

ANNEXURE-4

F. No. 6/231/2017-PA(S)/1327-28
Govt. of India
Central Water Commission
Project Appraisal (S) Dte.

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7th Floor
Sewa Bhawan
R.K. Puram
New Delhi-110066
Dated:30.10.2017

✓ To,
The Chief Engineer
Kaleshwaram Project
1st floor, Jalasoudha Building
Hyderabad

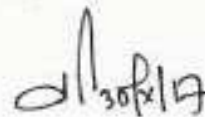
Sub: Kaleshwaram Project- Telangana

Ref: Hydrology(S) Dte letter No. CWC U.O 7/AP-93/2013-Hyd(S)/255 Dated: 30.10.2017

Sir,

Please find enclosed here-with the comments of Hydrology (South) Directorate,
CWC for necessary action please.

Encl: As above



(N. Mukherjee)
Director

Copy for information and necessary action please.

Director, Irrigation Planning (S), CWC, New Delhi.- with a copy along with 10 daily series
finalised by Hyd(S) for further needful.



Government of India
Central Water Commission
Hydrology (South) Directorate
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Subject: Detailed Project Report of Kaleshwaram Project, Telangana – reg.

Ref: No. (i) Lr No. CE/KPH/DCE/DEE-3/AEE-9/CWC/2017/1507 dated 12.09.2017
(ii) Meeting with WAPCOS dated 24.10.2017

With reference to above the Detailed Project Report of Kaleshwaram Project, Telangana has been further discussed during meeting and submitted for vetting/examination of hydrological aspects. The DPR has been scrutinized from hydrological angle & observations of this office are as under:

1. PROJECT PROPOSAL

The lift Irrigation scheme namely, Pranahita Chevella Lift Irrigation Scheme (PCLIS) was planned for irrigation of 16.4 lakh acres in seven districts of Telangana by diverting 160 TMC of water from Pranahita river at Tummidihatti. However, due to inter-state water issues and on other basis, the scheme is stated to be shifted to near Medigadda Village, below the point of confluence of Pranahita and Godavari River about 20 km downstream of confluence. The project is now renamed as Kaleshwaram Project.

The project envisages diversion of 180 TMC of water by constructing a barrage across River Godavari located at Medigadda near Kaleshwaram, Mahadevpur, Karimnagar District below the confluence of rivers Pranahita and Godavari. In addition to the barrage at Medigadda, two more barrages on River Godavari u/s of Medigadda to Sripada Rao Yellampally Project have been proposed, one at Annaram and other at Sundilla. The live storage capacities of Medigadda Barrage, Annaram Barrage and Sundilla Barrage are 457.9 MCM (16.17 TMC), 337 MCM (11.90 TMC) and 144.7 MCM (5.11 TMC) respectively. The water conveyance system consists of pumping from Medigadda Barrage to Annaram Barrage, Annaram Barrage to Sundilla Barrage and Sundilla Barrage to Sripada Rao Yellampally project. The water is proposed to be conveyed further to all beneficiary districts of projects viz., Karimnagar, Rajanna Sircilla, Siddipet, Medak, Yadadri-Bhongir, Nalgonda, Sangareddy, Nizamabad, Jagityal, Kamareddy, Nirmal, Medchal and Peddapally by a system of gravity canals, tunnels and lifts with online storages.

The total culturable command area (CCA) proposed to be covered is about 7,38,851 Ha (18,25,700 Acres) in districts of projects including of drinking water and industrial requirements to Hyderabad, Secunderabad and en-route villages. The project will also stabilize shortfalls in planned utilization, under SRSP Stage-I and Stage-II, flood flow canal, Singur Project and Nizam Sagar.

The project also envisages to facilitate restoration of the ground water levels to its original state by the way of shifting from usage of ground water for irrigation to usage of surface water and conjunctive use of ground water for the same.

