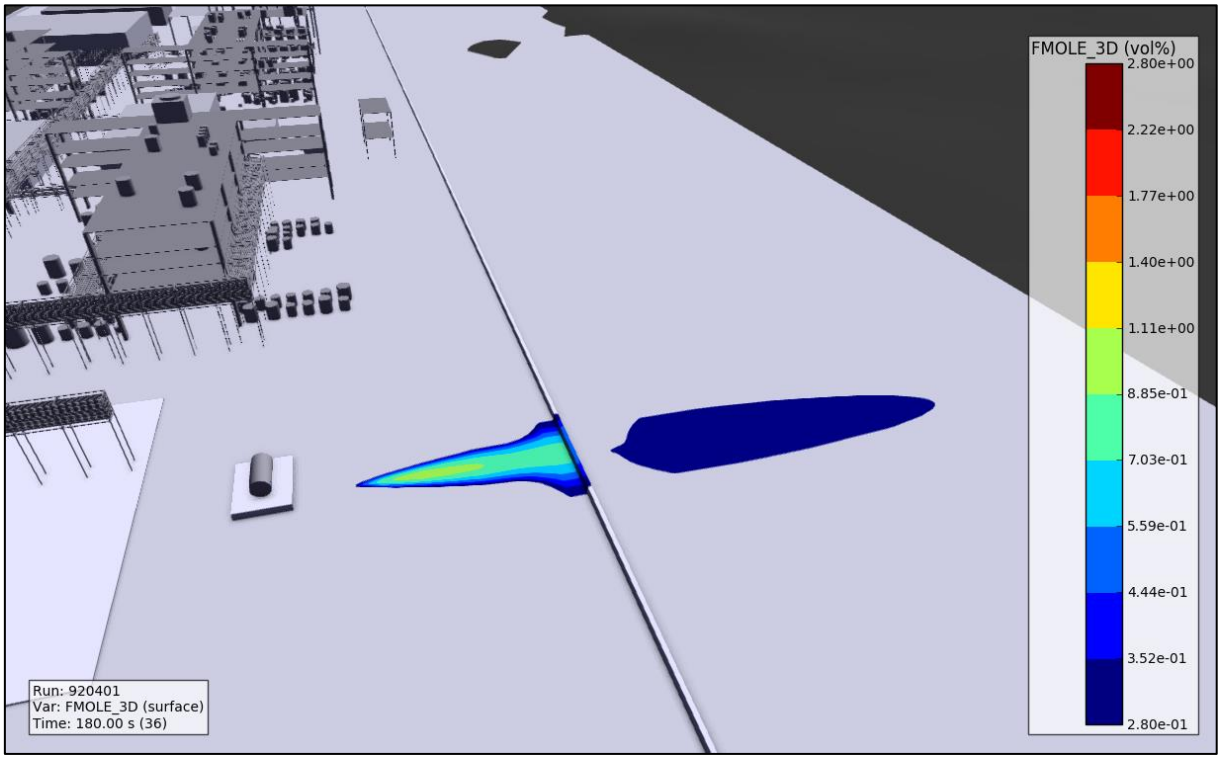

Figure 2-47: Di-Methyl Amine 10% to 100% LFL gas cloud at 180 sec, wind speed 3 m/s, NE to SW direction.

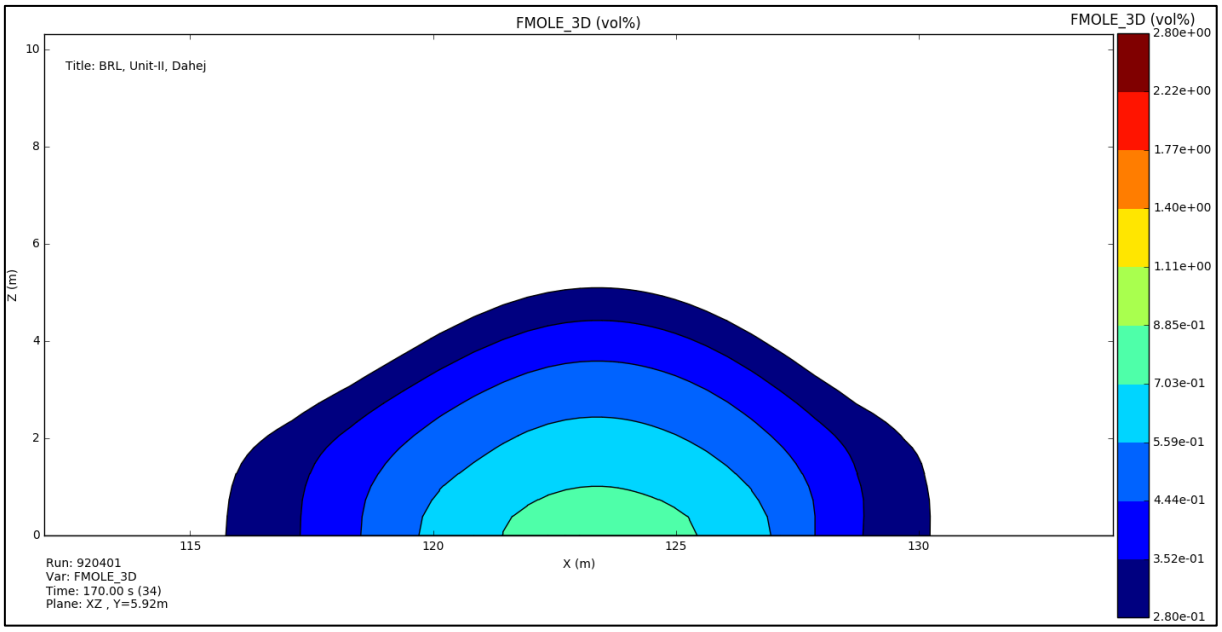

Figure 2-48: Di-Methyl Amine flammable gas cloud concentration at 170 sec for wind speed 3 m/s in XZ plane at Y= 5.92 m.

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2.12.2 Di-Methyl Amine Dispersion Case - Effective Wind Direction North to South

The resulting cloud was simulated for **300 sec** after the leak. The leak started at **100 sec** of simulation time. The DMA cloud is stabilized at **65 sec** after the leak is started for the flammable gas concentrations (10% LFL) as shown in Figure 2-49. The concentrations were scaled between 0.28 – 2.8 vol % which is 10 to 100% LFL of Di-Methyl Amine as shown in Figure 2-50 [2]. The maximum distance covered by cloud is **42 m** and height is up-to **7.2 m** at **165 sec** as shown in Figure 2-50 and Figure 2-51. In below Figure 2-51, the Blue colour represent the 10% flammable concentration contour. The flammable gas cloud spread nearby area towards the South direction.

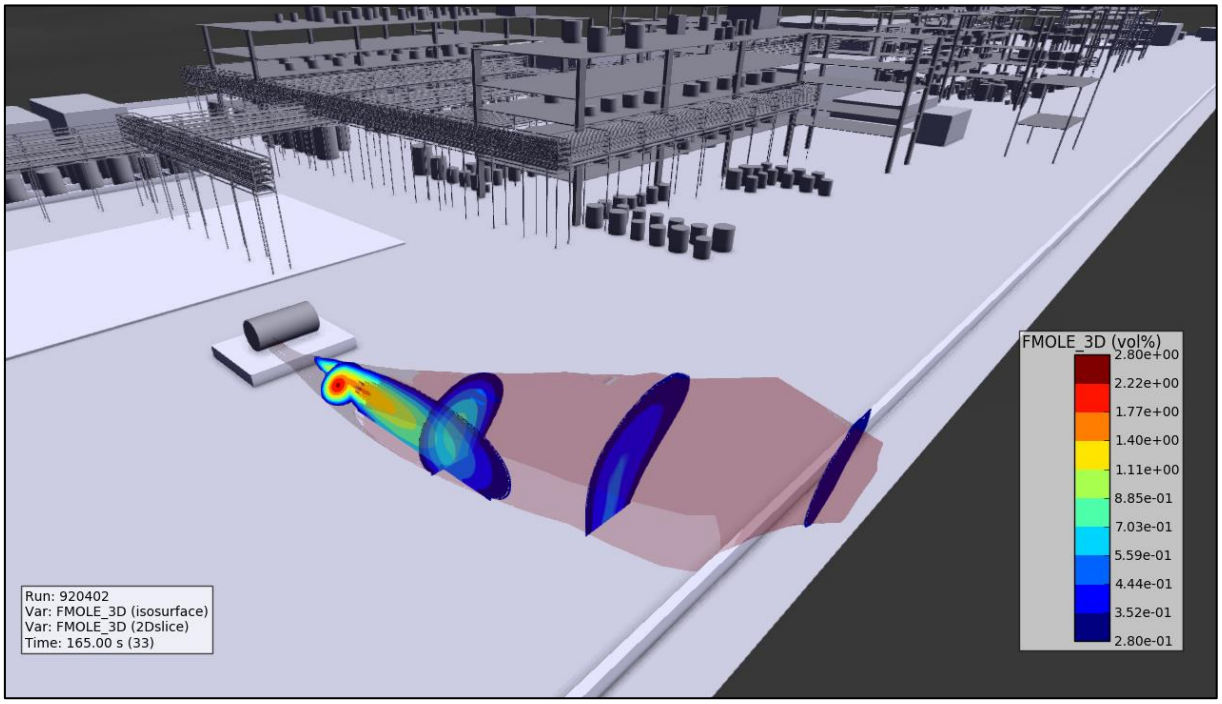

Figure 2-49: Di-Methyl Amine gas cloud at 165 sec, wind speed 3.2 m/s, N to S direction.

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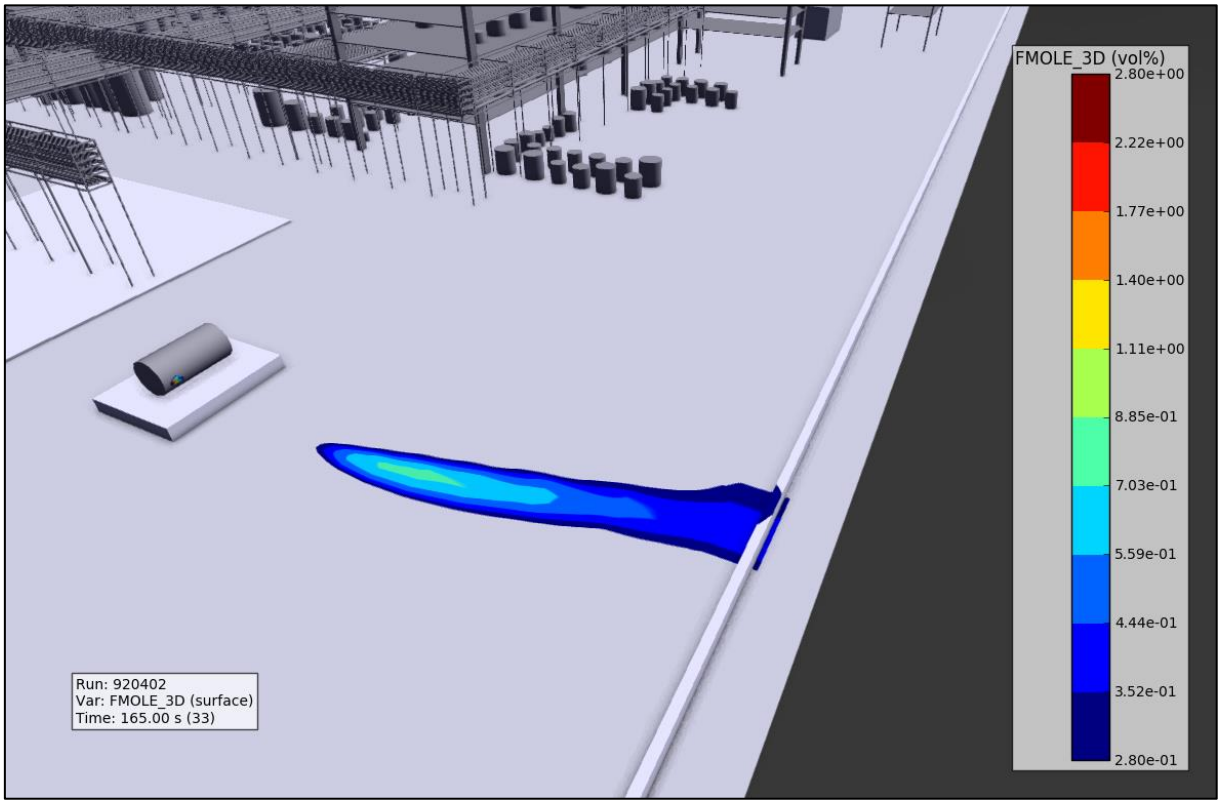

Figure 2-50: Di-Methyl Amine 10% to 100% LFL gas cloud at 165 sec, wind speed 3.2 m/s, N to S direction.

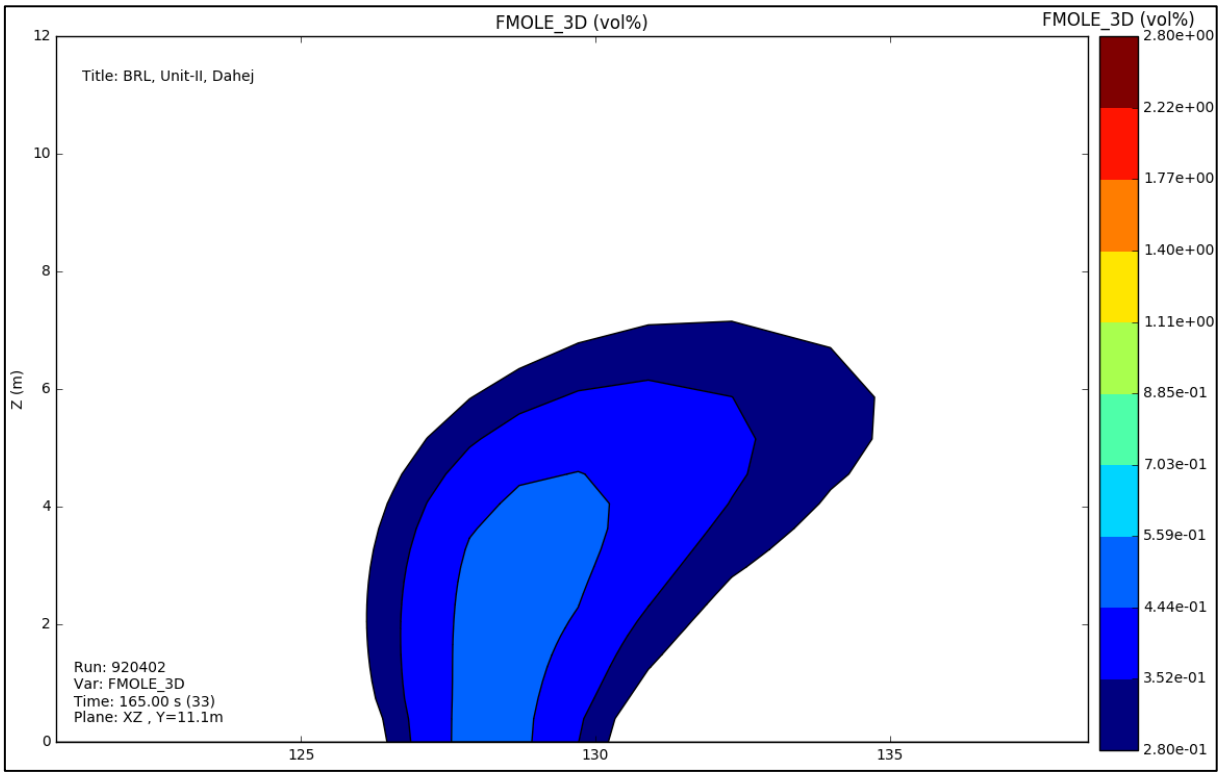

Figure 2-51: Di-Methyl Amine flammable gas cloud concentration at 165 sec for wind speed 3.2 m/s in XZ plane at Y= 11.1 m.

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2.13 Case 5: Hexane Pool Fire Scenario Input

For Hexane pool fire scenario, following input data were considered and results are calculated based on inhouse **TNO's EFFECTS Software**.

