OMAN Seeb Sewage Treatment Plant **ELO Pilot Test Report**

2025.02.

This report contains our unique knowledge and know-how.

We state that providing or leaking this report or the information and analysis contained within it to a third party without our consent may be against the law.



Table of Contents

| Ι | Overview 3 |
|-----|-------------------------|
| II | Test Procedure6 |
| III | Equipment Installation9 |
| IV | Test Result12 |
| V | Analysis15 |
| VI | Appendix19 |
| | |

Overview

PURPOSE

- ▶ The equipment for the pilot test is an electro-osmosis-based sludge cake dewatering machine.
- ► It reduces the moisture content of sludge cake in a short time and increases porosity, which helps to shorten the drying time and reduce odors.
- This equipment is developed using proprietary technology from Korea Water Technology Inc. and has been in operation for 15 years in various countries, proving its effectiveness.
- ► The technology has been recognized by the Korean government for its reliability and effectiveness, and this pilot test program receives support from KEITI—a subsidiary of the Korean Ministry of Environment.
- The purpose of this pilot test is to evaluate whether this technology can be effectively applied to Client's STP. The specific goals of the test are as follows:
- 1) Verify the actual performance of the equipment, including moisture reduction and power consumption.
- 2) Estimate the benefits that the STP can gain from operating the equipment.
- 3) Secure design parameters needed if NAMA decides to adopt this technology in the future.

TEST METHOD

- ► The pilot equipment was installed next to the sludge transport truck on the base floor of the sludge dewatering building at the Oman Seeb STP.
- ▶ Sludge cake discharged from the centrifuge B was dehydrated using the pilot equipment.

► Bad odor reduction test was conducted using the dehydrated cake discharged from the pilot equipment.

- ► DATE
- 1) 2024.12.16 ~ 2024.12.24: INSTALLATION
- 2) 2024.12.25 ~ 2025.01.01: SITE CUSTOMIZING
- 3) 2025.01.02 ~ 2025.01.16: PILOT TEST

► LOCATION: Next to the sludge transport truck on the base floor of the sludge dewatering building.



- ► Conducting the Pilot Test
- 1) Supervisor: KIM SUNGRYONG / KWT
- 2) Project Manager: Nikhil Benny / MMS
- 3) Operator: Pawan Chaubhary, M. Nouman Khen / MMS

► Key Performance Indicator

| No | KPI | Target Indicators | Evaluation Method |
|----|-----------------------|---|--|
| 1 | Treatment capacity | Achieving Standard Processing Capacity 200kg/hr input | The total amount of sludge cake fed into the equipment is measured. The time it takes for all the sludge cake to be discharged is tracked. Both of the above parameters are recorded daily, and using this data, the daily throughput and average throughput are calculated. |
| 2 | Dryness | Over 35% after ELO. | Measure the dryness according to standard test methods daily. |
| 3 | Weight reduction | Over 50% | Calculate the reduction rate based on the dryness of the input cake and the output cake. To do this, extract cake samples from both the input and output sections to measure and record their dryness. |
| 4 | Power consumption | Below 200kWh/ton input | Record the daily power consumption and input quantity. Then calculate the average power consumption per ton of input by dividing the total power consumption by the input quantity. |
| 5 | Bad odor reduction | Over 50% reduction of unpleasant odor | Prepare two piles of sludge with the same volume. The first pile consists of sludge cake discharged from a centrifugal dewatering machine. The second pile consists of sludge cake discharged from the pilot machine. Measure and compare the odor of each sludge pile daily. |
| 6 | Water Conditioning | Max. Temp.: 30 ℃ Max. Hardness: 120 ppm | The drum cooling water temperature is checked at the start of equipment operation to measure the water temperature. Hardness is measured using a hardness tester (once) |

Result Summary

| No | KPI | Target | Result | Attainment | | |
|----|--------------------|--|--------------------|------------|--|--|
| 1 | Treatment capacity | 200 kg/hr | Avg. 206.3 kg/hr | 100 % | | |
| 2 | Dryness | Over 35% | Avg. 40.73 % | 100 % | | |
| 3 | Weight reduction | Over 50% | Avg. 53.99 % | 100 % | | |
| 4 | Power consumption | Below 200kWh/ton | Avg. 195.8 kWh/ton | 100 % | | |
| 5 | Bad odor reduction | Over 50% | 74.53 % | 100 % | | |
| 6 | Water Conditioning | Temperature ≤ 30 °C Hardness ≤ 120 ppm | 22 ℃ / 105 mg/L | 100 % | | |

II Test Procedure

PILOT SYSTEM CONFIGURATION



SITE FOR PILOT TEST

► Seeb Sewage Treatment Plant, Seeb, Muscat, Oman



DESCRIPTION OF PILOT SYSTEM

- Continuous operation type electro-osmosis cake dehydrator
- ► Throughput : 200kg/hr cake input
- ▶ Dryness : DS 15% ~ 20% → 30% ~ 40% adjustable
- ► Leading time : 2min
- ► Power consumption : 40kW~60kW (depends on sludge)
- Process water consumption : 12 L/min
- ► Configuration : main body, electric panel, cleaning water supply
- Size



Pictures



TEST PROCEDURE

Installation & Customizing

- 1) Check the Installation Site and positioning each equipment
- 2) Internal Wiring and Piping
- 3) External Utility Supply
- 4) Customizing of Input device

Feeding of Sludge

1) Feed the sludge cake discharged from the centrifuge B into the ELO using a wedge slider type Input device.

