

NEXT DATE: 03.12.2021

**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI
ORIGINAL APPLICATION NO.164/2018**

IN THE MATTER OF:

ASHWANI KUMAR DUBEY

...APPLICANT

VERSUS

UNION OF INDIA & ORS

...RESPONDENTS

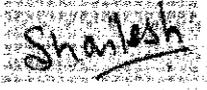
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Date: 01/12/2021

FILED BY:

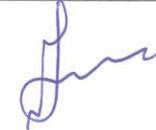
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MO.NO. 8447997954**


[SHAILESH MADIYAL]
Advocate for Respondent No.10
208, C.K. Daphtary Chamber
Supreme Court of India
New Delhi-110001

**RESPONSE OF THE VINDHYACHAL SUPER THERMAL POWER STATION LTD. [NTPC - VINDHYACHAL] TO THE FOURTH
QUARTERLY REPORT OF THE OVERSIGHT COMMITTEE**

S.N O.	OVERSIGHT COMMITTEE RECOMMENDATIONS IN ITS FIRST QUARTERLY REPORT(THERMAL POWER PLANTS)	RESPONSE OF THE VINDHYACHAL SUPER THERMAL POWER STATION LTD. [COMPLIANCE STATUS SUBMITTED AS ON 28.11.2021]
A.	The thermal power plants shall ensure that 100% fly ash utilization of the fly ash shall be ensured by them as per the Fly ash Notification.	Action plan to achieve 100 % ash utilization and the summary of the measures taken/planned to achieve the same is attached as Annexure-1 to this response.
B.	For the achievement of new emission norms, equipments like FGD, SCR/SNCR etc shall be got installed as per the time lines as notified vide G.S.R.243(E)dated31-03-2021.	<ul style="list-style-type: none"> • Contracts for the works have been awarded as required. • FGD installation work is in progress in all the Units (1-12). Progress of the work is as per Annexure-2 to this response. The same will be done within the timeline defined in the MoEF&CC notification dated 31-03-2021 [Environment (Protection) Amendment Rules, 2021]. The copy of the notification is annexed as Annexure-3 to this response. • Flue gas NOx limit has been achieved in the Unit 8, Unit 9, Unit 10 and Unit 12. Third Party sample analysis report to show the NOx limit is annexed as Annexure-4 to this response. Actions are being taken to achieve the limit in other Units too. Work is in progress to achieve the same before the timeline defined in the MoEF & CC notification dated 31-03-2021 [Environment (Protection) Amendment Rules, 2021]. Vide this notification, the timeline has been extended upto 31.12.2024 to comply with emission norms by category 'C' locations. The copy of the notification is annexed as Annexure-3 to this response.
C.	Fly ash dyke shall be monitored regularly for their strength through some reputed	<ul style="list-style-type: none"> • In order to ensure dyke stability and safety, detailed technical audit by external expert is being carried out on annual basis. • IIT - Roorkee had conducted dyke stability analysis of all 4 Shahpur dykes of NTPC

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organizations. The design should be safe and timely maintenance should be regularly ensured.

Vindhyachal in the year 2019. As per the report submitted, design and construction of the dykes was reported to be safe and no additional measures to enhance safety and stability of dyke were suggested. The true copy of the report of IIT-Roorkee is annexed as **Annexure-5** to this response. However, for V1 dyke, additional water escape structures in the form of spillways were suggested to take care of excessive rainfall conditions and the same have been incorporated in the design of the dyke and construction is completed. A photograph to show the same is annexed as **Annexure-6** to this response.

- IIT-Delhi has conducted a separate stability analysis of V2 dyke of NTPC Vindhyachal in the year 2020 and suggested some berm stabilization through rockfill strengthening of Starter dyke. Work is in progress to implement the same. Photographs to show the same are annexed as **Annexure-7** to this response.
- IIT-Hyderabad has conducted a comprehensive stability analysis of all Ash Dykes of Vindhyachal in 2020-21. The work included drone surveying and carrying out field tests of all dykes. The report is tentatively expected by 31.12.2021.
- Weekly inspection of all ash dykes is being carried out by inter-departmental team of NTPC Vindhyachal. Apart from this, daily monitoring in night is being done during the Monsoon period. These inspections are over and above the 24 hour patrolling being done in the dyke area through contractual manpower to monitor any abnormality. Any observations during these inspections are immediately attended.
- Robotic inspection of water escape structure and decanting pipelines for V-2 ash dyke has been carried out by M/s Digital Surveillance Inc. The wells were inspected internally by deploying a specially designed truss frame carrying a Pan Tilt Zoom camera with an objective to visually examine the condition of the well. The pipelines were inspected internally by deploying a robot equipped with video camera for visual inspection and sonar profiler for mapping ash accumulation. No major defect was observed in the inspection. The copy of the inspection report is annexed as

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		Annexure-8 to this response.
D.	Air borne fly ash from the ash dykes, specifically during summers should be controlled through arrangements of water sprinkling, vegetation and other scientific measure.	<p>Measures to control fugitive dust from ash dykes:</p> <ul style="list-style-type: none"> • 04 No of Fog Canons have been procured and are under commissioning (01 Fog Cannon has been commissioned). • 15 Eagle Sprinklers and 50 Garden Sprinklers in a HDPE Pipe Network of 500 Meters have been installed in the Baliyari Dyke. • 40 more automatic swiveling sprinklers have already been procured and procurement of another 200 is under progress. Installation is expected to be completed in the year 2021-22. • Procurement of additional 20 Km HDPE Pipes and Garden Sprinkling System for Fugitive Dust Suppression is in progress. Installation is expected to be completed in the year 2021-22. • Manual sprinkling through flexible hose pipes is being done in all the dykes. • Thin water film is maintained on top of all ash dykes that are in service to prevent fugitive dust emission.
E.	NTPC-VSTPS shall ensure that the disposal of the fly ash in the abandoned Gorbi mines shall be undertaken in an environmentally sound manner and necessary checks and balances as well as the monitoring of the surrounding ecosystem shall be ensured as outlined in the permission granted to it by MPPCB.	<ul style="list-style-type: none"> • Disposal of ash in GORBI mines has started w.e.f 30.06.2021 with concurrent monitoring of the groundwater in the surrounding areas. The water analysis report for the months of September, 2021 and October, 2021 is annexed as Annexure-9 to this response. • Necessary actions are being taken for compliance to other terms and conditions as specified in the MPPCB permission. The work is in progress to achieve the same.
F.	NPTC-Vindhyachal has reported completion of the dredging of the Rihand reservoir for the	<ul style="list-style-type: none"> • As per the recommendation, another round of dredging is proposed to be taken up in the month of August, 2022, once water in the Reservoir becomes high enough to support the activity. Contract proposal for the same will be initiated accordingly.



	removal of the ash flown into it due to breach of its ash dyke. However, as a measure of safety, the dredging pumps installed there should be operated regularly to ensure that no more traces of fly ash remain in the reservoir.	
G.	NTPC- Vindhyachal has completed the studies of making RCC wall around the ash dyke through IIT Roorkee/IIT Delhi and submitted the report, however, the conclusions that construction of RCC wall is neither technically feasible nor viable are subject to the final orders by Ld. NGT. Similarly, studies/action should be initiated for the construction of Ash mounds.	<ul style="list-style-type: none"> •Ash Mound construction is a highly specialized work that requires very minute detailing in design and construction, particularly with regard to the safety and environment aspects since sliding of ash during construction/stabilization period is a major risk. •NTPC itself does not have the requisite expertise in the area and the availability of outside agencies who have this kind of expertise in India is also very less. However, NTPC has been vigorously exploring all options for carrying out such a construction. Earlier, the complete work of ash mound and case study was offered to the known reputed institute/agency, namely M/s ATKINS, Bangalore, M/s Burns and Mcdonnell, M/s L&T, Sargent &Lundi, IIT-Roorkee and IIT-Delhi.Out of them, only IIT Delhi agreed for pilot construction after submission of GTI Investigations, rainfall data, Max. & min. flood level etc. •As per IIT Delhi proposal, pilotconstruction will again be followed by detailed analysis of data, construction methodology, sequencing of activities & finalization of specifications. In view of the long lead time in IIT-Delhi proposal, as recommended by NTPC's corporate office, NIT Rourkela has also been approached to take up the project since they are also competent to take up such work and their response is awaited. The copy of the mail to NIT Rourkela is annexed as Annexure-10 to this response.
H.	The CAAQMS to be installed by NTPC behind	•Installation of CAAQMS (Continuous Ambient Air Quality Monitoring System) work has been completed. Commissioning of CAAQMS is pending as electrical

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	the Trauma Center building of NTPC shall be completed within 2 months. NTPC shall ensure that apart from the regular parameters on line monitoring of Hg in ambient air shall also be ensured.	connection of required capacity is not available. Matter is being pursued with Madhya Pradesh Electricity Board ['MPEB'] and the Distt. Administration.
I.	The regular calibration of the CAAQMS and CEMS installed by the TPPs shall be ensured as per the prescribed frequency of calibration.	The same is being complied.
J.	As far as online continuous mercury monitoring in water is concerned, instead of continuous monitoring of mercury in water bodies like Suryanalla, Rihand reservoir etc., manually monitoring and analysis at least once in a month should be done and reported by NTPC till appropriate online Hg monitoring equipment is available.	Noted for compliance.

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S R 6573/21
Date 29/11/21

**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI
ORIGINAL APPLICATION NO. 164/2018**

IN THE MATTER OF:

ASHWANI KUMAR DUBEY

...APPLICANT

VERSUS

UNION OF INDIA & ORS.

...RESPONDENTS

AFFIDAVIT

I, Munish Kumar Jain, S/o Late Shri Madan Gopal Jain aged about 49 years, working as Additional General Manager (Environment Management), presently at NTPC Ltd-Vindhyachal Super Thermal Power Station, do hereby solemnly affirm and state as under:

1. That I am the Authorised Signatory of the Respondent No. ~~10~~ ¹⁰ herein in the abovementioned matter and as such I am well conversant with the facts and circumstances of the case and hence, I am authorised to swear to this affidavit.
2. That I have read and understood the contents of the accompanying response, which has been drafted under my instructions and the same are true and correct to my knowledge and belief.
3. That the Annexure ~~1-10~~ ¹⁻¹⁰ enclosed with the accompanying responses/are true copy of its/their original.

DEPONENT

DEPONENT

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NTPC Limited - Vindhyachal

VERIFICATION

Verified at Singrauli, M.P. on this 29 day of November, 2021. That the contents of my above affidavit from paras 1 to __ are true and correct to my knowledge and belief, no part of it is false and nothing material has been concealed therefrom.

DEPONENT

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NTPC Limited - Vindhyachal

Munish Kumar Jain
S/o Late Madan Gopal Jain
Additional General Manager
(Environment Management)
NTPC Limited - Vindhyachal
29 Nov 2021

BABU RAM JAISWAL
Oath Commissioner
Distt. Court Waikhan

Identified by
A.K. Jain
Advocate

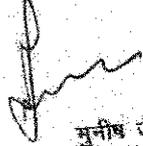
ANNEXURE A**ACTION PLAN FO 100% ASH UTILIZATION**

UOM: LMT

	2021-22	2022-23	2023-24	2024-25
Expected Ash Generation	88	88	88	88
Supply to Cement Plants through rail transportation including Export	5	10	18	23
Gorbi/Other Mines Filling	3	10	20	26
Utilisation in mixing with OB (OverBurden)	0	5	15	20
Waste land development	9	8	5	4
Brick Manufacturing & other Fly ash based industry	3	6	8	6
Road Construction	10	13	9	9
Ash Dyke Raising	8	8	4	0
Total Ash Utilisation	38	60	79	88
AU%	43%	75%	90%	100%

EXTERNAL SUPPORTS REQUIRED:

1. Implementation of demand side provisions of MoEF notification on fly ash utilization including mandatory use of fly ash bricks and OB (Over Burden) mixing with fly ash.
2. Development of requisite rail/road infrastructure to support ash evacuation from the region to ensure 100 % ash utilization.
3. Allotment of additional mine pits for Ash dumping.


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 NTPC Limited - Vindhyachal

Initiatives & Measures taken by NTPC Vindhyachal to improve ash utilization

1. NTPC Vindhyachal has successfully started backfilling of GORBI mine from 15.07.2021. The one pit of the mine currently allotted to NTPC Vindhyachal has the capacity to cater to the needs of VSTPS for 10 years if 75 % ash utilisation is achieved in other avenues.
2. Cement manufacturers are being given incentive for ash lifting from VSTPS to share the transportation cost and make it financially viable for them. Cement Manufacturers are also being pursued to set up Clinker Grinder Units in the area. UP Government is providing support/subsidies for setting up Cement grinding units. Similar support is solicited from Madhya Pradesh State Government/Authorities.
3. After constant follow-up with NHAI, a requirement of 10 Lac MT has been received from them for use in road construction in Varanasi area and ash supply through road transport is in progress. NTPC Vindhyachal is committed to provide ash to all projects under Pradhan Mantri Gramin Sadak Yojna and asset creation programmes of the Government involving construction of buildings, road, dams and embankments within 300 kms of the Plant as and when the requirement is received.
4. To meet the requirement of NHAI, Ash transportation by RCR mode (Road cum Rail mode) is also envisaged and a pilot project to transport 20,000 MT pond ash is underway. Tendering for the same was already done but since none of the vendors could meet the Qualifying Requirements, retendering is proposed in the month of December, 2021.
5. Infrastructure and facilities are being developed for start of ash transport through rail route to make the transportation economical and environment friendly. One rack of fly ash was transported to Star Cement, Assam in January, 2021. NTPC is procuring 3 rakes of BTAP wagons at a cost of approximately 60 crores. Two racks have already been delivered.
6. Direct rail loading facility for all the six units of stage 1 & both the units of stage 4 is under commissioning. One rack of fly ash has already been transported to RCCPL Ltd, Maihar by BTAP rake in October, 2021. Regular transport of ash through rail is likely to start in December, 2021.
7. 50 kg Ash Bagging Machines have been installed for transport of ash in bagged form to avoid fugitive dust. Jumbo Bagging Machine (3 Tonne) and Automatic Bagging Machine (1 Tonne) is also under procurement.
8. Ash Park has been set up at Rewa where fly ash transported in 50 kg bags from VSTPS is being made available to the ash based industries in the region.



9. Free of cost door step delivery of fly ash is being made to the ash based industries within 100 kms from the Plant.
10. Supply of fly ash to the ash based industries in 100 - 300 kms radius of the Plant on cost sharing basis is being done, as envisaged in the MoEF notification.
11. NTPC Vindhyachal is actively following up with Distt Administration for allotting any abandoned quarries which can be developed using ash. Ash filling in one no. of stone quarry allotted to NTPC Vindhyachal in Makrohar region has already been completed (approximately 90,000 MT of ash filling was done).
12. NTPC Vindhyachal is also doing free of cost land development using ash, as per CPCB guidelines, at various locations within 100 kms of Plant radius. Total ash utilization in these contracts is expected to be around 10 LMT this year.
13. NTPC Vindhyachal is making around 75,000 ash bricks/day for its own use. No red brick is used for any construction activity within Plant or the township.
14. NTPC Vindhyachal has been constantly requesting NCL (Northern Coalfields Limited) for mixing of fly ash with OB (Over Burden) as per the provisions of MoEF notification on Fly Ash but positive response from NCL has not been received. Appropriate directions may be passed by the NGT/Pollution control authorities in this regard.
15. NTPC Vindhyachal is in dialogue with leading consultants for technical studies and feasibility of construction of Ash Mound. IIT, Delhi has agreed to provide consultancy on one pilot project and scope of work for the same is under finalization. In view of the long lead time in IIT-Delhi proposal, NIT Rourkela has also been approached to take up the project since they are also competent to take up such work and their response is awaited.



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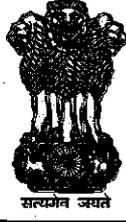
एनटीपीसी लिमिटेड
(भारत सरकार का उद्यम)
NTPC Limited
(A Govt. of India Enterprise)

विन्ध्याचल/ VINDHYACHAL

Annexure 2

FGD INSTALLATION WORK PROGRESS

Unit No.	% of work completed	Expected Commissioning
1, 2, 3	23	Sep'23
4, 5, 6	23	
7	23	
8	23	
9	58	June'23
10	58	
11	58	
12	58	



ANNEXURE-3

भारत का राजपत्र The Gazette of India

सी.जी.-डी.एल.-अ.-01042021-226335
CG-DL-E-01042021-226335

असाधारण
EXTRAORDINARY

भाग II—खण्ड 3—उप-खण्ड (i)
PART II—Section 3—Sub-section (i)

प्राधिकार से प्रकाशित
PUBLISHED BY AUTHORITY

सं. 192]
No. 192]

नई दिल्ली, बृहस्पतिवार, अप्रैल 1, 2021/चैत्र 11, 1943
NEW DELHI, THURSDAY, APRIL 1, 2021/CHAITRA 11, 1943

पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय

अधिसूचना

नई दिल्ली, 31 मार्च, 2021

सा.का.नि. 243(अ).—केन्द्रीय सरकार, पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 3, धारा 6 और धारा 25 द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए, पर्यावरण (संरक्षण) नियम, 1986 का और संशोधन करने के लिए निम्नलिखित नियम बनाती है, अर्थात् :-

1. (1) इन नियमों का संक्षिप्त नाम पर्यावरण (संरक्षण) संशोधन नियम, 2021 है।

(2) ये नियम राजपत्र में प्रकाशन की तारीख को प्रवृत्त होंगे।

2. पर्यावरण (संरक्षण) नियम, 1986 की अनुसूची-1, के क्रम संख्यांक 25 में, “*टीपीपी (इकाईयां) इस अधिसूचना के प्रकाशन की तारीख से दो वर्ष के भीतर सीमाओं को पूरा करेंगी”, अक्षरों, कोष्ठकों और शब्दों के स्थान पर, निम्नलिखित रखा जाएगा, अर्थात् :-

“(i) पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय, विद्युत मंत्रालय, केन्द्रीय विद्युत प्राधिकरण (सीईए) और केन्द्रीय प्रदूषण नियंत्रण बोर्ड के प्रतिनिधियों से मिलकर बने कार्य बल का गठन केन्द्रीय प्रदूषण नियंत्रण बोर्ड (सीपीसीबी) द्वारा सारणी-1 में यथाविनिर्दिष्ट तीन प्रवर्गों में सारणी-1 के स्तंभ (4) में यथाविनिर्दिष्ट समय सीमा के भीतर उत्सर्जन मानदंडों के अनुरूप होने के लिए उनकी अवस्थिति के आधार पर तापीय विद्युत संयंत्रों के प्रवर्गीकरण हेतु किया जाएगा, अर्थात् :-

सारणी-1

क्र.सं.	प्रवर्ग	अवस्थिति/स्थान	अनुपालन के लिए समय सीमाएं	
			निवृत्त नहीं होने वाली इकाईयां	निवृत्त होने वाली इकाईयां
(1)	(2)	(3)	(4)	(5)
1	प्रवर्ग क	10 लाख से अधिक जनसंख्या वाले राष्ट्रीय राजधानी क्षेत्र या शहरों की 10 किलोमीटर की परिधि के भीतर 1	31 दिसम्बर, 2022 तक	31 दिसम्बर, 2022 तक
2	प्रवर्ग ख	गंभीर रूप से प्रदूषित क्षेत्रों या गैर प्राप्ति शहरों की 10 किलोमीटर की परिधि के भीतर 2	31 दिसम्बर, 2023 तक	31 दिसम्बर, 2025 तक
3	प्रवर्ग ग	प्रवर्ग क और ख में सम्मिलित से भिन्न	31 दिसम्बर, 2024 तक	31 दिसम्बर, 2025 तक

1 भारत की 2011 की जनगणना के अनुसार।

2 सीपीसीबी द्वारा यथापरिभाषित।

(ii) सारणी-1 के स्तंभ (5) में यथाविनिर्दिष्ट तारीख के पूर्व निवृत्त होने के लिए घोषित तापीय विद्युत संयंत्र से, उस स्थिति में जहां ऐसे संयंत्र उनके निवृत्त होने के आधार पर छूट के लिए सीपीसीबी और सीईए को एक प्रतिज्ञान प्रस्तुत करते हैं, विनिर्दिष्ट मानदंडों को पूर्ण करने की अपेक्षा नहीं की जाएगी:

परन्तु ऐसे संयंत्रों से, उस स्थिति में जहां उनका प्रचालन प्रतिज्ञान में यथाविनिर्दिष्ट तारीख से आगे जारी रहता है, जनित विद्युत के प्रति यूनिट पर 0.20 रुपए की दर से पर्यावरण प्रतिकर उद्धृत किया जाएगा;

(iii) निवृत्त नहीं होने वाले तापीय विद्युत संयंत्र से, सारणी-1 के स्तंभ (4) में यथाविनिर्दिष्ट तारीख के पश्चात्, सारणी-2 में विनिर्दिष्ट दरों के अनुसार पर्यावरण प्रतिकर उद्धृत किया जाएगा, अर्थात् :-

सारणी-2

समय-सीमा से आगे गैर अनुपालन प्रचालन	पर्यावरणीय प्रतिकर (रुपए प्रति यूनिट जनित विद्युत)		
	प्रवर्ग क	प्रवर्ग ख	प्रवर्ग ग
0-180 दिवस	0.10	0.07	0.05
181-365 दिवस	0.15	0.10	0.075
366 दिवस और अधिक	0.20	0.15	0.10"

[फा.सं. क्यू-15017/40/2007-सीपीडब्ल्यू]

नरेश पाल गंगवार, संयुक्त सचिव

टिप्पण: मूल नियम, भारत के राजपत्र, असाधारण, भाग II, खंड 3, उपखंड (i) में अधिसूचना संख्या का.आ. 844(अ), तारीख 19 नवम्बर, 1986 द्वारा प्रकाशित किए गए थे और उनका अंतिम संशोधन अधिसूचना संख्या सा.का.नि. 662(अ), तारीख 19 अक्तूबर, 2020 द्वारा किया गया।

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 31st March, 2021

G.S.R. 243(E).—In exercise of the powers conferred by sections 3, 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules further to amend the Environment (Protection) Rules, 1986, namely:—

1. (1) These rules may be called the Environment (Protection) Amendment Rules, 2021.

(2) They shall come into force on the date of their publication in the Official Gazette.

2. In the Environment (Protection) Rules, 1986, in Schedule – I, in serial number 25 for letters, brackets and words “*TPPs (units) shall meet the limits within two years from date of publication of this notification”, the following shall be substituted, namely: -

“* (i) A task force shall be constituted by Central Pollution Control Board (CPCB) comprising of representative from Ministry of Environment and Forest and Climate Change, Ministry of Power, Central Electricity Authority (CEA) and CPCB to categorise thermal power plants in three categories as specified in the Table-I on the basis of their location to comply with the emission norms within the time limit as specified in column (4) of the Table-I, namely: -

Table-I

Sl. No.	Category	Location/area	Timelines for compliance	
			Non retiring units	Retiring units
(1)	(2)	(3)	(4)	(5)
1	Category A	Within 10 km radius of National Capital Region or cities having million plus population ¹ .	Upto 31 st December 2022	Upto 31 st December 2022
2	Category B	Within 10 km radius of Critically Polluted Areas ² or Non-attainment cities ²	Upto 31 st December 2023	Upto 31 st December 2025
3	Category C	Other than those included in category A and B	Upto 31 st December 2024	Upto 31 st December 2025

¹ As per 2011 census of India.

² As defined by CPCB.

(ii) the thermal power plant declared to retire before the date as specified in column (5) of Table-I shall not be required to meet the specified norms in case such plants submit an undertaking to CPCB and CEA for exemption on ground of retirement of such plant:

Provided that such plants shall be levied environment compensation at the rate of rupees **0.20** per unit electricity generated in case their operation is continued beyond the date as specified in the Undertaking;

(iii) there shall be levied environment compensation on the non-retiring thermal power plant, after the date as specified in column (4) of Table-I, as per the rates specified in the Table-II, namely:-

Table-II

Non-Compliant operation beyond the Timeline	Environmental Compensation (Rs. per unit electricity generated)		
	Category A	Category B	Category C
0-180 days	0.10	0.07	0.05
181-365 days	0.15	0.10	0.075
366 days and beyond	0.20	0.15	0.10.”

[F. No. Q-15017/40/2007-CPW]

NARESH PAL GANGAWAR, Jt. Secy.

Note: The principle rules were published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i) vide number S.O. 844(E), dated the 19th November, 1986 and lastly amended vide notification G.S.R. 662(E), dated the 19th October, 2020.



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EKO PRO ENGINEERS PVT. LTD.

Environmental Consultants and Analytical Laboratory
(An ISO 9001:2015 Certified Company)

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Contact No.: 9818405427, 9810240678, 8826344487 E-mail : email@ekopro.in, ekoproengineers@gmail.com, website : www.ekopro.in

TEST REPORT

Stack Emission Analysis

Test Report No. : EKO/136/011121

Issue Date : 05/11/2021

Issued To

: VINDHYACHAL SUPER THERMAL POWER STATION
Vindhya Nagar,
District - Singrauli
Madhya Pradesh

ANNEXURE -4

Sample Description : Stack (Boiler Emission)
 Sample Drawn on : 13/10/2021
 Sample Drawn by : EPEPL Representative
 Sampling Location : Unit - VIII
 Sampling Plan & Procedure : SOP-SE/09
 Source of Emission : Stack Attached To ESP
 Capacity : 500 MW
 Type of Stack : MS
 Remark (if any) : Stack Monitoring Kit

RESULTS

S. No.	Parameters	Test Methods	Results	Results (at 12% CO2 correction)	Units
1	Particulate Matter (as PM)	IS: 11255 (P-1)	71.0	-	mg/Nm ³
2	Sulphur Dioxide (as SO ₂)	IS: 11255 (P-2)	1126.0	1047.4	mg/Nm ³
3	Oxide of Nitrogen (as NOx)	IS: 11255 (P-7)	562.0	522.8	mg/Nm ³
4	Oxygen (O ₂)	IS: 13270	6.6	LIMIT IS 600 -	% V/V
5	Carbon Dioxide (as CO ₂)	IS: 13270	12.9	-	% V/V
6	Stack Gas Temp.	IS: 11255 (P-3)	130.0	-	°C
7	Exit Velocity of Gas	IS: 11255 (P-3)	22.38	-	m/sec
8	Moisture in flue gas	IS: 11255 (P-3)	8.6	-	%
9	Mercury	EKO/CHEM/SOP/FL-083	0.011	-	mg/Nm ³

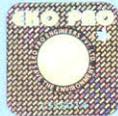
Remark- ND- Not Detected, LOD- Limit of Detection. (PM, SO₂ & Nox at 6% O₂ dry basis).

Notes :

- The results given above are related to the tested sample, for various parameters, as observed at the time of Sampling. The customer asked for the above tests only.
- This test report will not be generated again, either wholly or in part, without prior written permission of the Laboratory.
- The test report will not be used for any publicity/legal purpose.
- The test samples will be disposed off after 15 days from the date of issue of test report, unless until specified by the customer.
- Responsibility of the Laboratory is limited to the invoiced amount only.

**** End of Report ****

For EKO PRO ENGINEERS PVT. LTD.
PURNIMA CHAUHAN
 TECHNICAL MANAGER
 (Authorised Signatory)



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Contact : +91 - 9810243870

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Contact No.: 9818405427, 9810240678, 8826344487 E-mail : email@ekopro.in, ekoproengineers@gmail.com, website : www.ekopro.in

TEST REPORT**Stack Emission Analysis**

Test Report No. : EKO/137/011121

Issue Date : 05/11/2021

Issued To

: VINDHYACHAL SUPER THERMAL POWER STATION
Vindhya Nagar,
District - Singrauli
Madhya Pradesh

Sample Description : Stack (Boiler Emission)
Sample Drawn on : 14/10/2021
Sample Drawn by : EPEPL Representative
Sampling Location : Unit - IX
Sampling Plan & Procedure : SOP-SE/09
Source of Emission : Stack Attached To ESP
Capacity : 500 MW
Type of Stack : MS
Remark (if any) : Stack Monitoring Kit

RESULTS

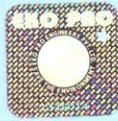
S. No.	Parameters	Test Methods	Results	Results (at 12% CO ₂ correction)	Units
1	Particulate Matter (as PM)	IS: 11255 (P-1)	43.0	-	mg/Nm ³
2	Sulphur Dioxide (as SO ₂)	IS: 11255 (P-2)	1098.0	998.2	mg/Nm ³
3	Oxide of Nitrogen (as NO _x)	IS: 11255 (P-7)	311.0	282.7	mg/Nm ³
4	Oxygen (O ₂)	IS: 13270	6.4 LIMIT 450	-	% V/V
5	Carbon Dioxide (as CO ₂)	IS: 13270	13.2	-	% V/V
6	Stack Gas Temp.	IS: 11255 (P-3)	129.0	-	°C
7	Exit Velocity of Gas	IS: 11255 (P-3)	22.75	-	m/sec
8	Moisture in flue gas	IS: 11255 (P-3)	8.3	-	%
9	Mercury	EKO/CHEM/SOP/FL-083	0.008	-	mg/Nm ³

Remark- ND- Not Detected, LOD- Limit of Detection. (PM, SO₂ & Nox at 6% O₂ dry basis).**Notes :**

1. The results given above are related to the tested sample, for various parameters, as observed at the time of Sampling. The customer asked for the above tests only.
2. This test report will not be generated again, either wholly or in part, without prior written permission of the Laboratory.
3. The test report will not be used for any publicity/legal purpose.
4. The test samples will be disposed off after 15 days from the date of issue of test report, unless until specified by the customer.
5. Responsibility of the Laboratory is limited to the invoiced amount only.

**** End of Report ****

For EKO PRO ENGINEERS PVT. LTD.
PURNIMA BHADHAN
TECHNICAL MANAGER
(Authorised Signatory)



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Contact No.: 9818405427, 9810240678, 8826344487 E-mail : email@ekopro.in, ekoproengineers@gmail.com, website : www.ekopro.in

TEST REPORT

Stack Emission Analysis

Test Report No. : EKO/138/011121

Issue Date : 05/11/2021

Issued To

: VINDHYACHAL SUPER THERMAL POWER STATION
Vindhya Nagar,
District - Singrauli
Madhya Pradesh

Sample Description

: Stack (Boiler Emission)

Sample Drawn on

: 18/10/2021

Sample Drawn by

: EPEPL Representative

Sampling Location

: Unit - X

Sampling Plan & Procedure

: SOP-SE/09

Source of Emission

: Stack Attached To ESP

Capacity

: 500 MW

Type of Stack

: MS

Remark (if any)

: Stack Monitoring Kit

RESULTS

S. No.	Parameters	Test Methods	Results	Results (at 12% CO2 correction)	Units
1	Particulate Matter (as PM)	IS: 11255 (P-1)	45.0	-	mg/Nm ³
2	Sulphur Dioxide (as SO ₂)	IS: 11255 (P-2)	1089.0	1029.0	mg/Nm ³
3	Oxide of Nitrogen (as NOx)	IS: 11255 (P-7)	324.0	306.1	mg/Nm ³
4	Oxygen (O ₂)	IS: 13270	6.7 LIMIT 450	-	% V/V
5	Carbon Dioxide (as CO ₂)	IS: 13270	12.7	-	% V/V
6	Stack Gas Temp.	IS: 11255 (P-3)	128.0	-	°C
7	Exit Velocity of Gas	IS: 11255 (P-3)	22.57	-	m/sec
8	Moisture in flue gas	IS: 11255 (P-3)	8.8	-	%
9	Mercury	EKO/CHEM/SOP/FL-083	0.011	-	mg/Nm ³

Remark- ND- Not Detected, LOD- Limit of Detection. (PM, SO₂ & Nox at 6% O₂ dry basis).

Notes :

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**** End of Report ****

For EKO PRO ENGINEERS PVT. LTD.