Table 2-5: **Modelling Hexane at transfer pipeline leak in FLACS**

Total Capacity [KL]	Leak Size [mm]	Mass flow rate [kg/s]	Pressure [kg/cm^2]	Temperature [°C]	Prevailing Wind Direction & Speed [m/s]	Effective Wind Direction & Speed [m/s]
40	16	1.42	2.5	35	NE – SW 3	N – S 3.2

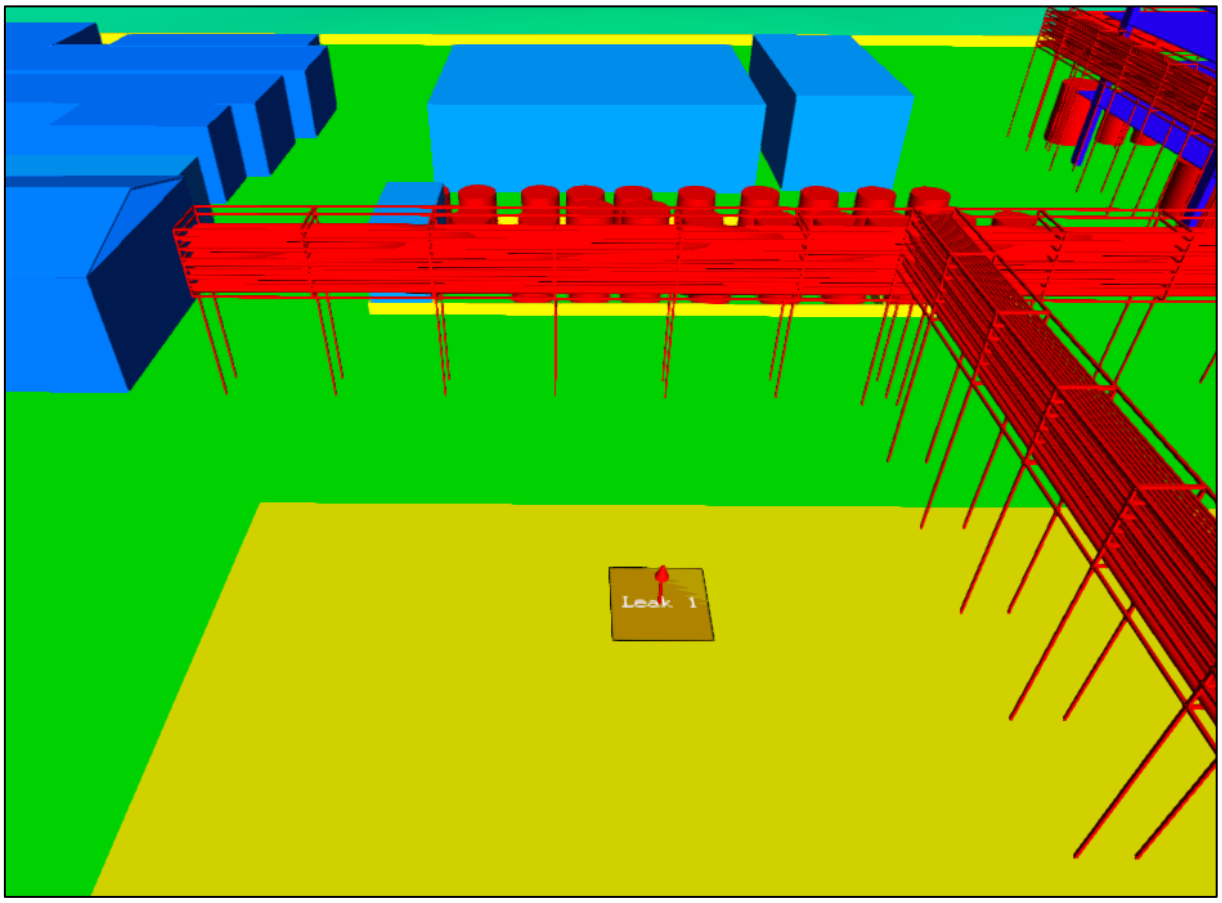

Figure 2-52: Leak Location for Hexane at Underground Explosive Tank Farm Area from Transfer pipeline

2.14 Results Hexane Pool Fire from storage tank

Plot description

Simulated data are collected and presented in two types of plots, 2D cut plane plots and 3D volume plots. 2D cut plane plots show the variable value for every grid cell (in the selected 2D plane) at selected times and 3D volume plots show the boundaries of the concentration for the specified value.

2D cut plane plots have been used to illustrate the toxic and flammable gas concentration at various time instances on vertical and horizontal planes.

3D volume plots have been used to show the propagation of the concentrated cloud with wind at various time instances.

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The accidental leak scenario described in the section 2.4 of Hexane inventory was selected for the simulation. The simulations were performed to capture the heat flux (kW/m^2) from Hexane pool fire on nearby surrounding facility. The heat fluxes were observed near the surrounding area, underground explosive tank farm and nearby pipe-rack. As shown in Figure 2-53 the impact of the heat fluxes are different as per prevailing wind direction from NE to SW and effective wind direction from N to S as shown in Figure 2-54, respectively.

QRADFF_3D (far-field radiative heat flux) shows the total radiative heat flux on the wall surfaces. Severe structural damage will occur at 37.5 kW/m^2 radiative heat flux [3]. In Figure 2-55 and Figure 2-56, the heat flux of 0.7-37.5 kW/m^2 is seen on Underground explosive tank farm and nearby pipe racks.

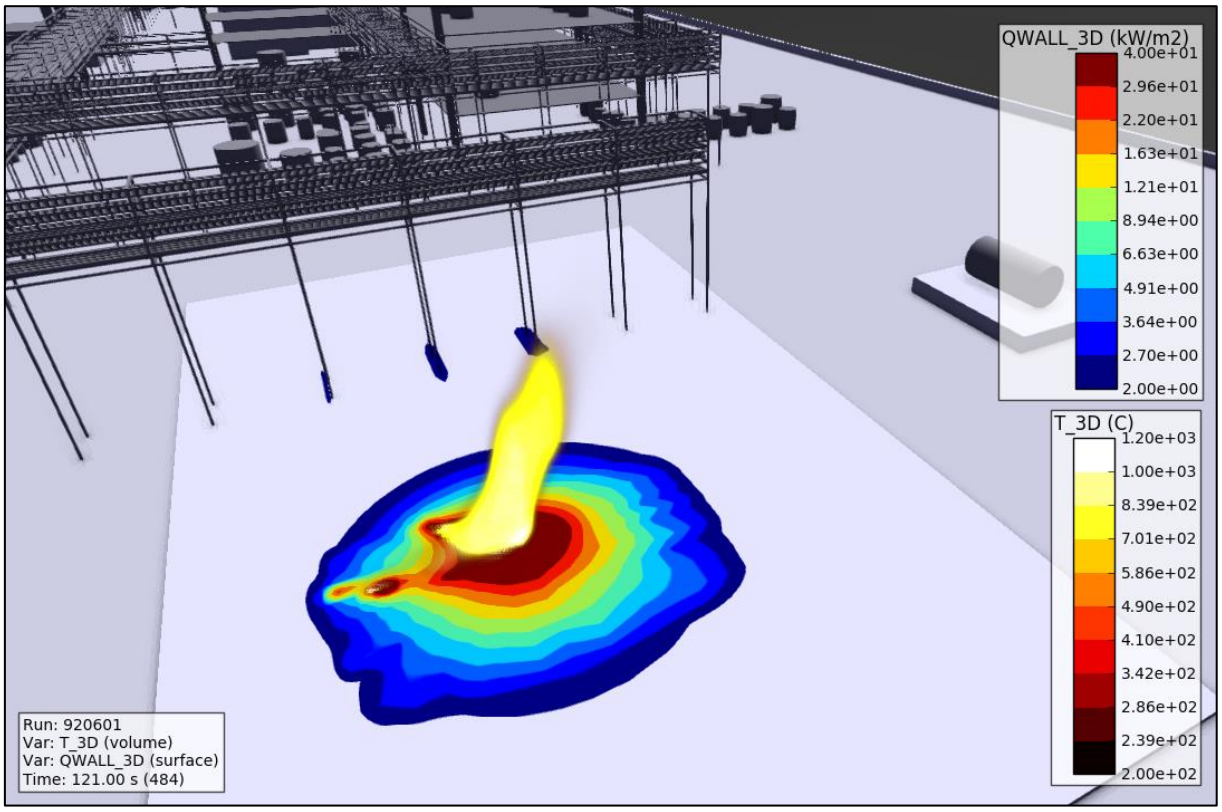

Figure 2-53: Incident Heat Flux from Hexane Pool Fire (2 – 37.5 kW/m^2) at wind 3 m/s, North-East to South-West direction scenario.

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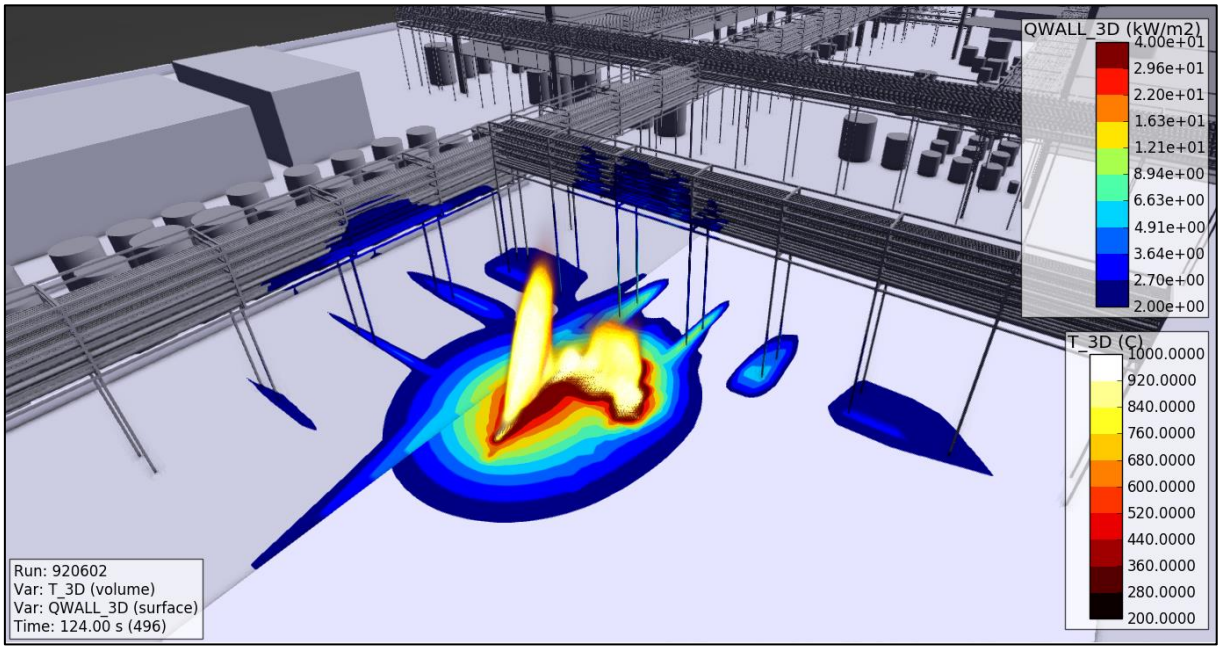

Figure 2-54: Incident Heat Flux from Hexane Pool Fire (2 – 37.5 kW/m^2) at wind 3.2 m/s, North to South direction scenario.

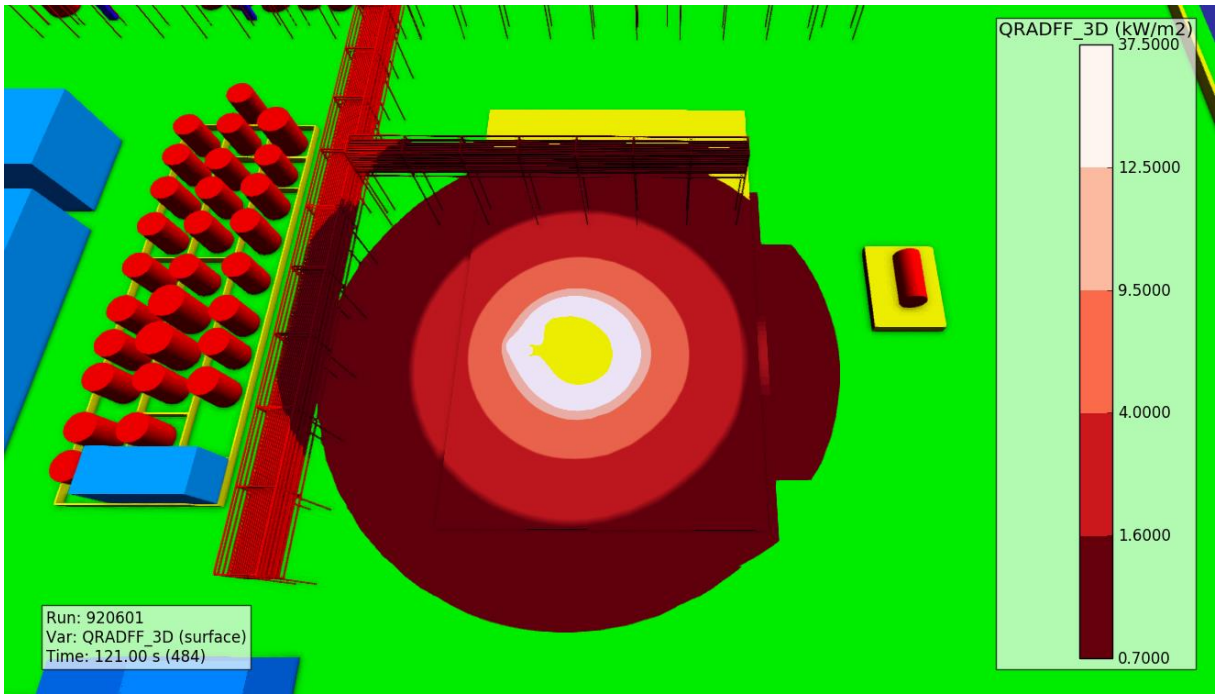

Figure 2-55: Radiative heat flux from Hexane pool fire at 0.5 sec after leak for wind direction North-East to South-West, wind speed 3 m/s

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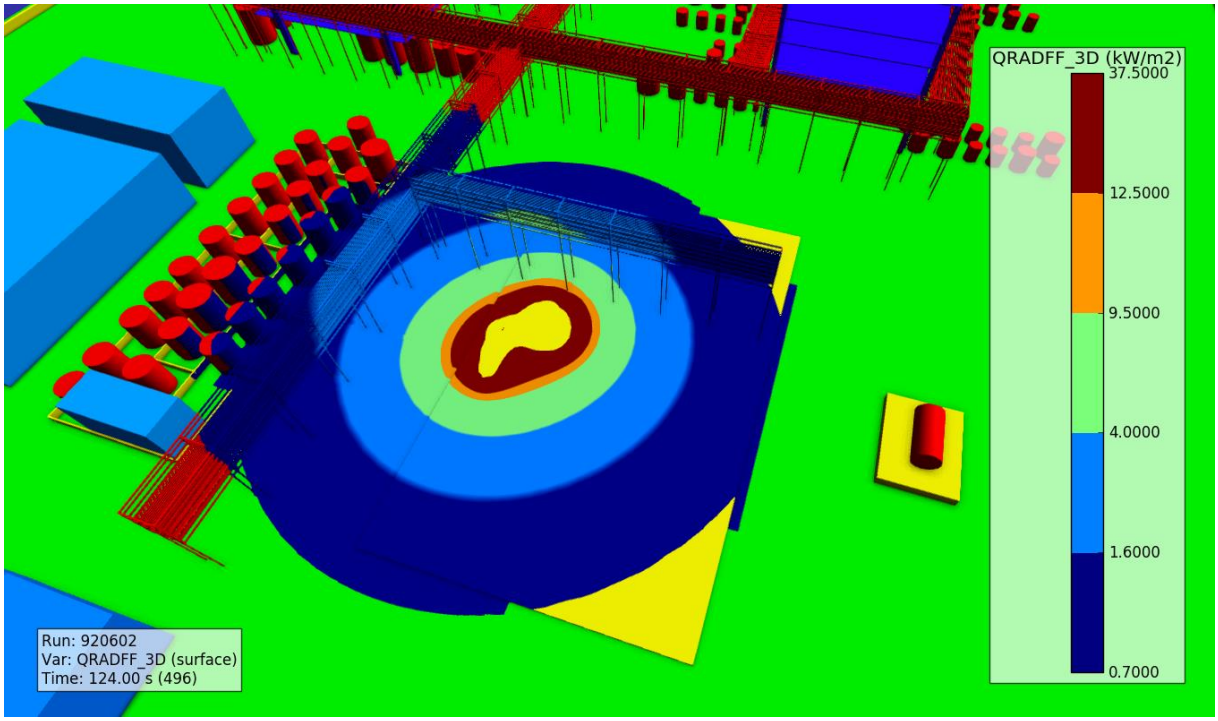

Figure 2-56: Radiative heat flux from Hexane pool fire at 0.5 sec after leak for wind direction North to South, wind speed 3.2 m/s

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3 Conclusion

This project report describes CFD simulations carried out as a part of consequence analysis study for catastrophic failure of Chlorine Tonner, Hydrogen Cylinder, Isobutylene Tank, DMA Tank and Hexane Transfer Pipeline accident at BRL (UNIT-II), Dahej plant.