Decision of Test Parameter

- 1) Set the test parameter based on the results of the preliminary test.
- 2) 60V~70V/ Input thickness: 5mm/ Drum speed: 35 Hz.
- 3) Adjust the feeding device speed according to the operating conditions.

Record Test Data

- 1) Test start/stop time
- 2) Cumulative power consumption before/after operation
- 3) DC voltage/current
- 4) Dehydrated sludge weight

Bad Odor Reduction Test

- 1) Store 20 kg of sludge before and after passing through the ELO.
- 2) Set a specific time every day to sample the sludge about 10 cm below the surface and qualitatively record the type and intensity of the odor, as well as the degree of unpleasantness.
- 3) Once a week, flip the entire sludge to record the smell from the sludge at the bottom.
- 4) The trend of the smell should be recorded throughout the 2-week testing period.

Dryness Measure

1)Take a representative sample once a day and send it to the NAMA laboratory for measuring of dryness.

Equipment Installation

Preparation before Installation

- ▶ Shipped on August 17, 2024, and arrived at Oman Sohar port on September 22, 2024.
- ► On-site entry permit granted on November 07, 2024.
- ▶ Detailed plans and safety management measures finalized on December 10, 2024.
- ► Final approval of installation plan and installation work began on December 16.

Installation

► Installation #1 – Positioning of each equipment



► Installation #2 – On-Site customizing



► Installation #3 – Wiring



► Installation #4 – Hose Connection



IV Test Result

Dehydration Test

- ▶ Dryness: <u>Before 16~20%</u>, <u>After Around 40%</u> → **Reduction around 55%**
- ► Sludge Characteristics: Except when the moisture content was too high, the sludge was generally clumped together in the size of a baseball or smaller. Compared to its visible characteristics, it had a consistency that didn't spread easily and was thick when applied.
- ▶ It appears to be sludge with a slightly less spreadable characteristic compared to typical wastewater sludge, but it actually tends to form a good thickness and has the property of not adhering to the press roll.
- ► The input is generally smooth, and both the scraping and washing conditions are good.
- Since the thickness forms well, the sludge scraping was effective, and there was no side leakage of sludge, so it is estimated that the solids recovery rate will also be excellent.

| Dete | Operating | Total Treatment | Treatment | Total Power | Power C`mption | Dryness | s (wt%) | Weight |
|-------|-----------|--------------------|-----------|-------------------|-------------------|------------|---------|--------|
| Dale | (hh:mm) | Weight (kg) | (kg/hr) | C`mption (kWh) | Rate (kWh/ton) | Centrifuge | ELO | (%) |
| 02/01 | 5:02 | 1,090 | 216.6 | 200.3 | 183.7 | 19% | 41% | 53.66% |
| 05/01 | 2:11 | 533 | 244.3 | 96.6 | 181.1 | 18% | 38% | 52.63% |
| 06/01 | 2:29 | 465 | 187.4 | 104.5 | 224.6 | 19% | 42% | 54.76% |
| 07/01 | 1:14 | 221 | 179.2 | 50.2 | 227.1 | 20% | 42% | 52.38% |
| 08/01 | 3:31 | 704 | 200.2 | 139.8 | 198.6 | 18% | 43% | 58.14% |
| 09/01 | 3:04 | 580 | 189.0 | 118.1 | 203.8 | 17% | 39% | 56.41% |
| 13/01 | 2:54 | 475 | 163.9 | 101.9 | 214.4 | 20% | 43% | 53.49% |
| 14/01 | 3:00 | 674 | 224.6 | 126.9 | 188.4 | 20% | 40% | 50.00% |
| 15/01 | 4:24 | 973 | 221.2 | 167.8 | 172.4 | 20% | 43% | 53.49% |
| 16/01 | 3:53 | 975 | 251.1 | 147.9 | 151.7 | 16% | 39% | 58.97% |
| 19/01 | 1:52 | 358 | 191.7 | 74.3 | 207.6 | 19% | 38% | 50.00% |
| Total | 9:34 | 7,049 | 206.3 | 1328.3 | 195.8 | 18.73% | 40.73% | 53.99% |

Summary of dehydrating test result

Bad Odor Reduction Test

► To ensure the fairness of the test, sludge discharged from the centrifugal dewatering machine and sludge discharged from the ELO were measured to have the same volume before forming the sludge piles for testing.

► After creating the piles, sludge was sampled daily (excluding weekends) at a depth of 10 cm inside the piles, and the odor concentration was measured using the Olfactory method.

► An attempt was made to measure the quantitative odor concentration using a simple odor measurement device, but detection was not possible due to the low concentration.



► Due to these limitations, the test was conducted solely using the olfactory method, and quantitative evaluation and analysis were determined based on the composting time relative to the storage duration.

Result summary of bad odor reduction test

| Dete | Storage | Odor C | hecking |
|-------|---------|---|---|
| Date | (hr) | ELO | Centrifuge |
| 06/01 | 0 | It has the distinctive smell of the ELO sludge, but it's not strong. | It has the distinctive smell of a mechanical sludge cake, but it's not strong. |
| 07/01 | 17 | No significant change | No significant change. |
| 08/01 | 41 | The type of odor has slightly changed. → It has a somewhat sour and unusual smell that is hard to encounter regularly. The intensity of the odor has increased by about 50% compared to yesterday. White mold has developed on the sludge. →Aerobic digestion has started, as judged. | • No significant change. |
| 09/01 | 65 | No significant change | No significant change. |
| 10/01 | 89 | The intensity of the odor has increased by about 100% compared to the beginning. However, the odor itself is not particularly unpleasant; it smells like soil or wood decomposing. | • No significant change. |
| 13/01 | 161 | The smell itself has completely changed to an earthy odor. The intensity of the smell has decreased by about half compared to last week. | A distinctive sewer-like odor has started to appear. Anaerobic digestion has begun. The intensity of the smell is not strong. |
| 14/01 | 185 | • No significant change. | The foul odor is gradually getting stronger. |
| 15/01 | 209 | No significant change. | No significant change. |
| 16/01 | 233 | • The odor has weakened to the point where one must put their nose close to the sludge to smell it. | • No significant change. |
| 19/01 | 305 | • No significant change. | • The odor has become so pungent and strong that it is difficult to bear. |

Other Parameters

► During the test period, the temperature and hardness of the washing water entering the treatment device were checked.