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The entire project system has been divided into seven links:

- Link-I: From Medigadda Barrage on Godavari River to Sripada Yellampally Project
- Link-II: From Sripada Yellampally Project to Mid Manair Reservoir
- Link-III: From Mid Manair Reservoir to Upper Manair Reservoir
- Link-IV: From Mid Manair Reservoir to Konda Pochamma Reservoir
- Link-V: From Anicut to Chityala Mandal
- Link-VI: From Sri Komaravelly Mallana Sagar to Singur Reservoir
- Link-VII: (i) From SRSP Foreshore to Nizam Sagar Canals and to Dilwapur and Hangarga Village for Nirmal and Mudhole Constituency
(ii) From Sri Komaravelly Mallana Sagar to Bhoompally Reservoir

The total length of water conductor system is 1832 km comprising gravity canal of 1531 km, tunnel gravity canals of 203 km and pressure mains of 98 km. In order to effectively store and utilize the diverted water of Godavari, it is also proposed to form 20 en-route online storages. The number of lifts envisaged is 20 nos. The power and energy requirements of scheme are 4627 MW (13558 MU) respectively.

It is stated by project authorities that as per the interstate agreement under Godavari Water Dispute Tribunal Award (GWDTA), Telangana and Andhra Pradesh states is having share of 1480 TMC of water at 75% dependability.

2. WATER AVAILABILITY STUDY CARRIED OUT BY PROJECT AUTHORITY

The water availability at the project location is contributed by five sub-basins namely Pranahita, Penganga, Wardha, Maner and Middle Godavari of Godavari Basin. The net yield series at Kaleswaram Lift Irrigation has been assessed based on the individual yield contribution from Pranahita sub-basin (CA-61,819 sq km) as approved by CWC. The residual flows as observed at CWC sites namely Mancherla on Godavari and Somanpally on Maner river has been increased pro rata to assessed water availability at Middle Godavari sub-basin (CA-10,3667 sq km) and Maner sub-basin (CA-13,106sq km) respectively. The flows for Pranahita sub-basin, Middle Godavari sub-basin and Maner sub-basin are integrated on monthly basis to assess the water availability at Medigadda barrage near Kaleswaram site after accounting utilization between co-basin states for their ongoing and future projects. The net availability at Medigadda Barrage site has been worked out as **7993.5 MCM (282.3 TMC)**.

3. FINDINGS/OBSERVATIONS OF CWC

3.1 Water Availability

- (i) The water availability at the project location(Kaleshwaram) contributed by five sub-basins namely Penganga (G7) (CA-23854 sq km) , Wardha(G8) (CA-24016 sq km), Maner(G6) (CA-13106 sq km), Middle Godavari(G5)(CA-17189 sq km) and Pranahita(G9)(CA-61819 sq km) of Godavari Basin. The sub-basin wise water entitlement to party state has been given in the GWDT award. Accordingly, availability of water to Andhra Pradesh & Telangana have been worked out as per GWDT award. The yield series for five sub-basins and at various projects locations have been estimated using corresponding rainfall-runoff model for each sub-basin. Earlier, 10 daily yield series were prepared by this office for Pranahita- Chavelia Lift irrigation Scheme (PCLIS), in which the 10 daily surpluses were available for Penganga and Pranahita sub-basin for period from 1971-72 to 2011-12 . On basis of available 10 daily surplus for Penganga and Pranahita, yield series at Kaleshwaram Project has been worked out using following methodology:
- (ii) The gross yield for Pranahita sub- basin (CA-61819 sq km) at 75% dependability has been assessed as 22300.29 MCM. The monsoon yield has been estimated by rainfall-runoff yield model. The gross yield of Pranahita sub- basin has been worked out by adding non-monsoon yield in monsoon yield. Non-monsoon yield for Pranahita sub-basin has been adopted as 4.62% of monsoon yield. The upstream utilization of 15079.8 MCM and 566.4 MCM (20 TMC assumed utilization from proposed Pranahita Project) respectively has been deducted from annual yield to obtained surplus annual yield for each year. The surplus annual yield has been converted in 10 daily yields by using average distribution coefficient obtained from the observed discharge data of Asthi G&D site.
- (iii) The gross yield for Penganga sub- basin (CA-23854 sq km) at 75% dependability has been assessed as 4269.22 MCM. The monsoon yield has been estimated by rainfall-runoff yield model of Penganaga sub-basin. The gross yield has been worked out by adding non-monsoon yield in monsoon yield. Non-monsoon yield for Penganga sub-basin has been adopted as 3.97% of monsoon yield. The upstream utilization of 3362.5 MCM has been deducted from annual yield to obtained surplus annual yield for each year. The surplus annual yield has been converted in 10 daily yield by using average distribution coefficient obtained from the observed discharge data of P.G Bridge G&D site.
- (iv) There is no surplus available from Wardha, Maner and Middle Godavari sub-basin. Therefore, the 10 daily series of Pranahita and Penganga sub-basin has been added to get the yield series at Kaleshwaram Project. The 75% dependable net yield at Kaleshwaram Project for the given series is worked out in order of **8049.8 MCM (284.3 TMC)** from the period 1971-72 to 2011-12. The same may be utilized for further planning purpose of project. The brief details of 10 daily net yield series at Kaleshwarm Project is enclosed at **Annex-I**.