Chlorine:

Based on the 3D CFD consequences analysis, the **Chlorine** cloud with IDLH concentration exit the facility at **50 sec** after the leak and moves further towards **prevailing wind condition (NE to SW)**. The Chlorine cloud length reached up-to **3350 m** at **810 sec** after the leak to SW direction and the maximum height of **14 m** with concentration equal to IDLH value of Chlorine (10 ppm). The toxic gas clouds spread near to Engineering Area, Cl_2 Area, Non-Explosive Tank Farm, Underground Explosive Tank Farm, Plant A, Plant-B, DMA Tanks.

The **Chlorine** cloud with IDLH concentration exit the facility at **150 sec** after the leak and moves further towards **effective wind condition (N to S)**. The Chlorine cloud length reached up-to **2600 m** at **835 sec** after the leak to South direction and the maximum height of **48 m** with concentration equal to IDLH value of Chlorine (10 ppm). The toxic gas clouds spread near to Engineering Area, Cl_2 Area, Non-Explosive Tank Farm, Plant A-B-C-D-F, QC and R&D, Canteen, Utility Area, Utility Building, WIP Store, Existing and Proposed Insecticide & Herbicide RM/FG Store, Fire Water Tank, Sump, TOC Room, Security Office, OHC, Changing Room, Training Centre, Gate House and Main Gate, etc.

Hydrogen:

Based on the 3D CFD study, the dispersed **Hydrogen** gas spreads nearby the plant. The flammable concentrations were scaled between **0.4 – 4 vol. %** which **10% - 100%** of **LFL** value respectively. The flammable gas cloud stabilized at **280 sec** towards **prevailing wind condition (NE to SW).** The maximum flammable cloud length is **80 m** and height are **18 m** at **280 sec**. A mitigation strategy is needed to ensure safety of personnel in such an accident event. The maximum LFL gas cloud stays within the facility. It is important to shut down the ignition sources around the LFL gas cloud regions. The flammable gas cloud stabilized at **175 sec** towards **effective wind condition (N to S).** The maximum flammable cloud length is **320 m** and height are **11 m** at **175 sec**. A mitigation strategy is needed to ensure safety of personnel in such an accident event. The maximum LFL gas cloud stays within the facility. It is important to shut down the ignition sources around the LFL gas cloud regions.

Isobutylene:

Based on the 3D CFD study, the dispersed **Isobutylene** gas flammable concentrations were scaled between **0.18 – 1.8 vol. %** which **10% - 100%** of **LFL** value respectively. The maximum flammable cloud length is **50 m** and reached up-to height **5 m** at **160 sec** towards **prevailing wind condition (NE to SW)**. Based on the results that are obtained and presented above, the Isobutylene gas cloud with 10 volume % LFL spread near to Admin Building. The maximum flammable cloud length is **23 m** and reached up-to height **6.5 m** at **250 sec** towards **effective wind condition (N to S)**. Based on the results that are obtained and presented above, the Isobutylene gas cloud with 10 volume % LFL spread near

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to Admin Building. A mitigation strategy is needed to ensure safety of personnel in such an accident event. It is important to shut down the ignition sources around the LFL gas cloud regions.

Di-Methyl Amine:

Based on the 3D CFD study, the dispersed **Di-Methyl Amine** gas spreads nearby the plant. The flammable concentrations were scaled between **0.28 – 2.8 vol. %** which **10% - 100%** of **LFL** value respectively. The flammable gas cloud stabilized at **180 sec** towards **prevailing wind condition (NE to SW).** The maximum flammable cloud length is **86 m** and height are up-to **5 m** at **180 sec**. A mitigation strategy is needed to ensure safety of personnel in such an accident event. The flammable gas cloud stabilized at **165 sec** towards **effective wind condition (N to S).** The maximum flammable cloud length is **42 m** and height are up-to **7.2 m** at **165 sec**. A mitigation strategy is needed to ensure safety of personnel in such an accident event. The maximum LFL gas cloud stays within the facility. It is important to shut down the ignition sources around the LFL gas cloud regions.

Hexane:

Based on the 3D CFD consequences analysis, Far-field radiative heat flux from **Hexane** Pool Fire shows the total radiative heat flux on the wall surfaces. Severe structural damage will occur at 37.5 kW/m^2 radiative heat flux. The heat flux of **4-37.5 kW/m^2** is seen on Underground Explosive Tank Farm. Less than 4 kW/m^2 heat flux observed on nearby Pipe-racks.

Table 3-1: Summary of conclusion for prevailing wind condition from NE to SW

Case No.	Chemical	Type of Hazard	Gas Dispersion from leak location	
			Horizontal Distance (m)	Vertical Distance (m)
1	Chlorine	Toxic	3350	14
2	Hydrogen	Flammable	80	18
3	Isobutylene	Flammable	50	5
4	Di-Methyl Amine	Flammable	86	5

Table 3-2: Summary of conclusion for effective wind condition from N to S

Case No.	Chemical	Type of Hazard	Gas Dispersion from leak location	
			Horizontal Distance (m)	Vertical Distance (m)
1	Chlorine	Toxic	2600	48
2	Hydrogen	Flammable	320	11
3	Isobutylene	Flammable	23	6.5
4	Di-Methyl Amine	Flammable	42	7.2

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Table 3-3: Summary of conclusion for Hexane pool fire result of prevailing wind condition from NE to SW

Case No.	Heat Flux for Hexane Fire (kW/m^2)	Distance (m)
5	0.7	24
	1.6	15.6
	4	10
	9.5	6.5
	12.5	5.6
	37.5	3.2

Table 3-4: Summary of conclusion for Hexane pool fire result of effective wind condition from N to S

Case No.	Heat Flux for Hexane Fire (kW/m^2)	Distance (m)
5	0.7	28.7
	1.6	15.4
	4	11.1
	9.5	7
	12.5	6
	37.5	3

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RECOMMENDATIONS:

Recommendations: Chlorine

Blue ink indication shows the existing safeguards at client's premises

1. Accidental leakage of Chlorine gas from Chlorine Tonner and toxic dispersion within and around the plant boundary.					
Properties	**Hazards**	**Effect**	**Preventive**	**Protective**	**Mitigative**
-Oxidiser -Non flammable	-B.P. – 34.05 Deg C	Accelerate the burning of other combustible material -Being heavier than air, accumulates at confined spaces.	-Adequate system designing. -Basic Process Control Systems -Critical alarms -ESD -Compatible electrical equipment -Avoid nearby oil, grease and other combustible materials. - Never keep the tonner to become a part of electrical circuit.	-Storage temperature below 50 deg C. -Hood with Scrubber -Use a backflow preventive device -Precautions against static charges -Non sparking tools -No suck back of water into container -Adequate ventilation -Regular checks to prevent leakage. -No open flame in area -Work Permit system -Public Announcing system -Training	-Cool down tonner. -Stop flow of gas if safe. -Emergency procedures. -Chlorine leakage sensors. -Prevent accumulation in sewer - Stop all hot jobs. -Safety showers -Use local exhaust -Evacuate in downwind areas
Health: Toxic, Corrosive, High pressure gas	- Poisonous by inhalation. -TLV: 1 ppm irritates eyes.	-Asphyxiant at high concentration. -Concentration above 15 ppm causes irritation of upper respiratory tract. - TLV >1000 ppm is fatal		-PPEs -Use corrosion resistant forced draft fume hood. -Self-contained breathing apparatus (SCBA).	-First Aid – Chlorine Kit

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Recommendations: Hydrogen gas

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2. Accidental leakage for Hydrogen gas from Hydrogen Cylinder to predict the flammable dispersion of Hydrogen within and around the plant boundary.					
Properties	**Hazards**	**Effect**	**Preventive**	**Protective**	**Mitigative**
- Flammable Gas.	- Flammable limit LEL4%, HEL 75% AIT: 500 Deg C	Heat may cause container to initiate and intensify fire - Fire extinguishing without stoppage of gas flow forms ignitable mixture with air, which may propagate to a source of ignition. - Excessive pressure in cylinder exposed to fire may cause explosion.	-Pressure relief device. - Doubly-contained piping, diaphragmed or bellows sealed-soft seat valves, backflow prevention devices, flash arrestors and flow monitoring and limiting devices. -BPCS -Critical alarms -ESD -Compatible electrical equipment	-Storage temperature below 55 deg C. -Restricted area. -Precautions against static charges. -Non sparking tools. -Adequate ventilation. -Regular checks to prevent leakage. Control concentration below LEL. -No open flame in area. -Work Permit system. -Public Announcing system. -Training	-No extinguishing media available. Only stopping the gas flow can extinguish the fire. - The vessel and surrounding can be cooled by water. - Full structural firefighting gear is minimum acceptable attire. -Evacuate in downwind areas. -Emergency procedures. -Gas detectors
Health	-No TLV, PEL or REL	- Asphyxiation	-PPEs	-Self-contained breathing apparatus (SCBA)	-First Aid

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Recommendations: Isobutylene

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3. Accidental loss of containment for Isobutylene gas from Isobutylene tank to predict the flammable dispersion of Isobutylene within and around the plant boundary.					
Properties	**Hazards**	**Effect**	**Preventive**	**Protective**	**Mitigative**
-Extremely Flammable Gas. -Gas under pressure may explode if heated	-Flash point: - 80 deg C - Flammable limit LEL4, HEL 9 AIT: 465 Deg C	Heat may cause container to explode	-BPCS. -Safety valve (double) -Critical alarms. -ESD. -Purge system with dry inert gas before introducing gas. -Compatible electrical equipment	-Storage temperature below 50 deg C. -Jacket with chilled water. -Restricted area -Precautions against static charges. -Non sparking tools. -No suck back of water into container. -Adequate ventilation. -Regular checks to prevent leakage. -No open flame in area. -Work Permit system. -Public Announcing system. -Training	-Water spray from protected position. -Evacuate in downwind areas. -Emergency procedures. -Gas detectors. -Prevent accumulation in sewer. -Fire water & foam monitors.
Health	-Exposure (80 hrs) LC50: 16-22 mg/l TLV: 5 ppm	-Evaporating liquid cause frostbite or freezing of skin -Respiratory arrest	-PPEs	-Self-contained breathing apparatus (SCBA).	-First Aid

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Recommendations: Di-Methyl Amine

Blue ink indication shows the existing safeguards at client's premises

4. Leakage of Di-Methyl Amine gas from tank. to predict the flammable dispersion of Di-Methyl Amine within and around the plant boundary.					
Properties	**Hazards**	**Effect**	**Preventive**	**Protective**	**Mitigative**
Extremely Flammable Gas	-Flammable limit LEL2.8, HEL 14.4	Combustion will form toxic and corrosive gases. (Nitric oxide, Nitrogen di oxide, Hydrogen, methane, carbon mono oxide.)	-BPCS. -Relief valve -Critical alarms. -ESD.	-Adequate ventilation. -Restricted area. -No open flame in area. -Work Permit system. -Public Announcing system. -Training.	-Flare /Incineration. -Scrub gases in sulphuric acid solution. -Emergency pumping. -Water sprinkler -Fire water and foam monitors. -Evacuate in downwind areas. -Emergency procedures. -Gas detectors
Health	Toxic ingestion LD50: mg/kg Exposure (24 hrs) LC50: 55 mg/l TLV: 5 ppm	.	-PPEs	-Self-contained breathing apparatus (SCBA).	-First Aid

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Recommendations: Hexane

Blue ink indication shows the existing safeguards at client's premises

5. Accidental loss of containment for Hexane from Hexane Transfer Pipeline to predict the Pool Fire of Hexane within and around the plant boundary					
Properties	**Hazards**	**Effect**	**Preventive**	**Protective**	**Mitigative**
Flammable	-Flash Point <-18 deg C -Flammable limit LEL1.2, HEL 7.3 -Auto ignition 290 deg C	Leak will result in Fire /explosion	-Proper bonding/grounding. -Flame proof equipment. -Dike. -BPCS. -Critical alarms	-Adequate ventilation. -No open flame in area. -Public Announcing system. -Training	-Vapour supressing foam. -Sewer routed to oil pond. -Emergency pumping. -Evacuate in downwind areas. -Emergency procedures
Health	Toxic ingestion LD50>15000mg/kg Toxic ingestion LD50>2000mg/kg	-Affects central nervous system. -Cause pneumonitis or pulmonary enema.	-Avoid breathing vapours, skin contact.	-Self-contained breathing apparatus (SCBA). -PPEs	-First Aid - Assist breathing with mechanical device

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A 2 Appendix B: References

1. FLACS User Guide
2. Shell Design and Engineering Practice (DEP 32.30.20.11-Gen), Page no. 48, Section 7 Alarm Levels, Detector Settings, Table 7.1
3. Effects due to Incident Radiation Intensity - CCPS, Guidelines for Chemical Process Quantitative Risk Analysis

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A 1 Appendix A: Material Safety Data for the Chemicals Studied

Material Safety Data Sheets for the Chemicals studied are attached herewith.

Chlorine MSDS.pdf

Hydrogen MSDS.pdf

Isobutylene MSDS.pdf

DMA MSDS.pdf

Hexane MSDS

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सत्यमेव जयते

भारत सरकार
GOVERNMENT OF INDIA
पर्यावरण, वन एवं जलवायु परिवर्तन
मंत्रालय
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE

SPEED POST
क्षेत्रीय कार्यालय, पश्चिम क्षेत्र,
Regional Office, Western Zone,
''केन्द्रीय पर्यावरण भवन''
"Kendriya Paryavaran Bhavan"
लिन्क रोड नं0-3/Link Road No. 3
E-5, रविशंकर नगर/Ravi Shankar Nagar,
भोपाल (म0प्र0)/Bhopal-462016 (M.P.)
Telefax: 0755-2465054
E-mail: rowz.bpl-mef@nic.in

File No .: 5-8/2011(ENV)/313

Dated: 28.05.2020

प्रति,

सुश्री गीता मेनन,
संयुक्त सचिव, मॉनिटरिंग सेल,
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय,
इंदिरा पर्यावरण भवन,
जोर बाग रोड, अलीगंज,
नई दिल्ली – 110003

Ms. Geeta Menon,
The Joint Secretary, Monitoring Cell,
Ministry of Environment, Forest and Climate Change
Indira Paryavaran Bhawan,
Jorbagh Road, Aliganj,
New Delhi - 110003

विषय : मेसर्स भारत रसायन लिमिटेड, द्वारा प्लाट नं. 42/4, जीआईडीसी एस्टेट, दहेज, तालुका वाग्रा, जिलाः भरूच, गुजरात में प्रस्तावित एग्रोकेमिकल प्लांट के लिए पर्यावरणीय स्वीकृति के संबंध में।

Sub: Proposed Agrochemical Plant at plot no. 42/4, GIDC estate, Dahej Taluka Vagra in Dist. Bharuch, in Gujarat by M/s Bharat Rasayan Limited- Environmental Clearance – reg.

Ref:
1. Ministry's Letter No. J-11011/961/2008-IA.II (I) dated 13.07.2009
2. PP's letter no. BRL/DIR/MoEF-D/2019/09 dated 04.11.2019
3. MoEF&CC, RO Bhopal's letter no. 5-8/2011(Env)/179 dated 13.02.2020
4. PP's letter no. BRL/DIR/RO-MoEF/2020/01 dated 19.02.2020
5. MoEF&CC, RO Bhopal's letter no. 5-8/2011(Env) dated 15.04.2020

महोदय,

Kind attention is invited to the above-cited letters on the above-mentioned subject matter. This office has earlier sent the certified EC compliance report vide letter dated 02.07.2019. PP vide their letter dated 04.11.2019 has submitted an action taken report with respect to conditions marked as complied subject to conditions. This office has examined ATR cum compliance report submitted by the PP. An ATR was issued by MoEF&CC, RO Bhopal vide letter dated 15.04.2020 based on the submission by the PP. The PP further submitted the information for one partly complied condition of ATR dated 15.04.2020. The information submitted by the PP vide E-mail dated 05.05.2020 has been examined. Accordingly, an addendum to the ATR Report submitted earlier by this office vide letter dated 15.04.2020 is enclosed herewith.