 PURNIMA CHAUHAN
 TECHNICAL MANAGER
 (Authorised Signatory)



Office & Laboratory : 32/41, South Side of G. T. Road, UPSIDC Industrial Area, Ghaziabad - 201 009 (Delhi-NCR) INDIA.
Contact No.: 9818405427, 9810240678, 8826344487 E-mail : email@ekopro.in, ekoproengineers@gmail.com, website : www.ekopro.in

TEST REPORT

Stack Emission Analysis

Test Report No. : EKO/140/011121

Issue Date : 05/11/2021

Issued To : VINDHYACHAL SUPER THERMAL POWER STATION
Vindhya Nagar,
District - Singrauli
Madhya Pradesh

Sample Description : Stack (Boiler Emission)
Sample Drawn on : 25/10/2021
Sample Drawn by : EPEPL Representative
Sampling Location : Unit - XII
Sampling Plan & Procedure : SOP-SE/09
Source of Emission : Stack Attached To ESP
Capacity : 500 MW
Type of Stack : MS
Remark (if any) : Stack Monitoring Kit

RESULTS

S. No.	Parameters	Test Methods	Results	Results (at 12% CO2 correction)	Units
1	Particulate Matter (as PM)	IS: 11255 (P-1)	42.0	-	mg/Nm ³
2	Sulphur Dioxide (as SO ₂)	IS: 11255 (P-2)	1059.0	992.8	mg/Nm ³
3	Oxide of Nitrogen (as NO _x)	IS: 11255 (P-7)	369.0	345.9	mg/Nm ³
4	Oxygen (O ₂)	IS: 13270	6.5 LIMIT 450	-	% V/V
5	Carbon Dioxide (as CO ₂)	IS: 13270	12.8	-	% V/V
6	Stack Gas Temp.	IS: 11255 (P-3)	128.0	-	°C
7	Exit Velocity of Gas	IS: 11255 (P-3)	22.61	-	m/sec
8	Moisture in flue gas	IS: 11255 (P-3)	8.9	-	%
9	Mercury	EKO/CHEM/SOP/FL-083	0.012	-	mg/Nm ³

Remark- ND- Not Detected, LOD- Limit of Detection. (PM, SO₂ & Nox at 6% O₂ dry basis).

Notes :

1. The results given above are related to the tested sample, for various parameters, as observed at the time of Sampling. The customer asked for the above tests only.
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**** End of Report ****

For EKO PRO ENGINEERS PVT. LTD.
* PURNIMA CHAUHAN *
TECHNICAL MANAGER
(Authorised Signatory)



भारतीय प्रौद्योगिकी संस्थान रुड़की
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

सिविल अभियांत्रिकी विभाग
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रुड़की – 247 667, उत्तराखण्ड, भारत
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Tele/फोन : 01332-284319, 285219

E-mail/ई-मेल : civil@iitr.ac.in

Dr. N. K. Samadhiya
Professor
samadhiyank@gmail.com
nksamfce@iitr.ac.in

No. CED/GTE/NKS/ 2611

Dated November 26, 2019

To,
Er. Vinod Kumar Mauriya
Dy. General Manager (PE-Civil)
NTPC, Engineering Office complex,
Plot No. A-8A, Sector-24, Post Box No. 13
NOIDA (UP) 201301

Sub: Evaluation Report of Structural design of Ash Dykes (Lagoons V-1, V-2, V-3A, V-3B, V-4A & V-4B) of Vindhyachal STPS (6x210+2x500+2x500+2x500+1x500MW)

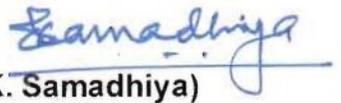
Dear Sir,

Please find attached herewith the report entitled "Evaluation Report of Structural design of Ash Dykes (Lagoons V-1, V-2, V-3A, V-3B, V-4A & V-4B) of Vindhyachal STPS (6x210+2x500+2x500+2x500+1x500MW)".

Please feel free to write for any queries.

Thanking you,

Yours faithfully


(N. K. Samadhiya)

Evaluation Report

of

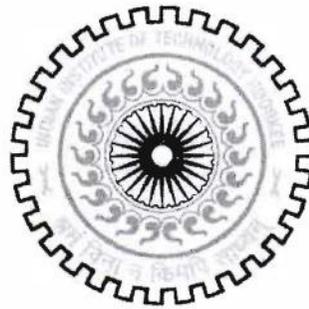
**Structural design of Ash Dykes
(Lagoons V-1, V-2, V-3A, V-3B, V-4A & V-4B)
of Vindhyachal STPS (6x210+2x500+2x500+2x500+1x500MW)**

N K Samadhiya
Professor

Submitted to

M/s NTPC Limited

EOC Noida, U.P.



**Department of Civil Engineering
Indian Institute of Technology
Roorkee – 247 667**

November, 2019

EVALUATION REPORT OF STRUCTURAL DESIGN OF ASH DYKES (LAGOONS V-1, V-2, V-3A, V-3B, V-4A & V-4B) OF VINDHYACHAL STPS (6x210+2x500+2x500+2x500+1x500MW)

N. K. Samadhiya

Professor, Department of Civil Engineering, IIT Roorkee

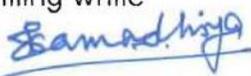
1.0 INTRODUCTION

Er. Prabhat Kumar, Manager (O&M-Civil) NTPC Ltd. VSTPS, Vindhyachal, Madhya Pradesh vide e-mail dated October 22 2019 requested Prof N K Samadhiya, Department of Civil Engineering, Indian Institute of Technology (IIT) Roorkee to Evaluate/Vet the Design and Drawing of Six Ash Dykes (V1, V2, V3A, V3B, V4A and and V4B) of NTPC VSTPS. The proposal was given by Dr. N.K. Samadhiya, Professor, Department of Civil Engineering, IIT Roorkee vide letter No. CED/GTE/NKS/2310 dated October 23, 2019. The acceptance of the proposal was communicated by AGM (CS), NTPC, SSC-VSR station vide Purchase Order No. 4000229511-026-1018 Dated 28.10.2019. Further, the details of in-house Design & drawings of the Starter dyke and raisings (Lagoons V-1, V-2, V-3A, V-3B, V-4A & V-4B) were furnished by Er. Vinod Kumar Mauriya, DGM (PE-Civil), NTPC, EOC, Noida vide their letter No. CC:PEC:2220/2240/2250:01 dated 05.11.19. A site visit was also done by IIT Roorkee team from 14th to 16th Nov'19 for assessing the site conditions of above dykes.

This report is based on the observations at site and the data provided by NTPC, Noida.

2.0 GENERAL

The ash generated from the power plants is disposed-off in the Ash ponds. Unlike water reservoir, the dyke embankments for ash pond are generally not constructed upto ultimate height in one go and initially constructed upto a limited height with provision of subsequent raising as per requirement. Ash pond is divided into lagoons and provided with garlanding arrangements for changeover of the ash slurry feed points for even filling of the pond and for effective settlement of the ash particles. Having two or more storage lagoon facilitates sequential raising of lagoons by putting one lagoon for ash filling while


N. K. Samadhiya
Ph.D.
Professor
Department of Civil Engineering
Indian Institute of Technology
Roorkee-247 667, U.K., INDIA

the other lagoon is used for raising its dyke. Overflow lagoon helps in controlling the effluent quality of the supernatant, which is recycled back to plant for making ash slurry.

NTPC's Vindhyachal Super Thermal Power Station (6x210+2x500+2x500+2x500+1x500MW) is 2 kilometres from Shakti Nagar Railway Station and located in Vindhyachal, District Singrauli of Madhya Pradesh Bihar. The ash disposal areas of Vindhyachal STPS is located in earthquake Zone-III as per IS: 1893.

3.0 EVALUATION OF STRUCTURAL DESIGN OF NTPC

3.1 General Arrangement

The scheme for ash disposal of VSTPS envisages storage lagoons namely V-1, V-2, V-3A, V-3B, V-4A & V-4B for storing ash (fly ash & bottom ash) to be discharged in slurry form. The two storage lagoons have one common over flow lagoon (OFL) to collect decanted water for recirculation back to plant. The lagoons V-1, V-2, V-3A, & V-3B having total area (including OFL) of about 1560 acres is located in Shahpur area and lagoons V-4A & V-4B having total area (including OFL) of about 500 acres is located in Baliyari area.

Ash disposal areas are designed as multi-lagoon systems with minimum two storage lagoons and one over-flow lagoon. Overflow lagoon helps in controlling the effluent quality of the supernatant, which is recycled back to plant for making ash slurry. The lagoons are provided with garlanding of ash slurry pipeline with arrangements for changeover of the ash slurry feed points to ensure uniform filling of the pond and to ensure effective settlement of the ash particles. Construction of Spillway/ well type water escape structure (WES) is also envisaged in the lagoon for taking out the decanted water from storage lagoon to over flow lagoon. The flexible opening provided in the WES wells is used to maintain adequate water cover over the deposited ash in the lagoon under charge to prevent any fugitive dust emission from storage lagoon. For safety of dyke against overtopping adequate free board has been provided as per codal provisions between the maximum ash fill level and top of dyke. For collection of any water below phreatic line from dyke, provision of a toe-drain all around the dyke has been kept, so that the toe drain water is collected and recirculated back to the plant. All the storage lagoons have been initially designed with Starter dyke to be constructed with earth and 4 subsequent raisings of 3 m height each (effective height) using ash as main

construction material with an earth cover over the ash dyke embankment in order to have better resistance against erosion due to rain cuts. For safety of dyke against overtopping a free board of 1.5m as per codal provisions has been provided between the maximum ash fill level and top of dyke.

The NTPC's structural design has been checked for stability in all critical states. The stability of the dyke embankment (for ultimate height) has been checked for i) static and ii) seismic conditions as per IS: 7894 for all the Lagoons. Additionally, stability for buttressing (Stage-I) up to 4th raising of V-1 lagoon is also checked. The design is found to be safe as per obtained factor of safety (FoS) in line with IS:7894. The provided slopes of 2.5 H:1.0 V for the starter dyke (constructed with earth) and 3.0 H:1.0 V for raising dykes (constructed with pond ash and earth cover) are as per safe. The adopted method of construction for raising dykes with an earth cover of 500mm over ash fill is a standard practice in order to have better resistance against erosion due to rain cuts.

Based on above analysis, it is seen that, the design of the ash dykes has been done in line with codal provisions of Dam design and as per prevalent engineering practices.

3.2 Additional features

The other elements of ash dykes are as follows:

a) Dyke Height

a. Lagoons: V-1, V-2, V-3A, V-3A and V-3B

Starter Dyke (Varying as per NGL):	14.00m (Maximum)
Raisings	:3m each(Effective)
Number of raisings	:4 Nos
Freeboard	:1.5m

b. Lagoons: V-4A and V-4B

Starter Dyke (Varying as per NGL):	20.00m (Maximum)
Raisings	:3m each(Effective)
Number of raisings	:4 Nos
Freeboard	:1.5m

b) Dyke Slope:

Slope of 2.5 H: 1.0 V with berms of width 3m at 6 m height intervals (from top) for starter dyke and slope of 3.0 H: 1.0 V with no berms for raising dyke

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is adopted. A top width of 6.0m has been adopted to accommodate maintenance road and ash slurry pipelines.

c) Internal drainage arrangement:

For safety against internal erosion, internal drainage as chimney filter and horizontal blanket filter connecting chimney filter to the rock toe is provided as below to guide the water from within the embankment to the rock-toe/drain. The filter criteria have been considered at all interfaces of dis-similar materials.

- Chimney filter upto 1m below dyke top meeting the filter criteria
- Blanket filter connecting chimney to rock-toe at the base of dyke
- Slope filters wherever required in case of buttressing

d) Slope Protection :

- i) Upstream Slope: Brick lining in panel walls for protection from wave section
- ii) Downstream Slope : Stone pitching with aggregate and filter up to HFL and turfing from HFL to top of the dyke.
- iii) Free Board : A free board of 1.5m is provided as per IS: 10635

e) Rock toe :

The rock-toe using stone boulder, aggregate & fine filter and 300mm thick RR masonry cap over rock-toe to protect filters against contamination is provided in order to release any residual pressure at the toe of the dyke and to arrest any material loss with water from the dyke. The filter criteria is considered at all interfaces of dis-similar materials.

f) Kerb/dowel walls:

230 thick dowel walls is provided to guide the surface water from the top of the dyke to the slope drains on downstream side.

g) Slope Drains:

As a safety measure against the soil erosion due to rain water, 300 mm wide x 150 mm deep brick masonry drains is provided. The slope drains are

either connected to the toe drain or taken off through network of pipes (in case of raising dyke).

h) Toe Drain:

For collection of any seepage water from dyke, provision of a drain all around the dyke has been kept and the toe drain water is collected and recirculated back to the plant. The section of toe-drain is designed in order to release any residual pressure at the toe of the dyke.

i) Instrumentation:

Piezometers and settlement markers are provided at various locations in the dyke embankment as indicated in the construction drawings for monitoring the health of dyke embankment.

j) Water Escape Structures (WES):

Construction of well type water escape structure(WES) in each ash storage lagoon with flexible opening is provided for taking out the decanted water from storage lagoon to over flow lagoon for recirculation through AWRS pump house. The flexible opening provided in the WES wells would be used to maintain adequate water cover over the deposited ash in the lagoon under charge to prevent any fugitive dust emission from storage lagoon.

k) Inspection Roads:

WBM road over top of dykes is provided for inspection and maintenance of ash dyke.

4.0 SUMMARY & RECOMMENDATIONS

On the basis of design documents provided by NTPC & a site visit, it is seen that the construction of ash dykes of VSTPS is in line with design and drawings. The stability of the dyke embankment (for ultimate height) has been checked for i) static and ii) seismic conditions as per IS: 7894. The safe slopes of 2.5 H:1.0 V for the starter dyke (constructed with earth) and 3.0 H:1.0 V for raising dykes (constructed with pond ash) are adopted. However, for raising dykes, an earth cover of 500mm over ash fill has been provided in order to have better resistance against erosion due to rain cuts.

The design & drawings submitted by NTPC for above dykes are checked and found to be in order. The copy of approved drawings of ash dykes (Lagoons V-1, V-2, V-3A, V-3B, V-4A & V-4B) is attached herewith.

Based on above, it is established that design of ash dyke embankment of Vindhyachal STPS has been carried out as per prevailing engineering practices/ codal provisions and found to be safe.

Encl:

- 1) Stability Analyses Outputs
- 2) Approved drawings of ash dykes

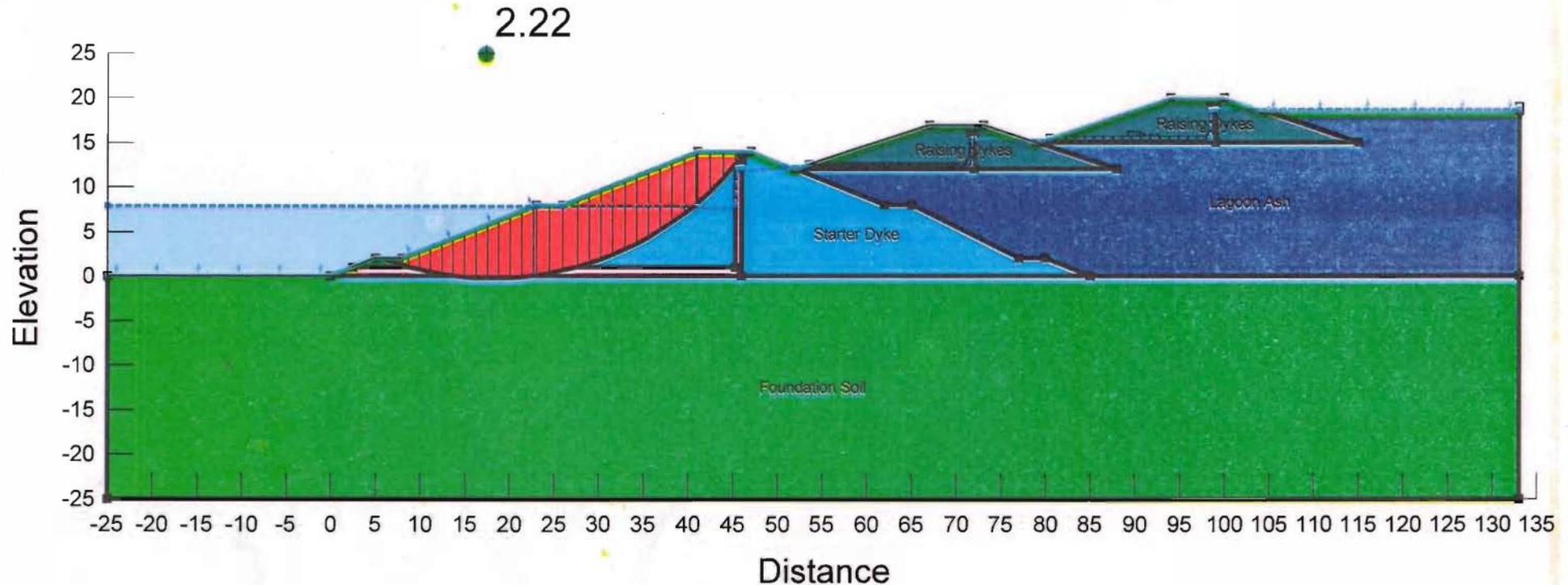


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VINDHYACHAL STPS (LAGOONS-V-1, V-2, V-3A&V-3B)

SLOPE STABILITY ANALYSIS(BISHOP METHOD) FOR STARTER DYKE WITH TWO RAISINGS
(STATIC CASE)

OBTAINED CRITICAL FOS > 1.5, SO SAFE



Reviewed & Approved
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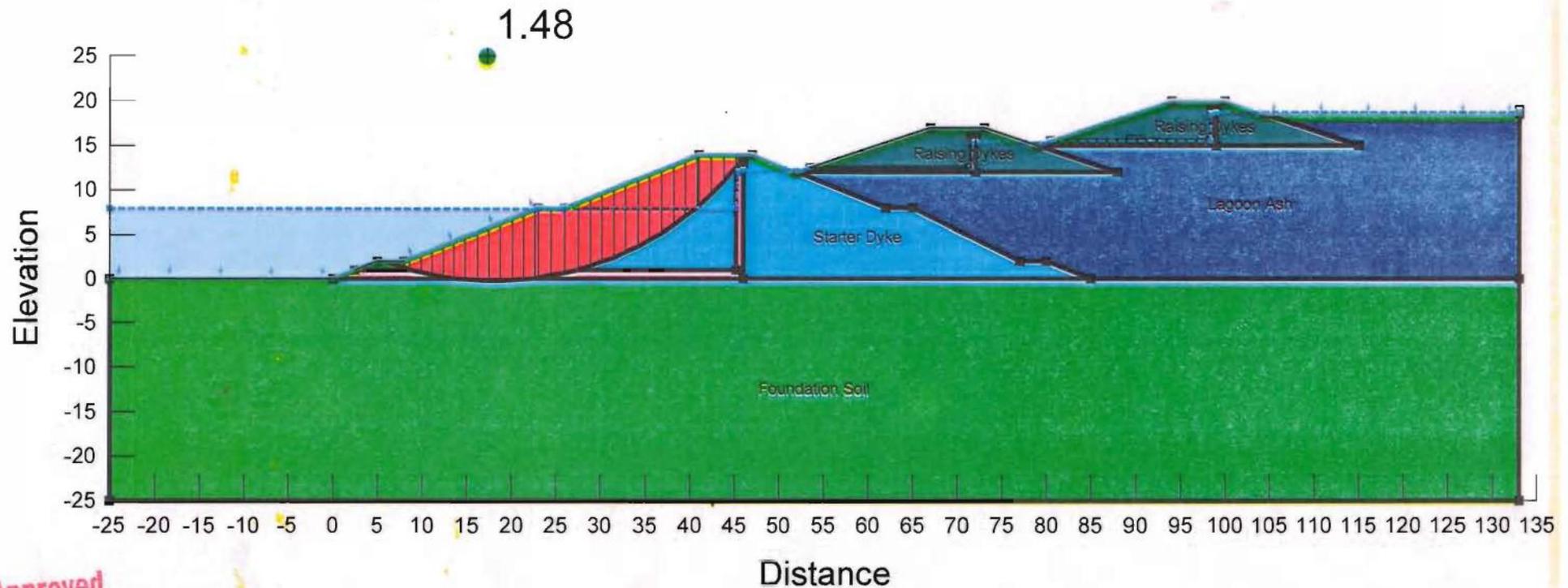
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Name: Filter	Unit Weight: 19 kN/m ³	Cohesion: 0 kPa	Phi: 35 °

VINDHYACHAL STPS (LAGOONS-V-1, V-2, V-3A&V-3B)

SLOPE STABILITY ANALYSIS(BISHOP METHOD) FOR STARTER DYKE WITH TWO RAISINGS
(SEISMIC CASE)

OBTAINED CRITICAL FOS > 1.0, SO SAFE



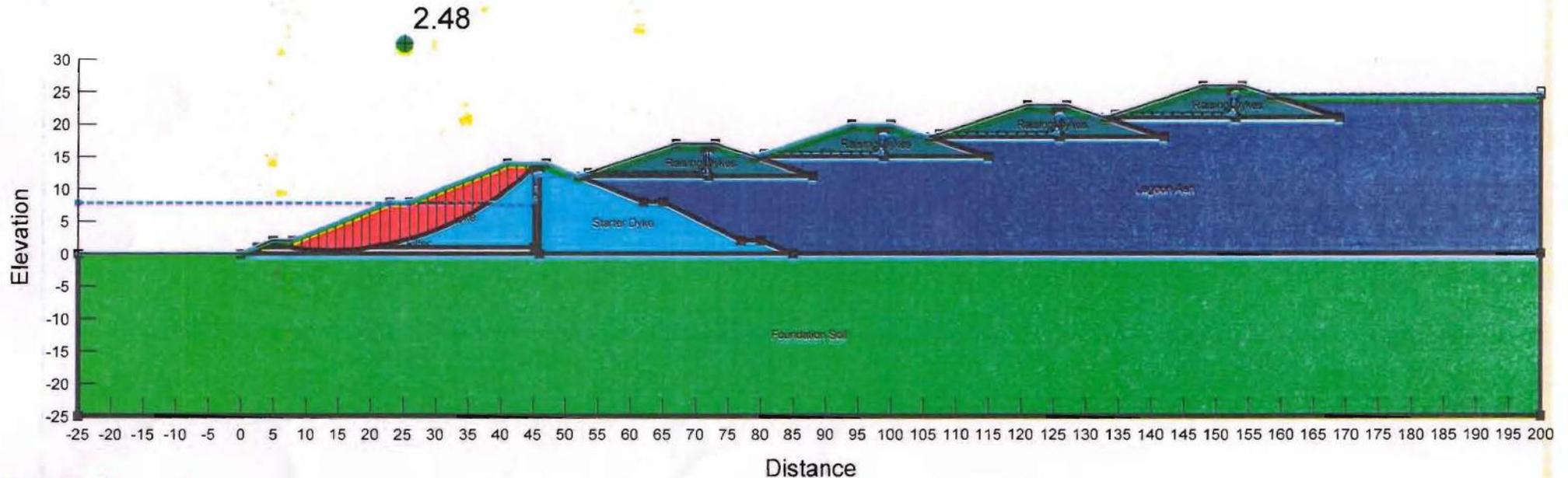
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VINDHYACHAL STPS (LAGOONS-V-1, V-2, V-3A&V-3B)

SLOPE STABILITY ANALYSIS(BISHOP METHOD) FOR STARTER DYKE WITH FOUR RAISINGS
(STATIC CASE)

OBTAINED CRITICAL FOS>1.5, SO SAFE



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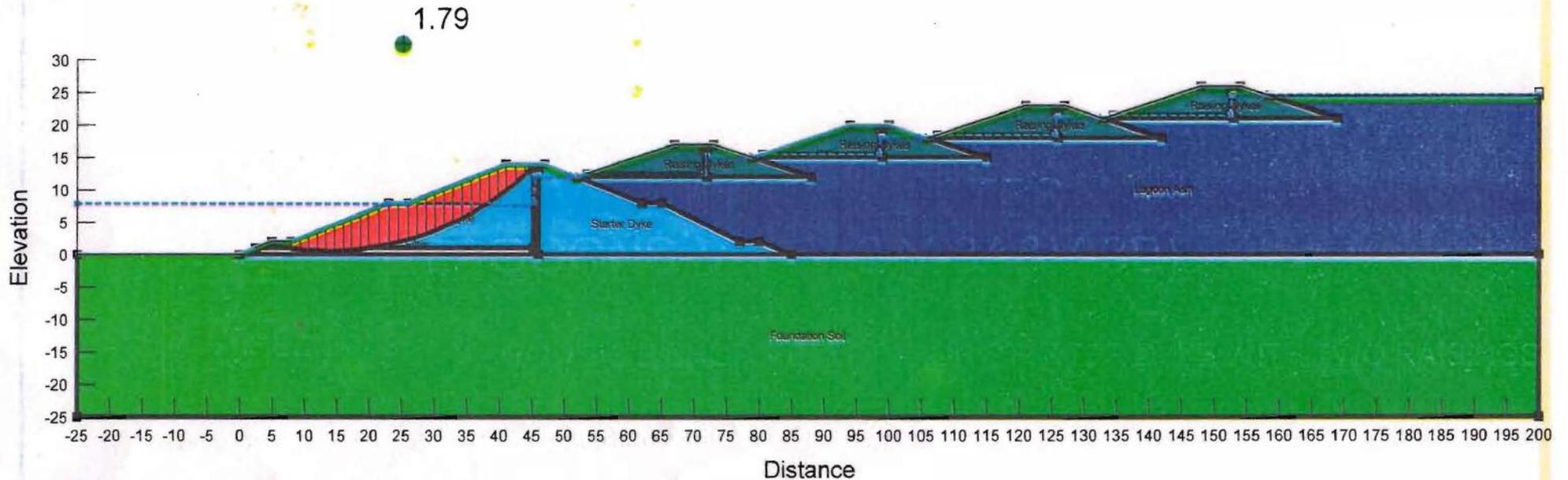
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VINDHYACHAL STPS (LAGOONS-V-1, V-2, V-3A&V-3B)

SLOPE STABILITY ANALYSIS(BISHOP METHOD) FOR STARTER DYKE WITH FOUR RAISINGS
(SEISMIC CASE)

OBTAINED CRITICAL FOS>1.0, SO SAFE



Reviewed & Approved
Samadhiya

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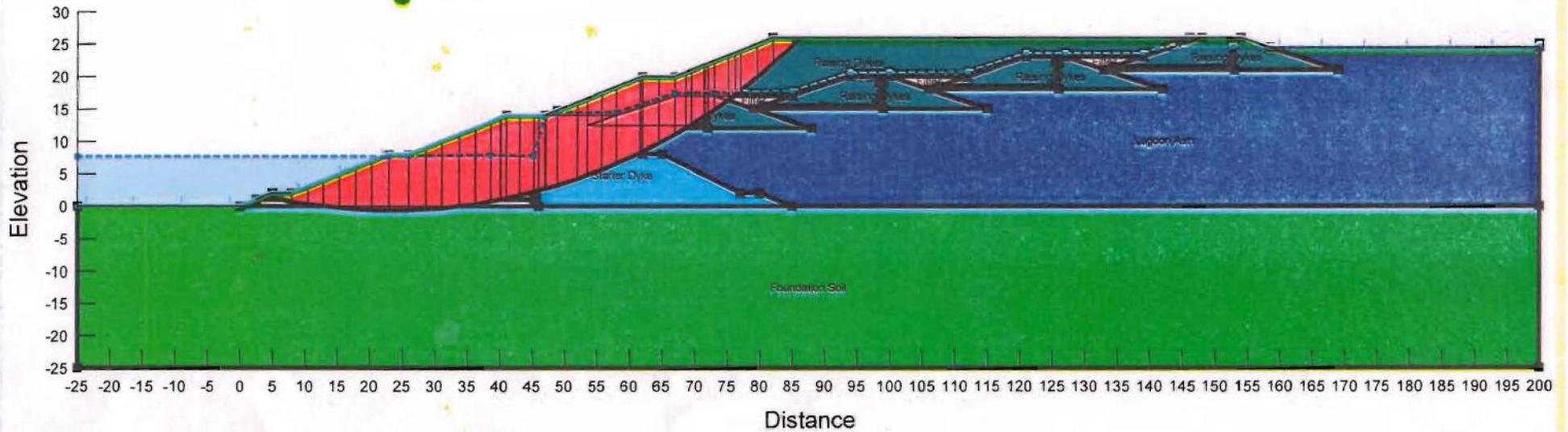
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VINDHYACHAL STPS (LAGOON-V-1)

SLOPE STABILITY ANALYSIS(BISHOP METHOD) FOR BUTTRESSING OF STARTER DYKE WITH FOUR RAISINGS
(STATIC CASE)

OBTAINED CRITICAL FOS>1.5, SO SAFE

1.78



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Name: Filter	Unit Weight: 19 kN/m ³	Cohesion: 0 kPa	Phi: 35 °

viewed & Approved

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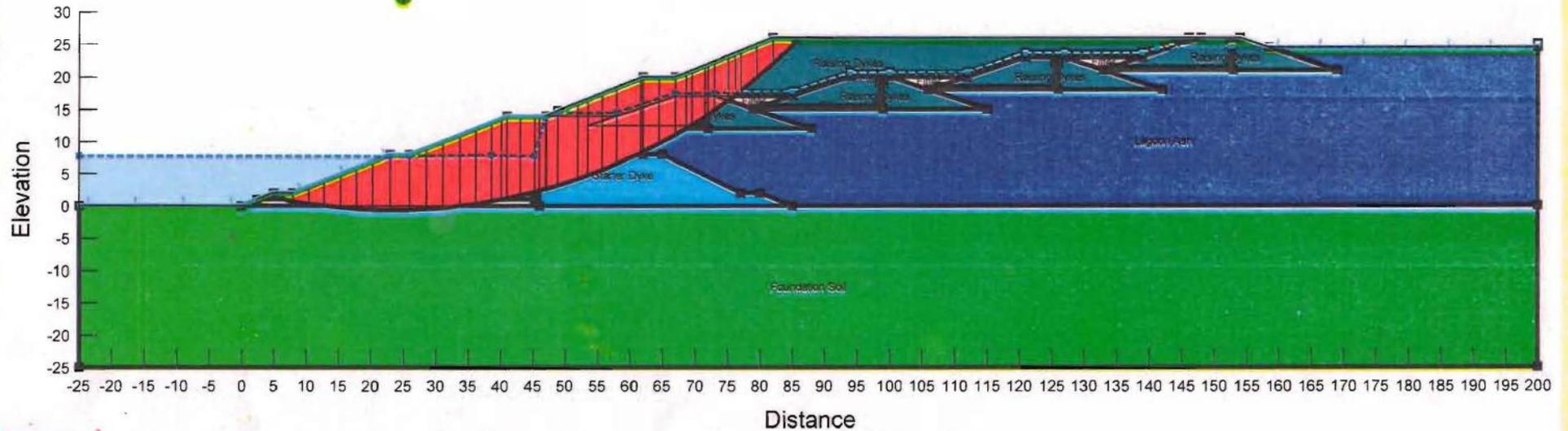
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VINDHYACHAL STPS (LAGOON-V-1)

SLOPE STABILITY ANALYSIS(BISHOP METHOD) FOR BUTTRESSING OF STARTER DYKE WITH FOUR RAISINGS
(SEISMIC CASE)

OBTAINED CRITICAL FOS>1.0, SO SAFE

1.22



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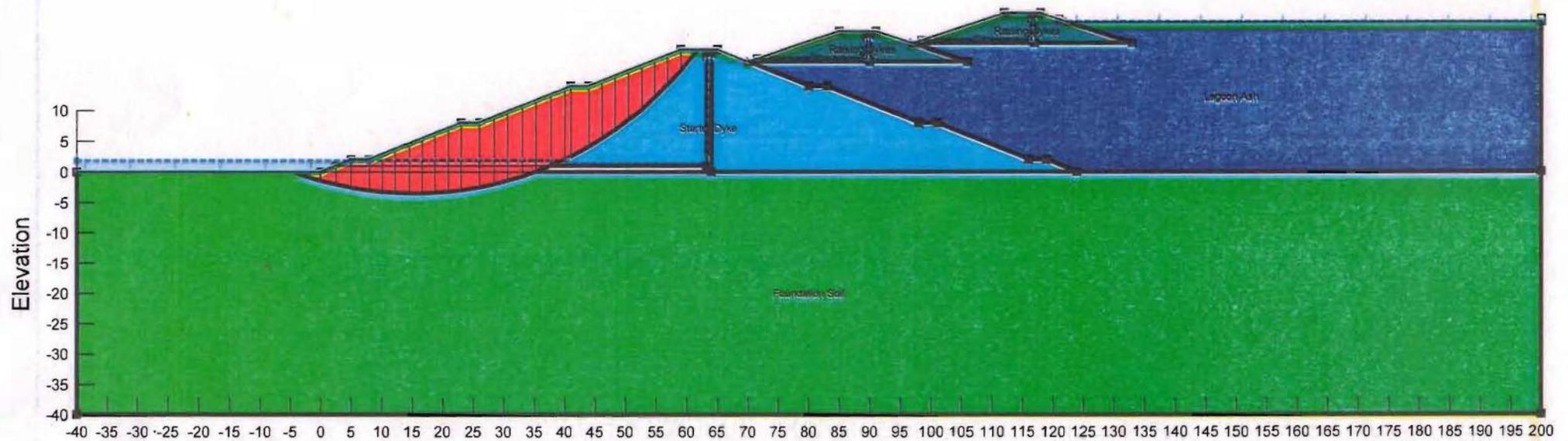
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VINDHYACHAL STPS (LAGOONS- V-4A&V-4B)