3.2 Design Flood

- (i) The proposed Sundilla Barrage Project (CA- 103482 sq km) and Annaram Barrage project (CA-17535 sq km) are situated about 30 km and 62 km respectively downstream of existing Yellampalli Barrage (CA- 101864 sq km) having PMF of 64937 m³/s assessed by CWC. The 100 year return period flood for Sundilla and Annaram barrages has been estimated as 29739 m³/s and 32731 m³/s respectively, based on flood frequency of Mancheril G&D site data (CA 102900 sq.km). The corresponding 500 year return period flood for Sundilla and Annaram barrages has been estimated as 38439 m³/s and 42250 m³/s respectively. Further, since Yellampally, Sundilla and Annaram Barrages are in cascade, hence, design flood for Sundilla and Annaram Barrages may be adopted as 64937 m³/s, which shall ensure safe passage of flood released from Yellampally barrage.
- (ii) The design flood at Kaleshwaram barrage site has been computed by the project authorities on the basis of annual peak discharge data at Perur G&D site (CA- 268200 sq km). The 1 in 100 year and 1 in 500 year return period flood computed at Perur G&D site using frequency analysis is about 74919 m³/s and 92860 m³/s respectively. The same has been transferred at Kaleshwaram barrage site using Dicken's formula. The 1 in 100 year and 1 in 500 year return period flood at Kaleshwaram Project site (CA-225652 sq km) worked out as **65816 m³/s** and **81576 m³/s** respectively. Considering the design flood of Yellampally barrage, and contributions from Pranahita river, the design flood for Kaleshwaram barrage may be adopted as **81576 m³/s**.

Enclosed: As Stated Above


(NITYA NAND RAI)
Director

Director, Project Appraisal (South) Directorate, CWC, New Delhi
CWC U.O 7/AP-93/2013-Hyd(S)/ 255 Dated 30.10.2017