2.0 This is for kind information please.

3.0 This has been issued with the approval of the competent Authority.

Encl. As above.

भवदीय

(विश्व बन्धु मीणा)
वैज्ञानिक 'सी'

Contd...2

Copy to :

1. डॉ. आर. बी. लाल, वैज्ञानिक 'ई', पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, इंदिरा पर्यावरण भवन, जोर बाग रोड, अलीगंज, नई दिल्ली – 110003 की ओर सूचनार्थ एवं आवश्यक कार्यवाही हेतु।
   Dr. R.B. Lal, Scientist 'E', Ministry of Environment, Forest and Climate Change Indira Paryavaran Bhawan, Jorbagh Road, Aliganj, New Delhi-110003 for kind information please.

2. श्रीमती श्रुति राय भारद्वाज, वैज्ञानिक 'ई', (मॉनीटरिंग सैल), पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, इंदिरा पर्यावरण भवन, जोर बाग रोड, अलीगंज,नई दिल्ली–110 003 की ओर सूचनार्थ हेतु।
   Smt. Shruti Rai Bhardwaj, Scientist-'E', Monitoring Cell, Ministry of Environment, Forest and Climate Change Indira Paryavaran Bhawan, Jorbagh Road, Aliganj, New Delhi- 110003 for kind information please.

3. श्री अजय गुप्ता (निदेशक संचालन), मेसर्स भरत रसायन लिमिटेड, इकाई–II, लाट नं. 42/4, अमोद रोड, जीआईडीसी, दहेज, जिला: भरूच– 392 130 गुजरात की ओर सूचनार्थ हेतु।
   Shri Ajay Gupta (Director Operations), M/s Bharat Rasayan Limited, Unit-II,Plot No. 42/4, Amod Road, GIDC, Dahej, Dist.-Bharuch- 392 130 Gujarat for kind information please.

(विश्व बन्धु मीणा)
वैज्ञानिक 'सी'

Ministry of Environment, Forest & Climate Change
Regional Office Bhopal

Subject: Addendum to the compliance status reported vide letter dated 15.04.2020 by MoEF&CC, RO Bhopal particularly with respect to partly complied condition.

This office has submitted a certified EC Compliance report to MoEF&CC, New Delhi vide letter dated 02.07.2019 wherein compliance of the some conditions were marked as complied subject to condition. PP submitted an action taken cum compliance report, accordingly action taken cum compliance report was examined by this office and remarks & updated compliance status submitted vide letter dated 15.04.2020. The PP submitted the ATR w.r.t. one partly complied condition. The latest reply by the PP is analysed and Revised Compliance status is presented below:

	Specific Conditions	Compliance		Updated Compliance	
Sr. No.	EC Condition	Non-compliance reported by MoEF&CC RO, Bhopal vide' letter dated 02.07.2019 (based on site visit on 16.05.2019, and submissions of the PP in response)	Remarks of MoEF&CC, RO Bhopal vide letter dated 15.04.2020.	Updated Status/ information submitted by the PP vide email dated 05.05.2020	Remarks of MoEF&CC, RO Bhopal based on latest information submitted by the PP vide email dated 05.05.2020.
xx	The company shall strictly follow all the recommendations mentioned in the Charter on Corporate Responsibility for Environmental Protection (CREP)	Please see our given table provided in report. **In view of the information furnished by the PP, i.e., detailed compliance of recommendations furnished below, the stipulated condition is considered complied subject to clarity on replacement of Bio Assay test by toxicity Factor test.** **COMPLIED SUBJECT TO CONDITION**	As per the updated information available, it is noted that PP is yet to undertake toxicity Factor test although Bio Assay test was under taken through an NABL accredited laboratory i.e. M/s Siddhi Green Excellence Pvt. Ltd. Ankleshwar. As agreed upon by the PP, PP shall furnish a time targeted action plan towards compliance of the said CREP recommendation related to toxicity Factor test. **In view of the updated information furnished by the PP, the condition is considered partly complied till the**	M/s Siddhi Green Excellence Laboratory is recognized by **MOEF&CC No. Q.15018/21/2013-CPW dated 19th August, 2016 (Annexure-1)**and NABL approved laboratory located in Ankleshwar and they are collecting our final treated discharge effluent on monthly basis with all parameters stipulated by GPCB in issued CC&A with Bio-Assay Test. FT-1 test	As per the latest information submitted by the PP, it is noted that the Bio-Assay test (TF-1 Factor test) has been carried out for toxicity factor as per IS Code 6582 (part-2) through M/s Siddhi Green Excellence Laboratory (recognized by MOEF&CC No. Q.15018/21/2013-CPW dated 19th August,

			submission of toxicity Factor test reports. PARTLY COMPLIED	has been carried out with IS Code 6582 (part-2)as mentioned Bio Assay - Toxicity Factor-1. Pl refer **Annexure-2**	2016). From the test reports it is evident that there is 100% survival of fish after 96 hrs in Effluent(TF1 Factor). The copy of information is attached as **Annexure-1** and **Annexure-2.**

SUMMARY NOTE:

i. **Implementation of Conditions:**

In view of the details furnished above, the status of one Partly Complied condition is presented below:

Compliance status reflected in the ATR report dated 15.04.2020	Updated Compliance status
Partly Complied - 1	Complied - 1

(Vishwa Bandhu Meena)
Deputy Director/Scientist-C

Bharat RASAYAN LIMITED

WORKS : UNIT-II: Plot No. 42/4, Amod Road, GIDC, Dahej, District-Bharuch, Gujarat-392130, Ph.: +91-2641-291123, +91-2642-241100

Date:22nd January,2020

Ref. No. : BRL/Dahej/2020/01

To,
Ministry of Environment, Forest & Climate Change
Government of India,
Indira Paryavaran Bhavan,
Vayu Wing, 3rd Floor, Aliganj
JorBagh, Road New Delhi – 110003.

Kind attention: Dr. J.P. Gupta (Chairman) & Dr. R. B. Lal, Scientist E (Member Secretary)

Subject: Action Taken Report regarding visit of respected EAC Members at BRL-Dahej site on 12/01/2020 and discussed during plant visit.

Reference Documents:
Proposal No.: IA/GJ/IND2/114039/2008 dated 07/10/2019, File No. J-11011/961/2008-IA-II (I) for prior EC for Proposed expansion in existing premises for manufacturing of Agrochemicals & their Intermediates at **Plot no. 42/4, Amod Road, Dahej-I GIDC Industrial Estate, Dahej - 392 130, District – Bharuch, Gujarat, India by M/s. Bharat Rasayan Limited (Unit-II).**
Minutes of 13th meeting of Expert Appraisal Committee (Industry-2) held on 25/10/2019 uploaded on official website of PARIVESH
Site visit dated 12/01/2020

Respected Sir,

We the M/s. Bharat Rasayan Limited, Unit-II, Plot No 42/4, Amod Road, Dahej-I GIDC Industrial Estate, Dahej-392130 (BRL) are very much thankful to Respected EAC Chairman and Members for site visit as well as observations pointed out during the visit session. Herewith we are submitting our following Action Taken Report pertaining to observations were discussed;

Sr. No.	Points were discussed	Our Action taken & Measures
1	Persons from BRL were present during discussion	Mr. Ajay Gupta – Director Operations Mr. Chetan Trivedi – Head (EHS) Mr. Ajay Bhavsar – Head (Production) Mr. Vijay Parmar- Manager(Process Safety) Mr. Sachin Sheth – Head (HR) Mr. Shailesh Mahajn – Dy.Mgr.(HR) -Coordinator for visit
2	Places of Site visited by team	Following areas visited by EAC committee: 1. ETP with HWs 2. Explosive & Non explosive Tank Farm 3. Walkway of Plant-A, B C &D 4. Boiler & RM/FG Shed area 5. Admin & Temple Block for meeting & plantation
3	Organogram of EHS	Please refer **Annexure-1**
4	Revised Water balance to be provided as the proposed discharged should be ZLD	Please refer **Annexure-2**
5	STP discharge should be	100 KLD sewage water will be treated in STP & treated water

CIN : L24119DL1989PLC036264
Regd. Off. : 1501, Vikram Tower, Rajendra Place, New Delhi - 110008
Ph. : +91-11-43661111 (30 lines) • Fax : +91-11-43661100, 41538600
E-mail : info@bharatgroup.co.in • Website : www.bharatgroup.co.in

	stopped. to utilize in Gardening purpose	shall be used for Greenbelt development when overall proposed manpower will be employed during operational phase.
6	Drinking Water supply in company	Drinking Water supply from GIDC reservoir & Third party analysis is carried out for Drinking water quality. We do not have RO for drinking purpose as the TDS/TH is meeting the Drinking water standards as per WHO. Drinking Water arrangement Sketch & Analysis Report is attached as **Annexure – 3**
7	Consequence Analysis Study to be carried out by advanced software	Consequence Analysis Study will be carried out by 3rd party M/s GEXCON-Pune as a 3D modelling will be carried out with CFD Technology. P.O. is already issued. Please refer **Annexure-4**
8	VOC recovery should be more than 99% instead of existing practice of 95%	Our unit will commit and confirm that guideline & suggestion given by committee member will be religiously follow and in this reference please refer **Annexure – 5**
9	Inherent smell was observed during plant round	We are having odor Control plan to measures and control VOCs at sources. Please refer **Annexure – 5 & 6** with photographs
10	Use of Gas instead of Coal to be checked & implemented	Unit is committed to use Natural gas as & when its infrastructure and continuous supply will be available in this region.
11	Land area vacant at site for proposed expansion	Please refer **Annexure – 7**
12	Photographs of Plants to be provided	Please refer **Annexure – 8**
13	Action Taken report with closing EC-CR of RO-Bhopal to be required.	We have submitted our action taken report regarding the compliance report of EC and complied conditions to MoEF&CC, WZ, Bhopal on dated 20/12/2019

Our unit is always thankful for your visit and given us your valuable suggestions and our unit is committed to implement on immediate basis.

We would like to request your good self to kindly consider the above and obliged

Thanking you,

Yours faithfully,

For, Bharat Rasayan Limited, Dahej

Bharat Rasayan Limited Dahej

Ajay Gupta
(Director Operations)

Encl.: Action Taken Report with Annexures

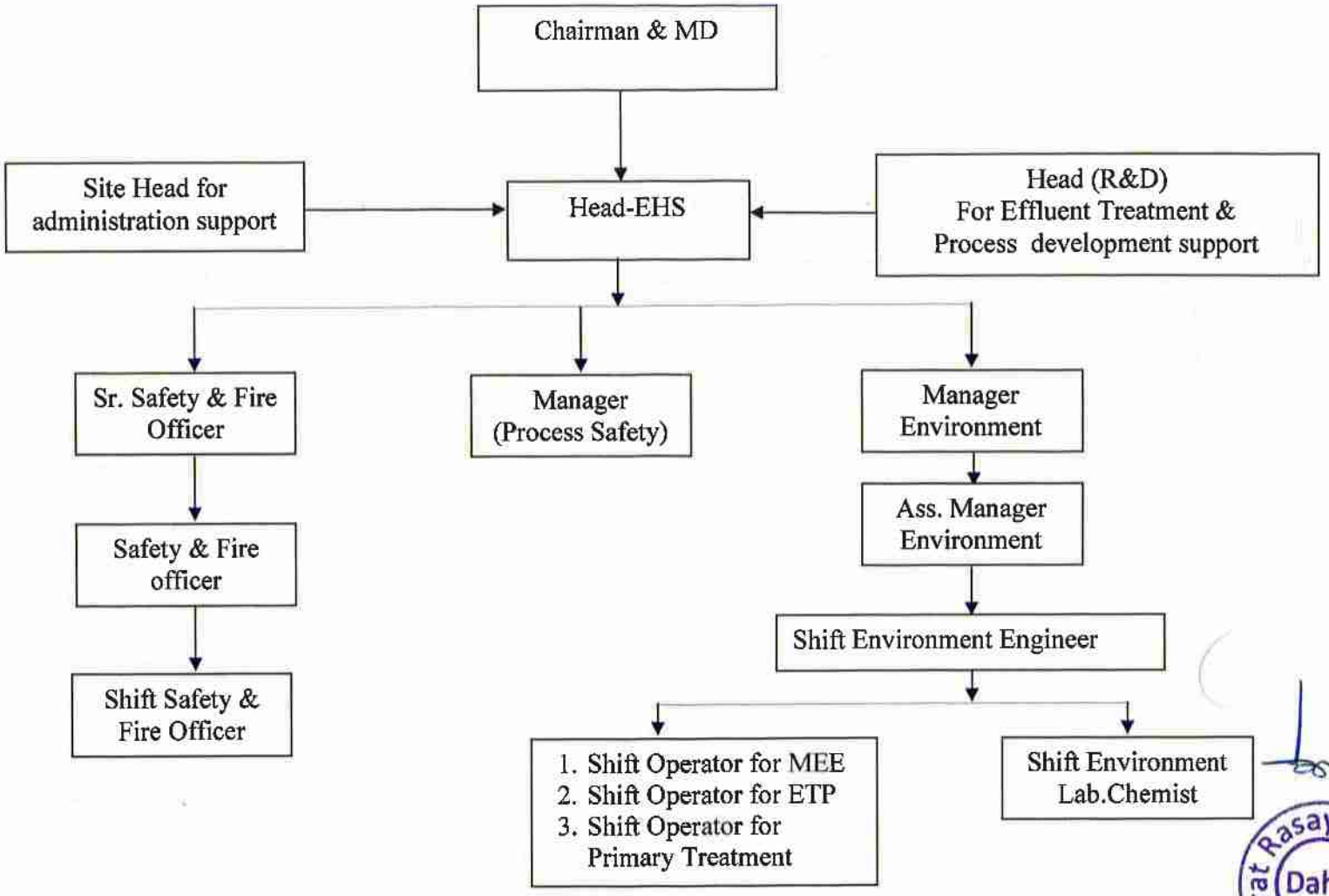
CC to;

-Ministry of Environment, Forest & Climate Change
Regional office, Western Region,"KendriyaParyavaranBhavan", Bhopal, MP. India.
-G.P.C.B , RO-Office, Bharuch

CIN : L24119DL1989PLC036264
Regd. Off. : 1501, Vikram Tower, Rajendra Place, New Delhi - 110008
Ph. : +91-11-43661111 (30 lines) • Fax : +91-11-43661100, 41538600
E-mail : info@bharatgroup.co.in • Website : www.bharatgroup.co.in

Annexure - 1

ENVIRONMENT MANAGEMENT CELL



Bharat Rasayan Limited Dahej

Annexure-2

Water Balance Details

Water Consumption (for Existing & Proposed expansion)

				Fresh water requirement (m3/day)				
				Existing Quantity	Proposed additional quantity	Total Water demand	Water available from recycling and reuse	Final GIDC water consumption
				m3/day	m3/day	m^3/day	m^3/day	m^3/day
(i) Domestic :				50	120	170	0	170
(ii) Industrial	:	(a) Process + APCM	:	455	474	929	773	156
		(b) Boiler	:	300	586	886	0	886
		(c) Cooling	:	200	367	567	Note 1	567
		(d) Washing		354	116	470	0	470
		(e) Gardening	:	60	40	100	Note 2	100
Domestic			**:**	**50**	**120**	**170**	**0**	**170**
Industrial			**:**	**1369**	**1583**	**2952**	**773**	**2179**
Total			**:**	**1419**	**1703**	**3122**	**773**	**2349**

After proposed expansion, Total fresh water consumption shall be reduced as unit is going to ZLD for proposed quantity & Recycled water (773 KLD) shall be used in Process + APCM + Washing. Approximately 45 KLD will be used for recovery purpose (MEE utility).

Note 1: Cooling tower blowdown (150 KLD) shall be passed through RO/Filtration and 130 KLD RO permeate reused for cooling tower makeup & RO reject sent to MEE for further treatment.

Note 2: 100 KLD sewage water will be treated in STP & treated water shall be used for Greenbelt development when overall proposed manpower will be employed during operational phase.