► The temperature was measured at around 22°C, which was higher than expected, possibly because the water is treated from the plant and supplied from the indoor reservoir.

► The hardness was slightly higher at 105 mg/L, but still lower than our standard threshold.

| Temperature [°C] | Hardness [mg/L] |
|------------------|-----------------|
| 22 | 105 |

V Analysis

Analysis of Sludge Dehydration

► When considering both the dehydrating reduction effect and the subsequent composting process, it is determined that a sludge dryness of around 40% from the ELO is the most effective.

- ► The operating conditions at this point are estimated as follows.
- 1) Voltage: 60V
- 2) Rated power consumption for 1 ton sludge: Avg. 197.3 kWh
- 3) Dryness of Discharging Sludge: around 40 %
- 4) Reduction ratio of Sludge Weight: around 55 %

During the test period, the exhaust gases were collected and washed only with water, without the addition of chemicals, in the scrubber before being discharged.

► However, it did not have any significant impact on the atmospheric environment of the STP, indicating that the concentration of odor gases emitted from ELO was not high.

► Therefore, it is expected that, when installing the actual system, simply connecting it to the existing odor treatment system at the plant and installing a basic wash-type scrubber will be sufficient for effective treatment.

► Since the input device was installed as a temporary facility, there was some variation, but the analysis showed that up to about 220 kg per hour could be processed.

It indicates that the standard processing capacity of our equipment can be applied to the Seeb STP.

Summary of Dehydrating Performance

| Treatment | Power | Drynes | Weight | | |
|---------------------|--------------------------|-----------|-----------|-----------|--|
| Capacity (kg/hr) | Consumption (kWh/ton) | Before | After | (%) | |
| 200 ± 10% | 200 ± 10% | 15 ~ 20 % | 36 ~ 42 % | 50 ~ 55 % | |

Analysis of Bad Odor Reduction Test

Centrifuge Sludge Pile

- 1) Until around day 5, there was no significant change in the concentration or quality of the odor.
- 2)After about a week, unpleasant odors, likely originating from the sewage, began to emerge from within the sludge, indicating the start of aerobic digestion.
- 3) After about 2 weeks, the odor became so strong that it was difficult to bear.

► ELO Sludge Pile

- 1)A faint odor began to emerge after 1 day of storage, but it was not the typical sludge smell. Instead, it had a slightly sharp scent, though it was not unpleasant.
- 2) From the 2nd day, white mold began to appear, indicating that aerobic digestion was proceeding rapidly, even without any special treatment, simply by storing the sludge after ELO dewatering.
- 3)After about 5 days, the type of odor completely changed, and a pleasant, compost-like smell, resembling decaying leaves or straw, began to emerge.
- 4) After about 2 weeks, the typical unpleasant sludge odor was completely gone, and the odor intensity was so weak that it was almost unnoticeable.
- Odor Analysis Conclusion
- 1) In the case of ELO sludge, aerobic digestion was observed to begin after about 41 hours of storage.
- 2) In contrast, for the centrifuge sludge, anaerobic digestion was observed to begin after about 161 hours of storage.
- 3) The pollutant gases generated by anaerobic digestion are known to be more harmful to the human body and cause greater discomfort than those produced by aerobic digestion.
- 4) In actual experiments, the odor of centrifuge-dewatered sludge was also observed to be more unpleasant.
- 5)However, in this test, aside from the discomfort caused by the odor, the odor intensity was analyzed by substituting it with the composting period.
- 6) Based on this analysis, it was found that the odor from ELO sludge was reduced by 74.53% compared to the odor from centrifuge sludge.

Performance Evaluation

► Based on the pilot test results and the analysis, an evaluation of the KPI performance was conducted, and the results are shown in the table below.

| No | КРІ | Target | Result | Attainment | | |
|----|--------------------|--|--------------------|------------|--|--|
| 1 | Treatment capacity | 200 kg/hr | Avg. 206.3 kg/hr | 100 % | | |
| 2 | Dryness | Over 35% | Avg. 40.73 % | 100 % | | |
| 3 | Weight reduction | Over 50% | Avg. 53.99 % | 100 % | | |
| 4 | Power consumption | Below 200kWh/ton | Avg. 195.8 kWh/ton | 100 % | | |
| 5 | Bad odor reduction | Over 50% | 74.53 % | 100 % | | |
| 6 | Water Conditioning | Temperature ≤ 30 °C Hardness ≤ 120 ppm | 22 ℃ / 105 mg/L | 100 % | | |

Implementation of the ELO

► Based on the analysis of the test results, it is determined that the standard processing capacity of our equipment can be sufficiently applied.