10-daily Net yield series at Kaleshwaram Project

Sl.No	Year	Jun			Jul			Aug			Sep			Oct			Nov			Dec			Jan	
		10	20	30/31	10	20	30/31	10	20	30/31	10	20	30/31	10	20	30/31	10	20	30/31	10	20	30/31		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	1971-72	6.28	61.87	256.13	401.54	830.12	1020.63	1358.6	1574.31	1607.14	1279.98	753.55	474.72	349.61	213.13	197.67	88.87	49.77	56.58	47.4	29.21	24.03	23.16	19.99
2	1972-73	1.56	15.39	63.7	99.87	206.47	253.85	337.91	391.56	399.73	318.36	187.42	118.07	86.96	53.01	49.16	22.1	12.38	14.07	11.7	7.26	5.98	5.76	4.97
3	1973-74	20.7	271.88	834.61	960.49	1842.64	2462.81	3270.17	3618.26	3814.02	3238.54	1743.45	1361.27	97039	589.13	501.68	223.63	128.37	126.39	108	69.4	60.62	54.93	47.98
4	1974-75	4.88	56.05	198	269.71	540.85	688.05	914.93	1040.18	1075.94	880.42	499.24	345.26	250.51	152.43	136.14	60.99	34.52	36.96	31.2	19.56	16.51	15.5	13.44
5	1975-76	26.77	333.67	1081.66	1337.37	2617.48	3421.4	4545.94	5091.44	5321.53	4445.2	2448.94	1813.61	130255	791.55	688.07	307.38	175.36	179.22	153	96.8	83.27	76.65	66.75
6	1976-77	13.03	167.27	525.91	625.3	1210.83	1601.65	2127.34	2367.14	2485.38	2094.46	1139.66	868.48	621.21	377.3	324.33	144.72	82.84	82.98	71	45.22	39.22	35.79	31.22
7	1977-78	12.53	147.32	507.66	673.6	1342.3	1719.68	2286.27	2589.12	2685.4	2209.35	1243.35	875.69	633.62	385.41	341.73	152.97	86.76	91.77	77.8	48.83	41.42	38.68	33.59
8	1978-79	16.66	202.74	64.08	859.17	1694.97	2196.01	2918.55	3284.75	3421.57	2839.17	1578.82	1143.95	824.22	501.08	439.33	196.43	111.78	115.98	98.7	62.23	53.2	49.28	42.86
9	1979-80	5.73	66.4	232.32	313.33	626.83	799.55	1063.11	1206.87	1249.64	1024.64	579.36	403.45	292.42	177.91	158.46	70.96	40.2	42.84	36.3	22.72	19.21	18	15.62
10	1980-81	10.91	136.13	440.64	543.79	1063.77	1391.27	1848.52	2069.7	2163.7	1808.14	995.55	738.27	530.13	322.15	279.88	125.02	71.34	72.84	62.2	39.36	33.87	31.16	27.14
11	1981-82	16.75	200.17	678	882.71	1750.78	2254.76	2997.17	3384.41	3517.3	2905.36	1625.94	1160.5	838.02	509.61	449.48	201.09	114.23	119.74	101	63.97	54.45	50.66	44.03
12	1982-83	5.75	68.44	232.96	305	605.79	778.96	1035.49	1170.28	1215.51	1002.85	562.16	399.66	288.77	175.62	155.14	69.42	39.42	41.43	35.1	22.1	18.8	17.51	15.21
13	1983-84	26.91	369.59	1082.53	1161.9	2182.05	2986.29	3962.6	4328.53	4603.85	3975.72	2089.64	1720.87	1217.93	738.72	616.36	274.16	158.35	149.95	129	83.81	74.36	66.29	58.1
14	1984-85	2.84	27.99	115.86	181.64	375.51	461.69	614.57	712.15	727	579.01	340.87	214.74	158.15	96.41	89.41	40.2	22.51	25.59	21.4	13.21	10.87	10.47	9.04
15	1985-86	3.92	44.18	158.92	220.46	443.97	562.12	747.59	852.18	879.87	717.32	408.85	279.24	203	123.55	110.9	49.7	28.09	30.33	25.6	16	13.45	12.68	40.99
16	1986-87	10.12	110.81	411.16	587.67	1191.53	1497.26	1991.72	2279.97	2347.19	1902.24	1093.2	731.7	533.61	324.9	294.01	131.87	74.36	81.35	68.6	42.67	35.68	33.81	29.28
17	1987-88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	1988-89	26.22	360.3	1054.64	1130.83	2123.01	2906.53	3856.72	4212.05	4480.57	3870.23	2033.47	1675.93	1186	719.34	600.01	266.88	154.16	145.89	126	81.56	72.39	64.52	56.55
19	1989-90	12.41	173.28	498.77	520.55	968.7	1339.23	1776.56	1930.07	2060.7	1792.15	932.52	784.99	553.98	335.88	277.93	123.51	71.52	66.62	57.9	37.52	33.51	29.67	26.04
20	1990-91	26.58	362.24	1069.66	1162.76	2192.47	2987.18	3964.28	4340.81	4609.12	3967.77	2094.82	1708.25	1210.58	734.38	615.04	273.68	157.89	150.61	130	83.9	74.23	66.37	58.13