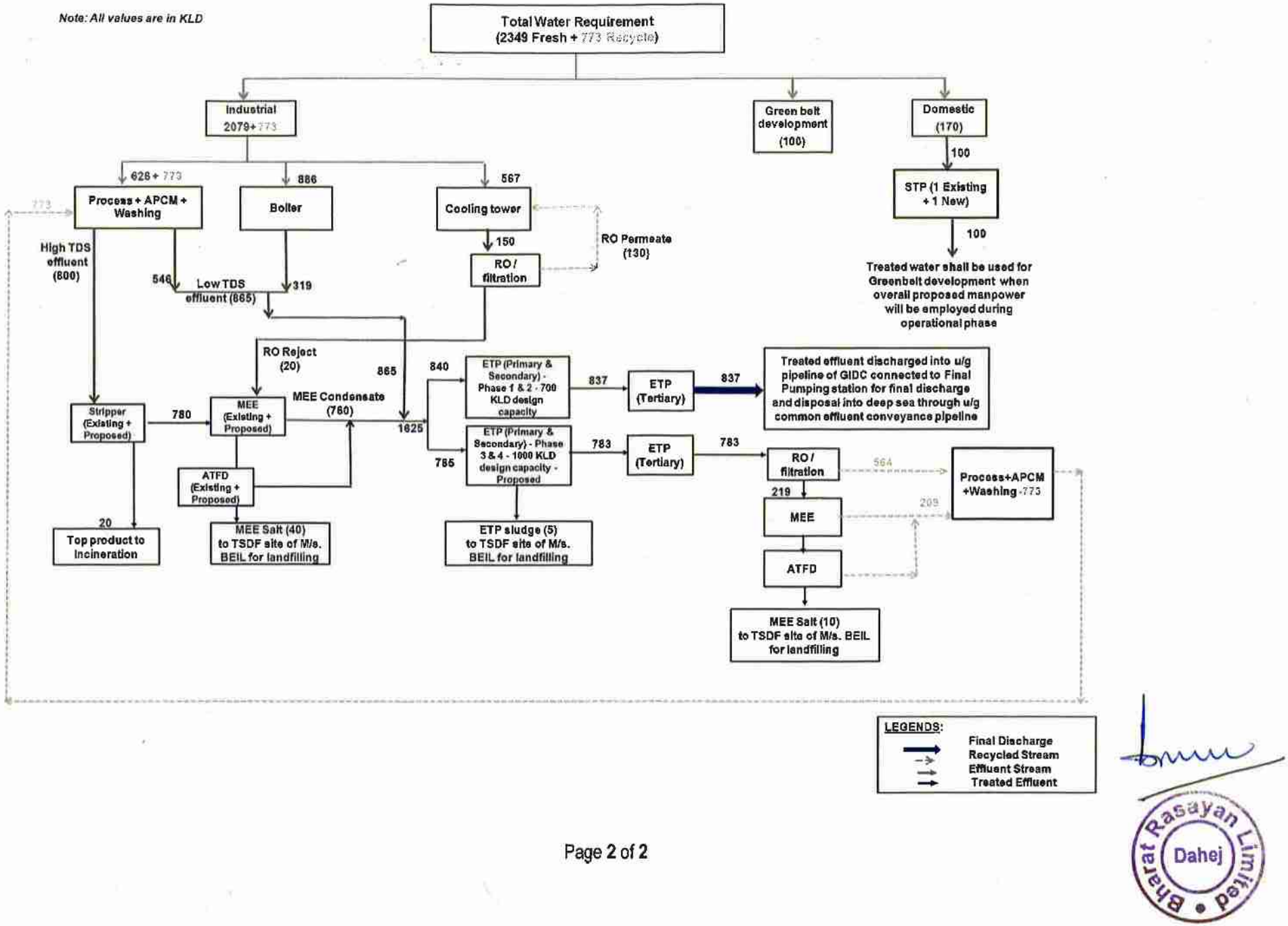
Waste Water Generation (for Existing & Proposed expansion)

				Wastewater generation (KL/Day)		
				Existing Quantity	Proposed additional quantity	Total Quantity
(i) Domestic	:			40	60	100
(ii) Industrial		(a) Processing + APCM + Washing	:	822	479	1301
		(b) Boiler + Contaminated steam	:	15	304	319
	:	(c) Cooling	:	Note 1	Note 1	Note 1
		Domestic	**:**	**40**	**60**	**100**
		Industrial	**:**	**837**	**783**	**1620**
		Total	**:**	**877**	**843**	**1720**

Note 1: Cooling tower blowdown shall be passed through RO/Filtration and reused for cooling tower makeup.

Bharat Rasayan Limited Dahej

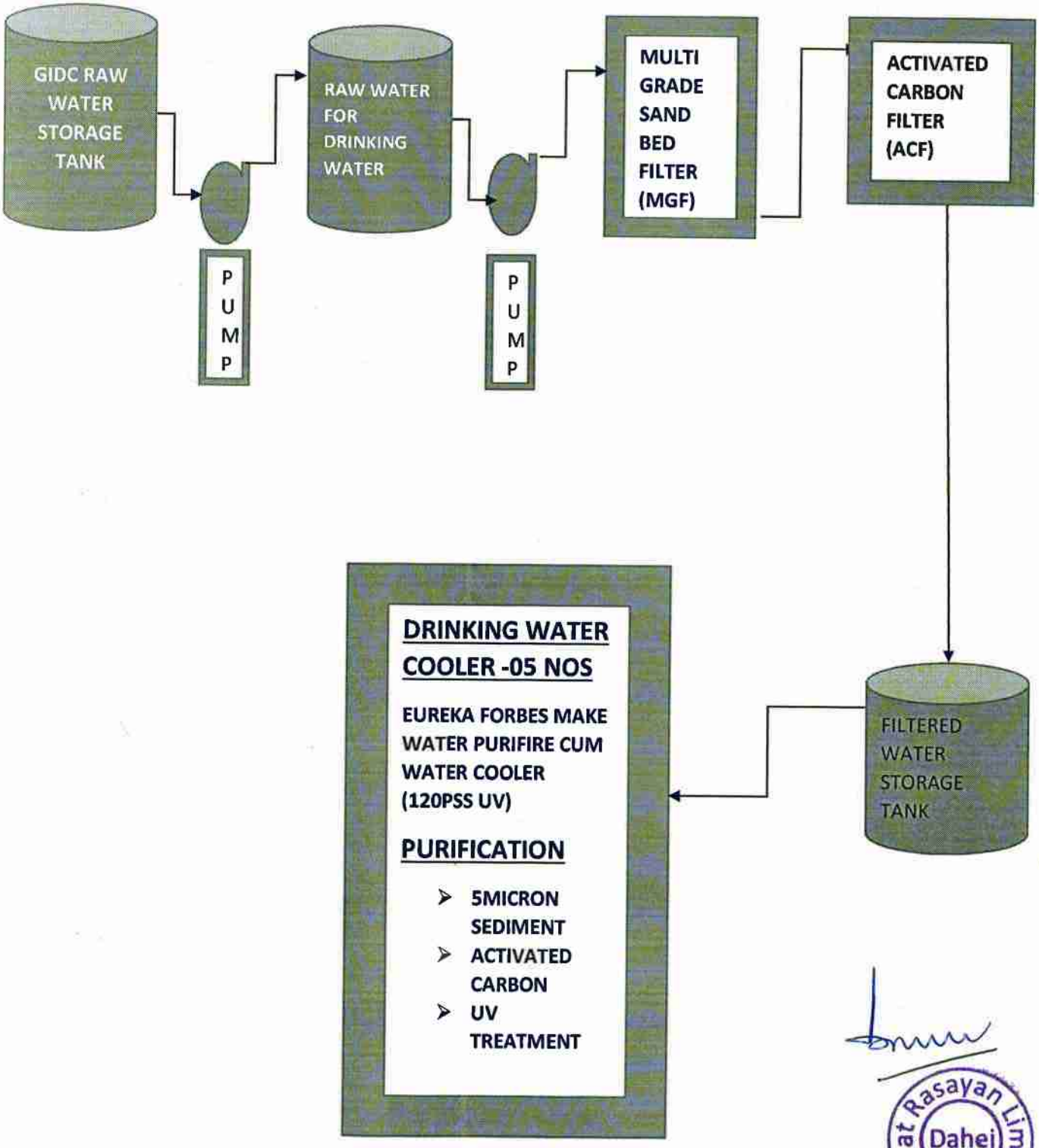
Water Balance Diagram



Bharat Rasayan Limited Dahej

Annexure-3

DRINKING WATER ARRANGMENT – BRL DAHEJ



Bharat Rasayan Limited Dahej

Siddhi Green Excellence
PRIVATE LIMITED

SIDDHI

TEST REPORT

REPORT NO. : SC/BRL/DW/JAN/2020/06 Date of Issue : 10-01-2020

Issued to	**M/s. BHARAT RASAYAN LIMITED**
Address	PLOT NO. 42/4, GIDC DAHEJ, DAHEJ, TAL. VAGRA, DIST. BHARUCH-392 130

Sample detail	**Sample 4**	Total No. of samples received	**4**
Type of sample	Drinking Water	Date of Sampling	04-01-2020
Sample ID	14869-DW-01	Date of Receipt	06-01-2020
Sample Qnty & packing	1 L & Sealed	Date of Analysis start	06-01-2020
Sample by	Mr.Arun Rana	Date of Completion	09-01-2020
Sampling Location	Canteen		

Sampling Plan & Sampling Method Used : Lab document SC/LAB/01 (Issue No. : 01 Issue Date : 01-08-2018 Revision No:00)

SR.NO.	PARAMETERS	UNIT	TEST METHOD	INDIAN STANDARDS : 10500 (2012)	RESULTS Sample 4
1.	pH	-	IS3025 (Part11):1983,RA2017	6.5 - 8.5	8.33 @ 26.0 °C
2.	Colour	pt./co.	APHA 23rd ed.2120 B	5.0	Colourless
3.	Turbidity	NTU	IS 3025 (Part 10):1984,RA2017	1.0	BDL(DL=0.5)
4.	Taste*	-	-	Agreeable	Agreeable
5.	Odour*	-	-	Agreeable	Agreeable
6.	TDS	mg/L	APHA 23rd ed. 2540 C	500	178
7.	TSS	mg/L	APHA 23rd ed. 2540 D	-	BDL(DL=10)
8.	Total Hardness	mg/L	APHA 23rd ed. 2340 C	200	112
9.	Chloride	mg/L	APHA 23rd ed. 4500 B	250	9
10.	Sulphate	mg/L	APHA 23rd ed.4500 $SO4^{-2}$ E	200	BDL(DL=10)
11.	Calcium	mg/L	APHA 23rd ed. 3500 Ca B	75	30
12.	Magnesium	mg/L	APHA 23rd ed. 3500 Mg B	30	BDL(DL=10)
13.	Residual Chlorine	mg/L	APHA 23rd ed. 4500 Cl B	0.2	BDL(DL=0.1)
14.	Fluorides	mg/L	APHA 23rd ed.4500F D	1.0	BDL(DL=0.5)
15.	Total Alkalinity	mg/L	IS 3025(Part 23):1986,RA2014	200	114
16.	Nitrate	mg/L	IS 3025(Part 34):1988,RA2014	45	0.8
17.	Copper	mg/L	APHA 23rd ed. 3111 B	0.05	BDL(DL=0.05)
18.	Iron	mg/L	IS3025(Part 53):2003,RA2014	0.3	BDL(DL=0.1)
19.	Phenolic Compound	mg/L	APHA 23rd ed. 5530 D	0.001	BDL(DL=0.0009)
20.	Zinc	mg/L	APHA 23rd ed. 3111 B	5	BDL(DL=0.2)

Additions to, deviations, or exclusions from the method :-None

Results from external providers, if any :- None

Any other remarks :-None

Abbreviations used :- BDL - Below Detection Limit, DL - Detection Limit

Verified by	Authorized Signatory
Mrs. Fatema M. Jadliwala (Technical Manager)	Mrs. Kuntal P. Shah (Quality Manager) Mr. Purvesh M. Shah (CEO & MD)

SIDDHI GREEN EXCELLENCE PRIVATE LIMITED

Notes : 1. Test results shall be referred to the tested sample(s) only and applicable parameter(s) only.

2. Permissible limits if mentioned in report are given by customer and included in the report upon request by customer.

3. Parameters not in scope of NABL accreditation for ISO 17025:2017 are shown with asterisk, certificates of accreditation are available on lab's website with period of validity.

4. The opinions and interpretations if mentioned in report are given upon request by customer and based upon material and information supplied by customer.

5. Perishable samples will be disposed after testing, for other samples, retention time is 15 days from the date of issue of test report, unless otherwise specified by customer or by applicable regulations

6. Laboratory has a complaint redressal system. Discrepancies if any in the test report must be brought to notice within 7 days of issue of test report.

7. This report shall not be used as evidence in the court of law and shall not be reproduced except in full, without prior written approval of Siddhi Green Excellence Pvt. Ltd.

***** End of Report *****

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" Grow More "

GUJARAT'S · Regd. Office : · Dahej Off. :

Bharat Rasayan Limited Dahej

Annexure 4

Intertek Intertek UKAS MANAGEMENT SYSTEMS 014 Intertek

Bharat RASAYAN LIMITED

WORKS : UNIT-II: Plot No. 42/4, Amod Road, GIDC, Dahej, District-Bharuch, Gujarat-392130, Ph.: +91-2641-291123, +91-2642-241100

BRL GST NO : 24AAACB4127A1ZJ

BRL/LOI/3D MODELLING/2019-20/66

Date: 18.01.2020

To,
M/s. Gexcon India.
RH 6, Mithila Residency,
Ram Indu Park,
Baner,
Pune-411045

Contact Person: Pratik Salunkhe

SUB: - 3D Modelling & Consequence Analysis Study for BRL Dahej site.

Dear Sir,

We are pleased to place LOI to you for below Work order study to be done at our BRL Dahej site (As Per mail dated 20.11.2019).

(Scope Of Work)

Sr. No.	Item Description	Qty	Unit Price (Rs.)	AMOUNT (Rs.)
1	Scope: 3D Modelling & Consequence Analysis Study using CFD Technology for Unit-II, Plot No. 42/4, Amod Road, GIDC Dahej, Tal.: Vagra, Dis.: Bharuch, Gujarat-392130 **Detail sope as per offer ref: Gexcon-19F-00030-P-1**	1	750000/-	7,50,000/-
APPROX TOTAL (Seven Lacs Fifty Thousand only/-)				7,50,000/-

Protecting Prosperity

Bharat RASAYAN LIMITED

WORKS : UNIT-II: Plot No. 42/4, Amod Road, GIDC, Dahej, District-Bharuch, Gujarat-392130, Ph.: +91-2641-291123, +91-2642-241100

OTHER DETAILS AS PER offer dated 20.11.2019

Teams & Condition

- GST Tax as per government rules.
- **Payment Terms**:
- 40 % order value is to be paid along with Po
- 40 % of order value to be paid after submission of Draft Report
- 20 % of order value is to be paid after submission of Final Report.

Special Note:
Draft report will be issued on or before 15.03.2020 after receipt of all required document from BRL side as per Project Need list & the confirmed Purchase order by BRL Side.

GEXCON shall make the presentation at MOEF Whenever required.

Final report will be delivered within 1 week after GexCon got all the required document from BRL side.

Travelling, lodging and boarding expenses to visit plant / office / meeting shall be arranged by BRL /reimbursed and invoiced separately.

For, BHARAT RASAYAN LIMITED.