Based on these results, the application of this technology to the A'Seeb STP is estimated as follows.

| | Item | Unit | Current Situation | Implementation of ELO | | | | |
|---------------|--|-----------|-------------------------|-----------------------|--|--|--|--|
| | Daily Sludge Cake | ton/day | 30 ¹⁾ | | | | | |
| | Weight Reduction Ratio ²⁾ | % | - | 53.9 | | | | |
| Sludge | kWh ratio ²⁾ | kWh/ton | - | 195.8 | | | | |
| Amount | Daily Power Consumption ³⁾ | kWh/day | - | 5,874 | | | | |
| | Additional Electricity | kWh/month | - | 176,220 | | | | |
| | Monthly Sludge Amount | ton/month | 900 | 414 | | | | |
| <u>Cummon</u> | Additional Electricity | kWh/month | - | 176,220 | | | | |
| Summary | Monthly Sludge Amount | ton/month | 900 | 414 | | | | |

1) Recommended ELO Model: ELO-M04s x 2 ea (800 kg/hr x 2ea x 20hr = 32 ton)

2) Values from the Pilot Test

3) Power Consumption Ratio (Pilot Test) x Daily Sludge Amount

Acknowledgements

I would like to express my heartfelt gratitude to all the individuals and organizations who supported the successful completion of this pilot test.

First and foremost, I would like to extend my sincere thanks to the representatives from KEITI for their invaluable assistance in ensuring that this project could take off and progress smoothly from the very beginning.

My sincere appreciation also goes to the teams at NAMA Water Services, MMS, and the Seeb sewage treatment plant in Oman for their dedicated efforts and support during the on-site operations. Their contributions were crucial to the successful implementation of the project.

I am deeply thankful for everyone's cooperation and effort in making this project a success.

VI Appendix

Test Record

| | ELO Pilot Test in Seeb STP in Oman Test Result | | | | | | | | | | | | | | | | |
|------|---|------------|------------------|------------------|-----------|------------|--------------|-----------------------|-------------------|----------------------------------|---------------|----------------|-----------|--------------|----------|------------|--|
| DAT | DATE: 2025.01.02 | | | | | | | | | | | | | | | | |
| Writ | Written By: M. Nouman Kihad hald | | | | | | | | | | | | | | | | |
| | Onerating Condition Degrees (ut%) | | | | | | | | | | | | | | | | |
| | START | END | Start kWh | End kWh | | | operating | DC | D | с | Diyness | (000) | Dischared | Storage | Measur | e Result | |
| NO. | (hh:mm) | (hh:mm) | (kWh) | (kWh) | (Hz) | (Hz) | (HZ) | Voltage (V) | Cur (A(min) - | rent - A(Max)) | Centrifuge | ELO | (kg) | Time (hr) | ELO | Centrifuge | |
| 1 | 9:59 | 12:06 | 290.7 | 387.0 | 29 | 32 | 60 | 68 | 535 | 556 | | - | 180 | | - | | |
| 2 | 12:39 | 15:34 | 387.0 | 491.0 | 29 | 32 | 60 | 60 | 497 | 562 | 19% | 41% | 300 | 121 | - | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | Operational status and irregularities | | | | | | | | | | | | | | arks | | |
| - Th | ickness of | Dischargeo | d Sludge: 2 mm | | | | | | | | | | | | | | |
| - Wi | dth of Disc | harged Slu | dge: 390 mm | | | | | | | | | | 8 | | | | |
| - C. | AM Motor | / Drum (| Cooling Pump TI | HR Alarm | | | auraauro 11. | | | | | | - | | | | |
| - G | rease Inp | ut to inpu | t device crank c | onnection sleeve | : 10:00 / | 12:00 / 14 | 4:00 | | | | | | r. | | | - | |
| - U: | se Ton Ba | ag for dis | charging sludge | from 12:39 | | | | | | | | | | | | | |
| - | | | | | | | | | | | | | 14 | | | | |
| - | | | | | | | | | | | | | | | | | |
| _ | | | | | | | | Pictures | | | | | | | | | |
| 1 | `# | TI NETED | 044 044 | | | P.J | | rictures | | | | Not- | e le | | | | |
| 1 | MJL | TT METER | | Lun . | The | PL | E | | internet internet | SETTING | 112 112/64 | | | | | | |
| | 3 - H | 87 ° | ှ ပြ | | - | | | | | 12/07 12/07 10/07 10/07 | | me internet | | | | | |
| | iie Mae | | | | | MI | | TRANKE START | AND AND A | Times Times | | R.C. HILF (NO. | | | | | |
| 1 | | | | | | | | 2.000 (a) 2.000 | | tite and | | 48.0 V | | | | | |
| | | SDK(| i B | 1 | Contrast. | | | | | T new 1 | | | | | | | |
| | | 0 | | 1 1 | | | | 0 | | | - | M | | an. | | 1 | |
| | | | <u></u> | | | | | ANTTHER TOLLOG | | | | 8 - / / | N. | it it | | A Star | |
| | | | n-U | | | | | | 210 | 68 | 00 | 0 | A | | 1/2 T | - | |
| | | Ĩ | 1387 | | | | | N NORTH AND IN COLUMN | | õ | 000 | | Sax a | in the | | 3 | |
| | 1 | | Цант | MAR | | | | 000 | | | | | 24 | | 2 | | |
| | - | | all. | | | | er. | and the second | | | | | | | - | | |
| | | | <u>i</u> | 30 | | | Per n | 1 | | - The | N. COL | | HER. C.V. | 1.19 | 1. 1. | | |