21	1991-92	2	29.89	80.14	73.49	130.48	190	251.69	266	289.58	260.75	129.05	120.72	84.09	50.89	40.5	17.92	10.51	9.01	7.9	5.28	4.87	4.17	3.68
22	1992-93	11.25	152.72	452.79	495.25	935.65	1272.05	1688.24	1850.74	1963.54	1687.75	829.99	724.73	513.92	311.79	261.6	116.43	67.13	64.26	55.5	35.74	31.57	28.27	24.76
23	1993-94	10.69	125.68	433.2	574.97	1145.84	1467.88	1951.5	2210.11	2292.22	1885.76	1061.34	747.34	540.77	328.93	291.68	130.56	74.05	78.34	66.4	41.68	35.35	33.02	28.67
24	1994-95	23.08	259.98	936.56	1301.17	2621.28	3317.62	4412.29	5030.65	5193.34	4232.64	2413.49	632.4	1197.31	728.74	654.39	293.29	165.75	179.05	151	94.42	79.38	74.81	64.85
25	1995-96	9.73	130.16	391.81	438.43	834.11	1125.23	1493.71	1644.39	1739.48	1486.91	792.93	1646.72	449.5	272.79	230.41	102.62	59.05	57.25	49.3	31.66	27.82	25.05	21.91
26	1996-97	5.79	87.44	231.73	207.5	364.94	537.03	711.2	747.5	816.95	740.61	362.97	349.39	240.71	145.65	115.07	50.87	29.89	25.23	22.4	14.89	13.82	11.76	10.41
27	1997-98	7.15	72.68	291.25	445.06	915.34	1131.95	1506.52	1740.03	1780.31	1424.56	833.26	533.65	391.95	238.86	220.04	98.87	55.47	62.42	52.3	32.36	26.74	25.65	22.16
28	1998-99	9.01	104.19	365.28	493.67	988.11	1259.67	1674.94	1902.02	1969	1613.8	913.03	634.89	460.27	280.04	249.57	111.77	63.3	67.53	57.2	35.8	30.26	28.36	24.61
29	1999-2000	16.3	193.25	659.98	867.15	1723.84	2214.44	2943.79	3328.8	3456.14	2489.31	1598.9	1133.86	819.57	498.46	440.76	197.24	111.96	117.88	100	62.85	53.41	49.78	43.25
30	2000-01	1.52	14.97	61.98	97.17	200.89	247	328.79	380.99	388.94	309.76	182.36	114.89	84.61	51.58	47.84	21.51	12.04	13.69	11.4	7.07	5.82	5.6	4.84
31	2001-02	12.17	147.66	492.18	629.14	1242.08	1607.92	2137.02	2406.25	2505.69	2077.88	1156.49	836.23	602.69	366.41	321.52	143.77	81.79	84.98	72.3	45.57	38.94	36.09	31.39
32	2002-03	14.14	205.19	567.21	551.69	1001.78	1423.07	1886.37	2019.87	2178.7	1930.1	978.03	871.21	610.44	369.77	299.57	132.82	77.42	69.05	60.5	39.68	36.06	31.36	27.63
33	2003-04	13.02	150.57	527.73	713	1427	1819.33	2419.1	2746.95	2843.77	2330.91	1318.63	917.12	664.86	404.51	360.47	161.44	91.43	97.53	82.6	51.71	43.7	40.97	35.55
34	2004-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	2005-06	15.79	197.72	637.7	783.49	1530.86	2004.81	2663.6	2980.15	3117.06	2607.41	143.64	1066.58	765.52	465.16	403.62	180.28	102.9	104.84	89.5	56.7	48.84	44.89	39.11
36	2006-07	13.34	182.75	536.82	573.78	1088.51	1487.33	1973.67	2157.78	2293.65	1978.49	1041.56	854.76	605.23	367.11	306.71	136.45	78.78	74.79	64.7	41.75	37.01	33.03	28.94
37	2007-08	6.44	72.49	261.3	363.27	731.93	926.21	1231.82	1404.59	1449.91	1181.54	673.85	459.56	334.16	203.39	182.67	81.87	46.27	49.99	42.2	26.36	22.16	20.89	18.1
38	2008-09	1.62	18.15	65.56	91.32	184.07	232.81	309.64	353.17	364.49	296.91	169.42	115.39	83.92	51.08	45.9	20.57	11.63	12.57	10.6	6.63	5.57	5.25	4.55
39	2009-10	4.78	47.07	194.85	305.47	631.5	776.43	1033.54	1197.64	1222.62	973.73	573.25	361.14	265.96	162.14	150.37	67.61	37.86	43.04	36	22.22	18.28	17.62	15.2
40	2010-11	17.56	229.37	708.1	821.32	1579.25	2105.43	2795.84	3097.71	3262.16	2764.85	1492.32	1158.36	826.52	501.78	428.26	190.95	109.53	108.3	93	59.36	51.76	46.98	41.03
41	2011-12	6.2	73.7	251.02	328.86	653.28	839.88	1116.48	1261.94	1310.62	1081.17	606.18	430.75	311.26	189.3	167.25	74.84	42.49	44.68	37.9	23.83	20.26	18.88	16.4