Bharat Rasayan Limited Dahej

[Authorized Signatory]

18/01/2020

Protecting Prosperity

CIN : L24119DL1989PLC036264
Regd. Off. : 1501, Vikram Tower, Rajendra Place, New Delhi - 110008
Ph. : +91-11-43661111 (30 lines) • Fax : +91-11-43661100, 41538600
E-mail : info@bharatgroup.co.in • Website : www.bharatgroup.co.in

Annexure 5

PHOTOGRAPHS FOR VOCs CONTROL SYSTEM

GAS SCRUBBER SYSTEM WITH PHE & SPIRAL CONDENSER AT PLANT (-20^{0}C BRINE)

CLOSED VACUUM SYSTEM CONNECTED TO EJECTOR CT

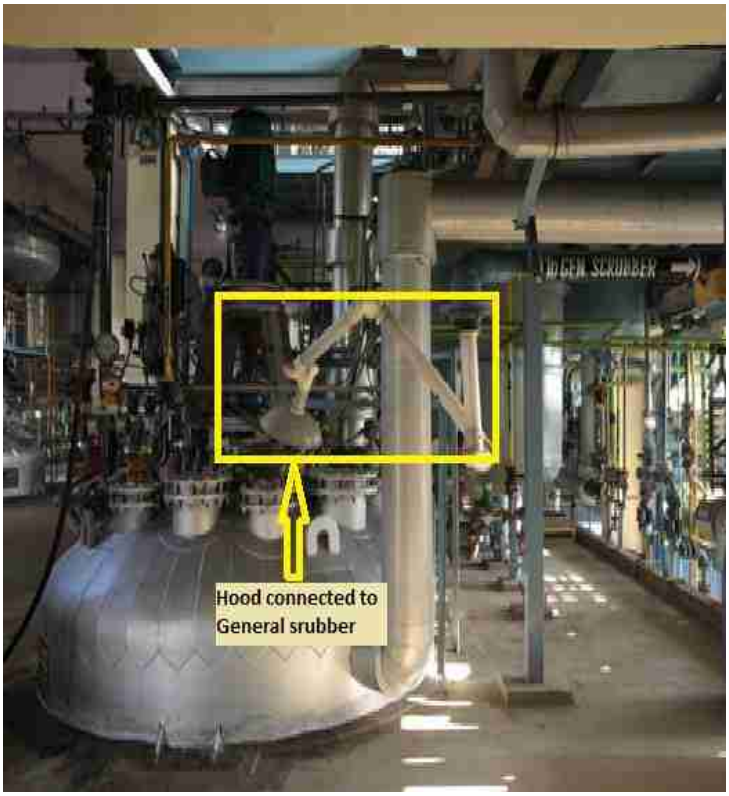
DRY VACUUM SYSTEM WITH AFTER CONDENSER FOR SOLVENT RECOVERY

CLOSED EJECTOR SYSTEM WITH SPIRAL CONDENSER

CLOSED EJECTOR SYSTEM WITH SPIRAL CONDENSER

VACUUM HOOD CONNECTED WITH DRAINING POINT

VACUUM HOOD OF GENERAL SCRUBBER CONNECTED TO REACTOR CHECK POINT



VACUUM HOOD CONNECTED WITH SAMPLING POINT

Annexure 5

PHOTOGRAPHS FOR VOCs CONTROL SYSTEM

PRIMARY, SECONDARY & TERTIARY CONDENSERS

BRINE STORAGE TANK FOR BRINE CIRCULATION IN SECONDERY & TERTIARY CONDENSER

CHILLED BRINE REFRIGERATION PLANT (-20°C)/(-30°C)

PRIMARY & SECONDARY SCRUBBER AT ETP FOR ODOR CONTROL

SCRUBBER HOOD CONNECTED WITH ETP TANKS FOR ODOR CONTROL

DEODORANT SPRAY SYSTEM CONNECTED WITH ETP, HWS, PLANTS & BOUNDARY AREA

ANNEXURE- 6

ODOR CONTROL MEASURES			
Sr. No.	**Area**	**Source of Odor**	**Control Measures Taken**
1	All Plants	Intermediate tank vents.	All vents are closed & connected to scrubber system.
2		Drum Packing area.	Closed room are provided for packing drums with connected general scrubber hoods
3		Plant Effluent gutter line and collection pits.	Plant inside effluent gutter line and collection pits are covered with sheet and we have installed Automated deodorant spray system on the Effluent collection pits of all plants
4		Distillation system	Dry Vacuum pumps are used for distillation. Vent of DVP after condensers are connected to scrubbers. Additionally to avoid VOC/Odor, we have installed closed vacuum system with -20^{0}C Brine
5		Sampling of Intermediate samples	We have provided closed sampling system and connected to General scrubbers
6		Manual charging of powder materials	We have installed solid charging pumps in process for the addition of raw material.
7		Additional support to control VOCs	1.All solvent tanks are under nitrogen blanketing for safety and environment consideration. 2. Spiral vent condensers with -20^0 C brine circulation are provided in solvent recovery. 3.Three stage packed column gas scrubbing system with PHE (plate heat exchangers and spiral vent condenser). 4.Dedicated tanks for fresh as well as recovered solvents are installed to minimize drum handling. 5.All the liquid chemicals are being procured in tankers/ISO tanks to avoid using drums. 6.Closed Ejector systems provided with online pH & temp. monitoring. 7.Online temp. monitoring of plant Utilities through DCS/PLC system.

Bharat Rasayan Limited Dahej

8	ETP	Odor in ETP Area / HW Storage area.	1. Equalization cum neutralization tanks are covered with FRP Hoods and connected to Primary &Secondary general scrubbers. 2. Haz.waste area is covered with Roof Shed & impervious flooring and timely disposed HW wastes to TSDF. 3. We have installed automatic (timer based) deodorant system and connected with ETP, MEE & HWs area, Plants as well as surrounding boundary towards Dahej village. 4. Installed 50 KL HDPE conical tanks to receive effluent from all plants & separation of solids 5. Strippers is provided to recover solvent from waste water.
9	Instrument	We are having latest ION Science Meter for VOCs monitoring with Bulb of approximate 110 probable VOC substances and time to time upgraded library by online software	

Bharat Rasayan Limited
Dahej

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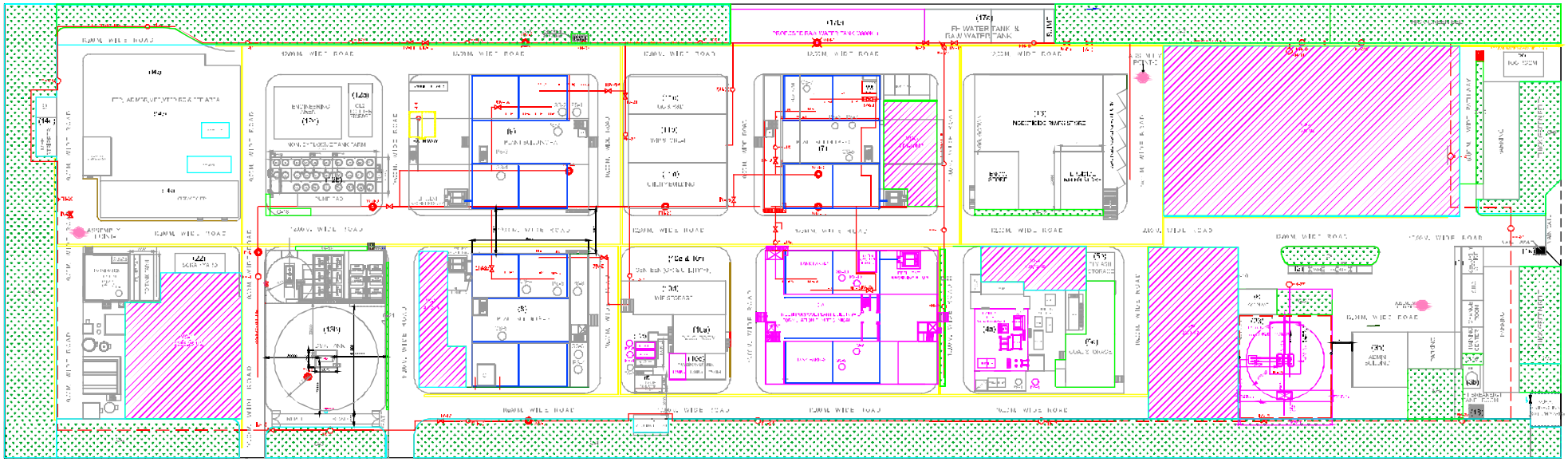
Annexure 7



PROPOSED LAY OUT OF PLAN (EC)
SCALE - 10M = 5.00M.

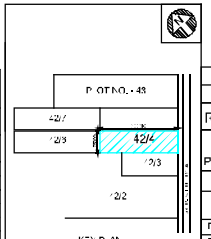
30.00 M. WIDE G.I.D.C. RAOD

30.00 M. WIDE G.I.D.C. RAOD

LEGEND		
1)	PLOT BOUNDARY	
2)	PROPOSED WORK	
3)	EXISTING WORK AREA	
4)	STORM WATER CHANNEL	
5)	GARLAND DRAIN	
6)	EFFLUENT RECEIVING SUMP	
7)	FIRE HYDRANT LINE	
8)	ASSEMBLY POINT	
9)	FLUE GAS STACK POINT	
10)	PROCESS STACK POINT	
11)	GENERAL SCRUBBER	
12)	INCINERATION STACK	
13)	GREEN BELT	
14)	VACANT SPACE	

VACANT SPACE FOR PROPOSED EXPANSION

Sr. No	AREA DESCRIPTION	AREA (M2)
VS-1	VACANT SPACE-1	2355.25
VS-2	VACANT SPACE-2	294.24
VS-3	VACANT SPACE-3	684.40
VS-4	VACANT SPACE-4	631.13
VS-5	VACANT SPACE-5	2280.00
VS-6	VACANT SPACE-6	7500.00
	TOTAL VACANT SPACE	14048.02



KEY PLAN
SCALE :- 1CM = 25.00M.

REV.	DESCRIPTION	DATE	REF.

BHARAT RASYAN LIMITED
PLOT NO. 42/4, AT :- INDUSTRIAL ESTATE, G.I.D.C. DAHEJ
JAY ENGINEERING SERVICES DAHEJ

TITLE :- PROPOSED PLAN (EC)

DRAWN BY :- HSD	CHECKED BY :- C.M.T	APPD.BY :- AKG	
DATE :- 14.09.18	DATE :- 14.09.18	SCALE :- 1:500	REV. 0

DRG.NO. :- BRL/PRO MoEF 01/18

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PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT

PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT

Annexure 8

GREEN BELT PHOTOGRAPHS WITHIN BRL

Green Belt near Admin area

Green Belt Near Main Gate

Front View of Green Belt

Green Belt All Around Boundary Wall Near Plant Area

Green Belt Near ETP All Around Boundary Wall

Green Belt near All Around Boundary Wall

Annexure 8

PHOTOGRAPHS OF ETP

ETP FRONT VIEW AREA

NEW SECONDARY ETP AREA

ETP FOR HIGH COD/TDS STREAMS

SECONDARY SYSTEM AT ETP

ADVANCED MEE FRONT AREA

DECANTER-FILTRATION AREA

Annexure 8

PHOTOGRAPHS OF HAZARDOUS WASTE STORAGE AREA

HWS STORAGE SHED & FRONT VIEW OF ETP

HWs STORAGE SHED

HWs STORAGE AREA FOR TSDF

RAW MATERIALS & FINISHED GOODS STORAGE AREA Annexure 8

RM-FG Yard

FG STORAGE AREA

RM GODOWN AREA

CHLORINE STORAGE YARD

PHOTOGRAPHS OF OTHER AREA

Annexure 8

NON EXPLOSIVE TANKFARM AREA

EXPLOSIVE TANKFARM AREA

PLANT-A FRONT AREA

PLANT-D AREA

UTILITY AREA

GENERAL PLANT VIEW

M/s. Bharat Rasayan Limited (Unit-II)
Project site: At Plot No. 42/4, Amod Road, Dahej-I GIDC Industrial Estate, Dahej – 392 130, District - Bharuch, State -Gujarat, India
Baseline Study Period: 1st January, 2019 to 31st March, 2019 (Analysis results of Borewell/Openwell)

Analysis results of Borewell / Openwell by M/s. Siddhi Green Excellence Pvt. Ltd., Ankleshwar during baseline study period.

Sr. No.	Parameters	Unit	CPCB Class B - Outdoor bathing (Organized)	Analysis results of Gro				
			Permissible limit	Ambheta openwell	Jolva	Vadadla	Dahej	Janiad
1	pH	-	6.5 - 8.5	8.5 @ 26.9 °C	8.1 @ 27.7°C	8.3 @ 28.2°C	8.5 @ 29.4°C	8.7 @ 28.8°
2	Color	Hazen units	NS	<5	5	5	10	10
3	Electrical Conductivity (EC)	µsm/cm	NS	1808	5526	824	4684	1694
4	Total Dissolved Solids (TDS)	mg/l	NS	1274	3892	498	3045	1068
5	Total Suspended Solids (TSS)	mg/l	NS	BDL	80	30	130	21
6	Turbidity	NTU	NS	BDL	BDL	BDL	BDL	BDL
7	Chemical Oxygen Demand (COD)	mg/l	NS	20	35	18	28	20
8	Biochemical Oxygen Demand (BOD) - 3 days (27° C)	mg/l	≤3	BDL	17	BDL	BDL	BDL
9	Total Alkalinity (as CaCO3)	mg/l	NS	364	815	185	439	397
10	Total Hardness (as CaCO3)	mg/l	NS	388	586	132	264	121
11	Calcium (Ca^{+2})	mg/l	NS	57	46	18	50	22
12	Magnesium (Mg+2)	mg/l	NS	60	115	21	34	16
13	Carbonate as CaCO3	mg/l	NS	33	0	30	68	34
14	Bicarbonate as CaCO3	mg/l	NS	331	815	155	371	363
15	Chlorides (Cl-1)	mg/l	NS	353	773	128	671	160
16	Sulphates (SO4-2)	mg/l	NS	30	348	12	155	28
17	Sodium (Na+)	mg/l	NS	295	850	88	725	270
18	Potassium (K+)	mg/l	NS	43	295	16	38	27
19	Fluoride	mg/l	NS	1.1	0.9	0.7	0.9	1
20	Arsenic	mg/l	NS	BDL	BDL	BDL	BDL	BDL
21	Hexavalent Chromium	mg/l	NS	BDL	BDL	BDL	BDL	BDL
22	Iron	mg/l	NS	BDL	BDL	BDL	BDL	BDL
23	Aluminium as Al	mg/l	NS	BDL	BDL	BDL	BDL	BDL
24	Copper	mg/l	NS	BDL	BDL	BDL	BDL	BDL
25	Lead	mg/l	NS	BDL	BDL	BDL	BDL	BDL
26	Zinc	mg/l	NS	BDL	BDL	BDL	BDL	BDL
27	Cadmium (as Cd)	mg/l	NS	BDL	BDL	BDL	BDL	BDL
28	Mercury (as Hg)	mg/l	NS	BDL	BDL	BDL	BDL	BDL
29	Nickel	mg/l	NS	BDL	BDL	BDL	BDL	BDL
30	Manganese (Mn)	mg/l	NS	BDL	BDL	BDL	BDL	BDL

M/s. Bharat Rasayan Limited (Unit-II)
Project site: At Plot No. 42/4, Amod Road, Dahej-I GIDC Industrial Estate, Dahej – 392 130, District - Bharuch, State -Gujarat, India
Baseline Study Period: 1st January, 2019 to 31st March, 2019 (Analysis results of Borewell/Openwell)

Sr. No.	Parameters	Unit	CPCB Class B - Outdoor bathing (Organized)	Analysis results of Gro				
			Permissible limit	Ambheta openwell	Jolva	Vadadla	Dahej	Janiad
31	Molybdenum	mg/l	NS	BDL	BDL	BDL	BDL	BDL
32	Ammonical Nitrogen	mg/l	NS	BDL	BDL	BDL	BDL	BDL
33	Nitrates	mg/l	NS	0.9	17.7	1.7	6.0	2.5
34	Total Phosphates	mg/l	NS	BDL	BDL	2	BDL	1
35	Phenol	mg/l	NS	BDL	BDL	BDL	BDL	BDL
36	Total coliforms	MPN/100ml	≤500	4	9	90	17	240
37	E.Coli	--	NS	Absent	Absent	Absent	Absent	Abser

NS : Not specified # BDL : Below Min. Detection Limit of Laboratory of Siddhi Green Excellence Pvt. Ltd.(SGEPL) – given in last c
Alkaline pH values indicate contribution from saline soil and ingress from sea. Exceeding BOD values may be from pipeline or o/h storage

M/s. Bharat Rasayan Limited (Unit-II)
Project site: At Plot No. 42/4, Amod Road, Dahej-I GIDC Industrial Estate, Dahej – 392 130, District - Bharuch, State - Gujarat, India

GREEN BELT PHOTOGRAPHS WITHIN BRL-Dahej site

Green Belt near Admin area

Green Belt Near Main Gate

Front View of Green Belt

Green Belt All Around Boundary Wall Near Plant Area

Green Belt Near ETP All Around Boundary Wall

Green Belt near All Around Boundary Wall

M/s. Bharat Rasayan Limited (Unit-II)
Project site: At Plot No. 42/4, Amod Road, Dahej-I GIDC Industrial Estate, Dahej – 392 130, District - Bharuch, State - Gujarat, India

Details of species planted in Green belt within premises

	Common name	**Scientific name**	**No. of species**
1.	Saru	Casuarina equisetifolia	4066
2.	Champa	Plumeria rubra	48
3.	Peltophorum	Peltophorum pterocarpum	323
4.	Ficus	Ficus benjamina	359
5.	Neem	Azadirecta indica	92
6.	Banyan	Ficus benghalensis	145
7.	Conocarpus	Conocarpus erectus	787
8.	Coconut tree	Cocos nucifera	180
9.	Karan	Nerium indicum	425
10.	Sisham	Dalbergia sisoo	31
11.	Gunda	Cordia dichotoma	122
12.	Kanji	Pterocarpus marsupium	220
13.	Piludi	Salvadora persica	43
14.	Koha/ Arjun tree	Terminalia Arjuna	14
15.	Cycus	Cycas revolute	36
16.	Ashoka	Polyalthia longifolia	55
17.	Kailashpati tree	Couroupita guianensis	5
18.	Arica Palm	Dypsis lutescens	41
19.	Ornamental plants and Other species	--	261
	Total		**7253**

(i) Consent to Establish was obtained by the M/s K. P. R. Industries (India) Ltd. from SPCB for the installation of plant on 24.05.2013 and project is under construction phase.