| | | | | | | ELO P | lot Test | in Seeb S | STP in Or | nan | | | | | | |
|------|---------------------------------------|-------------|-------------------|-------------------|--------------|-------------------|----------------|----------------|----------------|-------------------|------------|-----|----------------|--------------|--------|------------|
| | Test Result | | | | | | | | | | | | | | | |
| DAT | E: 05.01.2 | 025 | | | | | | | | | | | | | | |
| Writ | ten By: M. | Nouman K | hen Cely | alla | | | | | | | | | | | | |
| - | Operating Condition Dryness (wt%) | | | | | | | | | | | | | | Odor | |
| | START | END | Start kWh | End kWh | | | | DC | | c | - | | Dischared | Storage | Measur | e Result |
| No. | (hh:mm) | (hh:mm) | (kWh) | (kWh) | Drum (Hz) | Pressroll (Hz) | Supply (HZ) | Voltage (V) | Cur (A(min) | rent - A(Max)) | Centrifuge | ELO | Weight (kg) | Time (hr) | ELO | Centrifuge |
| 1 | 10:04 | 12:15 | 497.1 | 593.7 | 36 | 40 | 60 | 65 | 450 | 600 | 0.18 | 38% | 240 | 65 | 3/10 | 3/10 |
| 2 | | | | | | | | | | | | | - | | | |
| - | | | | | | | | | | | | | | | | |
| | Operational status and irregularities | | | | | | | | | | | | | Ren | narks | |
| - Tł | ickness of | Dischargeo | I Sludge: 2 mm | | | | - | | | | | | | | | |
| - W | idth of Disc | harged Slu | dge: 390 mm | | | | | | | | | | | | | |
| - In | put devic | e Suppor | ter Nut/Bolt Tigh | ntening - 08:15 A | М | | | | | | | | | | | |
| - G | rease Inp | out to inpu | t device crank o | connection sleev | e: 08:25 / | 11:15 | | | | | | | - | | | |
| - D | ropped sl | ludge stor | ed last week th | urday: 09:00 AM | | | | | | | | | | | | |
| - C | AM Moto | r THR Trij | o: 12:15 PM | | | | | | | | | | | | | |
| - A | fter trip, tl | he Centrif | uge stopped als | so due to the low | level of v | vaste wat | er. | | | | | | | | | |
| ~ | | | | | | | | | | | | | | | | |
| 00 | Pictures | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |

| - | ELO Pilot Test in Seeb STP in Oman Test Result | | | | | | | | | | | | | | | |
|------|---|----------------|---------------------|---------------------|--------------|-------------------|----------------|----------------------|-----------------------|-------------------------|------------|-----|-----------------------------|-------------------------|--------|------------------------|
| DAT | DATE: 06.01.2025 | | | | | | | | | | | | | | | |
| Writ | Written By: M.Nouman Khen | | | | | | | | | | | | | | | |
| | Operating Condition Dryness (wt%) | | | | | | | | | | | | | | Odor | |
| No. | START (hh:mm) | END (hh:mm) | Start kWh (kWh) | End kWh (kWh) | Drum (Hz) | Pressroll (Hz) | Supply (HZ) | DC Voltage (V) | D Cur (A(min) - | IC rent ~ A(Max)) | Centrifuge | ELO | Dischared Weight (kg) | Storage Time (hr) | Measur | e Result Centrifuge |
| 1 | 11:07 | 12:31 | 606.1 | 664.0 | 36 | 40 | 50 | 60 | 500 | 600 | | | 120 | - | - | |
| 2 | 14:45 | 15:50 | 664.3 | 710.9 | 36 | 40 | 65 | 70 | 450 | 600 | 19% | 42% | 80 | 9237 | 25 | 10 |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | Operational status and irregularities Remarks | | | | | | | | | | | | | | | |
| - Th | ickness of | Discharge | d Sludge: 2 mm | | | | | | | | | | | | | |
| - W | idth of Disc | harged Slu | dge: 390 mm | | | | | | | | | | | | | |
| - G | reasing T | ime 11:00 | 0 AM, 14:40 PM | | | | | | | | | | | | | |
| - S | ampling 1 | eim 11:2 | 0 ~ 11:45 AM | | | | | | | | | | | | | |
| - T | ruck cont | ainer arriv | ve at the site at 1 | 1:30 so, the ma | chine car | n be run fr | om 11:00 |) AM. | | | | | | | | |
| - W | /ater supp | oly stop a | t 12:30 PM - STI | ^o Issue. | | | | | | | | | | | | |
| - C | entrifuge | was stop | ped 12:45 ~ 14: | 30, due to the iss | ue of the | STP. | | | | | | | | | | |
| - S | tore Befo | re and aft | er sludge at 16: | 30 PM | | | | | | | | | | | | |
| 200 | | | | | | | | | | | | | | | | |
| | | | | | | | (| 1 | | | Ja. | • | | | | |