SLOPE STABILITY ANALYSIS(BISHOP METHOD) FOR STARTER DYKE WITH TWO RAISINGS

OBTAINED CRITICAL FOS>1.5, SO SAFE
2.18

(STATIC CASE)



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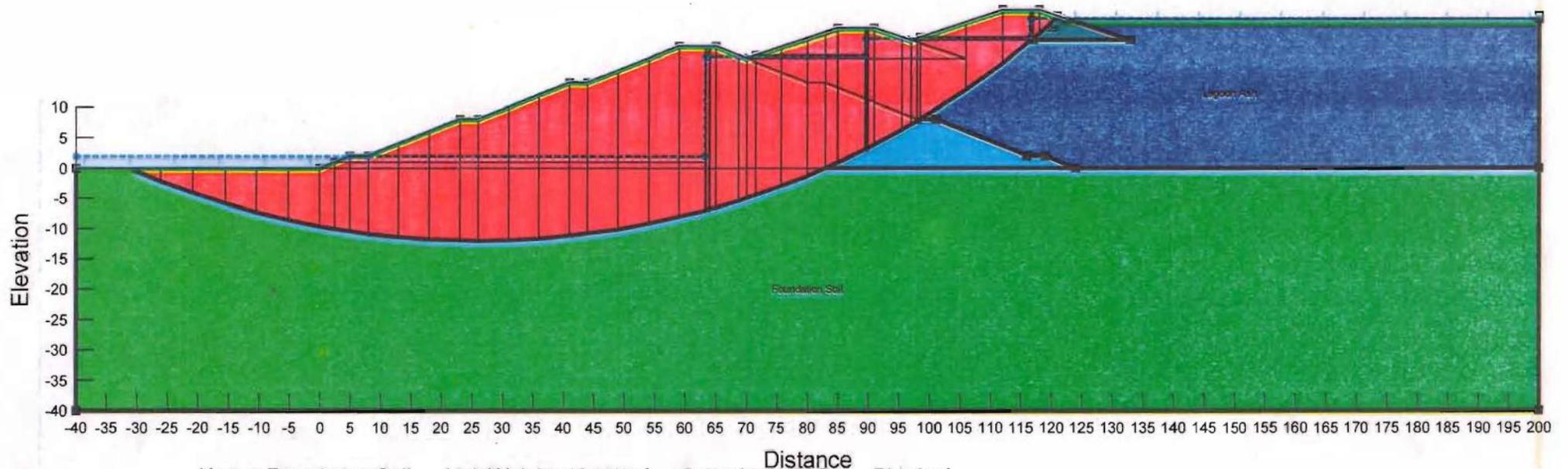
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VINDHYACHAL STPS (LAGOONS- V-4A&V-4B)

SLOPE STABILITY ANALYSIS(BISHOP METHOD) FOR STARTER DYKE WITH TWO RAISINGS
(SEISMIC CASE)

OBTAINED CRITICAL FOS>1.0, SO SAFE 1.52



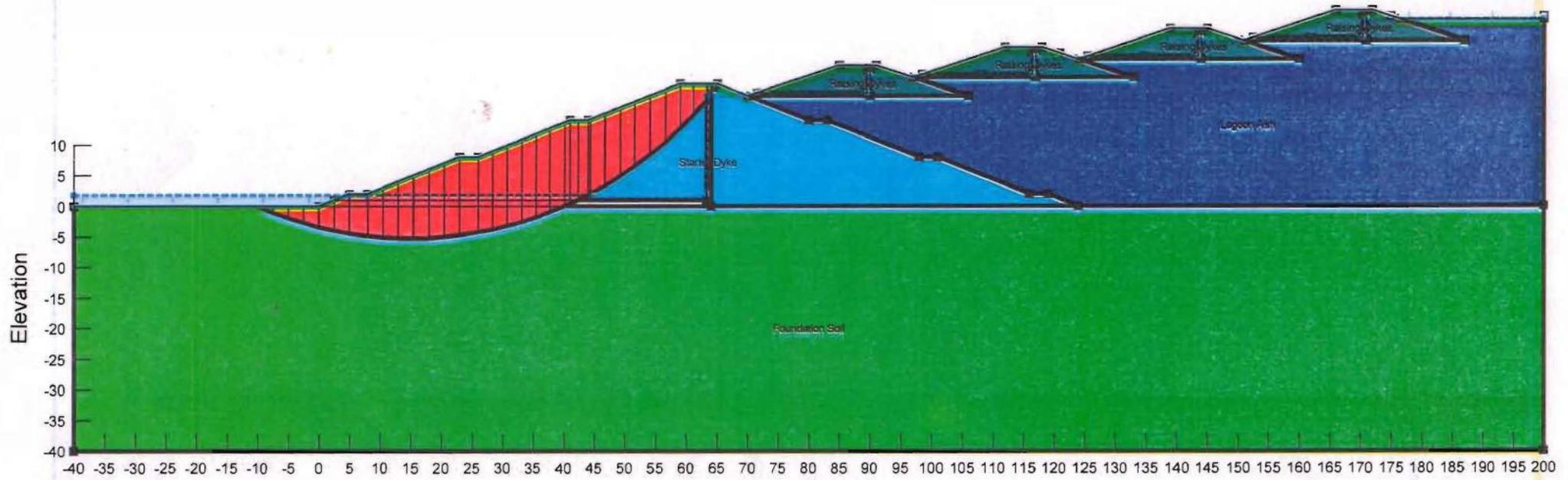
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VINDHYACHAL STPS (LAGOONS- V-4A&V-4B)

SLOPE STABILITY ANALYSIS(BISHOP METHOD) FOR STARTER DYKE WITH FOUR RAISINGS
 OBTAINED CRITICAL FOS > 1.5, SO SAFE (STATIC CASE)
 2.20



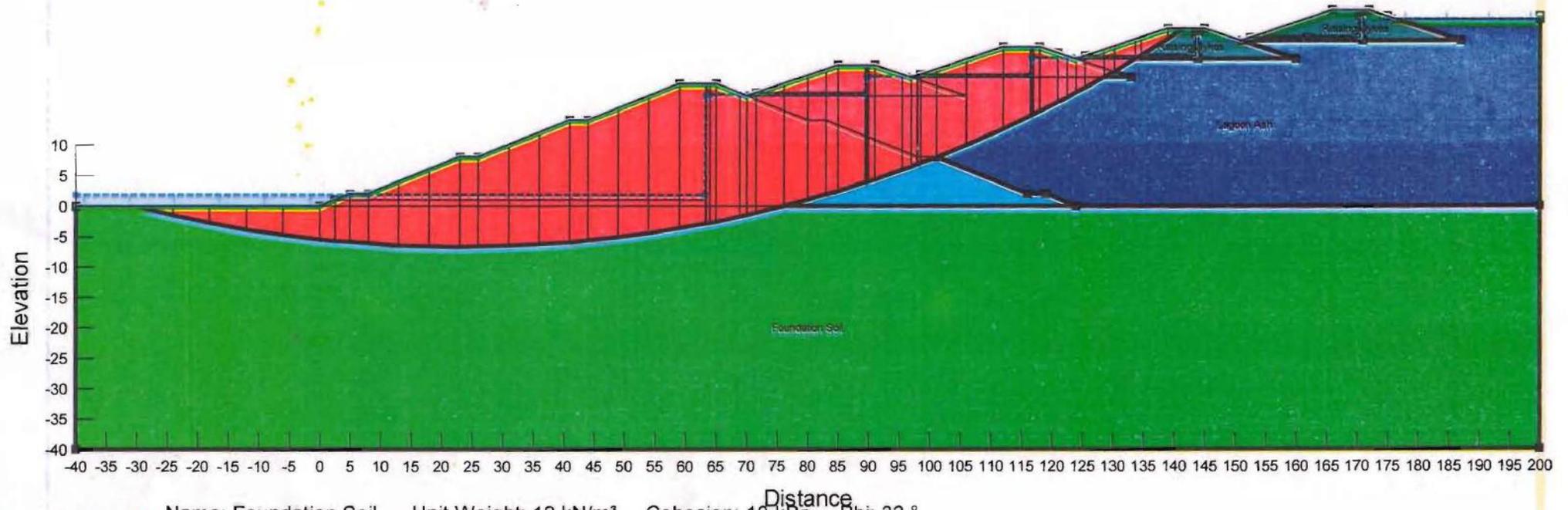
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VINDHYACHAL STPS (LAGOONS- V-4A&V-4B)

SLOPE STABILITY ANALYSIS(BISHOP METHOD) FOR STARTER DYKE WITH FOUR RAISINGS

OBTAINED CRITICAL FOS>1.0, SO SAFE (SEISMIC CASE)
1.52



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Report # DSI/NTPC/2021-21/01c

29th May 2021

Robotic inspection of water escape
structure and decanting pipelines for V-2
ash dyke of Vindhyachal STPS, NTPC

FINAL REPORT

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EXECUTIVE SUMMARY

NTPC commissioned M/s DSI Robotics for carrying out Robotic inspection of water escape structure and decanting pipelines for V-2 ash dyke of NTPC VSTPS through PO No: 4000255722-026-1018, dated: 23.03.2021. The inspection was carried out during 1st and 2nd weeks of May 2021. The scope of work included inspection of 5 nos water escape structures (wells) and corresponding decanting pipelines. The wells were inspected internally by deploying a specially designed truss frame carrying a Pan-Tilt-Zoom camera, with an objective to visually examine the condition of the well. The pipelines were inspected internally by deploying a robot (called marine trekker) equipped with video camera for visual inspection and sonar profiler for mapping ash accumulation. The inspection revealed the following key findings.

Well no.1: While some such joints had visible exposed reinforcements, some had missing mortar/concrete, and some had exposed jute/plastic bags. Leakages were found at depths of 3m, 8m and 9m depth.

Pipeline 1: Water infiltration (dripping) was found along the crown position at 120.1m and 130m.

Well no.2: While most of this well had similar issues like well no.1, there were two major defects found. The window is either not closed properly at a depth of 8-9m. At 12-13mtr depth, there is a huge infiltration of water into the well.

Pipeline 2: Extremely mild seepage at 23.5m was found.

Well no.3: General condition is similar to well 1. At 7m - 8m a concrete chunk is displaced and there is water infiltration. The concrete in this well from 7m to 12m depth is deteriorating fast and a major leakage was found at 11mtr depth.

Pipeline 3: Mild seepage was found at 8.5m. A major dripper (water continuously entering) at 15.1m.

Well no.4: General condition is similar to well 1. The well walls are deteriorating fast from 6-12mtr depth. Reinforcements are visible along this region with large holes/openings around 7mtr.

Pipeline 4: This pipe was to be in generally good condition with no evidence of leakage.

Well no. 5: General condition is similar to well 1. Along 7mtr depth, the concrete appears to be displaced and a huge hole was found at 8mtr depth. The construction joint is leaking around 9mtr. Another hole was found at 11mtr depth. The window at 13mtr depth is leaking along the bottom.

Pipeline 5: Water seepage was found at several joints viz.50.5m, 84.9m, 105.6m, 110.2m. A major hole (damage) was found in the pipe at 70.1m at 12:00 O'clock position.

Ash buildup in pipes: Ash deposits were found in all pipes. The level of ash in pipe varied from 5% to 40%. The ash level was generally highest near the well and it decreased towards the mid length. The level of ash increased towards exit at overflow lagoon.

SURVEY PROCEDURE

The Inspection procedure was broadly divided into two parts

1. Inspection of Decantation Wells
2. Inspection of Decanting Pipelines

A specially made steel platform was prepared and placed by Client on the well top to enable safe operating conditions around the well for lowering of ROV.



Fig 1 : Steel Platform



Fig 2 : Steel Platform placed on Well

The wells (and corresponding pipelines) were numbered from 1 to 5 for reference purposes, such that the well to the far north side was named Well#1 and the well to the far south side was named Well#5. Each well had two water inlet windows that were numbered 1 and 2, such that the opening away from the overflow lagoon was called Inlet#1 and the window towards the overflow lagoon was called Inlet#2.

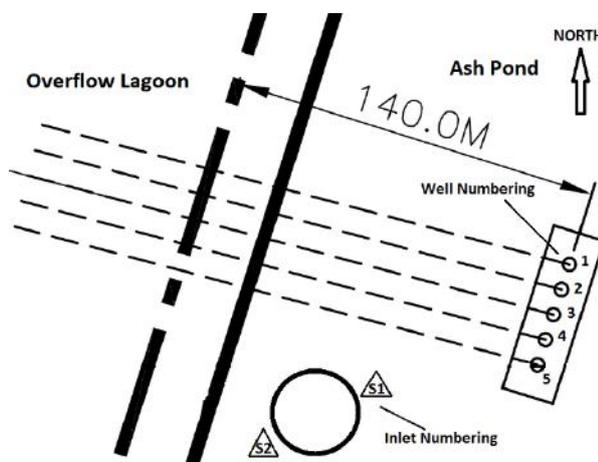


Fig 3 :
Well Numbering System.

The numbers S1 and S2 depict a reference well with the two inlets numbered with respect to the well orientation.

Specialized inspection equipment was used to inspect each structure (the well and pipe) independently.

Well Inlet Windows Inspection

The primary objective for well inspection was to check water inlet windows properly closed/plugged or not using a video camera. For this purpose, a specially designed truss frame carrying a Pan-Tilt-Zoom camera was lowered into the well such that the truss travelled along the well walls vertically, providing an optimum position for the camera to inspect the window slots. Depending on the site situation this inspection was done while lowering the camera (from up to down position) or while raising the camera (from down to upward position). It should be noted, that for this inspection to be carried out, flow of water into the well (that was being currently inspected) was stopped (by temporarily plugging the inlet opening) by client.

As the camera was lowered (or lifted depending on the direction of inspection), the camera travel depth was recorded at every meter. The camera video was transmitted to the operator control unit where it could be viewed (and recorded) in real-time as the inspection was carried out. The recorded video footage was then used to generate the inspection reports.



Fig 3: Inspection of Well#2



Fig 4 : Inspection of well #3

The water inflow into the well was stopped (for clear inspection video) by plugging the inlet windows by the client. Since the wells were operational, this was done in a sequential manner such that one well was closed at a time.

The following table shows the inspection schedule for well inlet window inspections. For each well two passes were made to inspect each window (inlet #1 and inlet #2) separately.

	Date of Inspection	Direction	
		Inlet #1	Inlet #2
Well # 1	30-04-2021	Top to Bottom	Top to Bottom
Well # 2	01-05-2021	Top to Bottom	Bottom to Top
Well # 3	03-05-2021	Top to Bottom	Bottom to Top
Well # 4	04-05-2021	Top to Bottom	Bottom to Top
Well # 5	05-05-2021	Top to Bottom	Bottom to Top

Pipeline Inspection

The inspection of pipelines carrying clear water from ash pond to overflow lagoon was carried using our proprietary ROV called the **Marine Trekker**. The Marine Trekker is an amphibious ROV specially designed and built by DSI Robotics for inspection of water intake and outfall structures. The inspection is done using high resolution video cameras and underwater pipe profiling sonar.

The video footage and sonar profile data are overlaid with the cable payout length value abbreviated as CP. Cable Payout is the length of cable that is released as the ROV travels across the pipeline. The CP value is initialized during the start of Survey. Since the survey starts when the ROV is fully inside the pipe, and (the survey) is stopped while the front of ROV is still at the exit location of pipe, accordingly, we need to add twice the length of ROV (RL) to evaluate the actual pipe length.

	Date of Inspection	Direction	Cable Payout Length (CP)	Pipe Length = CP + 2*RL
Pipeline #1	08-05-2021	d/s to u/s	155.1	157.5
Pipeline #2	01-05-2021	u/s to d/s	155.2	157.6
Pipeline #3	03-05-2021	u/s to d/s	154.9	157.3
Pipeline #4	04-05-2021 (first run) 07-05-2021 (second run) recollection of sonar data)	u/s to d/s	155.2	157.6
Pipeline #5	07-05-2021	u/s to d/s	155.9	158.3

The direction of inspection for Well#1 pipeline was from overflow lagoon (downstream a.k.a. d/s) to the well (upstream a.k.a. u/s). The direction of inspection for all the other wells was from well to the overflow lagoon (u/s to d/s). The table above shows the inspection schedule.

A Brief explanation of SONAR profiles

Sonar profiling of the pipelines was carried out to evaluate the pipe’s ash levels. The profiling comprises an underwater scanning transducer, a sonar processor unit and a high-resolution color monitor. The unit is housed in a pressure vessel which is rated at 3000m working depth.

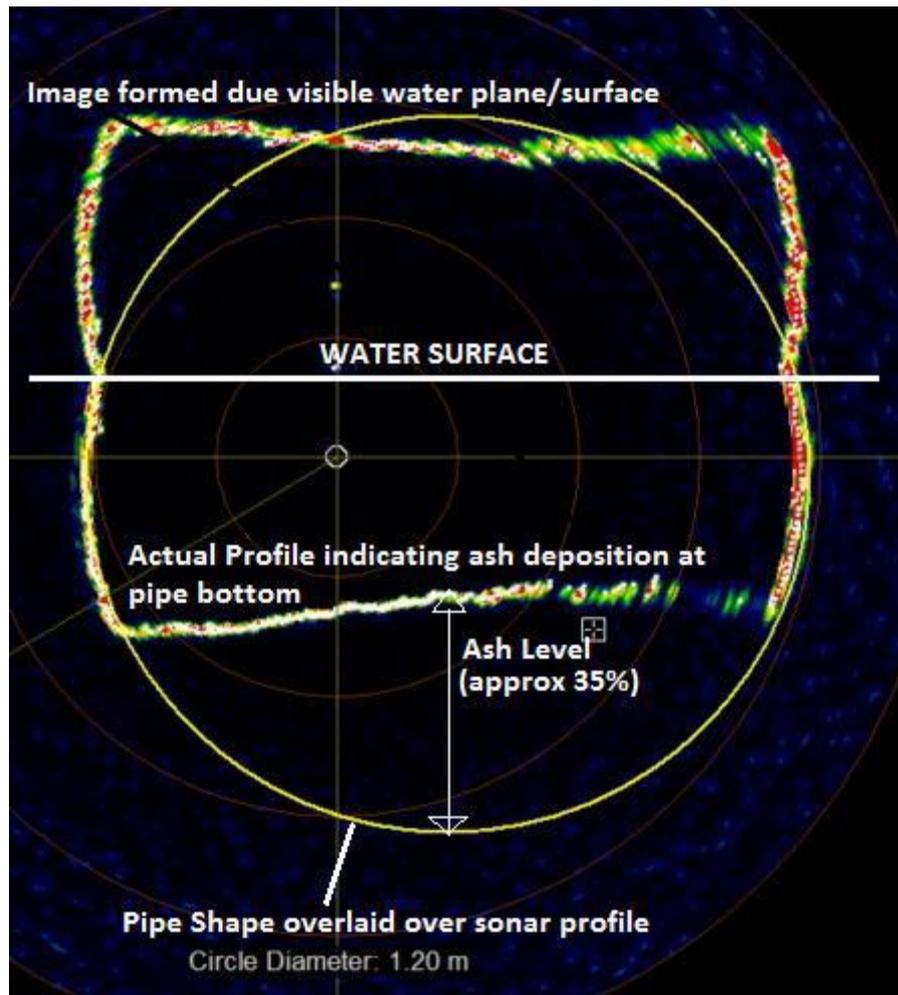
As the scanner is moved through the pipe an indication of the distance traveled is shown on the screen allowing for accurate determination of the location of defects in the pipe. Internal sensors monitor and display Pitch and Roll indicators in analogue and digital form on the screen to show the orientation of the transducer unit.

The Pipe Profiling Sonar uses a 1.4° conical beam at 2.25MHz (ultrasonic) acoustic frequency which is further amplified and logarithmically compressed prior to being digitized by a Flash A/D converter. The angular resolution of the system is 0.9°, which gives 400 sectors per revolution. For each sector the data is oversampled, and peak detected to arrive at 250 range cells. The digitally generated graphics display uses 256

colors to represent the signal amplitude. At the minimum full-scale range of 125mm this gives a range resolution of 0.5mm and at 2m range the resolution is 8mm.

The acoustic beam width of 1.4° ensures that the finest detail from the internal surface of the pipe is recorded. Pitch and Roll sensors inside the scanner record the attitude of the sonar to a resolution of 0.1°.

The profile image represents the ping locations received by the sonar as the transducers scans the entire 360° profile of pipe. However, since the pipes encountered were partially filled, physics principles dictate that the profile so obtained forms a mirror image about water surface. The image below shows one such profile taken during inspection.



KEY OBSERVATIONS – Decanting Wells

The inspection of Well Inlets revealed the following key issues,

1. **Well no.1:** Reinforcements were visible at 2mtr depth all around the well. The second window (side #2) has a large visible gap at this depth. Improper construction joints were found along entire depth of well. While some such joints had visible exposed reinforcements, some had missing mortar, and some had exposed jute/plastic bags. Leakages were found at depths of 9m depth along Side #1 and at depths of 3m and 8m along Side #1.
2. **Well no.2:** While most of this well had similar issues like missing mortar, exposed reinforcements, exposed jute/plastic bags due to ageing/improper construction joints, there were two major defects that were visible along Side #2 of this well. The window is either not closed properly or concrete is absent in well wall at a depth of 8-9m. At 12-13mtr depth, there is a huge leakage causing large infiltration of water into the well.
3. **Well no.3:** At 3m depth - rebar exposed all along the joint, at 7m - 8m a concrete chunk is displaced and water infiltration. The concrete in this well from 7m to 12m depth is deteriorating fast. Reinforcement were visible along several locations and a major leakage was found at 11mtr depth.
4. **Well no.4:** The well walls are deteriorating fast from 6-12mtr depth. reinforcements are visible along this region with large holes/openings around 7mtr. Concrete appears to be displaced around 9mtr. Several joints have exposed jute/plastic bags.
5. **Well no. 5:** Reinforcements are visible along Side #1 at 4mtr depth. Several Joints have exposed plastic/jute bags along construction joints. Along 7mtr depth, the concrete appears to be displaced and a huge hole was found at 8mtr depth along Side #2. The construction joint is leaking around 9mtr along Side #2. Another hole was found at 11mtr depth. The window along Side #2 at 13mtr depth is leaking along the bottom.

SOME INSPECTION SNAPS

The following photos indicate some of the above-mentioned observations as they were found during the conducted inspection. Appendix C contains the detailed inspection reports as generated during the inspection.



Large Visible Gap in Window (Well#1) at 2MTR depth



Absent Concrete, Reinforcements visible in Well#2 at 9MTR depth



Heavy Leakage in Well#2 at 13MTR depth (Inverted image because of camera position)

<p>05-03-2021 Mon 12:08:10</p>  <p>Well#3, side1 CP-7.0Mtr</p>	<p>Displaced Concrete chunk in Well#3 at 7MTR depth</p>
<p>05-05-2021 Wed 11:13:01</p>  <p>Well#5, side1 CP-4.0Mtr</p>	<p>Exposed rebar, exposed Jute/plastic bags along well joint in Well#5 at 4MTR depth</p>
<p>05-05-2021 Wed 11:33:27</p>  <p>Well#5, side2 CP-11.0Mtr</p>	<p>Hole in Well#5 (Leakage is also visible) at 11MTR depth</p>

KEY OBSERVATIONS - Pipelines

The wells are connected to the overflow lagoon through five 1200mm ID precast concrete pipelines encased in RCC. The pipes were inspected for any evidence of leakages and damage.

1. **Pipeline 1:** Water infiltration (dripping) was found along the crown position at 120.1m and 130m.
2. **Pipeline 2:** Extremely mild seepage at 23.5m was found.
3. **Pipeline 3:** Mild seepage was found at 8.5m. A major dripper (water continuously entering) at 15.1m.
4. **Pipeline 4:** This pipe was to be in generally good condition with no evidence of leakage.
5. **Pipeline 5:** This pipe had several locations where evidence of water seepage was found. At 50.5m and 84.9m the pipe joint was leaking from 9:00'clock position to 11:00'clock position. Joints at 105.6m and 110.2m were leaking over the entire crown position. A major hole (damage) was found in the pipe at 70.1m at 12:00 O'clock position.

SOME INDICATIVE SNAPS

The following photos indicate some of the above-mentioned observations as they were found during the conducted inspection. Appendix C contains the detailed inspection reports as generated during the inspection.



<p>01-05-2021 Sat 16:07:49</p>  <p>CP:0023 .5mt</p> <p>Camera 01</p>	<p>Mild seepage along joint at 23.5MTR from Well#2</p>
<p>03-05-2021 Mon 13:36:16</p>  <p>CP:0008 .5mt</p> <p>Camera 01</p>	<p>Mild Seepage along 9:00'clock to 11:00'clock position along pipe joint at 8.5MTR from Well#3</p>
<p>03-05-2021 Mon 13:38:50</p>  <p>CP:0015 .1mt</p> <p>Camera 01</p>	<p>Dripping Leakage along pipe joint at 15.1MTR from Well#3</p>



Hole in pipe at 12:00clock position along pipe joint at 69.6MTR from Well#5

Dripping Infiltration could be seen through this hole.

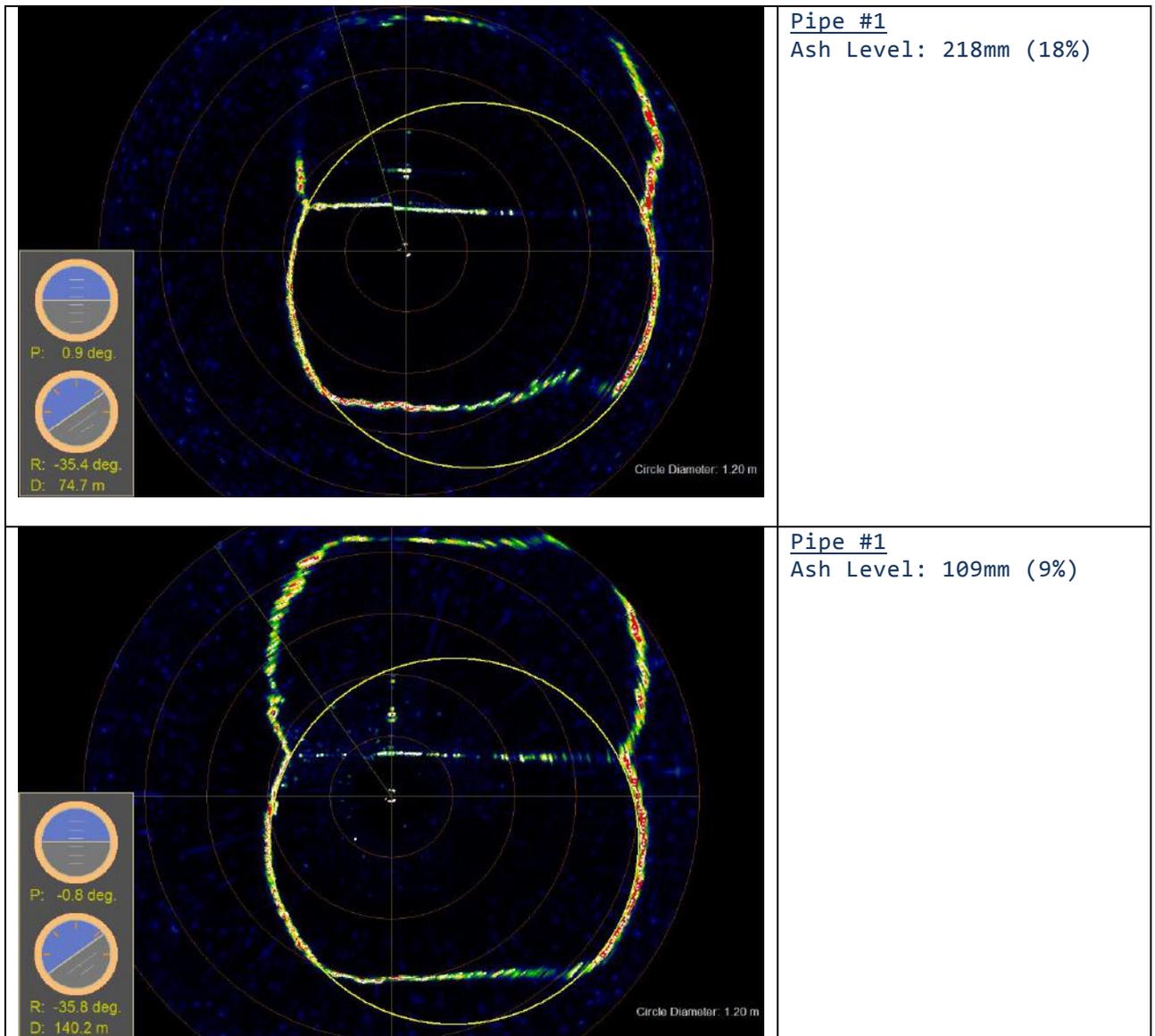


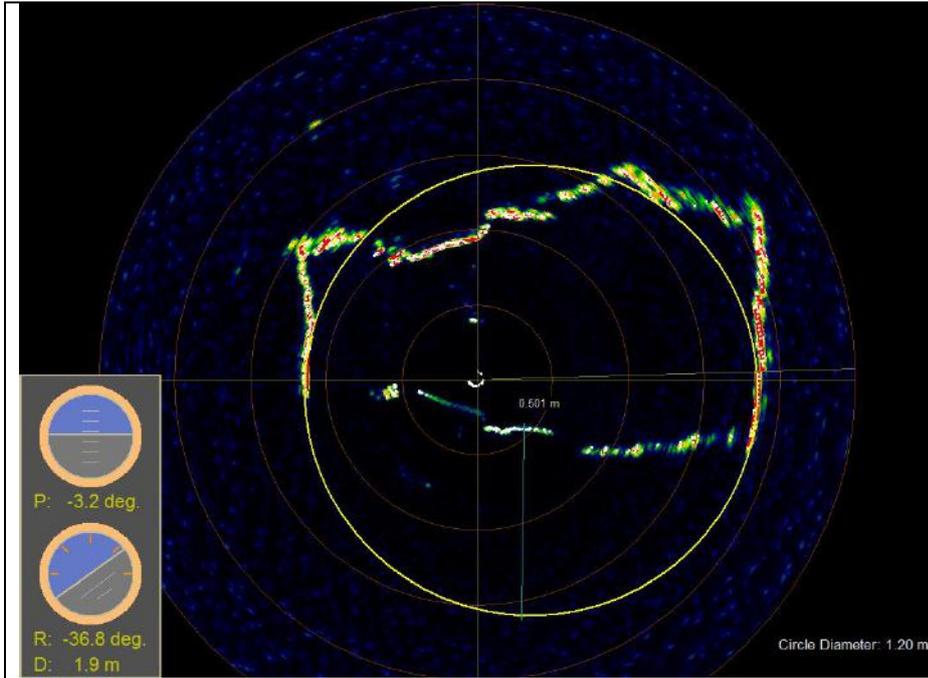
Dripping infiltration along pipe joint at 110.2MTr from Well#5

ASH LEVELS

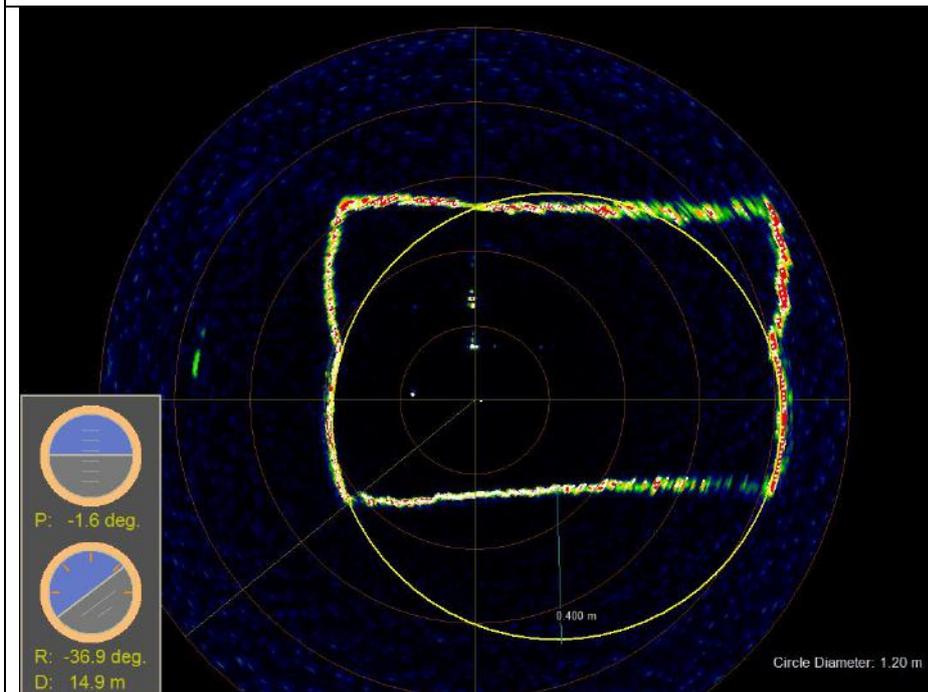
Ash deposits were found in all pipes using the sonar profiling. The level of ash in pipe varied from 5% to 40%. The ash level was highest near the well and it decreased towards the mid length of pipe. As the pipe approached the overflow lagoon, the level of ash further increased towards its exit at overflow lagoon. The following table shows the total ash volume found in the pipes.