(ii) Consent to Establish was obtained by the M/s K. P. R. Industries (India) Ltd. for the installation of 9 products out of 14 products. The project came to standstill after completion of 35% of the civil and mechanical work due to financial constraints.

(iii) M/s Grasim Industries Ltd. took possession of the company on 19.02.2019 and obtained the letter for transfer of EC from MoEFCC vide letter no. J-11011/90/2011- IA II (I) dated 21.11.2019.

(iv) The project works have been revived, with due verification of the integrity of the existing structures/buildings, which were abandoned almost 5 years back. The project is scheduled to be executed by GIL in two phases, i.e. 9 products in first stage (by October, 2020) and rest 5 products in second stage (December, 2023).

(v) Looking into the preparedness and investment made for project; extension of the validity of the EC has been requested for another 3 years.

The Committee has made a detailed deliberation on the progress of the project and found to be satisfactory. The Committee after hearing the submissions of the project proponent and noting the preparedness for implementation of the project, has agreed to consider the request for extension of validity of EC. The Committee noted that the EC has been transferred in favour of the present applicant vide Ministry's letter dated 21st November, 2019.

The Committee, after detailed deliberations, has **recommended** for extension of validity of the environmental clearance dated 22nd March, 2013 till 22nd March, 2023, to complete the work as per the scope of the project, with all other terms and conditions remain unchanged.

Agenda No. 19.34

Expansion of agrochemicals and their intermediates manufacturing unit by M/s Bharat Rasayan Limited (Unit-II) at Plot No. 42/4, Amod Road, Dahej-I GIDC Industrial Estate, Dahej, District Bharuch, (Gujarat) - Consideration of Environmental Clearance

[IA/GJ/IND2/114039/2008, J-11011/961/2008-IA-II (I)]

Earlier the proposal was considered by the EAC in its meeting held on 23-25 October, 2019, wherein the EAC deferred the proposal for site visit by sub-committee of the EAC.

Based on recommendation of EAC and subsequent approval of the Ministry, a Sub-committee comprising of Dr. J P Gupta (Chairman, EAC) Dr. Uma Kapoor (Member, EAC), Dr. Tudi Indrasen Reddy (Member, EAC) and Dr. Saurabh Upadhyay (Scientist C, MoEF&CC) conducted the site visit on 12th January, 2020. The Sub-Committee during the site inspection suggested certain action and recommendation as under:-

Action suggested;

(i) Immediate installation of volatile recovery systems, up to 99.997%. This is being followed by other pesticides companies in India;
(ii) Existing facilities and expansion facilities needed to study Process Safety and Risk Management (PSMR) using advanced 3D modelling. All mitigation measures need to be implemented. Also, PSRM studies should include number of detectors and location of detectors;
(iii) Expansion should be designed and engineered by a competent and reputed company;
(iv) Forensic environment audit and energy audit, needed to be carried out;
(v) Environment department has to be restructured. Environment Scientists/ Environment Engineers should be employed. This department should directly report to CMD of the company;
(vi) As subsoil water is with high TDS, green belt cannot be grown. Company should undertake to plant at least 2 lakhs trees on both side of highway. Also, the entire plantation has to be maintained for a period of ten years.
(vii) To save water, rain harvesting is extremely important for site with enough vacant land. Company will have storage tank of at least 2 lakh liters with RO and ZLD facilities. Purified water will be used for process operations and other activities.

Recommendations of Sub-Committee

The Sub-committee was of the opinion that the unit has enough space for proposed expansion and as the project proponent has already submitted the action taken report in respect of partly complied points to Ministry's Regional office at Bhopal. Accordingly, the Sub-committee is hereby recommending the EAC to take decision for grant of environmental clearance to the project for expansion of Agrochemicals and its Intermediates manufacturing unit submitted by M/s Bharat Rasayan Limited with the condition as under:

(i) Cutting of trees shall be avoided during construction activity.

(ii) Underground tank shall be constructed to store the collected rain water from the roof tops and reduce the fresh water demand accordingly.

(iii) A ETP efficiency study shall be carried out & its recommendations shall be implemented.

(iv) The green belt shall be enhanced with proper development plan.

(v) Adequate Scrubbers shall be used to control the process emission and installation of volatile recovery systems, up to 99.997%.

(vi) Automatic charged system shall be used for hazardous raw material feeding.

(vii) Noise monitoring shall be carried out on a weekly basis all around the periphery of the unit & records maintained.

(viii) Proper risk management system shall be followed by using Process Safety and Risk Management (PSMR) using advanced 3D modelling. All mitigation measures need to be implemented. Also, PSRM studies should include number of detectors and location of detectors;

(ix) Gas Detectors should be installed in processing area.

(x) Forensic environment audit and energy audit shall be carried out.

(xi) Company will have storage tank of at least 2 lakh liters with RO and ZLD facilities. Purified water will be used for process operations and other activities.

The proposal was further considered by the EAC in its meeting held on 13-15 April, 2020 has considered the site inspection report submitted by the sub-committee and deferred the proposal for the present and suggested that the proposal may be placed only after submission of certification from the RO, MoEFCC. The EAC has also suggested that the Regional Office of the Ministry may be requested to provide the certification for further appraisal by the EAC.

Now the Regional office of the Ministry has forwarded the Action taken report vide email dated 15th April, 2020. The EAC found the same to be satisfactory.

The project proponent and their accredited consultant M/s. Siddhi Green Excellence Pvt. Ltd. made a detailed presentation through Video Conferencing (VC) on the salient features of the project.

During deliberations the EAC noted the following:

The proposal is for environmental clearance to the project for expansion of agrochemicals and their intermediates manufacturing unit from 12300 to 29200 TPA by M/s Bharat Rasayan Limited (Unit-II) in an area of 105106.75 sqm at Plot No. 42/4, Amod Road, Dahej-I GIDC Industrial Estate, Dahej, District Bharuch, (Gujarat).

Details of existing and proposed products are as under:

	Name of Product	**CAS No.**	**Existing (TPA)**	**Proposed (TPA)**	**Total (TPA)**	**End Use**	**LD 50 – Oral (Rat) mg/kg**	**Remarks**
1.	2,4-D-Ethyl Ester	533-23-3	0	700	700	Weedicide	650 – 800	New Product
2.	4-acetyl-2-methylbenzoic acid (AMBA)	55860-35-0	0	50	50	Inter-mediate	>300 (Mouse)	New Product
3.	Atrazine	1912-24-9	0	400	400	Herbicide	2220	New Product
4.	Azoxystrobin Technical	131860-33-8	0	200	200	Fungicide	>2000	New Product
5.	Bispyribac Sodium salt	125401-92-5	0	200	200	Herbicide	2635	New Product
6.	Butachlor Technical	23184-66-9	0	1000	1000	Herbicide	1740	New Product
7.	Carfentrazone-ethyl	128639-02-1	0	50	50	Herbicide	5143	New Product
8.	Cartap Hydrochloride	15263-52-2	0	300	300	Insecticide	250	New Product
9.	Cypermethric acid chloride (CMAC)	52314-67-7	0	2000	2000	Inter-mediate	>600	New Product
10.	Isopropyl 5-chloro-4-Methyl-2-nitrobenzoate (CMNBP)	1204518-43-3	0	100	100	Inter-mediate	>500	New Product

11.	Cymoxanil Technical (98%)	57966-95-7	0	300	300	Fungicide	1100	New Product
12.	3,6-dichloropyridazin-4-ol (DCHD)	2779-81-9	0	100	100	Inter-mediate	>200 (Fish)	New Product
13.	Deltamethrin Technical	52918-63-5	0	300	300	Insecticide	>5000	New Product
14.	Fenoxaprop-P-ethyl	71283-80-2	0	200	200	Herbicide	3150 – 4000	New Product
15.	Fenpropathrin Technical (90% min)	64257-84-7	0	150	150	Insecticide	1000 (Skin & Eye)	New Product
16.	Halosulfuron-methyl	100784-20-1	0	50	50	Herbicide	8866	New Product
17.	2-hydroxy propyloxymine hydrochloride (HPOA HCl)	950595-72-9	0	100	100	Inter-mediate	>300 (Mouse)	New Product
18.	Icaridin	119515-38-7	0	15	15	Insecticide	4743	New Product
19.	Imibenconazole	86598-92-7	0	100	100	Fungicide	2800	New Product
20.	Isofetamid	875915-78-9	0	100	100	Fungicide	1302 – 6690	New Product
21.	Lambda Cyhalothric Acid	72748-35-7	0	1000	1000	Inter-mediate	980	New Product
22.	M,N,O-1,2 dimethyl-N-nitrosourea	255708-80-8	0	100	100	Inter-mediate	>500	New Product
23.	Paclobutrazol	76738-62-0	0	50	50	Plant growth regulator	1300	New Product
24.	Penoxsulam	219714-96-2	0	100	100	Herbicide	>5000	New Product
25.	Picoxystrobin Technical	117428-22-5	0	50	50	Fungicide	>5000	New Product
26.	Pymetrozine	123312-89-0	0	100	100	Insecticide	>5000	New Product
27.	Pyrithiobac Sodium	123343-16-8	0	50	50	Herbicide	3300	New Product

28.	Spiromesifen Technical	283594-90-1	0	50	50	Insecticide	>2500	New Product
29.	Thifluzamide	130000-40-7	0	170	170	Fungicide	>6500	New Product
30.	Thiodicarb Technical (94%)	59669-26-0	0	150	150	Insecticide	120	New Product
31.	Thiophanate-methyl	23564-05-8	0	200	200	Fungicide	6640	New Product
32.	Tolfenpyrad	129558-76-5	0	50	50	Insecticide	260 – 386	New Product
33.	Topramezone	210631-68-8	0	50	50	Herbicide	>2000	New Product
34.	Zeta Cypermethrin	52315-07-8	0	350	350	Insecticide	>5000	New Product
35.	Zineb	12122-67-7	0	200	200	Fungicide	1850 – 8900	New Product
36.	Dimefluthrin Technical	271241-14-6	0	15	15	Insecticide	>2000	New Product
37.	Meperfluthrin Technical	915288-13-0	0	8	8	Insecticide	>2000	New Product
38.	Pilot products**#**	--	0	100	100	--	--	New Product
39.	Acetamiprid Technical	135410-20-7	100	500	600	Insecticide	217	Expansion
40.	Alpha Cypermethrin Technical	67375-30-8	100	300	400	Insecticide	>2000 (Skin & Eye)	Expansion
41.	4-acetyl-2-methylbenzamide (AMBAD)	1095275-06-1	25	75	100	Inter-mediate	>300 (Mouse)	Expansion
42.	Bifenthrin Technical	82657-04-3	100	600	700	Insecticide	>2000 (Rabbit) (Dermal)	Expansion
43.	Chlorpyrifos-methyl Technical	5598-13-0	100	400	500	Insecticide	3000	Expansion
44.	Clodinafop Propargyl Technical	105512-06-9	250	50	300	Herbicide	1392	Expansion
45.	Cypermethrin Technical	52315-07-8	400	800	1200	Insecticide	7180	Expansion

46.	Chlorimuron Ethyl Technical (95%)	90982-32-4	10	15	25	Herbicide	4102	Expansion
47.	Diafenthiuron Technical	80060-09-9	300	500	800	Insecticide	2068	Expansion
48.	Propanil Technical	709-98-8	50	100	150	Herbicide	367	Expansion
49.	Diuron Technical	330-54-1	900	300	1200	Herbicide	3400	Expansion
50.	Difenoconazole Technical	119446-68-3	50	250	300	Fungicide	1453	Expansion
51.	3',5'-Dichloro-2,2,2-trifluoroacetophenone (DCAP)	130336-16-2	25	75	100	Inter-mediate	>300 (Mouse)	Expansion
52.	Ethion Technical	563-12-2	700	300	1000	Insecticide	1084	Expansion
53.	Fipronil Technical	120068-37-3	60	540	600	Insecticide	>2000 (Skin & Eye)	Expansion
54.	Fenpyroximate Technical	134098-61-6	15	10	25	Insecticide	245	Expansion
55.	Isoprothiolane Technical (96%)	50512-35-1	100	50	150	Fungicide	1190	Expansion
56.	Imidacloprid Technical	138261-41-3	250	350	600	Insecticide	410	Expansion
57.	Indoxacarb Technical	144171-61-9	20	80	100	Insecticide	268	Expansion
58.	Imazethapyr Technical (97%)	81335-77-5	50	50	100	Herbicide	>5000	Expansion
59.	Lambda Cyhalothrin Technical	91465-08-6	600	400	1000	Insecticide	632 – 696 (Skin & Eye)	Expansion
60.	m-Phenoxybenzaldehyde	39515-51-0	2200	90	2290	Inter-mediate	1222	Expansion
61.	Metsulfuron-methyl Technical	74223-64-6	20	10	30	Herbicide	>5000	Expansion

62.	Metribuzin Technical	21087-64-9	300	600	900	Herbicide	1100	Expansion
63.	Novaluron Technical	116714-46-6	10	90	100	Insecticide	>5000	Expansion
64.	Propargite Technical	2312-35-8	25	75	100	Insecticide	2800	Expansion
65.	Pendimethalin Technical	40487-42-1	600	400	1000	Herbicide	3956	Expansion
66.	Phenthoate Technical	2597-03-7	400	100	500	Insecticide	435	Expansion
67.	Permethrin Technical	52645-53-1	250	250	500	Insecticide	383	Expansion
68.	Pretilachlor Technical	51218-49-6	100	400	500	Herbicide	2200	Expansion
69.	Pyrazosulfuron-ethyl Technical (97%)	93697-74-6	25	25	50	Herbicide	>5000	Expansion
70.	Sulfosulfuron Technical	141776-32-1	20	30	50	Herbicide	>5000	Expansion
71.	Tricyclazole Technical	41814-78-2	200	100	300	Fungicide	250	Expansion
72.	Transfluthrin Technical	118712-89-3	60	90	150	Insecticide	>5000	Expansion
73.	Thiamethoxam Technical	153719-23-4	600	400	1000	Insecticide	1563	Expansion
74.	Tebuconazole Technical (93%)	107534-96-3	100	500	600	Fungicide	1700	Expansion
75.	Flumethrin Technical	69770-45-2	15	15	30	Insecticide	500 – 1000	Expansion
76.	Imiprothrin Technical	72963-72-5	8	12	20	Insecticide	2400	Expansion
77.	Metofluthrin Technical	240494-70-6	4	18	22	Insecticide	>2000	Expansion
78.	Flumethric Acid	88419-72-1	15	35	50	Inter-mediate	>5000	Expansion
79.	Propoxy Ethyl Chloride	42149-74-6	100	100	200	Inter-mediate	204	Expansion
80.	Fenvalerate Technical	51630-58-1	200	0	200	Insecticide	451	No change
81.	Hexaconazole Technical	79983-71-4	150	0	150	Fungicide	>2000 (Dermal)	No change

82.	m-Phenoxybenzyl Alcohol	13826-35-2	400	0	400	Inter-mediate	1496	No change
83.	Myclobutanil Technical	88671-89-0	15	0	15	Fungicide	1600	No change
84.	Prallethrin Technical	23031-36-9	25	0	25	Insecticide	640	No change
85.	Profenofos Technical	41198-08-7	200	0	200	Insecticide	358	No change
86.	Propiconazole Technical	60207-90-1	150	0	150	Fungicide	1517	No change
87.	Cloquintocet-mexyl Technical (Safener Technical)	99607-70-2	50	0	50	Herbicide	>2000	No change
88.	Temephos Technical	3383-96-8	50	0	50	Insecticide	1000	No change
89.	Triclopyr Technical	55335-06-3	50	0	50	Herbicide	630	No change
90.	Methanesulfonamide, N-(2-cyanophenyl)-1,1,1-trifluoro (TSBN)	53718-42-6	50	0	50	Intermediate	>300 (Mouse)	No change
91.	Amitraz Technical	33089-61-1	60	0	60	Insecticide	400	No change
92.	Bromobenzene	108-86-1	250	0	250	Inter-mediate	2383	No change
93.	Buprofezin Technical	69327-76-0	140	(-140)	0	Insecticide	2198	Discontinue
94.	Chlorpyrifos Technical	2921-88-2	910	(-910)	0	Insecticide	135 – 163	Discontinue
95.	Dichlorvos Technical	62-73-7	150	(-150)	0	Insecticide	435	Discontinue
96.	Glyphosate Technical	1071-83-6	50	(-50)	0	Herbicide	>5000	Discontinue
97.	Paraquat Technical	4685-14-7	43	(-43)	0	Herbicide	113	Discontinue
98.	Triazophos Technical	24017-47-8	100	(-100)	0	Insecticide	>2000 (skin & eye)	Discontinue
Total			**12300**	**16900**	**29200**			
Formulation Products								

1.	Pesticide Formulation (Solid)	6000	0	6000	--	--	No Change
2.	Pesticide Formulation (Liquid)	6000	0	6000	--	--	No Change
# Pilot products shall be carried out for the betterment of proposed products (Sr. No.1 to only. Hence, Total pollution load from Pilot products shall be disposed to common incinerat							

The project/activity is covered under category A of item 5 (b) 'Pesticides industry and pesticide specific intermediates (excluding formulations)' of the schedule to the EIA Notification, 2006 and requires appraisal/approval at Central level in the Ministry.