| - | | | | | | ELO Pi | lot Test | in Seeb S | TP in On t | nan | | | | | | |
|-------|---|----------------|--------------------|-------------------|--------------|-------------------|----------------|----------------------|-----------------------|------------------------|------------|-------|-----------------------------|-------------------------|------|------------------------|
| | | | | | | | | est Resul | | | | | | | | |
| DAT | E: 07.01.2 | 025 | | | | | | | | | | | | | | |
| Writ | ten By: M. | Nouman K | then <u>Rhal</u> | 7 | | | | | | | | | | | | |
| | | | | | | | Operating | Condition | | | Dryness | (wt%) | | | Odor | |
| No. | START (hh:mm) | END (hh:mm) | Start kWh (kWh) | End kWh (kWh) | Drum (Hz) | Pressroll (Hz) | Supply (HZ) | DC Voltage (V) | D Cur (A(min) ~ | C rent - A(Max)) | Centrifuge | ELO | Dischared Weight (kg) | Storage Time (hr) | ELO | e Result Centrifuge |
| 1 | 8:38 | 9:52 | 720.1 | 770.3 | 36 | 40 | 65 | 60 | 400 | 600 | 20% | 42% | 100 | 17 | 2/10 | 3/10 |
| 2 | | | | | | | | | | | | | | | - | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | Operat | ional stat | us and irre | gularities | | | | | | | Rem | arks | |
| - Th | ickness of | Discharge | d Sludge: 2 mm | | | | | | | | | | | | | |
| - W | Width of Discharged Sludge: 390 mm - Greasing Time 08:15 AM | | | | | | | | | | | | | | | |
| - G | Greasing Time 08:15 AM Sampling Time 08:20 ~ 08:35 AM (for tomorrow) | | | | | | | | | | | | | | | |
| - S | - Sampling Time 08:20 ~ 08:35 AM (for tomorrow) | | | | | | | | | | | | | | | |
| - 0 | Sampling Time 08:20 ~ 08:35 AM (for tomorrow) Odor checking Time 09:00 AM | | | | | | | | | | | | | | | |
| - In | Odor checking Time 09:00 AM Input conveyor was stopped at 09:52 due to connection bracket bolt was broken. | | | | | | | | | | | | | | | |
| - P | arts for in | put conve | eyor fixing was p | repared at 13:20 | PM | | | | | | | | | | | |
| - B | ut, the ce | ntrifuge w | as stopped due | to the low level. | | | | | | | | | 20 | | | |
| _ | | | | | | | | Pictures | | | | | | | | |
| 304HL | Parts for input conveyor fixing was prepared at 13:20 PM But, the centrifuge was stopped due to the low level. Pictures Fictures Ficture Ficture Fict | | | | | | | | | | | | | | | |
| | | 0380 | | | Bath post | | Sunter Sted. | -BDKC | | | | | | | | |

| | | | | | | ELO Pi | lot Test | in Seeb S | TP in On | nan | | | | | | |
|------|--|------------|------------------|------------------|--|-------------------|----------------|----------------|-------------------|-------------------|------------|-------|-----------|--------------|-------|------------|
| | | | | | | | | est Kesul | | | | | | | | |
| DAT | E: 08.01.2 | 025 | | | | | | | | | | | | | | |
| Writ | ten By: M. | Nouman K | hen Rhap | 4 | | | | | | | | | | | | |
| - 8 | | | | | | | Operating | Condition | | | Dryness | (wt%) | | | Odor | |
| | START | END | Start kWh | End kWh | | | | DC | D | с | | | Dischared | Storage | Measu | re Result |
| No. | (hh:mm) | (hh:mm) | (kWh) | (kWh) | (Hz) | Pressroll (Hz) | Supply (HZ) | Voltage (V) | Curi (A(min) ~ | rent • A(Max)) | Centrifuge | ELO | (kg) | Time (hr) | ELO | Centrifuge |
| 1 | 8:30 | 9:39 | 775.9 | 821.4 | 36 | 40 | 55 | 60 | 405 | 600 | - | | 110 | 41 | 3/10 | 1/10 |
| 2 | 10:37 | 12:59 | 826.1 | 920.4 | 36 | 40 | 60 | 65 | 420 | 600 | 18% | 43% | 170 | | | - |
| | | | | | | | | | | | | | | | | |
| | | | | Opera | tional stat | us and irre | quiarities | | | | | | | Rem | arks | |
| - Th | ickness of | Discharged | i Sludge: 2 mm | Obera | | | | | | | | | | | | |
| - W | dth of Disc | harged Slu | dge: 390 mm | | | | | | | | | | | | | |
| - A: | - Assemble Input conveyor crank connecting bolt & Sleeve/ Tighten the Bracket bolt & Nut 08:10 AM - Greasing Time 08:15 AM, 10:40 AM, 12:40 PM | | | | | | | | | | | | | | | |
| - G | - Greasing Time 08:15 AM, 10:40 AM, 12:40 PM - Sampling Time 08:20 ~ 08:35 AM (for tomorrow) | | | | | | | | | | | | | | | |
| - Si | - Greasing Time 08:15 AM, 10:40 AM, 12:40 PM - Sampling Time 08:20 ~ 08:35 AM (for tomorrow) - Odor checking Time 09:00 AM | | | | | | | | | | | | | | | |
| - 0 | - Sampling Time 08:20 ~ 08:35 AM (for tomorrow) - Odor checking Time 09:00 AM | | | | | | | | | | | | | | | |
| - SI | ludge Dis | posal Tim | ie 10:05 AM, 13 | :12 PM | | | | | | | | | 0 | | | |
| - TI | ne centrif | uge was s | stopped due to t | he low level. 12 | 58 AM | | | | | | | | 00 | | | |
| 00- | | WATER TER | 0900 | 240 | 0000 | | | 1 | | | | | | | | |
| | DRUM WA | | Decc | | илті на 1426 1-00 1204 150 | | | | | | | | | |) (| 1 |