		Feb			Mar			Apr			May			Annual Total	Monsoon	Rank	Prob	Annual		Descendin g
30/31	10	20	30/31	10	20	30/31	10	20	30/31	10	20	30/31	in MCM	Total in MCM	Descending					
26	27	28	29	30	31	32	33	34	35	36	37	38	39							
20.78	24.08	17.56	12.22	11.64	10.43	9.85	6.61	5.98	6.23	5.74	5	4.24	10864.62	10378.99	1	0.023809524	36845.02	35240.4		
5.17	5.99	4.37	30.04	2.9	2.59	2.45	1.64	1.49	1.55	1.43	1.24	1.05	2702.25	2581.47	2	0.047619048	35513.87	33946.17		
48.18	51.58	38.99	27.2	25.38	23.31	21.31	14.4	13.09	12.69	11.74	11.03	9.57	26628.53	25479.33	3	0.071428571	32422.68	31036.58		
13.78	15.47	11.44	7.97	7.53	6.81	6.35	4.27	3.88	3.93	3.62	3.25	2.78	7372.44	7047.7	4	0.095238095	32407.25	31019.36		
67.64	74	55.38	38.61	36.24	33.05	30.49	20.56	18.67	18.48	17.06	15.7	13.53	36845.02	35240.4	5	0.119047619	31558.58	30209.62		
31.49	34.05	25.62	17.87	16.72	15.3	14.05	9.49	8.62	8.44	7.8	7.26	6.28	17285.38	16536.26	6	0.142857143	26628.53	25479.33		
34.32	38.28	28.4	19.79	18.66	16.92	15.74	10.59	9.61	9.68	8.93	8.06	6.91	18450.79	17640.5	7	0.166666667	24215.32	23154.2		
43.6	48.1	35.86	24.99	23.51	21.38	19.8	13.34	12.11	12.08	11.15	10.17	8.75	23610.45	22578.41	8	0.19047619	23771.02	22728.26		
15.99	17.91	13.26	9.24	8.72	7.9	7.36	4.95	4.49	4.54	4.19	3.77	3.22	8571.42	8194.29	9	0.214285714	23610.45	22578.41		
27.5	30.07	22.51	15.69	14.72	13.43	12.39	8.35	7.59	7.5	6.93	6.38	5.5	14984.07	14331.65	10	0.238095238	22754.17	21771.16		
44.89	49.82	37.04	25.81	24.32	22.08	20.49	13.8	12.52	12.55	11.59	10.51	9.02	24215.32	23154.2	11	0.261904762	21597.17	20657.32		
15.52	17.25	12.82	8.93	8.42	7.64	7.09	4.78	4.33	4.35	4.01	3.64	3.12	8363.34	7996.62	12	0.285714286	19502.19	18643.97		
57.79	60.42	46.18	32.23	29.9	27.66	25.04	16.96	15.44	14.62	13.54	13.04	11.4	32422.68	31036.58	13	0.30952381	18450.79	17640.5		
9.4	10.89	7.94	5.53	5.27	4.72	4.46	2.99	2.71	2.82	2.6	2.26	1.92	4914.66	4694.98	14	0.333333333	17285.38	16536.26		
11.28	12.72	9.39	6.54	6.19	5.59	5.22	3.51	3.18	3.24	2.99	2.67	2.28	6017.75	5752.16	15	0.357142857	17284.95	16529.15		
30.16	34.26	25.21	17.55	16.63	15	14.05	9.44	8.55	8.76	8.07	7.17	6.11	16005.68	15296.97	16	0.380952381	16143.73	15453.14		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
56.24	58.78	44.93	31.36	29.09	26.91	24.36	16.5	15.02	14.22	13.17	12.69	11.09	31558.58	30209.62	18	0.428571429	15748.89	15057.24		
25.8	26.7	20.5	14.31	13.24	12.29	11.08	7.51	6.84	6.41	5.94	5.79	5.07	14565.5	13945.29	19	0.452380952	15548.13	14892.97		
57.93	60.84	46.4	32.38	30.07	27.78	25.2	17.06	15.53	14.77	13.68	13.11	11.44	32407.25	31019.36	20	0.476190476	14984.07	14331.65		