The Terms of References (TORs) for the Project has been issued by the Ministry vide letter dated 11th April, 2019. Public hearing is exempted as per para 7(i), III. Stage (3), (i)(b) of the EIA Notification, 2006, and in accordance with the Ministry's OM dated 27th April 2018, as the project site is located in the notified industrial area. It was informed to the Committee that this proposal was earlier considered in four EAC meetings held during October 2019, February 2020, April 2020 & this meeting and followed by site visit. The Sub-Committee, in its report recommended for consideration of project for grant of EC with certain actions/compliances.

Existing land area is 105106.75 sqm. No additional land area will be required. Industry has already developed greenbelt in an area of ~33.10 % i.e. 34792.00 sqm out of total area of the project. The estimated project cost is Rs.200 Crore (for expansion only) & existing investment is Rs.90.15 Crore. Total capital cost earmarked towards environmental pollution control measures is Rs.16 Crore and the Recurring cost (operation and maintenance) will be about Rs. 27.20 Crore per annum (for expansion only). Total Employment will be 850 Nos. persons as direct & 650 Nos. persons indirect after expansion. Industry proposes to allocate Rs. 1.5 Crore @ 0.75 % of project cost towards Corporate Environment Responsibility.

There are no National Parks, Wildlife Sanctuaries, Biosphere Reserves, Tiger/Elephant Reserves, Wildlife Corridors, rivers etc. within 10 km distance. Dahej Reserve Forest is covered at a distance of ~6 km towards West direction. Narmada Estuary is flowing at a distance of ~7 km towards South direction.

Ambient air quality monitoring was carried out at 10 locations including project site during January 2019 to March 2019 and the baseline data indicates the ranges of concentrations as PM10 (85-95 µg/m3), PM2.5 (33-45 µg/m3), SO2 (17-31 µg/m3) and NOx (26-33 µg/m3) (98th percentile values) respectively. AAQ modelling study for point source emissions indicates that the maximum incremental GLCs after the proposed expansion project would be 0.669 µg/m3, 5.717 µg/m3 and 2.343 µg/m3 with respect to PM10, SO2 and NOx. The resultant concentrations are within the National Ambient Air Quality Standards (NAAQS).

Total water requirement is 3122 m3/day of which fresh water requirement of 1512 m3/day will be met from GIDC supply. Industrial Effluent of 1815 m3/day will be treated through Effluent Treatment Plant (ETP) having Primary, Secondary & Tertiary Treatment, MEE and RO. 150 m3/day cooling tower blowdown will be treated through RO/Filtration and approx 130 m3/day RO permeate shall be used as makeup water for cooling tower. 20 m3/day RO reject shall be treated in MEE system. 800 m3/day industrial effluent will be treated through pre-treatment, stripper and MEE system. 760 m3/day MEE condensate and 865 m3/day industrial effluent shall be treated in ETP. 783 m3/day ETP treated effluent will be treated through RO, MEE and approximately 564 m3/day RO permeate and 209 m3/day MEE condensate shall be used as make-up water in Boiler. Treated effluent (837 m3/day) from ETP shall be passed through cartridge filter and 700 KLD shall be used for processing, APCM and washing purpose and 137 KLD shall be used as cooling tower make-up. Domestic effluent of 100 m3/day will be treated through Sewage Treatment Plant (STP).

Power requirement after expansion will be 7000 KVA including existing 2500 KVA and will be met from M/s. Dakshin Gujarat Vij Company Ltd. (DGVCL). Existing unit has 2 Nos. DG set of 750 KVA capacity of each, additionally 2 Nos. DG sets of 1500 KVA of each will be used as standby during power failure for proposed expansion. Existing 1 No. DG set of 750 KVA shall be discontinued after expansion. Stack (15 m Height) will be provided as per CPCB norms to the proposed DG Set.

Existing unit has Multi fuel boilers (1 No. 18 MT/h & 1 No. 12 MT/h standby) and Thermic Fluid Heaters (2 Nos. 4 Lakh kcal/h each - 1 operational + 1 standby). Additionally, Multi fuel boiler (1 No. 25 MT/h) and Thermic Fluid Heaters (2 Nos. 4 Lakh kcal/h each) will be installed. ESP shall be provided to Boilers and Bag filter shall be provided to Thermic Fluid Heaters with online CEMS on its stack (40 m height) for continuous monitoring. Natural gas OR Furnace Oil & Coal is used as Fuel for MFBs & TFHs, HSD is used as Fuel for DG Set and same will be used after expansion.

Ministry had issued EC earlier vide letter No. No. J-11011/961/2008-IA-II(I); dated 13th July, 2009 for manufacturing of agrochemicals manufacturing unit in favour of M/s Siris Crop Science Limited, the said EC further transferred in the name of M/s. Bharat Rasayan Limited (Unit-II) on 5th September, 2012 and amendment in EC granted for product mix change on 5th September, 2012. Further, the corrigendum granted on 10th January, 2013

The Certified report dated 2nd July, 2019 on the compliance status of the EC conditions has been forwarded by the Ministry's Regional Office at Bhopal. Further, the Regional office of the Ministry has forwarded the Action taken report on non/partial complied points vide email dated 15th April, 2020. The Committee deliberated the compliance repot and found in order.

The project proponent has submitted the point wise action plan in respect of points suggested by the sub-committee as under:-

Point No.	Action Suggested by EAC Committee	Action taken and measures
1	Immediate installation of volatile recovery systems, up to 99.997%. This is being followed by other pesticides companies in India.	The site is located in Dahej where the wind directions keep varying owing to coastal effects. Hence, odor generated at remote place is sometimes felt at other areas also, even when the source of odor is not nearby. We have carried out rigorous exercise to identify sources of VOC and odor at various sections of the plant and provided control measures to ensure maximum recovery of VOCs. Same approach shall be employed for new plant sections. Details are given herewith :- For process emission control, two stage scrubber systems consisting of packed columns with adequate height and intalox or saddle packings of PP or suitable resistant material are provided. The efficiency of scrubber systems is assured by – 1) Continuous Emission Monitoring System (CEMS) installed on process stack for HCl, SO2, Cl2, HBr, Br2, H2S, DMA. It is also planned to provide CEMS to new process stacks and connect it with server. 2) Scrubbing media analyzed for pH and concentration – daily – once 3) Manual stack monitoring — monthly by Third party recognized laboratory — quarterly by GPCB recognized Schedule I Environmental Auditor
2	Existing facilities and expansion facilities needed to study Process Safety and Risk Management (PSMR) using advanced 3D modelling. All mitigation measures need to be implemented. Also, PSRM studies should include number of detectors and location of detectors.	Consequence Analysis Study will be carried out by 3rd party M/s GEXCON-Pune as a 3D modelling will be carried out with CFD Technology. P.O. is already issued

3	Expansion should be designed and engineered by a competent and reputed company.	We shall appoint competent and experienced Project Engineering EPC company for expansion.
4	Forensic environment audit and energy audit, needed to be carried out.	Environment Audit is carried out every year by Schedule I Auditor. The recommendations and cleaner production suggestions from the audit are implemented with definite action plan and timeframe. For energy conservation and possibility of sources we have consulted Devki Energy Auditor to identify the streams to control Energy loss in terms of Utility-Power.
5	Environment department has to be restructured. Environment Scientists/ Environment Engineers should be employed. This department should directly report to CMD of the company.	We have restructured our Organogram of EHS and have submitted the same to EAC. It is also ensured that EHS personnel are having academic qualifications in the field of Environment and safety and they possess knowledge and information on site's EHS management system, Effluents and their treatment and recycling systems and components, stack emissions and their control mechanisms, work place environment air quality management, Monitoring of EHS, etc. EHS head reports directly to Chairman & Managing Director
6	As subsoil water is with high TDS, green belt cannot be grown. Company should undertake to plant at least 2 lakhs trees on both side of highway. Also, the entire plantation has to be maintained for a period of ten years.	Unit has planned to improve the soil quality of the greenbelt areas by filling new soil having proper composition and furnishing it with conditioners and micronutrients which can enhance the growth of greenbelt species. For this purpose management has allocated Rs. 50 lakh for carrying out the replenishment of soil at greenbelt areas. An annual budget of about 30 lakh is allocated for greenbelt maintenance. **<u>Plantation outside premises, on highways and at GIDC notified area</u>** Company is member of Dahej Industries Association (DIA) and as per district collector's initiative the company has participated in social forestry programmes of GIDC and Forest Department for tree plantation activities outside the premises at appropriate places in the nearby areas and elsewhere

		including Bharuch-Dahej State highway. Company is also committed to maintain planted trees. Proponent planted >700 trees on GIDC roads in consultation with GIDC & notified area.
7	To save water, rain harvesting is extremely important for site with enough vacant land. Company will have storage tank of at least 2 lakh liters with RO and ZLD facilities. Purified water will be used for process operations and other activities.	EIA consultant has identified following areas which can be studied for roof-top rainwater harvesting potential :- Estimated Total roof top area available for rain water harvesting is 5467.80 m2. Estimated rooftop rain water harvesting potential is ~1972000 litre per annum. For this purpose, we shall provide two nos. of underground tank of capacity 1 Lakh litres each to store rain water during monsoon and utilize it for process operations and other activities after sufficient purification through filter media

The project proponent has also submitted the action plan in respect of each recommendations given by the Sub-committee as under:-

S. No.	**Recommendations of Sub-Committee of EAC**	**Action Taken by the project proponent**
1.	Cutting of trees shall be avoided during construction activity.	We commit that no trees shall be cut during construction activity. We shall also take utmost care of existing trees and greenbelt areas.
2.	Underground tank shall be constructed to store the collected rain water from the roof tops and reduce the fresh water demand accordingly.	Estimated total roof top area available for rain water harvesting is 5467.80 m2. Estimated rooftop rain water harvesting potential is ~1972000 litre per annum. For this purpose, we shall provide two nos. of underground tank of capacity 1 Lakh litres each to store rain water during monsoon and utilize it for process operations and other activities after sufficient purification through filter media.

3.	A ETP efficiency study shall be carried out & its recommendations shall be implemented.	Unit has already engaged Schedule I Auditor for auditing of overall EHS system and this practice is continued for every year. The recommendations and cleaner production suggestions from the audit shall be implemented with definite action plan and timeframe. Company is also in process to engage expert from Institute like IIT and this work will be implemented within 90-120 days and recommendation will be implemented by unit.
4.	The green belt shall be enhanced with proper development plan.	About 7332 Trees are planted in company premises. Trees planted are of native species such as Neem, Sharu, Peltophorum, Champa, Ficus. An annual budget of about 3 lakh is allocated for greenbelt maintenance.
5.	Adequate Scrubbers shall be used to control the process emission and installation of volatile recovery systems, up to 99.997%.	For process emission control, two stage scrubber systems consisting of packed columns with adequate height and intalox or saddle packings of PP or suitable resistant material are provided. The efficiency of scrubber systems is assured by – 1) Continuous Emission Monitoring System (CEMS) installed on process stack for HCl, SO2, Cl2, HBr, Br2, H2S, DMA. It is also planned to provide CEMS to new process stacks and connect it with server. 2) Scrubbing media analyzed for pH and concentration – daily – once 3) Manual stack monitoring — monthly by Third party recognized laboratory — quarterly by GPCB recognized Schedule I Environmental Auditor

6.	Automatic charged system shall be used for hazardous raw material feeding.	Manual charging of powder materials is eliminated and we have installed solid charging pumps in process for the addition of raw material. For liquid raw materials, we have partially implemented installation of metering pumps which will be interlocked with reaction vessels to automatically stop as per required charging quantity and shall be fully implemented within 180 days .
7.	Noise monitoring shall be carried out on a weekly basis all around the periphery of the unit & records maintained.	Company shall procure in-house sound level meter for noise monitoring and carry out weekly noise level monitoring at strategic locations on all the periphery of the unit. Records of noise levels shall be maintained and corrective action if required shall be taken immediately. Presently ambient noise is measured every month – by third party laboratory and quarterly by Environmental Auditor. Noise levels at utility, boiler remain between 65 – 74 dBA on account of adequate acoustic enclosure.
8.	Proper risk management system shall be followed by using Process Safety and Risk Management (PSMR) using advanced 3D modelling. All mitigation measures need to be implemented. Also, PSRM studies should include number of detectors and location of detectors;	Consequence Analysis Study will be carried out by 3rd party M/s GEXCON-Pune as a 3D modelling will be carried out with CFD Technology. P.O. is already issued. PP reported that Proper risk management system shall be conducted by using Process Safety and Risk Management (PSMR) using advanced 3D modelling. PP reported that work order for Consequence Analysis Study on 3D modelling using CFD Technology has already given, however due to pandemic this study is awaited.
9.	Gas Detectors should be installed in processing area.	48 nos. gas detectors have already been installed and additional gas detectors if required shall be installed at strategic location at production plants, packaging areas and tankfarms within 120 days.

10.	Forensic environment audit and energy audit shall be carried out.	Environment Audit is carried out every year by Schedule I Auditor. The recommendations and cleaner production suggestions from the audit are implemented with definite action plan and timeframe. For energy conservation and possibility of sources we have consulted Devki Energy Auditor to identify the streams to control Energy loss in terms of Utility-Power.
11.	Company will have storage tank of at least 2 lakh liters with RO and ZLD facilities. Purified water will be used for process operations and other activities.	Purified water will be used for process operations and other activities. For collection of rooftop rainwater, we shall provide two nos. of underground tank of capacity 1 Lakh litres each to store rain water during monsoon and utilize it for process operations and other activities after sufficient purification through filter media.

EAC, after deliberation, insisted the following:

(1) During deliberations PP could not produce the PI Diagram as desired by the EAC committee to show the chilling systems installed at various locations which have been realizing toxic VOC in the environment. Also, VOC monitoring and detection systems not presented.
(2) PP also failed to submit a detailed risk management report by using Process Safety and Risk Management (PSMR) using advanced 3D modeling with location of detectors and number of detectors
(3) The industry being hazardous in nature and considering the recent Chemical Accident that took place in Visakhapatnam and other places, the PP can wait till the compliance of the above requirement.
(4) PP is making an excuse in the name of Pandemic and is unable to show any evidence of compliances as sought by the Sub-Committee and EAC- Industry -II and therefore the EC can not be recommended at this stage for risking the community and infrastructure.
(5) PP could not present how 33% greenery share with planted in light of very high TDS in the ground water.
(6) Committee suggested PP to present action taken on all the points indicated in the visit report.

(7) The Committee informed PP that the Visit report has been alarming needing closure of the factory and thus, the points indicated in the visit report has to be complied with in letter and spirit.

It was informed to the Committee that the Sub-Committee after visiting the site has made certain observation/actions to be compiled by the PP which was already deliberated in the earlier EAC meetings.

In view of the above, the Committee **deferred** the proposal.

The meeting ended with thanks to the Chair.

The EAC has appreciated the work of NIC Team for successful conduction of meeting through VC mode.

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