| | | | | | | ELO Pi | ot Test | in Seeb S | TP in On | nan | | | | | | |
|--|--|-------------|------------------|------------------|------------------------------|--|----------------|----------------|------------------|------------------------|------------|----------|----------------|-------------------------|--------|------------|
| | | | | | | | Те | est Resul | t | | | | | | | |
| DAT | E: 09.01.2 | 025 | | | | | | | | | | | | | | |
| Writt | en By: Pa | wan Chau | bhary Pawan | | | | | | | | | | | | | |
| | - | | | | | | Operating | Condition | _ | 9 | Dryness | (wt%) | | | Odor | |
| | | | | | - | | operating | Condition | | _ | Dryness | (****/0) | Dischared | | Measur | e Result |
| No. | (hh:mm) | (hh:mm) | (kWh) | (kWh) | Drum (Hz) | Pressroll (Hz) | Supply (HZ) | Voltage (V) | Cur (A(min) - | c rent · A(Max)) | Centrifuge | ELO | Weight (kg) | Storage Time (hr) | ELO | Centrifuge |
| 1 | 8:59 | 12:03 | 934.2 | 1,052.3 | 36 | 40 | 55 | 60 | 410 | 600 | 17% | 39% | 240 | | - | - |
| 2 | | | | | | | | | | | | | 2 | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Operational status and irregularities Thickness of Discharged Sludge: 2 mm | | | | | | | | | | | | | | Rem | arks | |
| - Thi | Operational status and irregularities Remarks Thickness of Discharged Sludge: 2 mm 211 Width of Discharged Sludge:: 375 mm 215 | | | | | | | | | | | | | | | |
| - Wi | Thickness of Discharged Sludge: 2 mm Width of Discharged Sludge: 375 mm | | | | | | | | | | | | | | | |
| - Cł | Width of Discharged Sludge: 375 mm • Change the Nut Sleeve 08:15 AM | | | | | | | | | | | | | | | |
| - Gr | easing T | ime 08:3 | 0 AM, 10:40 AM, | 11:00 AM | | | | | | | | | | | | |
| - Sa | Impling T | ime 08:4 | 0 ~ 09:00 AM (ca | an not submit du | e to lab f | inished to | o early) | | | | | | | | | |
| - Ba | ig Drop o | off 12:25 I | РМ | | | | | | | | | | | | | |
| - On | -site obs | ervation I | by the NAMA tea | ım 10:20 AM ~ 1 | 0:40 AM | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | Pictures | | | | | 16 | | | |
| | TAW MURC | | 050 | | нока • • (// • 09= | NULTI MET H 19 - 00 3 4 2 - : | | | | | | | | | | |
| T | P. Deim | | 1 | - | MUI KOKA | TI METER | MER MILLS C.C. | | | | LEP TOLEDO | | | - | | |

100

270

6-2 V

2

| \vdash | | | | | | ELO Pi | ilot Test T | in Seeb S est Resul | TP in On | nan | | | | | | |
|----------|--|-----------|-------------|---------|----------------------------|-------------------------------|----------------|------------------------|--|-------------------|------------|-------|----------------|--------------|--------|------------|
| DAT | E: 13.01.2 | 025 | | | | | | | | | | | | | | |
| Writ | ten By: M. | .Nouman F | then y hand | | | | | | | | | | | | | |
| | 570 | 1 | | | | | Operating | Condition | | | Drypose | (+9() | | | Odor | |
| | START | FND | Start kWh | End kWh | - | | Operating | DC | | 0 | Dryness | (Wt%) | Dischared | Storage | Measur | re Result |
| No. | (hh:mm) | (hh:mm) | (kWh) | (kWh) | Drum (Hz) | Pressroll (Hz) | Supply (HZ) | Voltage (V) | Cur (A(min) - | rent - A(Max)) | Centrifuge | ELO | Weight (kg) | Time (hr) | ELO | Centrifuge |
| 1 | 9:02 | 11:56 | 1,056.4 | 1,158.3 | 36 | 40 | 45 | 60 | 415 | 600 | 20% | 43% | 210 | | - | ~ |
| 2 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| L | | | | | | | | | | | | | | | | |
| | | | | Operat | tional stat | us and irre | gularities | | | | | | | Ren | narks | |
| - Th | Thickness of Discharged Sludge: 2 mm 2 mm Width of Discharged Sludge: 380 mm 2 mm • Nut Bolts tightening 08:20 AM 2 mm | | | | | | | | | | | | | | | |
| - W | Width of Discharged Sludge: 380 mm - Nut Bolts tightening 08:20 AM | | | | | | | | | | | | | | | |
| - N | - Nut Bolts tightening 08:20 AM - Greasing Time 08:30 AM, 11:00 AM | | | | | | | | | | | | | | | |
| - G | - Nut Bolts tightening 08:20 AM - Greasing Time 08:30 AM, 11:00 AM - Sampling Time 08:45 ~ 09:00 AM | | | | | | | | | | | | | | | |
| - S | - Greasing Time 08:30 AM, 11:00 AM - Sampling Time 08:45 ~ 09:00 AM - At 11:54 AM the centrifuge unit stopped | | | | | | | | | | | | | | | |
| - A | Sampling Time 08:45 ~ 09:00 AM At 11:54 AM the centrifuge unit stopped | | | | | | | | | | | | | | | |
| - Ba | Sampling Time 08:45 ~ 09:00 AM At 11:54 AM the centrifuge unit stopped Bag Drop off time 12:25 PM | | | | | | | | | | | | | | | |
| - Ch | Bag Drop off time 12:25 PM Check smell: ELO Sludge - Like a smoke of Burning / Centrifuge Sludge - The smell of the sewer from the sludge has started. | | | | | | | | | | | | | | | |
| | | _ | | - | | | | Pictures | _ | | | | | 5. 3mm | | |
| | Aw MURÓ | | DSC | | 425 1-00 1564 | | | | AN A | | | | | | | |
| | DRUM WA | | 000 | | кола С • С Д Т 15 | NULTI NET 123 00 8.3 | | | THE LOW | | IN A B | | | | F | |