3.58	3.51	2.76	1.93	1.76	1.66	1.47	1	0.91	0.81	0.75	0.78	0.69	2084.3	1997.29	21	0.5	14565.5	13945.29		
24.69	25.99	19.8	13.82	12.84	11.85	10.76	7.28	6.63	6.32	5.85	5.6	4.88	13795.07	13203.77	22	0.523809524	13795.07	13203.77		
29.3	32.68	24.24	16.89	15.93	14.44	13.43	9.04	8.2	8.26	7.62	6.88	5.9	15748.89	15057.24	23	0.547619048	13502.71	12908.48		
66.6	75.13	55.45	38.62	36.54	33.01	30.85	20.74	18.8	19.13	17.64	15.76	13.46	35513.87	33946.17	24	0.571428571	12186.22	11662.26		
21.92	23.25	17.65	12.32	11.47	10.56	9.62	6.5	5.92	5.69	5.26	4.99	4.34	12186.22	11662.26	25	0.595238095	12063.31	11525.46		
10.06	9.75	7.73	5.4	4.91	4.66	4.08	2.79	2.55	2.23	2.07	2.17	1.94	5901.09	5655.7	26	0.619047619	10864.62	10378.99		
22.98	26.49	19.36	13.48	12.82	11.5	10.85	7.28	6.59	6.84	6.3	5.51	4.68	12063.31	11525.46	27	0.642857143	9914.38	9476.69		
25.2	28.24	20.9	14.56	13.75	12.45	11.6	7.8	7.08	7.16	3.6	5.94	5.08	13502.71	12908.48	28	0.666666667	9017.13	8621.71		
44.14	49.1	36.47	25.41	23.95	21.73	20.19	13.59	12.33	12.39	11.44	10.35	8.88	23771.02	22728.26	29	0.69047619	8571.42	8194.29		
5.03	5.83	4.25	2.96	2.82	2.52	2.38	1.6	1.45	1.51	1.39	1.21	1.03	2629.31	2511.78	30	0.714285714	8363.34	7996.62		
31.93	35.26	26.28	18.31	17.23	15.67	14.51	9.78	8.87	8.86	8.18	7.46	6.41	17284.95	16529.15	31	0.738095238	8265.16	7895.72		
27.08	27.25	21.2	14.82	13.61	12.74	11.35	7.72	7.04	6.41	5.95	5.97	5.28	15548.13	14892.97	32	0.761904762	7372.44	7047.7		
36.39	40.78	30.19	21.03	19.86	17.98	16.76	11.27	10.22	10.34	9.54	8.57	7.34	19502.19	18643.97	33	0.785714286	6017.75	5752.16		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
39.6	43.24	32.39	22.58	21.18	19.33	17.82	12.02	10.92	10.78	9.96	9.18	7.92	21597.17	206537.32	35	0.833333333	4914.66	4694.98		
28.8	30.16	23.04	16.08	14.92	13.79	12.5	8.46	7.7	7.31	6.77	6.51	5.68	16143.73	15453.14	36	0.857142857	2702.25	2581.47		
18.59	20.98	15.48	10.78	10.2	9.22	8.61	5.79	5.25	5.34	4.93	4.4	3.76	9914.38	9476.69	37	0.880952381	2629.31	2511.78		
4.68	5.28	3.89	2.71	2.57	2.32	2.17	1.46	1.32	1.34	1.24	1.11	0.95	2491.88	2381.85	38	0.904761905	2491.88	2381.85		
15.81	18.32	13.36	9.3	8.86	7.93	7.5	5.03	4.55	4.74	4.37	3.8	3.22	8265.16	7895.72	39	0.928571429	2084.3	1997.28		
41.24	44.26	33.42	23.31	21.77	19.97	18.28	12.35	11.23	10.91	10.09	9.46	8.2	22754.17	21771.16	40	0.952380952	0	0		
16.73	18.6	13.82	9.63	9.08	8.24	7.65	5.15	4.67	4.69	4.33	3.92	3.37	9017.13	8621.71	41	0.976190476	0	0		

8049.8 MCM
284.3 TMC

7695.5 MCM
271.8 TMC