	Average Ash Level (% of Pipe Diameter)	Total Ash Volume (cum)
Pipe #1	12%	13.0 cum
Pipe #2	19%	24.1 cum
Pipe #3	18%	22.8 cum
Pipe #4	15%	16.3 cum
Pipe #5	11%	12.0 cum

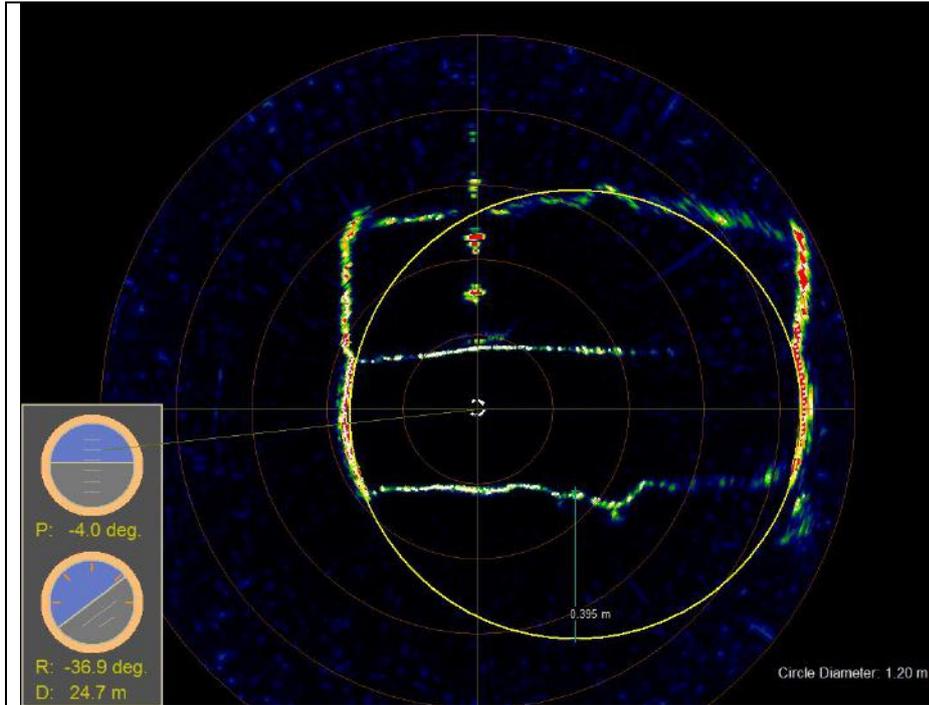




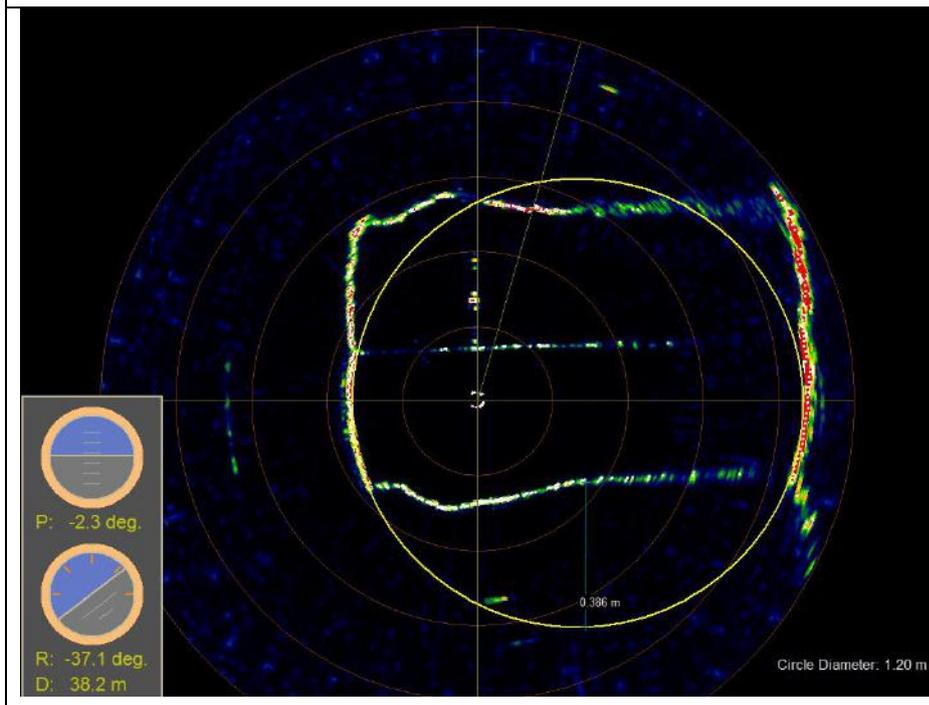
Pipe #2
Ash Level: 501mm
(42%)



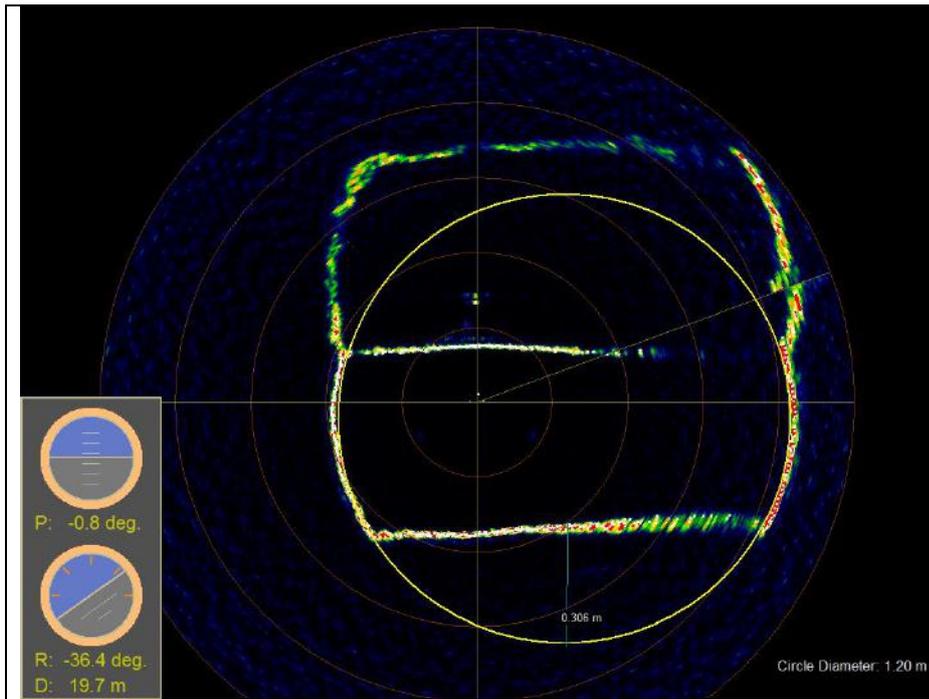
Pipe #2
Ash Level: 400mm
(33%)



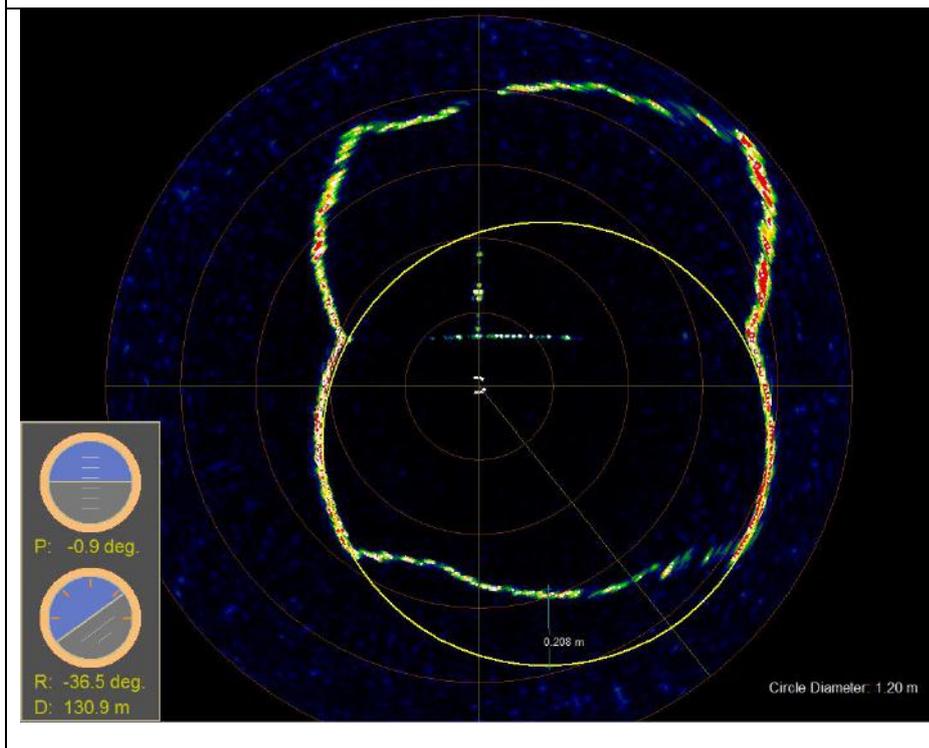
Pipe #3
Ash Level: 395mm
(33%)



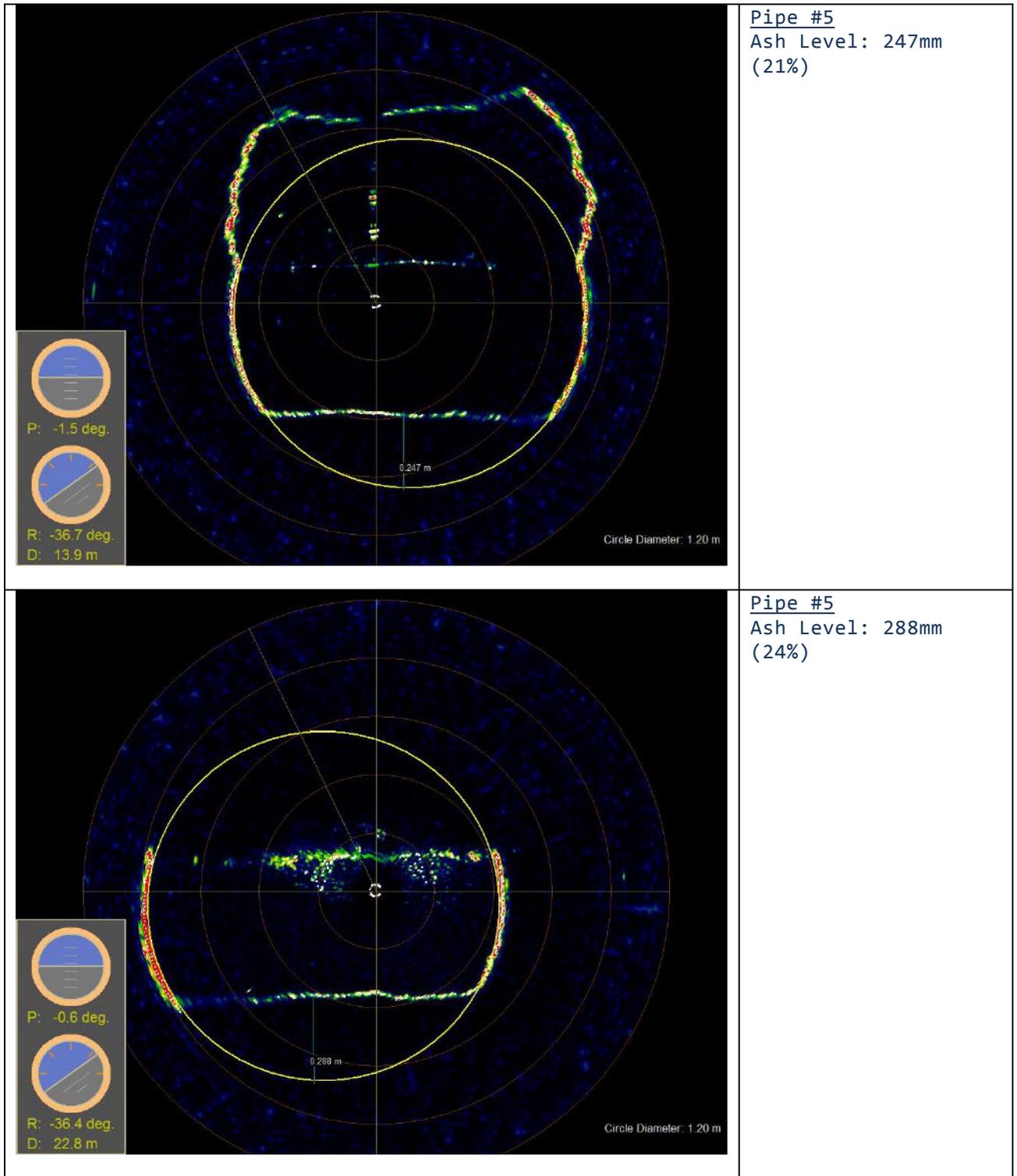
Pipe #3
Ash Level: 386mm
(32%)



Pipe #4
Ash Level: 306mm
(25%)



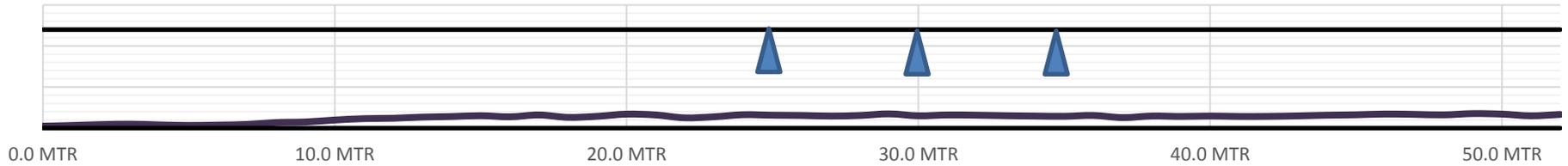
Pipe #4
Ash Level: 208mm
(19%)



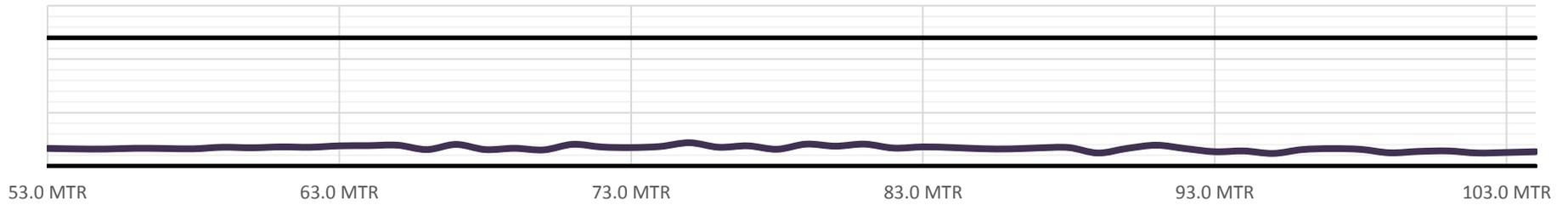
The following charts show the longitudinal plot of ash level inside the pipe. The top and bottom black lines represent the crown and invert of pipe respectively and are separated by 1200mm (pipe diameter).

 : These Markers indicate Leakage points along the line.

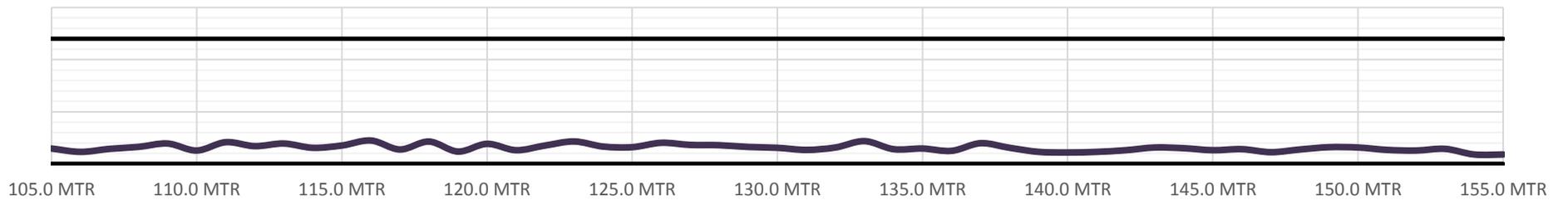
ASH-LEVELS FOR PIPE #1 (0-52MTR)



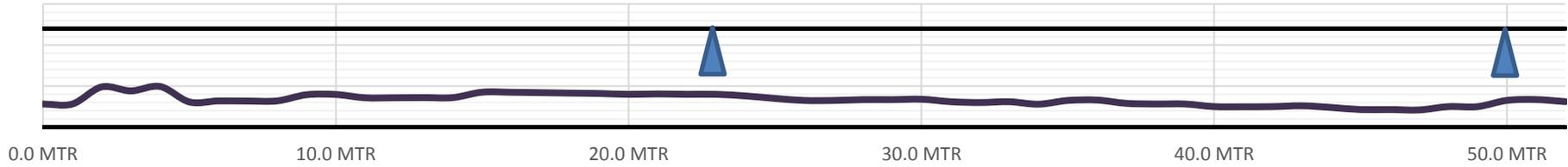
(53-104MTR)



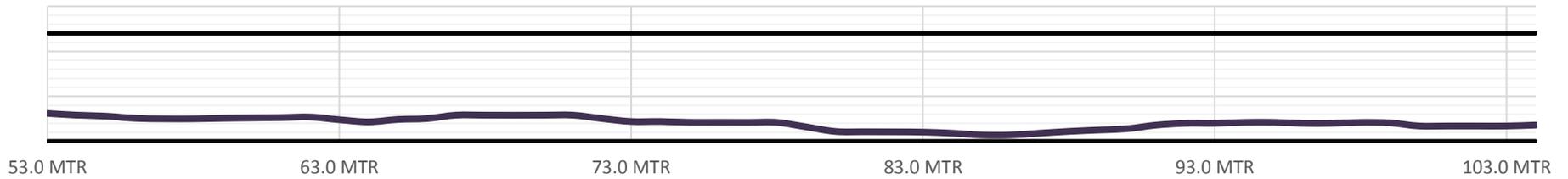
(105-155MTR)



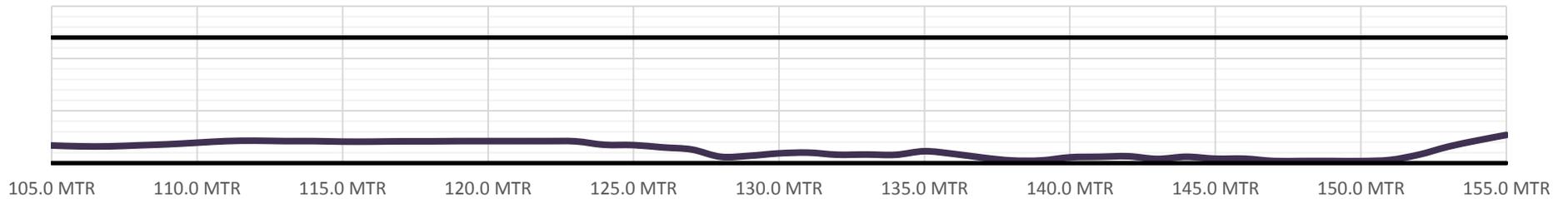
ASH-LEVELS FOR PIPE #2 (0-52MTR)



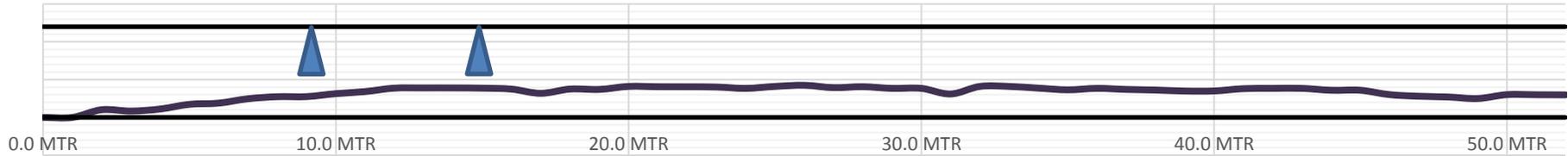
(53-104MTR)



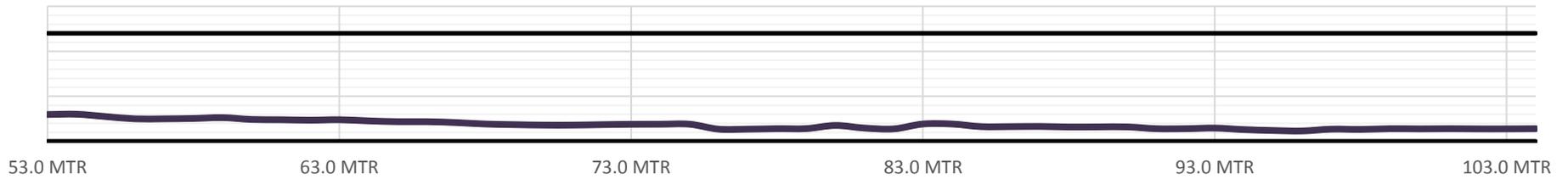
(105-155MTR)



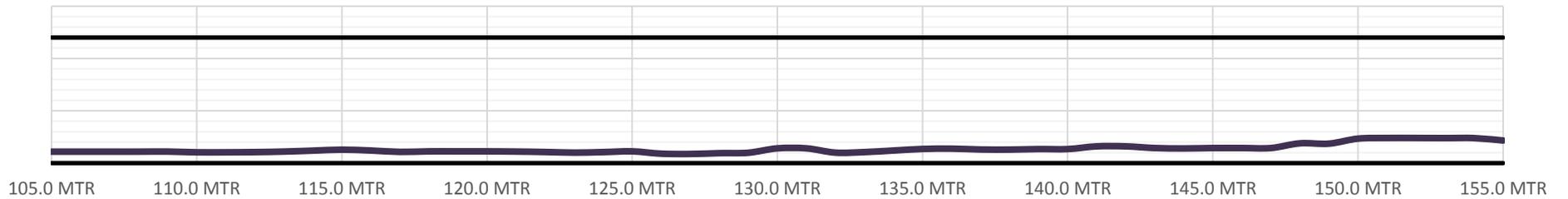
ASH-LEVELS FOR PIPE #3 (0-52MTR)



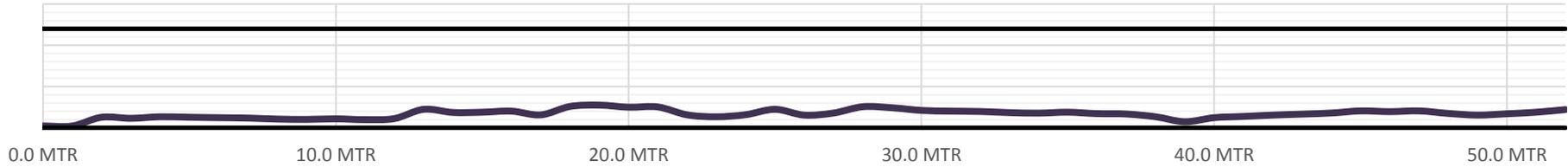
(53-104MTR)



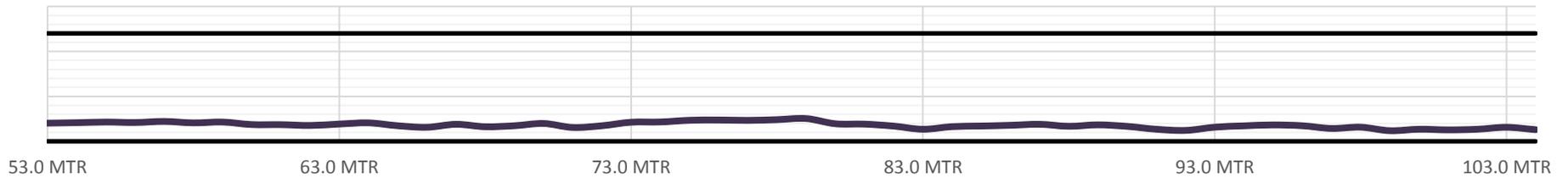
(105-155MTR)



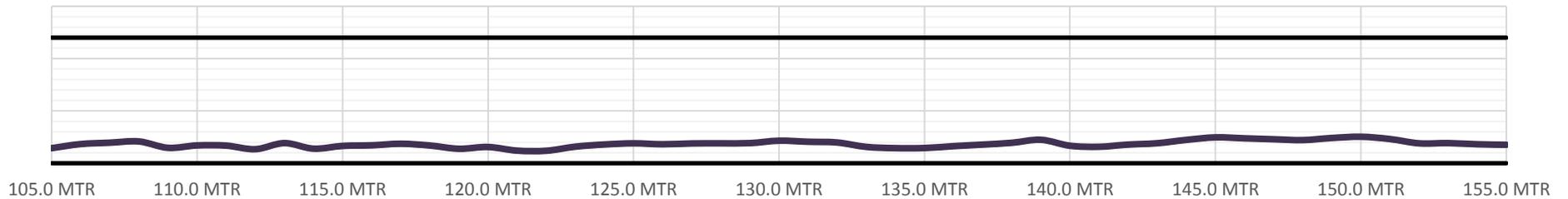
ASH-LEVELS FOR PIPE #4 (0-52MTR)



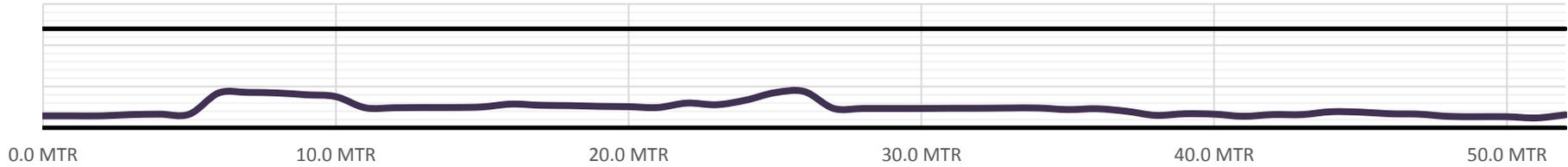
(53-104MTR)



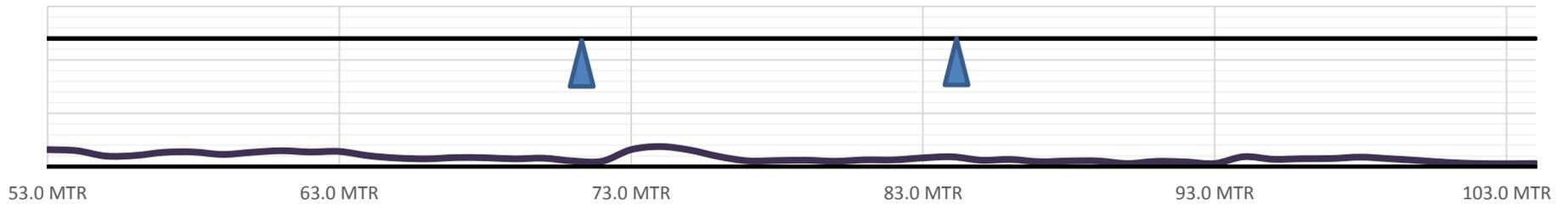
(105-155MTR)



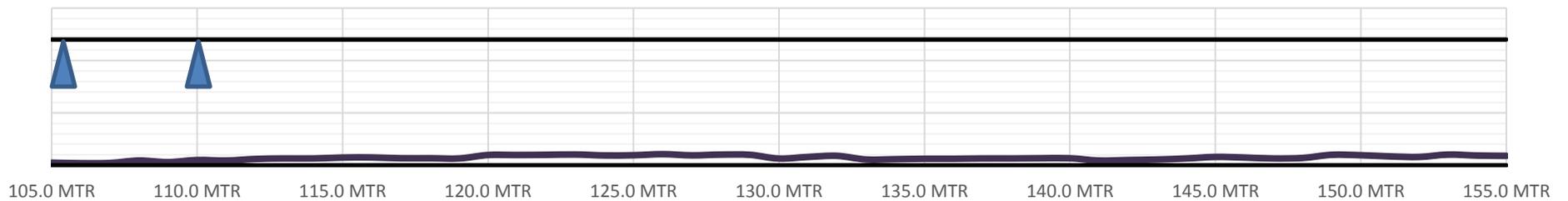
ASH-LEVELS FOR PIPE #5 (0-52MTR)



(53-104MTR)



(105-155MTR)



65

APPENDIX A

List of Videos/Data Attached

The camera video and sonar data has been converted into easily viewable *.mp4 and *.wmv files that can be played using the freely available VLC media player. The files have been categorized into 5 folders representing 5 wells. Each well folder contains 4 video files for Pipe Inspection Camera Video, Pipe Sonar Profile Video, Well Side#1 Video and Well Side #2 Video. The folders are named as follows:

- Well #1
 - 1) Pipe#1_Cam1.mp4
 - 2) Pipe#1_SonarProfile.wmv
 - 3) Well#1 Side1
 - 4) Well#1 Side2

- Well #2
 - 1) Pipe#2_Cam1.mp4
 - 2) Pipe#2_SonarProfile.wmv
 - 3) Well#2 Side1
 - 4) Well#2 Side2 Down to up

- Well #3
 - 1) Pipe#3_Cam1.mp4
 - 2) Pipe#3_SonarProfile.wmv
 - 3) Well#3 Side1
 - 4) Well#3 Side2 Down to up

- Well #4
 - 1) Pipe#4_Cam1.mp4
 - 2) Pipe#4_SonarProfile.wmv
 - 3) Well#4 Side1
 - 4) Well#4 Side2 Down to up

- Well #5
 - 1) Pipe#5_Cam1.mp4
 - 2) Pipe#5_SonarProfile.wmv
 - 3) Well#5 Side1
 - 4) Well#5 Side2 Down to up

The data may be downloaded using the following dropbox link:

<https://www.dropbox.com/sh/1qhqr144tzqgv/AADfmR5x5vQAFcv2hTnRM2eVa?dl=0>

APPENDIX B: Ash Level % for all Pipelines

B.1 Data for % Ash-Level in Pipe #1

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m ³)
1.0 MTR	32 mm	3%	0.008
2.0 MTR	43 mm	4%	0.013
3.0 MTR	48 mm	4%	0.015
4.0 MTR	39 mm	3%	0.011
5.0 MTR	32 mm	3%	0.008
6.0 MTR	37 mm	3%	0.010
7.0 MTR	45 mm	4%	0.014
8.0 MTR	68 mm	6%	0.025
9.0 MTR	75 mm	6%	0.029
10.0 MTR	98 mm	8%	0.044
11.0 MTR	115 mm	10%	0.055
12.0 MTR	120 mm	10%	0.059
13.0 MTR	134 mm	11%	0.069
14.0 MTR	141 mm	12%	0.075
15.0 MTR	151 mm	13%	0.082
16.0 MTR	138 mm	12%	0.072
17.0 MTR	160 mm	13%	0.090
18.0 MTR	131 mm	11%	0.067
19.0 MTR	144 mm	12%	0.077
20.0 MTR	170 mm	14%	0.098
21.0 MTR	160 mm	13%	0.090
22.0 MTR	125 mm	10%	0.062
23.0 MTR	138 mm	12%	0.072
24.0 MTR	163 mm	14%	0.092
25.0 MTR	157 mm	13%	0.087
26.0 MTR	154 mm	13%	0.085
27.0 MTR	147 mm	12%	0.079
28.0 MTR	154 mm	13%	0.085
29.0 MTR	173 mm	14%	0.100
30.0 MTR	150 mm	13%	0.082
31.0 MTR	160 mm	13%	0.090
32.0 MTR	157 mm	13%	0.087
33.0 MTR	151 mm	13%	0.082
34.0 MTR	147 mm	12%	0.079
35.0 MTR	144 mm	12%	0.077
36.0 MTR	154 mm	13%	0.085

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m ³)
37.0 MTR	128 mm	11%	0.065
38.0 MTR	147 mm	12%	0.079
39.0 MTR	142 mm	12%	0.075
40.0 MTR	147 mm	12%	0.079
41.0 MTR	142 mm	12%	0.075
42.0 MTR	143 mm	12%	0.076
43.0 MTR	149 mm	12%	0.081
44.0 MTR	157 mm	13%	0.087
45.0 MTR	162 mm	14%	0.091
46.0 MTR	171 mm	14%	0.099
47.0 MTR	167 mm	14%	0.095
48.0 MTR	161 mm	13%	0.090
49.0 MTR	176 mm	15%	0.103
50.0 MTR	170 mm	14%	0.098
51.0 MTR	150 mm	13%	0.082
52.0 MTR	166 mm	14%	0.095
53.0 MTR	165 mm	14%	0.094
54.0 MTR	160 mm	13%	0.090
55.0 MTR	159 mm	13%	0.089
56.0 MTR	166 mm	14%	0.095
57.0 MTR	164 mm	14%	0.093
58.0 MTR	161 mm	13%	0.090
59.0 MTR	176 mm	15%	0.103
60.0 MTR	171 mm	14%	0.099
61.0 MTR	179 mm	15%	0.106
62.0 MTR	176 mm	15%	0.103
63.0 MTR	189 mm	16%	0.114
64.0 MTR	191 mm	16%	0.116
65.0 MTR	195 mm	16%	0.119
66.0 MTR	154 mm	13%	0.085
67.0 MTR	202 mm	17%	0.126
68.0 MTR	154 mm	13%	0.085
69.0 MTR	166 mm	14%	0.095
70.0 MTR	151 mm	13%	0.082
71.0 MTR	203 mm	17%	0.127
72.0 MTR	178 mm	15%	0.105

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m ³)
73.0 MTR	173 mm	14%	0.100 cum
74.0 MTR	183 mm	15%	0.109 cum
75.0 MTR	218 mm	18%	0.140 cum
76.0 MTR	176 mm	15%	0.103 cum
77.0 MTR	189 mm	16%	0.114 cum
78.0 MTR	157 mm	13%	0.087 cum
79.0 MTR	205 mm	17%	0.128 cum
80.0 MTR	186 mm	16%	0.112 cum
81.0 MTR	205 mm	17%	0.128 cum
82.0 MTR	168 mm	14%	0.096 cum
83.0 MTR	179 mm	15%	0.106 cum
84.0 MTR	173 mm	14%	0.100 cum
85.0 MTR	162 mm	14%	0.091 cum
86.0 MTR	160 mm	13%	0.090 cum
87.0 MTR	170 mm	14%	0.098 cum
88.0 MTR	173 mm	14%	0.100 cum
89.0 MTR	122 mm	10%	0.060 cum
90.0 MTR	165 mm	14%	0.094 cum
91.0 MTR	195 mm	16%	0.119 cum
92.0 MTR	163 mm	14%	0.092 cum
93.0 MTR	134 mm	11%	0.069 cum
94.0 MTR	141 mm	12%	0.075 cum
95.0 MTR	118 mm	10%	0.057 cum
96.0 MTR	154 mm	13%	0.085 cum
97.0 MTR	163 mm	14%	0.092 cum
98.0 MTR	156 mm	13%	0.086 cum
99.0 MTR	124 mm	10%	0.062 cum
100.0 MTR	137 mm	11%	0.071 cum
101.0 MTR	141 mm	12%	0.075 cum
102.0 MTR	122 mm	10%	0.060 cum
103.0 MTR	127 mm	11%	0.064 cum
104.0 MTR	134 mm	11%	0.069 cum
105.0 MTR	147 mm	12%	0.079 cum
106.0 MTR	115 mm	10%	0.055 cum
107.0 MTR	144 mm	12%	0.077 cum
108.0 MTR	163 mm	14%	0.092 cum
109.0 MTR	195 mm	16%	0.119 cum
110.0 MTR	128 mm	11%	0.065 cum
111.0 MTR	208 mm	17%	0.131 cum
112.0 MTR	170 mm	14%	0.098 cum
113.0 MTR	195 mm	16%	0.119 cum
114.0 MTR	154 mm	13%	0.085 cum

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m ³)
115.0 MTR	176 mm	15%	0.103 cum
116.0 MTR	224 mm	19%	0.146 cum
117.0 MTR	138 mm	12%	0.072 cum
118.0 MTR	214 mm	18%	0.137 cum
119.0 MTR	118 mm	10%	0.057 cum
120.0 MTR	192 mm	16%	0.117 cum
121.0 MTR	131 mm	11%	0.067 cum
122.0 MTR	176 mm	15%	0.103 cum
123.0 MTR	215 mm	18%	0.138 cum
124.0 MTR	166 mm	14%	0.095 cum
125.0 MTR	160 mm	13%	0.090 cum
126.0 MTR	202 mm	17%	0.126 cum
127.0 MTR	182 mm	15%	0.108 cum
128.0 MTR	179 mm	15%	0.106 cum
129.0 MTR	162 mm	14%	0.091 cum
130.0 MTR	154 mm	13%	0.085 cum
131.0 MTR	134 mm	11%	0.069 cum
132.0 MTR	157 mm	13%	0.087 cum
133.0 MTR	218 mm	18%	0.140 cum
134.0 MTR	141 mm	12%	0.075 cum
135.0 MTR	147 mm	12%	0.079 cum
136.0 MTR	125 mm	10%	0.062 cum
137.0 MTR	198 mm	17%	0.122 cum
138.0 MTR	154 mm	13%	0.085 cum
139.0 MTR	115 mm	10%	0.055 cum
140.0 MTR	109 mm	9%	0.051 cum
141.0 MTR	115 mm	10%	0.055 cum
142.0 MTR	131 mm	11%	0.067 cum
143.0 MTR	157 mm	13%	0.087 cum
144.0 MTR	150 mm	13%	0.082 cum
145.0 MTR	131 mm	11%	0.067 cum
146.0 MTR	141 mm	12%	0.075 cum
147.0 MTR	112 mm	9%	0.053 cum
148.0 MTR	138 mm	12%	0.072 cum
149.0 MTR	160 mm	13%	0.090 cum
150.0 MTR	157 mm	13%	0.087 cum
151.0 MTR	134 mm	11%	0.069 cum
152.0 MTR	128 mm	11%	0.065 cum
153.0 MTR	144 mm	12%	0.077 cum
154.0 MTR	90 mm	8%	0.039 cum
155.0 MTR	90 mm	8%	0.039 cum

B.2 *Data for % Ash-Level in Pipe #2*

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m ³)
1.0 MTR	282 mm	24%	0.203
2.0 MTR	490 mm	41%	0.434
3.0 MTR	442 mm	37%	0.378
4.0 MTR	495 mm	41%	0.440
5.0 MTR	307 mm	26%	0.228
6.0 MTR	320 mm	27%	0.242
7.0 MTR	318 mm	27%	0.240
8.0 MTR	320 mm	27%	0.242
9.0 MTR	395 mm	33%	0.324
10.0 MTR	398 mm	33%	0.328
11.0 MTR	358 mm	30%	0.283
12.0 MTR	358 mm	30%	0.283
13.0 MTR	360 mm	30%	0.285
14.0 MTR	360 mm	30%	0.285
15.0 MTR	426 mm	36%	0.360
16.0 MTR	425 mm	35%	0.359
17.0 MTR	420 mm	35%	0.353
18.0 MTR	415 mm	35%	0.347
19.0 MTR	410 mm	34%	0.341
20.0 MTR	400 mm	33%	0.330
21.0 MTR	405 mm	34%	0.336
22.0 MTR	400 mm	33%	0.330
23.0 MTR	400 mm	33%	0.330
24.0 MTR	380 mm	32%	0.308
25.0 MTR	350 mm	29%	0.274
26.0 MTR	325 mm	27%	0.247
27.0 MTR	325 mm	27%	0.247
28.0 MTR	335 mm	28%	0.258
29.0 MTR	335 mm	28%	0.258
30.0 MTR	340 mm	28%	0.264
31.0 MTR	310 mm	26%	0.232
32.0 MTR	300 mm	25%	0.221
33.0 MTR	310 mm	26%	0.232
34.0 MTR	280 mm	23%	0.201
35.0 MTR	325 mm	27%	0.247
36.0 MTR	330 mm	28%	0.253
37.0 MTR	290 mm	24%	0.211
38.0 MTR	282 mm	24%	0.203
39.0 MTR	282 mm	24%	0.203

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m ³)
40.0 MTR	250 mm	21%	0.171
41.0 MTR	248 mm	21%	0.169
42.0 MTR	250 mm	21%	0.171
43.0 MTR	260 mm	22%	0.181
44.0 MTR	240 mm	20%	0.161
45.0 MTR	215 mm	18%	0.138
46.0 MTR	215 mm	18%	0.138
47.0 MTR	210 mm	18%	0.133
48.0 MTR	250 mm	21%	0.171
49.0 MTR	250 mm	21%	0.171
50.0 MTR	326 mm	27%	0.249
51.0 MTR	336 mm	28%	0.259
52.0 MTR	311 mm	26%	0.233
53.0 MTR	310 mm	26%	0.232
54.0 MTR	291 mm	24%	0.212
55.0 MTR	280 mm	23%	0.201
56.0 MTR	256 mm	21%	0.177
57.0 MTR	250 mm	21%	0.171
58.0 MTR	250 mm	21%	0.171
59.0 MTR	256 mm	21%	0.177
60.0 MTR	260 mm	22%	0.181
61.0 MTR	264 mm	22%	0.184
62.0 MTR	270 mm	23%	0.190
63.0 MTR	240 mm	20%	0.161
64.0 MTR	216 mm	18%	0.138
65.0 MTR	243 mm	20%	0.164
66.0 MTR	253 mm	21%	0.174
67.0 MTR	291 mm	24%	0.212
68.0 MTR	291 mm	24%	0.212
69.0 MTR	290 mm	24%	0.211
70.0 MTR	291 mm	24%	0.212
71.0 MTR	291 mm	24%	0.212
72.0 MTR	253 mm	21%	0.174
73.0 MTR	220 mm	18%	0.142
74.0 MTR	220 mm	18%	0.142
75.0 MTR	211 mm	18%	0.134
76.0 MTR	211 mm	18%	0.134
77.0 MTR	210 mm	18%	0.133
78.0 MTR	210 mm	18%	0.133

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m3)
79.0 MTR	160 mm	13%	0.090 cum
80.0 MTR	109 mm	9%	0.051 cum
81.0 MTR	106 mm	9%	0.049 cum
82.0 MTR	105 mm	9%	0.048 cum
83.0 MTR	102 mm	9%	0.046 cum
84.0 MTR	90 mm	8%	0.039 cum
85.0 MTR	70 mm	6%	0.027 cum
86.0 MTR	70 mm	6%	0.027 cum
87.0 MTR	90 mm	8%	0.039 cum
88.0 MTR	110 mm	9%	0.052 cum
89.0 MTR	125 mm	10%	0.062 cum
90.0 MTR	140 mm	12%	0.074 cum
91.0 MTR	180 mm	15%	0.106 cum
92.0 MTR	200 mm	17%	0.124 cum
93.0 MTR	200 mm	17%	0.124 cum
94.0 MTR	210 mm	18%	0.133 cum
95.0 MTR	211 mm	18%	0.134 cum
96.0 MTR	200 mm	17%	0.124 cum
97.0 MTR	200 mm	17%	0.124 cum
98.0 MTR	210 mm	18%	0.133 cum
99.0 MTR	205 mm	17%	0.128 cum
100.0 MTR	170 mm	14%	0.098 cum
101.0 MTR	170 mm	14%	0.098 cum
102.0 MTR	170 mm	14%	0.098 cum
103.0 MTR	170 mm	14%	0.098 cum
104.0 MTR	180 mm	15%	0.106 cum
105.0 MTR	168 mm	14%	0.096 cum
106.0 MTR	160 mm	13%	0.090 cum
107.0 MTR	160 mm	13%	0.090 cum
108.0 MTR	170 mm	14%	0.098 cum
109.0 MTR	180 mm	15%	0.106 cum
110.0 MTR	195 mm	16%	0.119 cum
111.0 MTR	210 mm	18%	0.133 cum
112.0 MTR	214 mm	18%	0.137 cum
113.0 MTR	210 mm	18%	0.133 cum
114.0 MTR	210 mm	18%	0.133 cum
115.0 MTR	205 mm	17%	0.128 cum
116.0 MTR	205 mm	17%	0.128 cum
117.0 MTR	208 mm	17%	0.131 cum
118.0 MTR	208 mm	17%	0.131 cum
119.0 MTR	210 mm	18%	0.133 cum

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m ³)
120.0 MTR	210 mm	18%	0.133 cum
121.0 MTR	210 mm	18%	0.133 cum
122.0 MTR	210 mm	18%	0.133 cum
123.0 MTR	208 mm	17%	0.131 cum
124.0 MTR	175 mm	15%	0.102 cum
125.0 MTR	172 mm	14%	0.100 cum
126.0 MTR	150 mm	13%	0.082 cum
127.0 MTR	130 mm	11%	0.066 cum
128.0 MTR	60 mm	5%	0.021 cum
129.0 MTR	70 mm	6%	0.027 cum
130.0 MTR	93 mm	8%	0.040 cum
131.0 MTR	100 mm	8%	0.045 cum
132.0 MTR	80 mm	7%	0.032 cum
133.0 MTR	82 mm	7%	0.034 cum
134.0 MTR	79 mm	7%	0.032 cum
135.0 MTR	113 mm	9%	0.054 cum
136.0 MTR	88 mm	7%	0.037 cum
137.0 MTR	52 mm	4%	0.017 cum
138.0 MTR	25 mm	2%	0.006 cum
139.0 MTR	25 mm	2%	0.006 cum
140.0 MTR	55 mm	5%	0.019 cum
141.0 MTR	60 mm	5%	0.021 cum
142.0 MTR	65 mm	5%	0.024 cum
143.0 MTR	40 mm	3%	0.012 cum
144.0 MTR	60 mm	5%	0.021 cum
145.0 MTR	42 mm	4%	0.012 cum
146.0 MTR	42 mm	4%	0.012 cum
147.0 MTR	20 mm	2%	0.004 cum
148.0 MTR	20 mm	2%	0.004 cum
149.0 MTR	20 mm	2%	0.004 cum
150.0 MTR	19 mm	2%	0.004 cum
151.0 MTR	30 mm	3%	0.008 cum
152.0 MTR	81 mm	7%	0.033 cum
153.0 MTR	157 mm	13%	0.087 cum
154.0 MTR	216 mm	18%	0.138 cum
155.0 MTR	269 mm	22%	0.189 cum

B.3 *Data for % Ash-Level in Pipe #3*

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m ³)
1.0 MTR	0 mm	0%	0.000
2.0 MTR	102 mm	9%	0.046
3.0 MTR	84 mm	7%	0.035
4.0 MTR	111 mm	9%	0.052
5.0 MTR	173 mm	14%	0.100
6.0 MTR	189 mm	16%	0.114
7.0 MTR	247 mm	21%	0.168
8.0 MTR	274 mm	23%	0.194
9.0 MTR	275 mm	23%	0.196
10.0 MTR	314 mm	26%	0.236
11.0 MTR	342 mm	29%	0.266
12.0 MTR	387 mm	32%	0.315
13.0 MTR	390 mm	33%	0.319
14.0 MTR	390 mm	33%	0.319
15.0 MTR	387 mm	32%	0.315
16.0 MTR	374 mm	31%	0.301
17.0 MTR	319 mm	27%	0.241
18.0 MTR	375 mm	31%	0.302
19.0 MTR	370 mm	31%	0.296
20.0 MTR	410 mm	34%	0.341
21.0 MTR	406 mm	34%	0.337
22.0 MTR	405 mm	34%	0.336
23.0 MTR	402 mm	34%	0.332
24.0 MTR	384 mm	32%	0.312
25.0 MTR	410 mm	34%	0.341
26.0 MTR	425 mm	35%	0.359
27.0 MTR	394 mm	33%	0.323
28.0 MTR	406 mm	34%	0.337
29.0 MTR	384 mm	32%	0.312
30.0 MTR	384 mm	32%	0.312
31.0 MTR	310 mm	26%	0.232
32.0 MTR	410 mm	34%	0.341
33.0 MTR	410 mm	34%	0.341
34.0 MTR	387 mm	32%	0.315
35.0 MTR	365 mm	30%	0.291
36.0 MTR	384 mm	32%	0.312
37.0 MTR	370 mm	31%	0.296
38.0 MTR	362 mm	30%	0.288
39.0 MTR	349 mm	29%	0.273

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m ³)
40.0 MTR	350 mm	29%	0.274
41.0 MTR	380 mm	32%	0.308
42.0 MTR	384 mm	32%	0.312
43.0 MTR	384 mm	32%	0.312
44.0 MTR	359 mm	30%	0.284
45.0 MTR	359 mm	30%	0.284
46.0 MTR	301 mm	25%	0.222
47.0 MTR	280 mm	23%	0.201
48.0 MTR	270 mm	23%	0.190
49.0 MTR	250 mm	21%	0.171
50.0 MTR	301 mm	25%	0.222
51.0 MTR	300 mm	25%	0.221
52.0 MTR	298 mm	25%	0.219
53.0 MTR	298 mm	25%	0.219
54.0 MTR	301 mm	25%	0.222
55.0 MTR	275 mm	23%	0.196
56.0 MTR	250 mm	21%	0.171
57.0 MTR	250 mm	21%	0.171
58.0 MTR	254 mm	21%	0.175
59.0 MTR	263 mm	22%	0.183
60.0 MTR	243 mm	20%	0.164
61.0 MTR	240 mm	20%	0.161
62.0 MTR	235 mm	20%	0.156
63.0 MTR	240 mm	20%	0.161
64.0 MTR	227 mm	19%	0.149
65.0 MTR	218 mm	18%	0.140
66.0 MTR	218 mm	18%	0.140
67.0 MTR	208 mm	17%	0.131
68.0 MTR	192 mm	16%	0.117
69.0 MTR	185 mm	15%	0.111
70.0 MTR	180 mm	15%	0.106
71.0 MTR	180 mm	15%	0.106
72.0 MTR	185 mm	15%	0.111
73.0 MTR	189 mm	16%	0.114
74.0 MTR	190 mm	16%	0.115
75.0 MTR	190 mm	16%	0.115
76.0 MTR	135 mm	11%	0.070
77.0 MTR	135 mm	11%	0.070
78.0 MTR	140 mm	12%	0.074

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m3)
79.0 MTR	141 mm	12%	0.075 cum
80.0 MTR	176 mm	15%	0.103 cum
81.0 MTR	147 mm	12%	0.079 cum
82.0 MTR	138 mm	12%	0.072 cum
83.0 MTR	192 mm	16%	0.117 cum
84.0 MTR	192 mm	16%	0.117 cum
85.0 MTR	163 mm	14%	0.092 cum
86.0 MTR	163 mm	14%	0.092 cum
87.0 MTR	165 mm	14%	0.094 cum
88.0 MTR	159 mm	13%	0.089 cum
89.0 MTR	160 mm	13%	0.090 cum
90.0 MTR	160 mm	13%	0.090 cum
91.0 MTR	140 mm	12%	0.074 cum
92.0 MTR	140 mm	12%	0.074 cum
93.0 MTR	147 mm	12%	0.079 cum
94.0 MTR	130 mm	11%	0.066 cum
95.0 MTR	120 mm	10%	0.059 cum
96.0 MTR	115 mm	10%	0.055 cum
97.0 MTR	135 mm	11%	0.070 cum
98.0 MTR	132 mm	11%	0.068 cum
99.0 MTR	140 mm	12%	0.074 cum
100.0 MTR	138 mm	12%	0.072 cum
101.0 MTR	140 mm	12%	0.074 cum
102.0 MTR	138 mm	12%	0.072 cum
103.0 MTR	138 mm	12%	0.072 cum
104.0 MTR	140 mm	12%	0.074 cum
105.0 MTR	109 mm	9%	0.051 cum
106.0 MTR	109 mm	9%	0.051 cum
107.0 MTR	109 mm	9%	0.051 cum
108.0 MTR	109 mm	9%	0.051 cum
109.0 MTR	110 mm	9%	0.052 cum
110.0 MTR	103 mm	9%	0.047 cum
111.0 MTR	103 mm	9%	0.047 cum
112.0 MTR	105 mm	9%	0.048 cum
113.0 MTR	110 mm	9%	0.052 cum
114.0 MTR	119 mm	10%	0.058 cum
115.0 MTR	128 mm	11%	0.065 cum
116.0 MTR	120 mm	10%	0.059 cum
117.0 MTR	107 mm	9%	0.050 cum
118.0 MTR	112 mm	9%	0.053 cum
119.0 MTR	112 mm	9%	0.053 cum

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m ³)
120.0 MTR	112 mm	9%	0.053 cum
121.0 MTR	110 mm	9%	0.052 cum
122.0 MTR	106 mm	9%	0.049 cum
123.0 MTR	100 mm	8%	0.045 cum
124.0 MTR	105 mm	9%	0.048 cum
125.0 MTR	112 mm	9%	0.053 cum
126.0 MTR	90 mm	8%	0.039 cum
127.0 MTR	87 mm	7%	0.037 cum
128.0 MTR	95 mm	8%	0.042 cum
129.0 MTR	99 mm	8%	0.044 cum
130.0 MTR	141 mm	12%	0.075 cum
131.0 MTR	141 mm	12%	0.075 cum
132.0 MTR	100 mm	8%	0.045 cum
133.0 MTR	105 mm	9%	0.048 cum
134.0 MTR	120 mm	10%	0.059 cum
135.0 MTR	135 mm	11%	0.070 cum
136.0 MTR	138 mm	12%	0.072 cum
137.0 MTR	130 mm	11%	0.066 cum
138.0 MTR	129 mm	11%	0.065 cum
139.0 MTR	134 mm	11%	0.069 cum
140.0 MTR	134 mm	11%	0.069 cum
141.0 MTR	160 mm	13%	0.090 cum
142.0 MTR	160 mm	13%	0.090 cum
143.0 MTR	144 mm	12%	0.077 cum
144.0 MTR	140 mm	12%	0.074 cum
145.0 MTR	144 mm	12%	0.077 cum
146.0 MTR	144 mm	12%	0.077 cum
147.0 MTR	144 mm	12%	0.077 cum
148.0 MTR	189 mm	16%	0.114 cum
149.0 MTR	186 mm	16%	0.112 cum
150.0 MTR	234 mm	20%	0.155 cum
151.0 MTR	240 mm	20%	0.161 cum
152.0 MTR	240 mm	20%	0.161 cum
153.0 MTR	239 mm	20%	0.160 cum
154.0 MTR	239 mm	20%	0.160 cum
155.0 MTR	216 mm	18%	0.138 cum

B.4 *Data for % Ash-Level in Pipe #4*

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m ³)
1.0 MTR	23 mm	2%	0.005
2.0 MTR	128 mm	11%	0.065
3.0 MTR	115 mm	10%	0.055
4.0 MTR	134 mm	11%	0.069
5.0 MTR	128 mm	11%	0.065
6.0 MTR	123 mm	10%	0.061
7.0 MTR	118 mm	10%	0.057
8.0 MTR	106 mm	9%	0.049
9.0 MTR	102 mm	9%	0.046
10.0 MTR	109 mm	9%	0.051
11.0 MTR	99 mm	8%	0.044
12.0 MTR	112 mm	9%	0.053
13.0 MTR	224 mm	19%	0.146
14.0 MTR	186 mm	16%	0.112
15.0 MTR	189 mm	16%	0.114
16.0 MTR	202 mm	17%	0.126
17.0 MTR	157 mm	13%	0.087
18.0 MTR	259 mm	22%	0.180
19.0 MTR	275 mm	23%	0.196
20.0 MTR	250 mm	21%	0.171
21.0 MTR	253 mm	21%	0.174
22.0 MTR	157 mm	13%	0.087
23.0 MTR	134 mm	11%	0.069
24.0 MTR	159 mm	13%	0.089
25.0 MTR	224 mm	19%	0.146
26.0 MTR	154 mm	13%	0.085
27.0 MTR	179 mm	15%	0.106
28.0 MTR	256 mm	21%	0.177
29.0 MTR	243 mm	20%	0.164
30.0 MTR	211 mm	18%	0.134
31.0 MTR	202 mm	17%	0.126
32.0 MTR	198 mm	17%	0.122
33.0 MTR	184 mm	15%	0.110
34.0 MTR	178 mm	15%	0.105
35.0 MTR	189 mm	16%	0.114
36.0 MTR	172 mm	14%	0.100
37.0 MTR	167 mm	14%	0.095
38.0 MTR	134 mm	11%	0.069
39.0 MTR	74 mm	6%	0.029

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m ³)
40.0 MTR	123 mm	10%	0.061
41.0 MTR	138 mm	12%	0.072
42.0 MTR	154 mm	13%	0.085
43.0 MTR	166 mm	14%	0.095
44.0 MTR	179 mm	15%	0.106
45.0 MTR	205 mm	17%	0.128
46.0 MTR	196 mm	16%	0.120
47.0 MTR	205 mm	17%	0.128
48.0 MTR	174 mm	15%	0.101
49.0 MTR	154 mm	13%	0.085
50.0 MTR	170 mm	14%	0.098
51.0 MTR	189 mm	16%	0.114
52.0 MTR	221 mm	18%	0.143
53.0 MTR	202 mm	17%	0.126
54.0 MTR	207 mm	17%	0.130
55.0 MTR	214 mm	18%	0.137
56.0 MTR	209 mm	17%	0.132
57.0 MTR	221 mm	18%	0.143
58.0 MTR	205 mm	17%	0.128
59.0 MTR	214 mm	18%	0.137
60.0 MTR	186 mm	16%	0.112
61.0 MTR	185 mm	15%	0.111
62.0 MTR	176 mm	15%	0.103
63.0 MTR	192 mm	16%	0.117
64.0 MTR	205 mm	17%	0.128
65.0 MTR	173 mm	14%	0.100
66.0 MTR	156 mm	13%	0.086
67.0 MTR	189 mm	16%	0.114
68.0 MTR	162 mm	14%	0.091
69.0 MTR	173 mm	14%	0.100
70.0 MTR	198 mm	17%	0.122
71.0 MTR	154 mm	13%	0.085
72.0 MTR	173 mm	14%	0.100
73.0 MTR	212 mm	18%	0.135
74.0 MTR	215 mm	18%	0.138
75.0 MTR	234 mm	20%	0.155
76.0 MTR	237 mm	20%	0.158
77.0 MTR	233 mm	19%	0.154
78.0 MTR	241 mm	20%	0.162

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m3)
79.0 MTR	253 mm	21%	0.174 cum
80.0 MTR	195 mm	16%	0.119 cum
81.0 MTR	191 mm	16%	0.116 cum
82.0 MTR	169 mm	14%	0.097 cum
83.0 MTR	134 mm	11%	0.069 cum
84.0 MTR	163 mm	14%	0.092 cum
85.0 MTR	170 mm	14%	0.098 cum
86.0 MTR	178 mm	15%	0.105 cum
87.0 MTR	189 mm	16%	0.114 cum
88.0 MTR	167 mm	14%	0.095 cum
89.0 MTR	183 mm	15%	0.109 cum
90.0 MTR	166 mm	14%	0.095 cum
91.0 MTR	134 mm	11%	0.069 cum
92.0 MTR	121 mm	10%	0.060 cum
93.0 MTR	157 mm	13%	0.087 cum
94.0 MTR	172 mm	14%	0.100 cum
95.0 MTR	182 mm	15%	0.108 cum
96.0 MTR	173 mm	14%	0.100 cum
97.0 MTR	143 mm	12%	0.076 cum
98.0 MTR	157 mm	13%	0.087 cum
99.0 MTR	118 mm	10%	0.057 cum
100.0 MTR	134 mm	11%	0.069 cum
101.0 MTR	127 mm	11%	0.064 cum
102.0 MTR	134 mm	11%	0.069 cum
103.0 MTR	156 mm	13%	0.086 cum
104.0 MTR	129 mm	11%	0.065 cum
105.0 MTR	144 mm	12%	0.077 cum
106.0 MTR	183 mm	15%	0.109 cum
107.0 MTR	196 mm	16%	0.120 cum
108.0 MTR	208 mm	17%	0.131 cum
109.0 MTR	147 mm	12%	0.079 cum
110.0 MTR	170 mm	14%	0.098 cum
111.0 MTR	168 mm	14%	0.096 cum
112.0 MTR	134 mm	11%	0.069 cum
113.0 MTR	192 mm	16%	0.117 cum
114.0 MTR	139 mm	12%	0.073 cum
115.0 MTR	165 mm	14%	0.094 cum
116.0 MTR	171 mm	14%	0.099 cum
117.0 MTR	186 mm	16%	0.112 cum
118.0 MTR	169 mm	14%	0.097 cum
119.0 MTR	138 mm	12%	0.072 cum

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m ³)
120.0 MTR	155 mm	13%	0.086 cum
121.0 MTR	120 mm	10%	0.059 cum
122.0 MTR	119 mm	10%	0.058 cum
123.0 MTR	158 mm	13%	0.088 cum
124.0 MTR	179 mm	15%	0.106 cum
125.0 MTR	190 mm	16%	0.115 cum
126.0 MTR	181 mm	15%	0.107 cum
127.0 MTR	189 mm	16%	0.114 cum
128.0 MTR	190 mm	16%	0.115 cum
129.0 MTR	192 mm	16%	0.117 cum
130.0 MTR	215 mm	18%	0.138 cum
131.0 MTR	205 mm	17%	0.128 cum
132.0 MTR	198 mm	17%	0.122 cum
133.0 MTR	156 mm	13%	0.086 cum
134.0 MTR	144 mm	12%	0.077 cum
135.0 MTR	145 mm	12%	0.078 cum
136.0 MTR	163 mm	14%	0.092 cum
137.0 MTR	178 mm	15%	0.105 cum
138.0 MTR	195 mm	16%	0.119 cum
139.0 MTR	224 mm	19%	0.146 cum
140.0 MTR	167 mm	14%	0.095 cum
141.0 MTR	157 mm	13%	0.087 cum
142.0 MTR	178 mm	15%	0.105 cum
143.0 MTR	191 mm	16%	0.116 cum
144.0 MTR	223 mm	19%	0.145 cum
145.0 MTR	247 mm	21%	0.168 cum
146.0 MTR	238 mm	20%	0.159 cum
147.0 MTR	229 mm	19%	0.151 cum
148.0 MTR	221 mm	18%	0.143 cum
149.0 MTR	241 mm	20%	0.162 cum
150.0 MTR	253 mm	21%	0.174 cum
151.0 MTR	231 mm	19%	0.152 cum
152.0 MTR	190 mm	16%	0.115 cum
153.0 MTR	192 mm	16%	0.117 cum
154.0 MTR	181 mm	15%	0.107 cum
155.0 MTR	176 mm	15%	0.103 cum

B.5 *Data for % Ash-Level in Pipe #5*

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m ³)
1.0 MTR	145 mm	12%	0.078
2.0 MTR	145 mm	12%	0.078
3.0 MTR	160 mm	13%	0.090
4.0 MTR	165 mm	14%	0.094
5.0 MTR	165 mm	14%	0.094
6.0 MTR	423 mm	35%	0.356
7.0 MTR	429 mm	36%	0.363
8.0 MTR	422 mm	35%	0.355
9.0 MTR	400 mm	33%	0.330
10.0 MTR	378 mm	32%	0.305
11.0 MTR	243 mm	20%	0.164
12.0 MTR	243 mm	20%	0.164
13.0 MTR	246 mm	21%	0.167
14.0 MTR	246 mm	21%	0.167
15.0 MTR	253 mm	21%	0.174
16.0 MTR	288 mm	24%	0.209
17.0 MTR	273 mm	23%	0.193
18.0 MTR	269 mm	22%	0.189
19.0 MTR	260 mm	22%	0.181
20.0 MTR	256 mm	21%	0.177
21.0 MTR	246 mm	21%	0.167
22.0 MTR	300 mm	25%	0.221
23.0 MTR	280 mm	23%	0.201
24.0 MTR	335 mm	28%	0.258
25.0 MTR	426 mm	36%	0.360
26.0 MTR	440 mm	37%	0.376
27.0 MTR	235 mm	20%	0.156
28.0 MTR	234 mm	20%	0.155
29.0 MTR	234 mm	20%	0.155
30.0 MTR	234 mm	20%	0.155
31.0 MTR	237 mm	20%	0.158
32.0 MTR	237 mm	20%	0.158
33.0 MTR	240 mm	20%	0.161
34.0 MTR	240 mm	20%	0.161
35.0 MTR	221 mm	18%	0.143
36.0 MTR	231 mm	19%	0.152
37.0 MTR	201 mm	17%	0.125
38.0 MTR	151 mm	13%	0.082
39.0 MTR	170 mm	14%	0.098

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m ³)
40.0 MTR	165 mm	14%	0.094
41.0 MTR	140 mm	12%	0.074
42.0 MTR	160 mm	13%	0.090
43.0 MTR	160 mm	13%	0.090
44.0 MTR	195 mm	16%	0.119
45.0 MTR	190 mm	16%	0.115
46.0 MTR	170 mm	14%	0.098
47.0 MTR	165 mm	14%	0.094
48.0 MTR	139 mm	12%	0.073
49.0 MTR	135 mm	11%	0.070
50.0 MTR	135 mm	11%	0.070
51.0 MTR	120 mm	10%	0.059
52.0 MTR	157 mm	13%	0.087
53.0 MTR	160 mm	13%	0.090
54.0 MTR	150 mm	13%	0.082
55.0 MTR	100 mm	8%	0.045
56.0 MTR	105 mm	9%	0.048
57.0 MTR	135 mm	11%	0.070
58.0 MTR	138 mm	12%	0.072
59.0 MTR	115 mm	10%	0.055
60.0 MTR	135 mm	11%	0.070
61.0 MTR	150 mm	13%	0.082
62.0 MTR	138 mm	12%	0.072
63.0 MTR	143 mm	12%	0.076
64.0 MTR	103 mm	9%	0.047
65.0 MTR	81 mm	7%	0.033
66.0 MTR	74 mm	6%	0.029
67.0 MTR	86 mm	7%	0.036
68.0 MTR	84 mm	7%	0.035
69.0 MTR	74 mm	6%	0.029
70.0 MTR	80 mm	7%	0.032
71.0 MTR	54 mm	5%	0.018
72.0 MTR	51 mm	4%	0.017
73.0 MTR	160 mm	13%	0.090
74.0 MTR	189 mm	16%	0.114
75.0 MTR	157 mm	13%	0.087
76.0 MTR	96 mm	8%	0.042
77.0 MTR	55 mm	5%	0.019
78.0 MTR	58 mm	5%	0.020

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m ³)
79.0 MTR	61 mm	5%	0.022 cum
80.0 MTR	51 mm	4%	0.017 cum
81.0 MTR	64 mm	5%	0.023 cum
82.0 MTR	64 mm	5%	0.023 cum
83.0 MTR	83 mm	7%	0.034 cum
84.0 MTR	93 mm	8%	0.040 cum
85.0 MTR	61 mm	5%	0.022 cum
86.0 MTR	68 mm	6%	0.025 cum
87.0 MTR	47 mm	4%	0.015 cum
88.0 MTR	54 mm	5%	0.018 cum
89.0 MTR	54 mm	5%	0.018 cum
90.0 MTR	30 mm	3%	0.008 cum
91.0 MTR	50 mm	4%	0.016 cum
92.0 MTR	45 mm	4%	0.014 cum
93.0 MTR	30 mm	3%	0.008 cum
94.0 MTR	94 mm	8%	0.041 cum
95.0 MTR	70 mm	6%	0.027 cum
96.0 MTR	75 mm	6%	0.029 cum
97.0 MTR	77 mm	6%	0.031 cum
98.0 MTR	90 mm	8%	0.039 cum
99.0 MTR	75 mm	6%	0.029 cum
100.0 MTR	58 mm	5%	0.020 cum
101.0 MTR	40 mm	3%	0.012 cum
102.0 MTR	30 mm	3%	0.008 cum
103.0 MTR	28 mm	2%	0.007 cum
104.0 MTR	30 mm	3%	0.008 cum
105.0 MTR	25 mm	2%	0.006 cum
106.0 MTR	20 mm	2%	0.004 cum
107.0 MTR	22 mm	2%	0.005 cum
108.0 MTR	45 mm	4%	0.014 cum
109.0 MTR	30 mm	3%	0.008 cum
110.0 MTR	50 mm	4%	0.016 cum
111.0 MTR	45 mm	4%	0.014 cum
112.0 MTR	60 mm	5%	0.021 cum
113.0 MTR	65 mm	5%	0.024 cum
114.0 MTR	65 mm	5%	0.024 cum
115.0 MTR	74 mm	6%	0.029 cum
116.0 MTR	75 mm	6%	0.029 cum
117.0 MTR	67 mm	6%	0.025 cum
118.0 MTR	67 mm	6%	0.025 cum
119.0 MTR	65 mm	5%	0.024 cum

Distance from Well	Silt Height	Silt Level	Silt Volume
(MTR)	(mm)	(%)	(m ³)
120.0 MTR	98 mm	8%	0.044 cum
121.0 MTR	98 mm	8%	0.044 cum
122.0 MTR	100 mm	8%	0.045 cum
123.0 MTR	103 mm	9%	0.047 cum
124.0 MTR	94 mm	8%	0.041 cum
125.0 MTR	96 mm	8%	0.042 cum
126.0 MTR	106 mm	9%	0.049 cum
127.0 MTR	95 mm	8%	0.042 cum
128.0 MTR	102 mm	9%	0.046 cum
129.0 MTR	100 mm	8%	0.045 cum
130.0 MTR	64 mm	5%	0.023 cum
131.0 MTR	80 mm	7%	0.032 cum
132.0 MTR	90 mm	8%	0.039 cum
133.0 MTR	55 mm	5%	0.019 cum
134.0 MTR	58 mm	5%	0.020 cum
135.0 MTR	62 mm	5%	0.022 cum
136.0 MTR	62 mm	5%	0.022 cum
137.0 MTR	65 mm	5%	0.024 cum
138.0 MTR	65 mm	5%	0.024 cum
139.0 MTR	67 mm	6%	0.025 cum
140.0 MTR	67 mm	6%	0.025 cum
141.0 MTR	45 mm	4%	0.014 cum
142.0 MTR	50 mm	4%	0.016 cum
143.0 MTR	55 mm	5%	0.019 cum
144.0 MTR	65 mm	5%	0.024 cum
145.0 MTR	80 mm	7%	0.032 cum
146.0 MTR	74 mm	6%	0.029 cum
147.0 MTR	65 mm	5%	0.024 cum
148.0 MTR	70 mm	6%	0.027 cum
149.0 MTR	100 mm	8%	0.045 cum
150.0 MTR	96 mm	8%	0.042 cum
151.0 MTR	85 mm	7%	0.035 cum
152.0 MTR	80 mm	7%	0.032 cum
153.0 MTR	102 mm	9%	0.046 cum
154.0 MTR	93 mm	8%	0.040 cum
155.0 MTR	90 mm	8%	0.039 cum

APPENDIX C : Well Inspection Reports & Appendix D: Pipe Inspection Reports



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WELL INSPECTION REPORT

Date: 30-04-2021	Video File: Well#1side1.mp4	Operator: Anil Mishra
Report ID: Well#1	Well#1side2.mp4	Camera: PTZ OWL 3000

Place:	NTPC, VSTPS	U/S Point:	Well top
Location:	Vindhya Nagar, Singrauli	D/S Point:	Well bottom
Inspection:	CCTV		
Well Use:	Decantation water escape structure	Well Shape:	Circular
Year Laid:	NA	Well Size:	4000mm
Inspection Purpose:	Condition Assessment	Well Material:	RCC
Total Length:	16m	Inspected Length:	13m

	Position	Code	Observation	Direction	Slide
Well top	0.0m	ST	Survey start	US to DS	
	2.0m	RV	Rebar exposed	US to DS	Well#1_01
	2.0m	RV	Large visible gap at side2	US to DS	Well#1_02
	3.0m	ID	Leakage at side1	US to DS	Well#1_03
	4.5m	RV	Rebar exposed	US to DS	Well#1_04
	5.0m	IA	Exposed jute/plastic bags	US to DS	Well#1_05
	7.0m	IA	Exposed jute/plastic bags	US to DS	Well#1_06
	8.0m	ID	Leakage at side1	US to DS	Well#1_07
	8.0m	MM	Improper construction joints	US to DS	Well#1_08
	9.0m	ID	Leakage at side2	US to DS	Well#1_09
	10.0m	RV	Visible iron bar	US to DS	Well#1_10
	11.0m	MM	Improper construction joints	US to DS	Well#1_11
	13.0m	RV	Visible iron bar	US to DS	Well#1_12
Well bottom	13.0m	FH	Survey finish	US to DS	



SLIDE: Well#1_01

Distance from U/S Manhole: 2.0m

RV Rebar exposed

0



SLIDE: Well#1_02

Distance from U/S Manhole: 2.0m

RV Large visible gap at side2

0



SLIDE: Well#1_03

Distance from U/S Manhole: 3.0m

ID Leakage at side1

0



SLIDE: Well#1_04

Distance from U/S Manhole: 4.5m

RV Rebar exposed

0



Well#1, CP-5.0Mtr

SLIDE: Well#1_05

Distance from U/S Manhole: 5.0m

IA Exposed jute/plastic bags

0



Well#1, side2 CP-7.0Mtr

SLIDE: Well#1_06

Distance from U/S Manhole: 7.0m

IA Exposed jute/plastic bags

0



SLIDE: Well#1_07

Distance from U/S Manhole: 8.0m

ID Leakage at side1

0



SLIDE: Well#1_08

Distance from U/S Manhole: 8.0m

MM Improper construction joints

0



SLIDE: Well#1_09

Distance from U/S Manhole: 9.0m

ID Leakage at side2

0



SLIDE: Well#1_10

Distance from U/S Manhole: 10.0m

RV Visible iron bar

0



SLIDE: Well#1_11

Distance from U/S Manhole: 11.0m

MM	Improper construction joints	0
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SLIDE: Well#1_12

Distance from U/S Manhole: 13.0m

RV	Visible iron bar	0
FH	Survey finish	0



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WELL INSPECTION REPORT

Date: 01-05-2021	Video File: Well#2side1.mp4	Operator: Anil mishra
Report ID: Well#2	Well#2side2.mp4	Camera: PTZ OWL 3000

Place: NTPC, VSTPS	U/S Point: Well top
Location: Vindhya Nagar, Singrauli	D/S Point: Well bottom
Inspection: CCTV	
Well Use: Decantation water escape structure	Well Shape: Circular
Year Laid: NA	Well Size: 4000mm
Inspection Purpose: Condition Assessment	Well Material: RCC
Total Length: 16m	Inspected Length: 13m

	Position	Code	Observation	Direction	Slide
Well top	0.0m	ST	Survey start	US to DS	
	1.0m	GP	Window (concrete is absent)	US to DS	Well#2_01
	3.0m	MM	Improper construction joints	US to DS	Well#2_02
	5.0m	IA	Exposed jute/plastic bags	US to DS	Well#2_03
	6.0m	MM	Improper construction joints	US to DS	Well#2_04
	6.0m	MM	Improper construction joints	US to DS	Well#2_05
	8.0m	MM	Improper construction joints	US to DS	Well#2_06
	9.0m	RV	Rebar exposed at side2, concrete is absent	US to DS	Well#2_07
	10.0m	GP	General inspection photograph	US to DS	Well#2_08
	12.0m	GP	General inspection photograph	US to DS	Well#2_09
	13.0m	GP	Leakage at side2 (Infiltration of water)	US to DS	Well#2_10
Well bottom	13.0m	FH	Survey finish	US to DS	



SLIDE: Well#2_01

Distance from U/S Manhole: 1.0m

GP Window (concrete is absent)

0



SLIDE: Well#2_02

Distance from U/S Manhole: 3.0m

MM Improper construction joints

0



SLIDE: Well#2_03

Distance from U/S Manhole: 5.0m

IA Exposed jute/plastic bags

0



SLIDE: Well#2_04

Distance from U/S Manhole: 6.0m

MM Improper construction joints

0



SLIDE: Well#2_05

Distance from U/S Manhole: 6.0m

MM

Improper construction joints

0



SLIDE: Well#2_06

Distance from U/S Manhole: 8.0m

MM

Improper construction joints

0



SLIDE: Well#2_07

Distance from U/S Manhole: 9.0m

RV Rebar exposed at side2, concrete is absent 0



SLIDE: Well#2_08

Distance from U/S Manhole: 10.0m

GP General inspection photograph 0



SLIDE: Well#2_09

Distance from U/S Manhole: 12.0m

GP	General inspection photograph	0
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SLIDE: Well#2_10

Distance from U/S Manhole: 13.0m

ID	Leakage at side2 (infiltration of water)	0
FH	Survey finish	0



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WELL INSPECTION REPORT

Date: 03-05-2021	Video File: Well#3side1.mp4	Operator: Anil mishra
Report ID: Well#3	Well#3side2.mp4	Camera: PTZ OWL 3000

Place: NTPC, VSTPS	U/S Point: Well top
Location: Vindhya Nagar, Singrauli	D/S Point: Well bottom
Inspection: CCTV	
Well Use: Decantation water escape structure	Well Shape: Circular
Year Laid: NA	Well Size: 4000mm
Inspection Purpose: Condition Assessment	Well Material: RCC
Total Length: 16m	Inspected Length: 13m

	Position	Code	Observation	Direction	Slide
Well top	0.0m	ST	Survey start	US to DS	
	2.0m	GP	Window (concrete is absent)	US to DS	Well#3_01
	3.0m	RV	Rebar exposed all along the joint	US to DS	Well#3_02
	4.0m	IA	Exposed jute/plastic bags	US to DS	Well#3_03
	5.0m	IA	Exposed jute/plastic bags	US to DS	Well#3_04
	6.0m	RV	Rebar exposed, concrete absent	US to DS	Well#3_05
	7.0m	MM	Concrete chunk displaced	US to DS	Well#3_06
	8.0m	ID	Infiltration of Water	US to DS	Well#3_07
	8.0m	IA	Exposed jute/plastic bags, rebar exposed	US to DS	Well#3_08
	9.0m	MM	Improper construction joints	US to DS	Well#3_09
	10.0m	RV	Visible iron bar	US to DS	Well#3_10
	11.0m	RV	Visible iron bar	US to DS	Well#3_11
	11.0m	ID	Leakage at side2, Infiltration of Water	US to DS	Well#3_12
	13.0m	RV	Visible iron bar	US to DS	Well#3_13
Well bottom	13.0m	FH	Survey finish	US to DS	



SLIDE: Well#3_01

Distance from U/S Manhole: 2.0m

GP Window (concrete is absent)

0



SLIDE: Well#3_02

Distance from U/S Manhole: 3.0m

RV Rebar exposed all along the joint

0



SLIDE: Well#3_03

Distance from U/S Manhole: 4.0m

IA Exposed jute/plastic bags

0



SLIDE: Well#3_04

Distance from U/S Manhole: 5.0m

IA Exposed jute/plastic bags

0



SLIDE: Well#3_05

Distance from U/S Manhole: 6.0m

RV Rebar exposed, concrete absent

0



SLIDE: Well#3_06

Distance from U/S Manhole: 7.0m

MM Concrete chunk displaced

0



SLIDE: Well#3_07

Distance from U/S Manhole: 8.0m

ID Water infiltration

0



SLIDE: Well#3_08

Distance from U/S Manhole: 8.0m

IA Exposed jute/plastic bags, rebar exposed

0



SLIDE: Well#3_09

Distance from U/S Manhole: 9.0m

MM

Improper construction joints

0



SLIDE: Well#3_10

Distance from U/S Manhole: 10.0m

RV

Visible iron bar

0



SLIDE: Well#3_11

Distance from U/S Manhole: 11.0m

RV

Visible iron bar

0



SLIDE: Well#3_12

Distance from U/S Manhole: 11.0m

ID

Leakage at side2, water infiltration

0



SLIDE: Well#3_13

Distance from U/S Manhole: 13.0m

RV	Visible iron bar	0
FH	Survey finish	0



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WELL INSPECTION REPORT

Date: 04-05-2021	Video File: Well#4Side1.mp4	Operator: Anil mishra
Report ID: Well#4	Well#4Side2.mp4	Camera: PTZ OWL 3000

Place: NTPC, VSTPS	U/S Point: Well top
Location: Vindhya Nagar, Singrauli	D/S Point: Well bottom
Inspection: CCTV	
Well Use: Decantation water escape structure	Well Shape: Circular
Year Laid: NA	Well Size: 4000mm
Inspection Purpose: Condition Assessment	Well Material: RCC
Total Length: 16m	Inspected Length: 13m

	Position	Code	Observation	Direction	Slide
Well top	0.0m	ST	Survey start	US to DS	
	1.0m	GP	Window, visible iron bar	US to DS	Well#4_01
	3.0m	RV	Rebar exposed, concrete absent	US to DS	Well#4_02
	3.0m	IA	Exposed jute/plastic bags	US to DS	Well#4_03
	4.0m	IA	Exposed jute/plastic bags at side1	US to DS	Well#4_04
	4.0m	IA	Exposed jute/plastic bags at side2	US to DS	Well#4_05
	5.0m	MM	Improper construction joints	US to DS	Well#4_06
	6.0m	MM	Improper construction joints	US to DS	Well#4_07
	7.0m	IA	Exposed jute/plastic bags	US to DS	Well#4_08
	7.0m	H	Large hole/opening at side2	US to DS	Well#4_09
	8.0m	MM	Improper construction joints	US to DS	Well#4_10
	9.0m	MM	Concrete absent	US to DS	Well#4_11
	9.0m	IA	Exposed jute/plastic bags	US to DS	Well#4_12
	10.0m	IA	Exposed jute/plastic bags, improper construction	US to DS	Well#4_13
	10.0m	IA	Exposed jute/plastic bags	US to DS	Well#4_14
	12.0m	MM	Concrete absent	US to DS	Well#4_15
Well bottom	13.0m	FH	Survey finish	US to DS	



SLIDE: Well#4_01

Distance from U/S Manhole: 1.0m

GP Window, visible iron bar

0



SLIDE: Well#4_02

Distance from U/S Manhole: 3.0m

RV Rebar exposed, concrete absent

0



SLIDE: Well#4_03

Distance from U/S Manhole: 3.0m

IA Exposed jute/plastic bags

0



SLIDE: Well#4_04

Distance from U/S Manhole: 4.0m

IA Exposed jute/plastic bags at side1

0



SLIDE: Well#4_05

Distance from U/S Manhole: 4.0m

IA Exposed jute/plastic bags at side2

0



SLIDE: Well#4_06

Distance from U/S Manhole: 5.0m

MM Improper construction joints

0



SLIDE: Well#4_07

Distance from U/S Manhole: 6.0m

MM

Improper construction joints

0



SLIDE: Well#4_08

Distance from U/S Manhole: 7.0m

IA

Exposed jute/plastic bags

0



SLIDE: Well#4_09

Distance from U/S Manhole: 7.0m

H Large hole/opening at side2

0



SLIDE: Well#4_10

Distance from U/S Manhole: 8.0m

MM Improper construction joints

0



SLIDE: Well#4_11

Distance from U/S Manhole: 9.0m

MM

Concrete absent

0



SLIDE: Well#4_12

Distance from U/S Manhole: 9.0m

IA

Exposed jute/plastic bags

0



SLIDE: Well#4_13

Distance from U/S Manhole: 10.0m

IA Exposed jute/plastic bags, improper construction

0



SLIDE: Well#4_14

Distance from U/S Manhole: 10.0m

IA Exposed jute/plastic bags

0



SLIDE: Well#4_15

Distance from U/S Manhole: 12.0m

MM

Concrete absent

0



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WELL INSPECTION REPORT

Date: 05-05-2021	Video File: Well#5side1.mp4	Operator: Anil Mishra
Report ID: Well#5	Well#5side2.mp4	Camera: PTZ OWL 3000

Place: NTPC, VSTPS	U/S Point: Well top
Location: Vindhya Nagar, Singrauli	D/S Point: Well bottom
Inspection: CCTV	
Well Use: Decantation water escape structure	Well Shape: Circular
Year Laid: NA	Well Size: 4000mm
Inspection Purpose: Condition Assessment	Well Material: RCC
Total Length: 16m	Inspected Length: 13m

	Position	Code	Observation	Direction	Slide
Well top	0.0m	ST	Survey start	US to DS	
	2.0m	GP	Window	US to DS	Well#5_01
	3.0m	IA	Exposed jute/plastic bags	US to DS	Well#5_02
	3.0m	RV	Rebar exposed	US to DS	
	4.0m	RV	Rebar exposed	US to DS	Well#5_04
	5.0m	IA	Exposed jute/plastic bags	US to DS	Well#5_05
	6.0m	MM	Concrete absent	US to DS	Well#5_06
	6.0m	IA	Exposed jute/plastic bags	US to DS	Well#5_07
	7.0m	JDL	Concrete displaced	US to DS	Well#5_08
	8.0m	MM	Improper construction	US to DS	Well#5_09
	8.0m	H	Hole	US to DS	Well#5_10
	9.0m	ID	Leakage at side2	US to DS	Well#5_11
	11.0m	ID	Hole at side2	US to DS	Well#5_12
	12.0m	RV	Visible iron bar	US to DS	Well#5_13
	13.0m	ID	Leakage at side2	US to DS	Well#5_14
	13.0m	FH	Survey finish	US to DS	
Well bottom					



SLIDE: Well#5_01

Distance from U/S Manhole: 2.0m

GP

Window

0



SLIDE: Well#5_02

Distance from U/S Manhole: 3.0m

IA

Exposed jute/plastic bags

0

RV

Rebar exposed

0



SLIDE: Well#5_04

Distance from U/S Manhole: 4.0m

RV Rebar exposed

0



SLIDE: Well#5_05

Distance from U/S Manhole: 5.0m

IA Exposed jute/plastic bags

0



SLIDE: Well#5_06

Distance from U/S Manhole: 6.0m

MM

Concrete absent

0



SLIDE: Well#5_07

Distance from U/S Manhole: 6.0m

IA

Exposed jute/plastic bags

0



SLIDE: Well#5_08

Distance from U/S Manhole: 7.0m

JDL Concrete displaced

0



SLIDE: Well#5_09

Distance from U/S Manhole: 8.0m

MM Improper construction

0



SLIDE: Well#5_10

Distance from U/S Manhole: 8.0m

H Hole at side2

0



SLIDE: Well#5_11

Distance from U/S Manhole: 9.0m

ID Leakage at side2

0



SLIDE: Well#5_12

Distance from U/S Manhole: 11.0m

ID Hole at side2

0



SLIDE: Well#5_13

Distance from U/S Manhole: 12.0m

RV Visible iron bar

0



SLIDE: Well#5_14

Distance from U/S Manhole: 13.0m

ID	Leakage at side2	0
FH	Survey finish	0

APPENDIX D : Pipeline Inspection Reports



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NTPC Limited.
Client: **SSC-VSR station**
Vindhya Nagar District- Singrauli.
Madhya Pradesh-486885, India



A Maharatna Company

PIPELINE INSPECTION REPORT

Date: 08-05-2021	Video File: pipeline#1.mp4	Operator: Anil Mishra
Report ID: Pipeline#1		Camera: Marine Trekker

Place: NTPC, VSTPS	U/S Point: Well#1
Location: Vindhya Nagar, Singrauli	D/S Point: Overflow lagoon
Inspection: CCTV+SONAR	
Pipe Use: Decantation water escape structure	Pipe Shape: Circular
Year Laid: NA	Pipe Size: 1200mm
Inspection Purpose: Condition Assessment	Pipe Material: RCC
Total Length: 155m	Inspected Length: 155.1m

	Position	Code	Observation	Direction	Slide
	0.0m	FH	Survey Finish	DS to US	
	5.0m	GP	General inspection photograph	DS to US	Pipe#1_09
	25.0m	ID(J)	Infiltration dripping at joint	DS to US	Pipe#1_08
	29.4m	ID(J)	Infiltration dripping at joint	DS to US	Pipe#1_11
	34.5m	ID(J)	Infiltration dripping at joint	DS to US	Pipe#1_10
	50.0m	GP	General inspection photograph	DS to US	Pipe#1_07
	75.0m	GP	General inspection photograph	DS to US	Pipe#1_06
	89.9m	GP	General inspection photograph	DS to US	Pipe#1_05
	110.0m	GP	General inspection photograph	DS to US	Pipe#1_04
	120.1m	GP	General inspection photograph	DS to US	Pipe#1_03
	129.6m	GP	General inspection photograph	DS to US	Pipe#1_02
	149.9m	GP	General inspection photograph	DS to US	Pipe#1_01
	155.0m	ST	Survey Start	DS to US	



SLIDE: Pipe#1_09

Distance from U/S Manhole: 5.0m

GP General inspection photograph

0



SLIDE: Pipe#1_08

Distance from U/S Manhole: 25.0m

ID(J) Infiltration dripping at joint

0



SLIDE: Pipe#1_11

Distance from U/S Manhole: 29.4m

ID(J)	Infiltration dripping at joint	0
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SLIDE: Pipe#1_10

Distance from U/S Manhole: 34.5m

ID(J)	Infiltration dripping at joint	0
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SLIDE: Pipe#1_07

Distance from U/S Manhole: 50.0m

GP General inspection photograph

0



SLIDE: Pipe#1_06

Distance from U/S Manhole: 75.0m

GP General inspection photograph

0



SLIDE: Pipe#1_05

Distance from U/S Manhole: 89.9m

GP General inspection photograph

0



SLIDE: Pipe#1_04

Distance from U/S Manhole: 110.0m

GP General inspection photograph

0



SLIDE: Pipe#1_03

Distance from U/S Manhole: 120.1m

GP General inspection photograph

0



SLIDE: Pipe#1_02

Distance from U/S Manhole: 129.6m

GP General inspection photograph

0



SLIDE: Pipe#1_01

Distance from U/S Manhole: 149.9m

GP General inspection photograph

0


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NTPC Limited.

 Client: SSC-VSR station
 Vindhya Nagar District -Singrauli.
 Madhya Pradesh-486885, India


A Maharatna Company

PIPELINE INSPECTION REPORT

Date: 01-05-2021	Video File: Pipeline#2.mp4	Operator: Anil Mishra
Report ID: Pipeline#2		Camera: Marine Trekker

Place: NTPC, VSTPS	U/S Point: Well#2
Location: Vindhya Nagar, Singrauli	D/S Point: Overflow lagoon
Inspection: CCTV+SONAR	
Pipe Use: Decantation water escape structure	Pipe Shape: Circular
Year Laid: NA	Pipe Size: 1200mm
Inspection Purpose: Condition Assessment	Pipe Material: RCC
Total Length: 155m	Inspected Length: 155.2m

	Position	Code	Observation	Direction	Slide
Well#2	0.0m	ST	Survey Start	US to DS	
	7.6m	GP	General inspection photograph	US to DS	Pipeline#2_01
	23.5m	IS(J)	Infiltration seepage at joint	US to DS	Pipeline#2_02
	29.5m	GP	General inspection photograph	US to DS	Pipeline#2_03
	45.8m	GP	General inspection photograph	US to DS	Pipeline#2_04
	50.0m	ID(J)	Infiltration dripping at joint	US to DS	Pipeline#2_05
	58.2m	GP	General inspection photograph	US to DS	Pipeline#2_06
	70.3m	GP	General inspection photograph	US to DS	Pipeline#2_07
	79.8m	GP	General inspection photograph	US to DS	Pipeline#2_08
	90.1m	GP	General inspection photograph	US to DS	Pipeline#2_09
	95.4m	GP	General inspection photograph	US to DS	Pipeline#2_10
	101.0m	GP	General inspection photograph	US to DS	Pipeline#2_11
	113.8m	GP	General inspection photograph	US to DS	Pipeline#2_12
	123.8m	GP	General inspection photograph	US to DS	Pipeline#2_13
	138.2m	GP	General inspection photograph	US to DS	Pipeline#2_14
	144.4m	GP	General inspection photograph	US to DS	Pipeline#2_15
	155.2m	FH	Survey Finish	US to DS	
Overflow lagoon					



SLIDE: Pipeline#2_01

Distance from U/S Manhole: 7.6m

GP General inspection photograph

0



SLIDE: Pipeline#2_02

Distance from U/S Manhole: 23.5m

IS(J) Infiltration seepage at joint

0



SLIDE: Pipeline#2_03

Distance from U/S Manhole: 29.5m

GP General inspection photograph

0



SLIDE: Pipeline#2_04

Distance from U/S Manhole: 45.8m

GP General inspection photograph

0



SLIDE: Pipeline#2_05

Distance from U/S Manhole: 50.0m

ID(J)	Infiltration dripping at joint	0
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SLIDE: Pipeline#2_06

Distance from U/S Manhole: 58.2m

GP	General inspection photograph	0
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SLIDE: Pipeline#2_07

Distance from U/S Manhole: 70.3m

GP General inspection photograph

0



SLIDE: Pipeline#2_08

Distance from U/S Manhole: 79.8m

GP General inspection photograph

0



SLIDE: Pipeline#2_09

Distance from U/S Manhole: 90.1m

GP General inspection photograph

0



SLIDE: Pipeline#2_10

Distance from U/S Manhole: 95.4m

GP General inspection photograph

0



SLIDE: Pipeline#2_11

Distance from U/S Manhole: 101.0m

GP General inspection photograph

0



SLIDE: Pipeline#2_12

Distance from U/S Manhole: 113.8m

GP General inspection photograph

0



SLIDE: Pipeline#2_13

Distance from U/S Manhole: 123.8m

GP General inspection photograph

0



SLIDE: Pipeline#2_14

Distance from U/S Manhole: 138.2m

GP General inspection photograph

0



SLIDE: Pipeline#2_15

Distance from U/S Manhole: 144.4m

GP General inspection photograph

0



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Madhya Pradesh-486885, India



A Maharatna Company

PIPELINE INSPECTION REPORT

Date: 03-05-2021	Video File: Pipeline#3.mp4	Operator: Anil Mishra
Report ID: Pipeline#3		Camera: Marine Trekker

Place: NTPC, VSTPS	U/S Point: Well#3
Location: Vindhya Nagar, Singrauli	D/S Point: Overflow lagoon
Inspection: CCTV+SONAR	
Pipe Use: Decantation water escape structure	Pipe Shape: Circular
Year Laid: NA	Pipe Size: 1200mm
Inspection Purpose: Condition Assessment	Pipe Material: RCC
Total Length: 155m	Inspected Length: 154.9m

	Position	Code	Observation	Direction	Slide
Well#3	0.0m	ST	Survey Start	US to DS	
	8.5m	IS(J)	Infiltration seepage at joint	US to DS	Pipeline#3_01
	15.1m	IS(J)	Infiltration dripping at joint	US to DS	Pipeline#3_02
	24.4m	GP	General inspection photograph	US to DS	Pipeline#3_03
	34.7m	GP	General inspection photograph	US to DS	Pipeline#3_04
	50.0m	GP	General inspection photograph	US to DS	Pipeline#3_05
	65.0m	GP	General inspection photograph	US to DS	Pipeline#3_06
	80.1m	GP	General inspection photograph	US to DS	Pipeline#3_07
	90.0m	GP	General inspection photograph	US to DS	Pipeline#3_08
	104.4m	GP	General inspection photograph	US to DS	Pipeline#3_09
	119.4m	GP	General inspection photograph	US to DS	Pipeline#3_10
	132.3m	GP	General inspection photograph	US to DS	Pipeline#3_11
	140.1m	GP	General inspection photograph	US to DS	Pipeline#3_12
	150.3m	GP	General inspection photograph	US to DS	Pipeline#3_13
	154.9m	FH	Survey Finish	US to DS	
Overflow lagoon					



SLIDE: Pipeline#3_01

Distance from U/S Manhole: 8.5m

IS(J) Infiltration seepage at joint 0



SLIDE: Pipeline#3_02

Distance from U/S Manhole: 15.1m

IS(J) Infiltration dripping at joint 0



SLIDE: Pipeline#3_03

Distance from U/S Manhole: 24.4m

GP General inspection photograph

0



SLIDE: Pipeline#3_04

Distance from U/S Manhole: 34.7m

GP General inspection photograph

0



SLIDE: Pipeline#3_05

Distance from U/S Manhole: 50.0m

GP General inspection photograph

0



SLIDE: Pipeline#3_06

Distance from U/S Manhole: 65.0m

GP General inspection photograph

0



SLIDE: Pipeline#3_07

Distance from U/S Manhole: 80.1m

GP General inspection photograph

0



SLIDE: Pipeline#3_08

Distance from U/S Manhole: 90.0m

GP General inspection photograph

0



SLIDE: Pipeline#3_09

Distance from U/S Manhole: 104.4m

GP General inspection photograph

0



SLIDE: Pipeline#3_10

Distance from U/S Manhole: 119.4m

GP General inspection photograph

0



SLIDE: Pipeline#3_11

Distance from U/S Manhole: 132.3m

GP General inspection photograph

0



SLIDE: Pipeline#3_12

Distance from U/S Manhole: 140.1m

GP General inspection photograph

0



SLIDE: Pipeline#3_13

Distance from U/S Manhole: 150.3m

GP General inspection photograph

0



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PIPELINE INSPECTION REPORT

Date: 04-05-2021	Video File: pipeline#4.mp4	Operator: Anil Mishra
Report ID: Pipeline#4		Camera: Marine Trekker

Place: NTPC, VSTPS	U/S Point: Well#4
Location: Vindhya Nagar, Singrauli	D/S Point: Overflow lagoon
Inspection: CCTV+SONAR	
Pipe Use: Decantation water escape structure	Pipe Shape: Circular
Year Laid: NA	Pipe Size: 1200mm
Inspection Purpose: Condition Assessment	Pipe Material: RCC
Total Length: 155m	Inspected Length: 155.2m

	Position	Code	Observation	Direction	Slide
	0.0m	ST	Survey Start	US to DS	
	3.1m	GP	General inspection photograph	US to DS	Well#4 to Exit_01
	20.1m	GP	General inspection photograph	US to DS	Well#4 to Exit_03
	30.1m	GP	General inspection photograph	US to DS	Well#4 to Exit_05
	39.9m	GP	General inspection photograph	US to DS	Well#4 to Exit_07
	50.0m	GP	General inspection photograph	US to DS	Well#4 to Exit_08
	65.1m	GP	General inspection photograph	US to DS	Well#4 to Exit_11
	80.0m	GP	General inspection photograph	US to DS	Well#4 to Exit_14
	90.3m	GP	General inspection photograph	US to DS	Well#4 to Exit_16
	105.0m	GP	General inspection photograph	US to DS	Well#4 to Exit_17
	121.2m	GP	General inspection photograph	US to DS	Well#4 to Exit_19
	139.6m	GP	General inspection photograph	US to DS	Well#4 to Exit_21
	150.1m	GP	General inspection photograph	US to DS	Well#4 to Exit_24
	155.2m	FH	Survey Finish	US to DS	



SLIDE: Well#4 to Exit_01

Distance from U/S Manhole: 3.1m

GP General inspection photograph

0



SLIDE: Well#4 to Exit_03

Distance from U/S Manhole: 20.1m

GP General inspection photograph

0



SLIDE: Well#4 to Exit_05

Distance from U/S Manhole: 30.1m

GP General inspection photograph

0



SLIDE: Well#4 to Exit_07

Distance from U/S Manhole: 39.9m

GP General inspection photograph

0



SLIDE: Well#4 to Exit_08

Distance from U/S Manhole: 50.0m

GP General inspection photograph

0



SLIDE: Well#4 to Exit_11

Distance from U/S Manhole: 65.1m

GP General inspection photograph

0



SLIDE: Well#4 to Exit_14

Distance from U/S Manhole: 80.0m

GP General inspection photograph

0



SLIDE: Well#4 to Exit_16

Distance from U/S Manhole: 90.3m

GP General inspection photograph

0



SLIDE: Well#4 to Exit_17

Distance from U/S Manhole: 105.0m

GP General inspection photograph

0



SLIDE: Well#4 to Exit_19

Distance from U/S Manhole: 121.2m

GP General inspection photograph

0



SLIDE: Well#4 to Exit_21

Distance from U/S Manhole: 139.6m

GP General inspection photograph

0



SLIDE: Well#4 to Exit_24

Distance from U/S Manhole: 150.1m

GP General inspection photograph

0



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NTPC Limited.
Client: **SSC-VSR station**
Vindhya Nagar District-Singrauli.
Madhya Pradesh-486885, India



A Maharatna Company

PIPELINE INSPECTION REPORT

Date: 07-05-2021	Video File: Pipeline#5.mp4	Operator: Anil Mishra
Report ID: Pipeline#5		Camera: Marine Trekker

Place: NTPC, VSTPS	U/S Point: Well#5
Location: Vindhya Nagar, Singrauli	D/S Point: Overflow lagoon
Inspection: CCTV+SONAR	
Pipe Use: Decantation water escape structure	Pipe Shape: Circular
Year Laid: NA	Pipe Size: 1200mm
Inspection Purpose: Condition Assessment	Pipe Material: RCC
Total Length: 155m	Inspected Length: 155.9m

	Position	Code	Observation	Direction	Slide
	0.0m	ST	Survey Start	US to DS	
	5.9m	GP	General inspection photograph	US to DS	Well#5 to Exit_01
	16.2m	GP	General inspection photograph	US to DS	Well#5 to Exit_03
	30.7m	GP	General inspection photograph	US to DS	Well#5 to Exit_05
	40.2m	GP	General inspection photograph	US to DS	Well#5 to Exit_07
	50.5m	ID(J)	Infiltration dripping at joint	US to DS	Well#5 to Exit_09
	70.1m	H	Hole	US to DS	Well#5 to Exit_12
	77.8m	GP	General inspection photograph	US to DS	Well#5 to Exit_13
	84.9m	ID(J)	Infiltration dripping at joint	US to DS	Well#5 to Exit_14
	95.2m	GP	General inspection photograph	US to DS	Well#5 to Exit_16
	105.6m	ID(J)	Infiltration dripping at joint	US to DS	Well#5 to Exit_19
	110.2m	ID(J)	Infiltration dripping at joint	US to DS	Well#5 to Exit_20
	125.0m	GP	General inspection photograph	US to DS	Well#5 to Exit_23
	134.3m	GP	General inspection photograph	US to DS	Well#5 to Exit_25
	155.8m	GP	General Inspection Photograph	US to DS	Well#5 to Exit_29
	155.9m	FH	Survey Finish	US to DS	



SLIDE: Well#5 to Exit_01

Distance from U/S Manhole: 5.9m

GP General inspection photograph

0



SLIDE: Well#5 to Exit_03

Distance from U/S Manhole: 16.2m

GP General inspection photograph

0



SLIDE: Well#5 to Exit_05

Distance from U/S Manhole: 30.7m

GP General inspection photograph

0



SLIDE: Well#5 to Exit_07

Distance from U/S Manhole: 40.2m

GP General inspection photograph

0



SLIDE: Well#5 to Exit_09

Distance from U/S Manhole: 50.5m

ID(J) Infiltration dripping at joint

0



SLIDE: Well#5 to Exit_12

Distance from U/S Manhole: 69.6m

H Hole

0



SLIDE: Well#5 to Exit_13

Distance from U/S Manhole: 77.8m

GP General inspection photograph

0



SLIDE: Well#5 to Exit_14

Distance from U/S Manhole: 84.9m

ID(J) Infiltration dripping at joint

0



SLIDE: Well#5 to Exit_16

Distance from U/S Manhole: 95.2m

GP General inspection photograph

0



SLIDE: Well#5 to Exit_19

Distance from U/S Manhole: 105.6m

ID(J) Infiltration dripping at joint

0



SLIDE: Well#5 to Exit_20

Distance from U/S Manhole: 110.2m

ID(J) Infiltration dripping at joint

0



SLIDE: Well#5 to Exit_23

Distance from U/S Manhole: 125.0m

GP General inspection photograph

0



SLIDE: Well#5 to Exit_25

Distance from U/S Manhole: 134.3m

GP General inspection photograph

0



SLIDE: Well#5 to Exit_29

Distance from U/S Manhole: 155.8m

GP General Inspection Photograph

0



ANNEXURE -9

TEST REPORT

Client Name	: M/s. NTPC LIMITED				
Client Address	: Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885				
Client Reference	: P.O. No: 4000234082, Dated : 30.01.2020				
MoEFCC Validity	: 16 October 2024	NABL Validity	: 19 March 2022		
Sample Type	: Piezometer Well Water	Sampled by	: Netel India Limited		
Sample Container	: Sampling Bottle	Sample Quantity	: 1 Litre		
Date of Sampling	: 28.10.2021	Date of Reporting	: 11.11.2021		
Sampling Method	: APHA 1060 B & C	Sample Code	: NIL/W/10/21/290		
Sample Location	: Piezometer Well PZ-1A (Magazine House)				

Sr. No.	Parameter	Result	Unit	Std. Limit*	Method
1	pH	6.5	---	6.5 - 8.5	IS 3025 (Part 11)
2	Turbidity	<1.0	mg/l	1	IS 3025 (Part 10)
3	Total Dissolved Solids	168	mg/l	500	IS 3025 (Part 16)
4	Boron as B	<0.2	mg/l	0.5	IS 3025 (Part 57)
5	Calcium as Ca	0.11	mg/l	75	IS 3025 (Part 40)
6	Chlorides as Cl	9.4	mg/l	250	IS 3025 (Part 32)
7	Copper as Cu	<0.01	mg/l	0.05	APHA 3111 B
8	Fluoride as F	<0.2	mg/l	1	IS 3025 (Part 60)
9	Iron as Fe	0.13	mg/l	0.3	APHA 3111 B
10	Magnesium as Mg	6.3	mg/l	30	IS 3025 (Part 46)
11	Manganese as Mn	<0.01	mg/l	0.1	APHA 3111-B
12	Nitrate as NO ₃	2.7	mg/l	45	IS 3025 (Part 34)
13	Silver as Ag	<0.05	mg/l	0.1	APHA 3111 B
14	Sulphate as SO ₄	13.8	mg/l	200	IS 3025 (Part 24)
15	Total Alkalinity as CaCO ₃	38	mg/l	200	IS 3025 (Part 23)
16	Total Hardness as CaCO ₃	36	mg/l	200	IS 3025 (Part 21)
17	Zinc as Zn	0.09	mg/l	5	APHA 3111 B
18	Nickel as Ni	<0.01	mg/l	0.02	APHA 3111 B
19	Total Chromium as Cr	<0.01	mg/l	0.05	APHA 3111 B

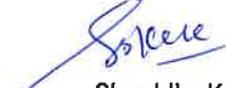
- Note :**
1. This Test Report refers only to the sample tested.
 2. This Test Report shall not be reproduced except in full, without written approval of the Laboratory.
 3. The complaint register is available with the Laboratory as per Environment Protection Act, 1986.

Verified by:



Surekha Jamdar
Dy. Technical Manager

Issued by:



Shradha Kere
Technical Manager

End of Report

TEST REPORT

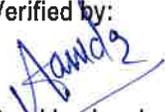
Client Name : M/s. NTPC LIMITED					
Client Address : Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885					
Client Reference : P.O. No: 4000234082, Dated : 30.01.2020					
Sample Type : Piezometer Well Water	Sampled by : Netel India Limited				
Sample Container : Sampling Bottle	Sample Quantity : 1 Litre				
Date of Sampling : 28.10.2021	Date of Reporting : 01.11.2021				
Sampling Method : APHA 1060 B & C	Sample Code : NIL/W/10/21/290				
Sample Location : Piezometer Well PZ-1A (Magazine House)					
Sr. No.	Parameter	Result	Unit	Std Limit*	Method
1	Colour	<1.0	-	5	IS 3025 (Part 4)
2	Odor	Agreeable	-	Agreeable	IS 3025 (Part 5)
3	Aluminum as Al	<0.02	mg/l	0.03	IS 3025 (Part 55)
4	Total Ammonia as N	<0.5	mg/l	0.5	IS 3025 (Part 34)
5	Barium as Ba	<0.1	mg/l	0.7	APHA 3111 D
6	Chloramines as Cl ₂	<2.5	mg/l	4	APHA 4500-Cl
7	Phenolic compounds as C ₆ H ₅ OH	<0.0005	mg/l	0.001	IS 3025 (Part 43)
8	Selenium as Se	<0.005	mg/l	0.01	IS 3025 (Part 56)
9	Sulphide as H ₂ S	<0.05	mg/l	0.05	IS 3025 (Part 29)
10	Cyanide as CN	<0.01	mg/l	0.05	IS 3025 (Part 27)
11	Cadmium as Cd	<0.001	mg/l	0.003	IS 3025 (Part 41)
12	Lead as Pb	<0.01	mg/l	0.01	IS 3025 (Part 47)
13	Molybdenum as Mo	<0.05	mg/l	0.07	IS 3025 (Part 2)
14	Mercury as Hg	<0.001	mg/l	0.001	IS 3025 (Part 48)
15	Total Arsenic as As	<0.005	mg/l	0.01	IS 3025 (Part 37)

Note : 1. This Test Report refers only to the sample tested.

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Verified by:


Surekha Jamdar

Dy. Technical Manager

Issued by:


Shradha Kere

Technical Manager

End of Report



T - 2037

TEST REPORT

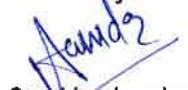
Client Name	: M/s. NTPC LIMITED				
Client Address	: Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885				
Client Reference	: P.O. No: 4000234082, Dated : 30.01.2020				
MoEFCC Validity	: 16 October 2024	NABL Validity	: 19 March 2022		
Sample Type	: Piezometer Well Water	Sampled by	: Netel India Limited		
Sample Container	: Sampling Bottle	Sample Quantity	: 1 Litre		
Date of Sampling	: 28.10.2021	Date of Reporting	: 11.11.2021		
Sampling Method	: APHA 1060 B & C	Sample Code	: NIL/W/10/21/291		
Sample Location	: Pizometer Well PZ-1B (South of Magazine House)				
Sr. No.	Parameter	Result	Unit	Std. Limit*	Method
1	pH	6.6	---	6.5 - 8.5	IS 3025 (Part 11)
2	Turbidity	<1.0	mg/l	1	IS 3025 (Part 10)
3	Total Dissolved Solids	182	mg/l	500	IS 3025 (Part 16)
4	Boron as B	<0.2	mg/l	0.5	IS 3025 (Part 57)
5	Calcium as Ca	0.09	mg/l	75	IS 3025 (Part 40)
6	Chlorides as Cl	10.3	mg/l	250	IS 3025 (Part 32)
7	Copper as Cu	<0.01	mg/l	0.05	APHA 3111 B
8	Fluoride as F	<0.2	mg/l	1	IS 3025 (Part 60)
9	Iron as Fe	0.06	mg/l	0.3	APHA 3111 B
10	Magnesium as Mg	5.8	mg/l	30	IS 3025 (Part 46)
11	Manganese as Mn	<0.01	mg/l	0.1	APHA 3111-B
12	Nitrate as NO ₃	2.6	mg/l	45	IS 3025 (Part 34)
13	Silver as Ag	<0.05	mg/l	0.1	APHA 3111 B
14	Sulphate as SO ₄	9.7	mg/l	200	IS 3025 (Part 24)
15	Total Alkalinity as CaCO ₃	31	mg/l	200	IS 3025 (Part 23)
16	Total Hardness as CaCO ₃	28	mg/l	200	IS 3025 (Part 21)
17	Zinc as Zn	0.09	mg/l	5	APHA 3111 B
18	Nickel as Ni	<0.01	mg/l	0.02	APHA 3111 B
19	Total Chromium as Cr	<0.01	mg/l	0.05	APHA 3111 B

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Verified by:



Surokha Jamdar

Dy. Technical Manager

Issued by:



Shraddha Kere

Technical Manager

End of Report

TEST REPORT

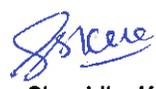
Client Name : M/s. NTPC LIMITED					
Client Address : Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885					
Client Reference : P.O. No: 4000234082, Dated : 30.01.2020					
Sample Type : Piezometer Well Water			Sampled by : Netel India Limited		
Sample Container : Sampling Bottle			Sample Quantity : 1 Litre		
Date of Sampling : 28.10.2021			Date of Reporting : 01.11.2021		
Sampling Method : APHA 1060 B & C			Sample Code : NIL/W/10/21/291		
Sample Location : Pizometer Well PZ-1B (South of Magazine House)					
Sr. No.	Parameter	Result	Unit	Std Limit*	Method
1	Colour	<1.0	-	5	IS 3025 (Part 4)
2	Odor	Agreeable	-	Agreeable	IS 3025 (Part 5)
3	Aluminum as Al	<0.02	mg/l	0.03	IS 3025 (Part 55)
4	Total Ammonia as N	<0.5	mg/l	0.5	IS 3025 (Part 34)
5	Barium as Ba	<0.1	mg/l	0.7	APHA 3111 D
6	Chloramines as Cl ₂	<2.5	mg/l	4	APHA 4500-Cl
7	Phenolic compounds as C ₆ H ₅ OH	<0.0005	mg/l	0.001	IS 3025 (Part 43)
8	Selenium as Se	<0.005	mg/l	0.01	IS 3025 (Part 56)
9	Sulphide as H ₂ S	<0.05	mg/l	0.05	IS 3025 (Part 29)
10	Cyanide as CN	<0.01	mg/l	0.05	IS 3025 (Part 27)
11	Cadmium as Cd	<0.001	mg/l	0.003	IS 3025 (Part 41)
12	Lead as Pb	<0.01	mg/l	0.01	IS 3025 (Part 47)
13	Molybdenum as Mo	<0.05	mg/l	0.07	IS 3025 (Part 2)
14	Mercury as Hg	<0.001	mg/l	0.001	IS 3025 (Part 48)
15	Total Arsenic as As	<0.005	mg/l	0.01	IS 3025 (Part 37)

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Verified by:


Surekha Jamdar
Dy. Technical Manager

Issued by:


Shraddha Kere
Technical Manager

End of Report



TEST REPORT

Client Name : M/s. NTPC LIMITED					
Client Address : Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885					
Client Reference : P.O. No: 4000234082, Dated : 30.01.2020					
MoEFCC Validity : 16 October 2024	NABL Validity : 19 March 2022				
Sample Type : Piezometer Well Water	Sampled by : Netel India Limited				
Sample Container : Sampling Bottle	Sample Quantity : 1 Litre				
Date of Sampling : 28.10.2021	Date of Reporting : 11.11.2021				
Sampling Method : APHA 1060 B & C	Sample Code : NIL/W/10/21/292				
Sample Location : Piezometer Well PZ- 2 (In Middle Higher School, Infront of Rudra Public school, Gorbi)					
Sr. No.	Parameter	Result	Unit	Std. Limit*	Method
1	pH	6.8	---	6.5 - 8.5	IS 3025 (Part 11)
2	Turbidity	<1.0	mg/l	1	IS 3025 (Part 10)
3	Total Dissolved Solids	421	mg/l	500	IS 3025 (Part 16)
4	Boron as B	<0.2	mg/l	0.5	IS 3025 (Part 57)
5	Calcium as Ca	0.72	mg/l	75	IS 3025 (Part 40)
6	Chlorides as Cl	31.6	mg/l	250	IS 3025 (Part 32)
7	Copper as Cu	<0.01	mg/l	0.05	APHA 3111 B
8	Fluoride as F	0.21	mg/l	1	IS 3025 (Part 60)
9	Iron as Fe	0.35	mg/l	0.3	APHA 3111 B
10	Magnesium as Mg	24.9	mg/l	30	IS 3025 (Part 46)
11	Manganese as Mn	<0.01	mg/l	0.1	APHA 3111-B
12	Nitrate as NO ₃	6.3	mg/l	45	IS 3025 (Part 34)
13	Silver as Ag	<0.05	mg/l	0.1	APHA 3111 B
14	Sulphate as SO ₄	16.8	mg/l	200	IS 3025 (Part 24)
15	Total Alkalinity as CaCO ₃	146	mg/l	200	IS 3025 (Part 23)
16	Total Hardness as CaCO ₃	354	mg/l	200	IS 3025 (Part 21)
17	Zinc as Zn	0.16	mg/l	5	APHA 3111 B
18	Nickel as Ni	<0.01	mg/l	0.02	APHA 3111 B
19	Total Chromium as Cr	<0.01	mg/l	0.05	APHA 3111 B

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Surekha Jamdar

Dy. Technical Manager

Issued by:



Shraddha Kere

Technical Manager

End of Report

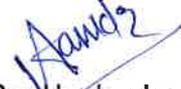
TEST REPORT

Client Name	: M/s. NTPC LIMITED				
Client Address	: Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885				
Client Reference	: P.O. No: 4000234082, Dated : 30.01.2020				
Sample Type	: Piezometer Well Water	Sampled by	: Netel India Limited		
Sample Container	: Sampling Bottle	Sample Quantity	: 1 Litre		
Date of Sampling	: 28.10.2021	Date of Reporting	: 01.11.2021		
Sampling Method	: APHA 1060 B & C	Sample Code	: NIL/W/10/21/292		
Sample Location	: Piezometer Well PZ- 2 (Middle Higher School)				

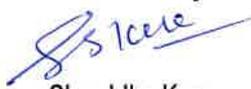
Sr. No.	Parameter	Result	Unit	Std Limit*	Method
1	Colour	<1.0	-	5	IS 3025 (Part 4)
2	Odor	Agreeable	-	Agreeable	IS 3025 (Part 5)
3	Aluminum as Al	<0.02	mg/l	0.03	IS 3025 (Part 55)
4	Total Ammonia as N	<0.5	mg/l	0.5	IS 3025 (Part 34)
5	Barium as Ba	<0.1	mg/l	0.7	APHA 3111 D
6	Chloramines as Cl ₂	<2.5	mg/l	4	APHA 4500-Cl
7	Phenolic compounds as C ₆ H ₅ OH	<0.0005	mg/l	0.001	IS 3025 (Part 43)
8	Selenium as Se	<0.005	mg/l	0.01	IS 3025 (Part 56)
9	Sulphide as H ₂ S	<0.05	mg/l	0.05	IS 3025 (Part 29)
10	Cyanide as CN	<0.01	mg/l	0.05	IS 3025 (Part 27)
11	Cadmium as Cd	<0.001	mg/l	0.003	IS 3025 (Part 41)
12	Lead as Pb	<0.01	mg/l	0.01	IS 3025 (Part 47)
13	Molybdenum as Mo	<0.05	mg/l	0.07	IS 3025 (Part 2)
14	Mercury as Hg	<0.001	mg/l	0.001	IS 3025 (Part 48)
15	Total Arsenic as As	<0.005	mg/l	0.01	IS 3025 (Part 37)

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Verified by:


Surekha Jamdar
Dy. Technical Manager

Issued by:


Shraddha Kere
Technical Manager

End of Report



T - 2037

TEST REPORT

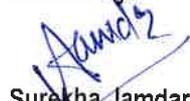
Client Name : M/s. NTPC LIMITED					
Client Address : Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885					
Client Reference : P.O. No: 4000234082, Dated : 30.01.2020					
MoEFCC Validity : 16 October 2024	NABL Validity : 19 March 2022				
Sample Type : Piezometer Well Water	Sampled by : Netel India Limited				
Sample Container : Sampling Bottle	Sample Quantity : 1 Litre				
Date of Sampling : 28.10.2021	Date of Reporting : 11.11.2021				
Sampling Method : APHA 1060 B & C	Sample Code : NIL/W/10/21/293				
Sample Location : Piezometer well PZ- 3 (In MPRWN Nursery)					
Sr. No.	Parameter	Result	Unit	Std. Limit*	Method
1	pH	7.3	---	6.5 - 8.5	IS 3025 (Part 11)
2	Turbidity	<1.0	mg/l	1	IS 3025 (Part 10)
3	Total Dissolved Solids	170	mg/l	500	IS 3025 (Part 16)
4	Boron as B	<0.2	mg/l	0.5	IS 3025 (Part 57)
5	Calcium as Ca	0.31	mg/l	75	IS 3025 (Part 40)
6	Chlorides as Cl	9.8	mg/l	250	IS 3025 (Part 32)
7	Copper as Cu	<0.01	mg/l	0.05	APHA 3111 B
8	Fluoride as F	<0.2	mg/l	1	IS 3025 (Part 60)
9	Iron as Fe	0.11	mg/l	0.3	APHA 3111 B
10	Magnesium as Mg	13.6	mg/l	30	IS 3025 (Part 46)
11	Manganese as Mn	<0.01	mg/l	0.1	APHA 3111-B
12	Nitrate as NO ₃	3.2	mg/l	45	IS 3025 (Part 34)
13	Silver as Ag	<0.05	mg/l	0.1	APHA 3111 B
14	Sulphate as SO ₄	15.2	mg/l	200	IS 3025 (Part 24)
15	Total Alkalinity as CaCO ₃	75	mg/l	200	IS 3025 (Part 23)
16	Total Hardness as CaCO ₃	83	mg/l	200	IS 3025 (Part 21)
17	Zinc as Zn	0.19	mg/l	5	APHA 3111 B
18	Nickel as Ni	<0.01	mg/l	0.02	APHA 3111 B
19	Total Chromium as Cr	<0.01	mg/l	0.05	APHA 3111 B

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Verified by:



Surekha Jamdar

Dy. Technical Manager

Issued by:



Shradha Kere

Technical Manager

End of Report

TEST REPORT

Client Name : M/s. NTPC LIMITED					
Client Address : Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885					
Client Reference : P.O. No: 4000234082, Dated : 30.01.2020					
Sample Type : Piezometer Well Water	Sampled by : Netel India Limited				
Sample Container : Sampling Bottle	Sample Quantity : 1 Litre				
Date of Sampling : 28.10.2021	Date of Reporting : 01.11.2021				
Sampling Method : APHA 1060 B & C	Sample Code : NIL/W/10/21/293				
Sample Location : Piezometer well PZ- 3 (In MPRWN Nursery)					
Sr. No.	Parameter	Result	Unit	Std Limit*	Method
1	Colour	<1.0	-	5	IS 3025 (Part 4)
2	Odor	Agreeable	-	Agreeable	IS 3025 (Part 5)
3	Aluminum as Al	<0.02	mg/l	0.03	IS 3025 (Part 55)
4	Total Ammonia as N	<0.5	mg/l	0.5	IS 3025 (Part 34)
5	Barium as Ba	<0.1	mg/l	0.7	APHA 3111 D
6	Chloramines as Cl ₂	<2.5	mg/l	4	APHA 4500-Cl
7	Phenolic compounds as C ₆ H ₅ OH	<0.0005	mg/l	0.001	IS 3025 (Part 43)
8	Selenium as Se	<0.005	mg/l	0.01	IS 3025 (Part 56)
9	Sulphide as H ₂ S	<0.05	mg/l	0.05	IS 3025 (Part 29)
10	Cyanide as CN	<0.01	mg/l	0.05	IS 3025 (Part 27)
11	Cadmium as Cd	<0.001	mg/l	0.003	IS 3025 (Part 41)
12	Lead as Pb	<0.01	mg/l	0.01	IS 3025 (Part 47)
13	Molybdenum as Mo	<0.05	mg/l	0.07	IS 3025 (Part 2)
14	Mercury as Hg	<0.001	mg/l	0.001	IS 3025 (Part 48)
15	Total Arsenic as As	<0.005	mg/l	0.01	IS 3025 (Part 37)

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Surekha Jamdar

Dy. Technical Manager

Issued by:


Shradha Kere

Technical Manager

End of Report



TEST REPORT

Client Name : M/s. NTPC LIMITED					
Client Address : Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885					
Client Reference : P.O. No: 4000234082, Dated : 30.01.2020					
MoEFCC Validity : 16 October 2024	NABL Validity : 19 March 2022				
Sample Type : Piezometer Well Water	Sampled by : Netel India Limited				
Sample Container : Sampling Bottle	Sample Quantity : 1 Litre				
Date of Sampling : 28.10.2021	Date of Reporting : 11.11.2021				
Sampling Method : APHA 1060 B & C	Sample Code : NIL/W/10/21/294				
Sample Location : Piezometer Well PZ- 4 (East of Qt No 322A)					
Sr. No.	Parameter	Result	Unit	Std. Limit*	Method
1	pH	6.9	---	6.5 - 8.5	IS 3025 (Part 11)
2	Turbidity	<1.0	mg/l	1	IS 3025 (Part 10)
3	Total Dissolved Solids	391	mg/l	500	IS 3025 (Part 16)
4	Boron as B	<0.2	mg/l	0.5	IS 3025 (Part 57)
5	Calcium as Ca	0.41	mg/l	75	IS 3025 (Part 40)
6	Chlorides as Cl	48.6	mg/l	250	IS 3025 (Part 32)
7	Copper as Cu	<0.01	mg/l	0.05	APHA 3111 B
8	Fluoride as F	<0.2	mg/l	1	IS 3025 (Part 60)
9	Iron as Fe	0.20	mg/l	0.3	APHA 3111 B
10	Magnesium as Mg	34.1	mg/l	30	IS 3025 (Part 46)
11	Manganese as Mn	<0.01	mg/l	0.1	APHA 3111-B
12	Nitrate as NO ₃	5.6	mg/l	45	IS 3025 (Part 34)
13	Silver as Ag	<0.05	mg/l	0.1	APHA 3111 B
14	Sulphate as SO ₄	21.7	mg/l	200	IS 3025 (Part 24)
15	Total Alkalinity as CaCO ₃	143	mg/l	200	IS 3025 (Part 23)
16	Total Hardness as CaCO ₃	179	mg/l	200	IS 3025 (Part 21)
17	Zinc as Zn	0.27	mg/l	5	APHA 3111 B
18	Nickel as Ni	<0.01	mg/l	0.02	APHA 3111 B
19	Total Chromium as Cr	<0.01	mg/l	0.05	APHA 3111 B

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 Dy. Technical Manager

Issued by:


 Shradha Kere
 Technical Manager

End of Report

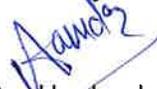
TEST REPORT

Client Name	: M/s. NTPC LIMITED				
Client Address	: Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885				
Client Reference	: P.O. No: 4000234082, Dated : 30.01.2020				
Sample Type	: Piezometer Well Water	Sampled by	: Netel India Limited		
Sample Container	: Sampling Bottle	Sample Quantity	: 1 Litre		
Date of Sampling	: 28.10.2021	Date of Reporting	: 01.11.2021		
Sampling Method	: APHA 1060 B & C	Sample Code	: NIL/W/10/21/294		
Sample Location	: Piezometer Well PZ- 4 (East of Qt No 322A)				

Sr. No.	Parameter	Result	Unit	Std Limit*	Method
1	Colour	<1.0	-	5	IS 3025 (Part 4)
2	Odor	Agreeable	-	Agreeable	IS 3025 (Part 5)
3	Aluminum as Al	<0.02	mg/l	0.03	IS 3025 (Part 55)
4	Total Ammonia as N	<0.5	mg/l	0.5	IS 3025 (Part 34)
5	Barium as Ba	<0.1	mg/l	0.7	APHA 3111 D
6	Chloramines as Cl ₂	<2.5	mg/l	4	APHA 4500-Cl
7	Phenolic compounds as C ₆ H ₅ OH	<0.0005	mg/l	0.001	IS 3025 (Part 43)
8	Selenium as Se	<0.005	mg/l	0.01	IS 3025 (Part 56)
9	Sulphide as H ₂ S	<0.05	mg/l	0.05	IS 3025 (Part 29)
10	Cyanide as CN	<0.01	mg/l	0.05	IS 3025 (Part 27)
11	Cadmium as Cd	<0.001	mg/l	0.003	IS 3025 (Part 41)
12	Lead as Pb	<0.01	mg/l	0.01	IS 3025 (Part 47)
13	Molybdenum as Mo	<0.05	mg/l	0.07	IS 3025 (Part 2)
14	Mercury as Hg	<0.001	mg/l	0.001	IS 3025 (Part 48)
15	Total Arsenic as As	<0.005	mg/l	0.01	IS 3025 (Part 37)

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Surekha Jamdar
Dy. Technical Manager

Issued by:


Shraddha Kere
Technical Manager

End of Report



T - 2037

TEST REPORT

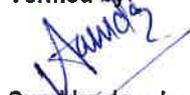
Client Name : M/s. NTPC LIMITED					
Client Address : Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885					
Client Reference : P.O. No: 4000234082, Dated : 30.01.2020					
MoEFCC Validity : 16 October 2024	NABL Validity : 19 March 2022				
Sample Type : Piezometer Well Water	Sampled by : Netel India Limited				
Sample Container : Sampling Bottle	Sample Quantity : 1 Litre				
Date of Sampling : 28.10.2021	Date of Reporting : 11.11.2021				
Sampling Method : APHA 1060 B & C	Sample Code : NIL/W/10/21/295				
Sample Location : Piezometer Well PZ- 5 (N.W of the House of Mr. Brindavan Nai)					
Sr. No.	Parameter	Result	Unit	Std. Limit*	Method
1	pH	7.7	---	6.5 - 8.5	IS 3025 (Part 11)
2	Turbidity	<1.0	mg/l	1	IS 3025 (Part 10)
3	Total Dissolved Solids	183	mg/l	500	IS 3025 (Part 16)
4	Boron as B	<0.2	mg/l	0.5	IS 3025 (Part 57)
5	Calcium as Ca	0.23	mg/l	75	IS 3025 (Part 40)
6	Chlorides as Cl	18.1	mg/l	250	IS 3025 (Part 32)
7	Copper as Cu	<0.01	mg/l	0.05	APHA 3111 B
8	Fluoride as F	<0.2	mg/l	1	IS 3025 (Part 60)
9	Iron as Fe	0.14	mg/l	0.3	APHA 3111 B
10	Magnesium as Mg	14.8	mg/l	30	IS 3025 (Part 46)
11	Manganese as Mn	<0.01	mg/l	0.1	APHA 3111-B
12	Nitrate as NO ₃	1.5	mg/l	45	IS 3025 (Part 34)
13	Silver as Ag	<0.05	mg/l	0.1	APHA 3111 B
14	Sulphate as SO ₄	14.7	mg/l	200	IS 3025 (Part 24)
15	Total Alkalinity as CaCO ₃	116	mg/l	200	IS 3025 (Part 23)
16	Total Hardness as CaCO ₃	98	mg/l	200	IS 3025 (Part 21)
17	Zinc as Zn	0.18	mg/l	5	APHA 3111 B
18	Nickel as Ni	<0.01	mg/l	0.02	APHA 3111 B
19	Total Chromium as Cr	<0.01	mg/l	0.05	APHA 3111 B

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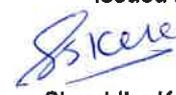
Verified by:



Surekha Jamdar

Dy. Technical Manager

Issued by:



Shradha Kere

Technical Manager

End of Report

TEST REPORT

Client Name	: M/s. NTPC LIMITED				
Client Address	: Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885				
Client Reference	: P.O. No: 4000234082, Dated : 30.01.2020				
Sample Type	: Piezometer Well Water	Sampled by	: Netel India Limited		
Sample Container	: Sampling Bottle	Sample Quantity	: 1 Litre		
Date of Sampling	: 28.10.2021	Date of Reporting	: 01.11.2021		
Sampling Method	: APHA 1060 B & C	Sample Code	: NIL/W/10/21/295		
Sample Location	: Piezometer Well PZ- 5 (N.W of the House of Mr. Brindavan Nai)				

Sr. No.	Parameter	Result	Unit	Std Limit*	Method
1	Colour	<1.0	-	5	IS 3025 (Part 4)
2	Odor	Agreeable	-	Agreeable	IS 3025 (Part 5)
3	Aluminum as Al	<0.02	mg/l	0.03	IS 3025 (Part 55)
4	Total Ammonia as N	<0.5	mg/l	0.5	IS 3025 (Part 34)
5	Barium as Ba	<0.1	mg/l	0.7	APHA 3111 D
6	Chloramines as Cl ₂	<2.5	mg/l	4	APHA 4500-Cl
7	Phenolic compounds as C ₆ H ₅ OH	<0.0005	mg/l	0.001	IS 3025 (Part 43)
8	Selenium as Se	<0.005	mg/l	0.01	IS 3025 (Part 56)
9	Sulphide as H ₂ S	<0.05	mg/l	0.05	IS 3025 (Part 29)
10	Cyanide as CN	<0.01	mg/l	0.05	IS 3025 (Part 27)
11	Cadmium as Cd	<0.001	mg/l	0.003	IS 3025 (Part 41)
12	Lead as Pb	<0.01	mg/l	0.01	IS 3025 (Part 47)
13	Molybdenum as Mo	<0.05	mg/l	0.07	IS 3025 (Part 2)
14	Mercury as Hg	<0.001	mg/l	0.001	IS 3025 (Part 48)
15	Total Arsenic as As	<0.005	mg/l	0.01	IS 3025 (Part 37)

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Technical Manager

End of Report



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TEST REPORT

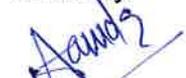
Client Name : M/s. NTPC LIMITED					
Client Address : Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885					
Client Reference : P.O. No: 4000234082, Dated : 30.01.2020					
MoEFCC Validity : 16 October 2024	NABL Validity : 19 March 2022				
Sample Type : Piezometer Well Water	Sampled by : Netel India Limited				
Sample Container : Sampling Bottle	Sample Quantity : 1 Litre				
Date of Sampling : 28.10.2021	Date of Reporting : 11.11.2021				
Sampling Method : APHA 1060 B & C	Sample Code : NIL/W/10/21/296				
Sample Location : Piezometer well PZ- 6 (N.W.of Pit No. 6)					
Sr. No.	Parameter	Result	Unit	Std. Limit*	Method
1	pH	7.8	---	6.5 - 8.5	IS 3025 (Part 11)
2	Turbidity	<1.0	mg/l	1	IS 3025 (Part 10)
3	Total Dissolved Solids	353	mg/l	500	IS 3025 (Part 16)
4	Boron as B	<0.2	mg/l	0.5	IS 3025 (Part 57)
5	Calcium as Ca	0.37	mg/l	75	IS 3025 (Part 40)
6	Chlorides as Cl	35.2	mg/l	250	IS 3025 (Part 32)
7	Copper as Cu	<0.01	mg/l	0.05	APHA 3111 B
8	Fluoride as F	<0.2	mg/l	1	IS 3025 (Part 60)
9	Iron as Fe	0.23	mg/l	0.3	APHA 3111 B
10	Magnesium as Mg	37.7	mg/l	30	IS 3025 (Part 46)
11	Manganese as Mn	<0.01	mg/l	0.1	APHA 3111-B
12	Nitrate as NO ₃	2.8	mg/l	45	IS 3025 (Part 34)
13	Silver as Ag	<0.05	mg/l	0.1	APHA 3111 B
14	Sulphate as SO ₄	16.6	mg/l	200	IS 3025 (Part 24)
15	Total Alkalinity as CaCO ₃	214	mg/l	200	IS 3025 (Part 23)
16	Total Hardness as CaCO ₃	208	mg/l	200	IS 3025 (Part 21)
17	Zinc as Zn	0.24	mg/l	5	APHA 3111 B
18	Nickel as Ni	<0.01	mg/l	0.02	APHA 3111 B
19	Total Chromium as Cr	<0.01	mg/l	0.05	APHA 3111 B

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Surekha Jamdar

Dy. Technical Manager

Issued by:



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Technical Manager

End of Report

TEST REPORT

Client Name	: M/s. NTPC LIMITED				
Client Address	: Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885				
Client Reference	: P.O. No: 4000234082, Dated : 30.01.2020				
Sample Type	: Piezometer Well Water	Sampled by	: Netel India Limited		
Sample Container	: Sampling Bottle	Sample Quantity	: 1 Litre		
Date of Sampling	: 28.10.2021	Date of Reporting	: 01.11.2021		
Sampling Method	: APHA 1060 B & C	Sample Code	: NIL/W/10/21/296		
Sample Location	: Piezometer well PZ- 6 (N.W.of Pit No. 6)				

Sr. No.	Parameter	Result	Unit	Std Limit*	Method
1	Colour	<1.0	-	5	IS 3025 (Part 4)
2	Odor	Agreeable	-	Agreeable	IS 3025 (Part 5)
3	Aluminum as Al	<0.02	mg/l	0.03	IS 3025 (Part 55)
4	Total Ammonia as N	<0.5	mg/l	0.5	IS 3025 (Part 34)
5	Barium as Ba	<0.1	mg/l	0.7	APHA 3111 D
6	Chloramines as Cl ₂	<2.5	mg/l	4	APHA 4500-Cl
7	Phenolic compounds as C ₆ H ₅ OH	<0.0005	mg/l	0.001	IS 3025 (Part 43)
8	Selenium as Se	<0.005	mg/l	0.01	IS 3025 (Part 56)
9	Sulphide as H ₂ S	<0.05	mg/l	0.05	IS 3025 (Part 29)
10	Cyanide as CN	<0.01	mg/l	0.05	IS 3025 (Part 27)
11	Cadmium as Cd	<0.001	mg/l	0.003	IS 3025 (Part 41)
12	Lead as Pb	<0.01	mg/l	0.01	IS 3025 (Part 47)
13	Molybdenum as Mo	<0.05	mg/l	0.07	IS 3025 (Part 2)
14	Mercury as Hg	<0.001	mg/l	0.001	IS 3025 (Part 48)
15	Total Arsenic as As	<0.005	mg/l	0.01	IS 3025 (Part 37)

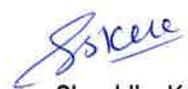
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Dy. Technical Manager

Issued by:


 Shraddha Kere

Technical Manager

End of Report



TEST REPORT

Client Name : M/s. NTPC LIMITED					
Client Address : Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885					
Client Reference : P.O. No: 4000234082, Dated : 30.01.2020					
MoEFCC Validity : 16 October 2024	NABL Validity : 19 March 2022				
Sample Type : Piezometer Well Water	Sampled by : Netel India Limited				
Sample Container : Sampling Bottle	Sample Quantity : 1 Litre				
Date of Sampling : 28.10.2021	Date of Reporting : 11.11.2021				
Sampling Method : APHA 1060 B & C	Sample Code : NIL/W/10/21/297				
Sample Location : Piezometer Well PZ- 7 (Infront of Primary School)					
Sr. No.	Parameter	Result	Unit	Std. Limit*	Method
1	pH	6.6	---	6.5 - 8.5	IS 3025 (Part 11)
2	Turbidity	<1.0	mg/l	1	IS 3025 (Part 10)
3	Total Dissolved Solids	274	mg/l	500	IS 3025 (Part 16)
4	Boron as B	<0.2	mg/l	0.5	IS 3025 (Part 57)
5	Calcium as Ca	0.56	mg/l	75	IS 3025 (Part 40)
6	Chlorides as Cl	42.4	mg/l	250	IS 3025 (Part 32)
7	Copper as Cu	<0.01	mg/l	0.05	APHA 3111 B
8	Fluoride as F	<0.2	mg/l	1	IS 3025 (Part 60)
9	Iron as Fe	0.17	mg/l	0.3	APHA 3111 B
10	Magnesium as Mg	29.4	mg/l	30	IS 3025 (Part 46)
11	Manganese as Mn	<0.01	mg/l	0.1	APHA 3111-B
12	Nitrate as NO ₃	4.9	mg/l	45	IS 3025 (Part 34)
13	Silver as Ag	<0.05	mg/l	0.1	APHA 3111 B
14	Sulphate as SO ₄	118.3	mg/l	200	IS 3025 (Part 24)
15	Total Alkalinity as CaCO ₃	126	mg/l	200	IS 3025 (Part 23)
16	Total Hardness as CaCO ₃	192	mg/l	200	IS 3025 (Part 21)
17	Zinc as Zn	0.36	mg/l	5	APHA 3111 B
18	Nickel as Ni	<0.01	mg/l	0.02	APHA 3111 B
19	Total Chromium as Cr	<0.01	mg/l	0.05	APHA 3111 B

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Surekha Jamdar
Dy. Technical Manager

Issued by:



Shradha Kere
Technical Manager

End of Report

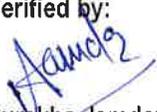
TEST REPORT

Client Name	: M/s. NTPC LIMITED				
Client Address	: Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885				
Client Reference	: P.O. No: 4000234082, Dated : 30.01.2020				
Sample Type	: Piezometer Well Water	Sampled by	: Netel India Limited		
Sample Container	: Sampling Bottle	Sample Quantity	: 1 Litre		
Date of Sampling	: 28.10.2021	Date of Reporting	: 01.11.2021		
Sampling Method	: APHA 1060 B & C	Sample Code	: NIL/W/10/21/297		
Sample Location	: Piezometer Well PZ- 7 (Infront of Primary School)				

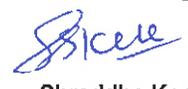
Sr. No.	Parameter	Result	Unit	Std Limit*	Method
1	Colour	<1.0	-	5	IS 3025 (Part 4)
2	Odor	Agreeable	-	Agreeable	IS 3025 (Part 5)
3	Aluminum as Al	<0.02	mg/l	0.03	IS 3025 (Part 55)
4	Total Ammonia as N	<0.5	mg/l	0.5	IS 3025 (Part 34)
5	Barium as Ba	<0.1	mg/l	0.7	APHA 3111 D
6	Chloramines as Cl ₂	<2.5	mg/l	4	APHA 4500-Cl
7	Phenolic compounds as C ₆ H ₅ OH	<0.0005	mg/l	0.001	IS 3025 (Part 43)
8	Selenium as Se	<0.005	mg/l	0.01	IS 3025 (Part 56)
9	Sulphide as H ₂ S	<0.05	mg/l	0.05	IS 3025 (Part 29)
10	Cyanide as CN	<0.01	mg/l	0.05	IS 3025 (Part 27)
11	Cadmium as Cd	<0.001	mg/l	0.003	IS 3025 (Part 41)
12	Lead as Pb	<0.01	mg/l	0.01	IS 3025 (Part 47)
13	Molybdenum as Mo	<0.05	mg/l	0.07	IS 3025 (Part 2)
14	Mercury as Hg	<0.001	mg/l	0.001	IS 3025 (Part 48)
15	Total Arsenic as As	<0.005	mg/l	0.01	IS 3025 (Part 37)

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Verified by:


Suresha Jamdar
Dy. Technical Manager

Issued by:


Shradha Kere
Technical Manager

End of Report

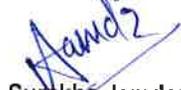


TEST REPORT

Client Name : M/s. NTPC LIMITED					
Client Address : Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885					
Client Reference : P.O. No: 4000234082, Dated : 30.01.2020					
MoEFCC Validity : 16 October 2024	NABL Validity : 19 March 2022				
Sample Type : Piezometer Well Water	Sampled by : Netel India Limited				
Sample Container : Sampling Bottle	Sample Quantity : 1 Litre				
Date of Sampling : 28.10.2021	Date of Reporting : 11.11.2021				
Sampling Method : APHA 1060 B & C	Sample Code : NIL/W/10/21/298				
Sample Location : Piezometer Well PZ- 8 (South of Pit No. 1)					
Sr. No.	Parameter	Result	Unit	Std. Limit*	Method
1	pH	6.5	---	6.5 - 8.5	IS 3025 (Part 11)
2	Turbidity	<1.0	mg/l	1	IS 3025 (Part 10)
3	Total Dissolved Solids	288	mg/l	500	IS 3025 (Part 16)
4	Boron as B	<0.2	mg/l	0.5	IS 3025 (Part 57)
5	Calcium as Ca	0.43	mg/l	75	IS 3025 (Part 40)
6	Chlorides as Cl	38.1	mg/l	250	IS 3025 (Part 32)
7	Copper as Cu	<0.01	mg/l	0.05	APHA 3111 B
8	Fluoride as F	<0.2	mg/l	1	IS 3025 (Part 60)
9	Iron as Fe	0.26	mg/l	0.3	APHA 3111 B
10	Magnesium as Mg	36.2	mg/l	30	IS 3025 (Part 46)
11	Manganese as Mn	<0.01	mg/l	0.1	APHA 3111-B
12	Nitrate as NO ₃	7.1	mg/l	45	IS 3025 (Part 34)
13	Silver as Ag	<0.05	mg/l	0.1	APHA 3111 B
14	Sulphate as SO ₄	16.4	mg/l	200	IS 3025 (Part 24)
15	Total Alkalinity as CaCO ₃	130	mg/l	200	IS 3025 (Part 23)
16	Total Hardness as CaCO ₃	202	mg/l	200	IS 3025 (Part 21)
17	Zinc as Zn	0.52	mg/l	5	APHA 3111 B
18	Nickel as Ni	<0.01	mg/l	0.02	APHA 3111 B
19	Total Chromium as Cr	<0.01	mg/l	0.05	APHA 3111 B

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Surakha Jamdar

Dy. Technical Manager

Issued by:



Shradha Kere

Technical Manager

End of Report

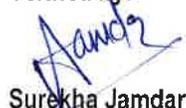
TEST REPORT

Client Name	: M/s. NTPC LIMITED				
Client Address	: Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885				
Client Reference	: P.O. No: 4000234082, Dated : 30.01.2020				
Sample Type	: Piezometer Well Water	Sampled by	: Netel India Limited		
Sample Container	: Sampling Bottle	Sample Quantity	: 1 Litre		
Date of Sampling	: 28.10.2021	Date of Reporting	: 01.11.2021		
Sampling Method	: APHA 1060 B & C	Sample Code	: NIL/W/10/21/298		
Sample Location	: Piezometer Well PZ- 8 (South of Pit No. 1)				

Sr. No.	Parameter	Result	Unit	Std Limit*	Method
1	Colour	<1.0	-	5	IS 3025 (Part 4)
2	Odor	Agreeable	-	Agreeable	IS 3025 (Part 5)
3	Aluminum as Al	<0.02	mg/l	0.03	IS 3025 (Part 55)
4	Total Ammonia as N	<0.5	mg/l	0.5	IS 3025 (Part 34)
5	Barium as Ba	<0.1	mg/l	0.7	APHA 3111 D
6	Chloramines as Cl ₂	<2.5	mg/l	4	APHA 4500-Cl
7	Phenolic compounds as C ₆ H ₅ OH	<0.0005	mg/l	0.001	IS 3025 (Part 43)
8	Selenium as Se	<0.005	mg/l	0.01	IS 3025 (Part 56)
9	Sulphide as H ₂ S	<0.05	mg/l	0.05	IS 3025 (Part 29)
10	Cyanide as CN	<0.01	mg/l	0.05	IS 3025 (Part 27)
11	Cadmium as Cd	<0.001	mg/l	0.003	IS 3025 (Part 41)
12	Lead as Pb	<0.01	mg/l	0.01	IS 3025 (Part 47)
13	Molybdenum as Mo	<0.05	mg/l	0.07	IS 3025 (Part 2)
14	Mercury as Hg	<0.001	mg/l	0.001	IS 3025 (Part 48)
15	Total Arsenic as As	<0.005	mg/l	0.01	IS 3025 (Part 37)

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Surekha Jamdar

Dy. Technical Manager

Issued by:



Shraddha Kere

Technical Manager

End of Report

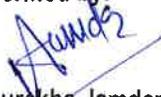


TEST REPORT

Client Name	: M/s. NTPC LIMITED				
Client Address	: Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885				
Client Reference	: P.O. No: 4000234082, Dated : 30.01.2020				
MoEFCC Validity	: 16 October 2024	NABL Validity	: 19 March 2022		
Sample Type	: Surface Water	Sampled by	: Netel India Limited		
Sample Container	: Sampling Bottle	Sample Quantity	: 1 Litre		
Date of Sampling	: 28.10.2021	Date of Reporting	: 11.11.2021		
Sampling Method	: APHA 1060 B & C	Sample Code	: NIL/W/10/21/299		
Sample Location	: Pit-1 (Gorbi Mines Water)				
Sr. No.	Parameter	Result	Unit	Std. Limit*	Method
1	pH	3.8	---	6.5 - 8.5	IS 3025 (Part 11)
2	Turbidity	<1.0	mg/l	1	IS 3025 (Part 10)
3	Total Dissolved Solids	2085	mg/l	500	IS 3025 (Part 16)
4	Boron as B	<0.2	mg/l	0.5	IS 3025 (Part 57)
5	Calcium as Ca	13.60	mg/l	75	IS 3025 (Part 40)
6	Chlorides as Cl	133.5	mg/l	250	IS 3025 (Part 32)
7	Copper as Cu	<0.01	mg/l	0.05	APHA 3111 B
8	Fluoride as F	3.2	mg/l	1	IS 3025 (Part 60)
9	Iron as Fe	9.42	mg/l	0.3	APHA 3111 B
10	Magnesium as Mg	75.9	mg/l	30	IS 3025 (Part 46)
11	Manganese as Mn	<0.01	mg/l	0.1	APHA 3111-B
12	Nitrate as NO ₃	26.7	mg/l	45	IS 3025 (Part 34)
13	Silver as Ag	<0.05	mg/l	0.1	APHA 3111 B
14	Sulphate as SO ₄	52.4	mg/l	200	IS 3025 (Part 24)
15	Total Alkalinity as CaCO ₃	<5	mg/l	200	IS 3025 (Part 23)
16	Total Hardness as CaCO ₃	887	mg/l	200	IS 3025 (Part 21)
17	Zinc as Zn	1.26	mg/l	5	APHA 3111 B
18	Nickel as Ni	<0.01	mg/l	0.02	APHA 3111 B
19	Total Chromium as Cr	0.03	mg/l	0.05	APHA 3111 B

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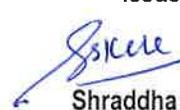
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Surekha Jamdar

Dy. Technical Manager

Issued by:



Shradha Kere

Technical Manager

End of Report

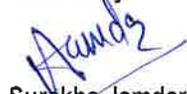
TEST REPORT

Client Name	: M/s. NTPC LIMITED				
Client Address	: Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885				
Client Reference	: P.O. No: 4000234082, Dated : 30.01.2020				
Sample Type	: Surface Water	Sampled by	: Netel India Limited		
Sample Container	: Sampling Bottle	Sample Quantity	: 1 Litre		
Date of Sampling	: 28.10.2021	Date of Reporting	: 01.11.2021		
Sampling Method	: APHA 1060 B & C	Sample Code	: NIL/W/10/21/299		
Sample Location	: Pit-1 (Gorbi Mines Water)				

Sr. No.	Parameter	Result	Unit	Std Limit*	Method
1	Colour	<1.0	-	5	IS 3025 (Part 4)
2	Odor	Agreeable	-	Agreeable	IS 3025 (Part 5)
3	Aluminum as Al	0.18	mg/l	0.03	IS 3025 (Part 55)
4	Total Ammonia as N	<0.5	mg/l	0.5	IS 3025 (Part 34)
5	Barium as Ba	<0.1	mg/l	0.7	APHA 3111 D
6	Chloramines as Cl ₂	<2.5	mg/l	4	APHA 4500-Cl
7	Phenolic compounds as C ₆ H ₅ OH	<0.0005	mg/l	0.001	IS 3025 (Part 43)
8	Selenium as Se	<0.005	mg/l	0.01	IS 3025 (Part 56)
9	Sulphide as H ₂ S	<0.05	mg/l	0.05	IS 3025 (Part 29)
10	Cyanide as CN	<0.01	mg/l	0.05	IS 3025 (Part 27)
11	Cadmium as Cd	<0.001	mg/l	0.003	IS 3025 (Part 41)
12	Lead as Pb	<0.01	mg/l	0.01	IS 3025 (Part 47)
13	Molybdenum as Mo	<0.05	mg/l	0.07	IS 3025 (Part 2)
14	Mercury as Hg	<0.001	mg/l	0.001	IS 3025 (Part 48)
15	Total Arsenic as As	<0.005	mg/l	0.01	IS 3025 (Part 37)

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Surakha Jamdar

Dy. Technical Manager

Issued by:



Shraddha Kere

Technical Manager

End of Report

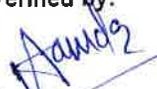


TEST REPORT

Client Name : M/s. NTPC LIMITED					
Client Address : Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885					
Client Reference : P.O. No: 4000234082, Dated : 30.01.2020					
MoEFCC Validity : 16 October 2024	NABL Validity : 19 March 2022				
Sample Type : Surface Water	Sampled by : Netel India Limited				
Sample Container : Sampling Bottle	Sample Quantity : 1 Litre				
Date of Sampling : 28.10.2021	Date of Reporting : 01.11.2021				
Sampling Method : APHA 1060 B & C	Sample Code : NIL/W/10/21/300				
Sample Location : Pit-1+A (Gorbi Mines PIT-1 Water + Ash Filtrate)					
Sr. No.	Parameter	Result	Unit	Std. Limit*	Method
1	pH	3.8	---	6.5 - 8.5	IS 3025 (Part 11)
2	Turbidity	<1.0	mg/l	1	IS 3025 (Part 10)
3	Total Dissolved Solids	1654	mg/l	500	IS 3025 (Part 16)
4	Boron as B	<0.2	mg/l	0.5	IS 3025 (Part 57)
5	Calcium as Ca	10.20	mg/l	75	IS 3025 (Part 40)
6	Chlorides as Cl	85.0	mg/l	250	IS 3025 (Part 32)
7	Copper as Cu	<0.01	mg/l	0.05	APHA 3111 B
8	Fluoride as F	1.5	mg/l	1	IS 3025 (Part 60)
9	Iron as Fe	6.50	mg/l	0.3	APHA 3111 B
10	Magnesium as Mg	62.5	mg/l	30	IS 3025 (Part 46)
11	Manganese as Mn	<0.01	mg/l	0.1	APHA 3111-B
12	Nitrate as NO ₃	17.9	mg/l	45	IS 3025 (Part 34)
13	Silver as Ag	<0.05	mg/l	0.1	APHA 3111 B
14	Sulphate as SO ₄	42.5	mg/l	200	IS 3025 (Part 24)
15	Total Alkalinity as CaCO ₃	<5.0	mg/l	200	IS 3025 (Part 23)
16	Total Hardness as CaCO ₃	645	mg/l	200	IS 3025 (Part 21)
17	Zinc as Zn	0.65	mg/l	5	APHA 3111 B
18	Nickel as Ni	<0.01	mg/l	0.02	APHA 3111 B
19	Total Chromium as Cr	<0.01	mg/l	0.05	APHA 3111 B

- Note : 1. This Test Report refers only to the sample tested.
 2. This Test Report shall not be reproduced except in full, without written approval of the Laboratory.
 3. The complaint register is available with the Laboratory as per Environment Protection Act, 1986.

Verified by:


 Surekha Jamdar
 Dy. Technical Manager

Issued by:


 Shradha Kere
 Technical Manager

End of Report

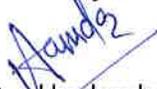
TEST REPORT

Client Name	: M/s. NTPC LIMITED				
Client Address	: Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885				
Client Reference	: P.O. No: 4000234082, Dated : 30.01.2020				
Sample Type	: Surface Water	Sampled by	: Netel India Limited		
Sample Container	: Sampling Bottle	Sample Quantity	: 1 Litre		
Date of Sampling	: 28.10.2021	Date of Reporting	: 01.11.2021		
Sampling Method	: APHA 1060 B & C	Sample Code	: NIL/W/10/21/300		
Sample Location	: Pit-1+A (Gorbi Mines Water and Ash)				

Sr. No.	Parameter	Result	Unit	Std Limit*	Method
1	Colour	<1.0	-	5	IS 3025 (Part 4)
2	Odor	Agreeable	-	Agreeable	IS 3025 (Part 5)
3	Aluminum as Al	0.11	mg/l	0.03	IS 3025 (Part 55)
4	Total Ammonia as N	<0.5	mg/l	0.5	IS 3025 (Part 34)
5	Barium as Ba	<0.1	mg/l	0.7	APHA 3111 D
6	Chloramines as Cl ₂	<2.5	mg/l	4	APHA 4500-Cl
7	Phenolic compounds as C ₆ H ₅ OH	<0.0005	mg/l	0.001	IS 3025 (Part 43)
8	Selenium as Se	<0.005	mg/l	0.01	IS 3025 (Part 56)
9	Sulphide as H ₂ S	<0.05	mg/l	0.05	IS 3025 (Part 29)
10	Cyanide as CN	<0.01	mg/l	0.05	IS 3025 (Part 27)
11	Cadmium as Cd	<0.001	mg/l	0.003	IS 3025 (Part 41)
12	Lead as Pb	<0.01	mg/l	0.01	IS 3025 (Part 47)
13	Molybdenum as Mo	<0.05	mg/l	0.07	IS 3025 (Part 2)
14	Mercury as Hg	<0.001	mg/l	0.001	IS 3025 (Part 48)
15	Total Arsenic as As	<0.005	mg/l	0.01	IS 3025 (Part 37)

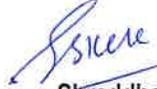
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Verified by:


 Surekha Jamdar

Dy. Technical Manager

Issued by:


 Shradha Kere

Technical Manager

End of Report



TEST REPORT

Client Name	: M/s. NTPC LIMITED
Client Address	: Vindhyanagar Super Thermal Power Project, Vindhya Nagar, Dist: singrauli, MP - 486885
Client Reference	: P.O. No: 4000234082, Dated : 30.01.2020
MoEFCC Validity	: 16 October 2024
NABL Validity	: 19 March 2022
Sample Type	: Piezometer Well Water
Sampled by	: Netel India Limited
Sample Container	: Sampling Bottle
Sample Quantity	: 1 Litre
Date of Sampling	: 03.09.2021
Date of Reporting	: 06.09.2021
Sampling Method	: APHA 1060 B & C
Sample Code	: NIL/W/09/21/086
Sample Location	: Pizometer Water PZ-1A (South of Magazine house of old Gorbi mine)

Sr. No.	Parameter	Result	Unit	Std. Limit*	Method
1	pH	6.6	---	6.5 - 8.5	IS 3025 (Part 11)
2	Turbidity	<1.0	mg/l	1	IS 3025 (Part 10)
3	Total Dissolved Solids	151	mg/l	500	IS 3025 (Part 16)
4	Boron as B	<0.2	mg/l	0.5	IS 3025 (Part 57)
5	Calcium as Ca	0.06	mg/l	75	IS 3025 (Part 40)
6	Chlorides as Cl	8.2	mg/l	250	IS 3025 (Part 32)
7	Copper as Cu	<0.01	mg/l	0.05	APHA 3111 B
8	Fluoride as F	<0.2	mg/l	1	IS 3025 (Part 60)
9	Iron as Fe	0.08	mg/l	0.3	APHA 3111 B
10	Magnesium as Mg	5.6	mg/l	30	IS 3025 (Part 46)
11	Manganese as Mn	<0.01	mg/l	0.1	APHA 3111-B
12	Nitrate as NO ₃	2.2	mg/l	45	IS 3025 (Part 34)
13	Silver as Ag	<0.05	mg/l	0.1	APHA 3111 B
14	Sulphate as SO ₄	12.4	mg/l	200	IS 3025 (Part 24)
15	Total Alkalinity as CaCO ₃	33	mg/l	200	IS 3025 (Part 23)
16	Total Hardness as CaCO ₃	33	mg/l	200	IS 3025 (Part 21)
17	Zinc as Zn	0.06	mg/l	5	APHA 3111 B
18	Nickel as Ni	<0.01	mg/l	0.02	APHA 3111 B
19	Total Chromium as Cr	<0.01	mg/l	0.05	APHA 3111 B

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Verified by:



Surekha Jamdar

Dy. Technical Manager

Issued by:



Shradha Kere

Technical Manager

End of Report

Fwd: Consultancy for ASH MOUND construction at Khadia dyke of SSSTPS and at other probable locations of VSTPS

ANNEXURE -10

Ashok Kumar Sehgal <AKSEHGAL@NTPC.CO.IN>

Tue 30-11-2021 10:32

To: Munish Kumar Jain <MKJAIN@NTPC.CO.IN>

As desired, pfa.

Best rgds

Get [Outlook for iOS](#)

From: ANIMESH KUMAR <ANIMESHKUMAR@NTPC.CO.IN>

Sent: Monday, November 29, 2021 12:05:18 PM

To: Dr. Chittaranjan Patra <crpatra19@yahoo.co.in>

Cc: Umesh Dayal <umesh_dayal@yahoo.com>; Manoj <MANOJK@NTPC.CO.IN>; Sandeep Patel <SANDEEPPATEL@NTPC.CO.IN>; Anil Shankar Sharan <ASSHARAN@NTPC.CO.IN>; Ashok Kumar Sehgal <AKSEHGAL@NTPC.CO.IN>; Prabhat Kumar <PRABHATKUMAR04@NTPC.CO.IN>

Subject: Consultancy for ASH MOUND construction at Khadia dyke of SSSTPS and at other probable locations of VSTPS

Dear Sir,

This has the reference to the Tele-conversation that undersigned had with Prof U. Dayal and further with your good self regarding the subject matter. In this connection, this is to inform that the NTPC VSTPS request for consultancy for feasibility and construction of Ash mound for abandoned KHADIA dyke of

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SSTPS /at other probable locations of VSTPS including detailed Engineering, Scope of work, technical specifications including Ash evacuation (from sharpur & Baliyari dyke of VSTPS) ,transportation with all feasible provisions.

In this regard, you are kindly requested to confirm the EOI and arrange to provide the details of inputs required for further processing. it is also requested to arrange for a site visit for detailed discussions on the subject matter and submit your budgetary offer for the subject work to enable us to process further.

An early response in the subject matter shall be highly appreciated.

Thanking You.

Regards,

ANIMESH KUMAR

DGM,CIVIL

VINDHAYACHAL STPS

NTPC LTD

MOB NO: 9431820070,7368807685





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