| | | | | | | ELO Pi | llot Test Te | in Seeb S est Resul | TP in On t | nan | | | | | | |
|----------|--|----------------|--------------------|------------------|--|-------------------|-----------------|------------------------|-----------------------|------------------------|------------|-------|-----------------------------|-------------------------|-------|------------------------|
| DAT | E: 14.01.2 | 025 | | | | | | | | | | | | | | |
| Writ | ten By: Pa | wan Chau | bhang all | - | | | | | | | | | | | | |
| | | | | | | | Operating | Condition | | | Dryness | (wt%) | | | Odor | |
| No. | START (hh:mm) | END (hh:mm) | Start kWh (kWh) | End kWh (kWh) | Drum (Hz) | Pressroll (Hz) | Supply (HZ) | DC Voltage (V) | D Cur (A(min) - | C rent · A(Max)) | Centrifuge | ELO | Dischared Weight (kg) | Storage Time (hr) | ELO | e Result Centrifuge |
| 1 | 9:05 | 12:05 | 1,162.8 | 1,289.7 | 36 | 40 | 55 | 60 | 405 | 600 | 20% | 40% | 320 | | - | - |
| 2 | | | | | | | | | | | | | 12 S | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | Operat | ional stati | us and irre | gularities | | | | | | | Ren | narks | |
| - Th | ickness of | Discharge | d Sludge: 2 mm | | | | | | | | | | | | | |
| - W | dth of Disc | harged Slu | dge: 380 mm | | | | | | | | | | | | | |
| - C | hecking t | he Nut/Bo | olt of Input devic | e 08:20 AM | | | | | | | | | | | | |
| - G | Greasing Time 08:30 AM, 10:20 AM Sampling Time 09:10 AM | | | | | | | | | | | | | | | |
| - Si | Sampling Time 09:10 AM Bag Drop off time 12:35 PM Sampling Time 12:35 PM | | | | | | | | | | | | | | | |
| - Ba | Sampling Time 09:10 AM | | | | | | | | | | | | | | | |
| | ag Drop off time 12:35 PM | | | | | | | | | | | | | | | |
| Pictures | | | | | | | | | | | | | | | | |
| SOARC - | Bag Drop off time 12:35 PM Bag Drop off time 12:35 PM Pictures Fictures | | | | | | | | | | | | | | | KC T |
| A A | AW MURD | | Dec | | нона С о С С О С О С | 431 00 97 | | | | | | 350 | 0000 | A. 0000 |)(| / |

| _ | | | | | | ELO Pi | lot Test Te | in Seeb S est Resul | TP in Or t | nan | | | | | | |
|--|---|------------|--------------------|---|--|---|----------------|------------------------|----------------|-------------------|------------|-------|----------------|--------------|---------------|------------|
| DAT | E: 15.01.2 | 025 | | | | | | | | | | | | | | |
| Writ | ten Bv: M. | Nouman K | hen () | naM | | | | | | | | | | | | |
| | | | | | 1 | | | - | | | | | | | | |
| | STADT | END | Chard With | | <u> </u> | | Operating | Condition | | <u> </u> | Dryness | (wt%) | Dischared | | Odor Measu | e Result |
| No. | (hh:mm) | (hh:mm) | (kWh) | (kWh) | Drum (Hz) | Pressroll (Hz) | Supply (HZ) | Voltage (V) | Cur (A(min) | rent - A(Max)) | Centrifuge | ELO | Weight (kg) | Time (hr) | ELO | Centrifuge |
| 1 | 9:00 | 11:34 | 1,292.1 | 1,391.4 | 36 | 40 | 60 | 60 | 410 | 600 | | - | 260 | | - | ~ |
| 2 | 12:12 | 14:02 | 1,392.0 | 1,460.5 | 36 | 40 | 55 | 60 | 415 | 600 | 20% | 43% | 170 | 1211 | - | |
| | | | | | | | | | | | | | | | | |
| | | | | Operat | tional stat | us and irre | gularities | | | | | | - | Ren | narks | |
| - Th | ickness of | Discharge | d Sludge: 2 mm | | | | | - | | | | | | | | |
| - W | dth of Disc | harged Slu | dge: 380 mm | | | | | | | | | | - | | | |
| - C | hecking t | he Nut/Bo | olt of Input devic | | | | | | | | | | | | | |
| - G | reasing T | ime 08:2 | 5 AM, 11:00 AM | | - | | | | | | | | | | | |
| - Greasing Time 08:25 AM, 11:00 AM, 12:40 PM - Sampling Time 08:40 AM - Bag Drop off time 12:00 PM | | | | | | | | | | | | | | | | |
| - Ba | - Sampling Time 08:40 AM - Bag Drop off time 12:00 PM | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | Pictures | | | | | | | | | | | | | | |
| | | | | | - Pa | 1 | S S CAL | Pictures | | | | | _ | 6 | | |
| | | | 060 | TING RECIONATION 36.00 39.60 40.00 RECEV PORTE CONTRACTOR ALLO | 22 Control Control Co | nı 23 Nı 23 Nı 23 Nı 25 Nı 20 Nı 20 | | | | | | | | | | |
| * | DRUM WA | | OSC | | кона С • С (Н - Т Ч Б | 124 124 00 | | | | | | 200 | 0000 | | | |

| - | | | | | | ELO Pi | lot Test Te | in Seeb S est Resul | iTP in Or t | nan | | | | | | |
|----------------|---|------------|---------------------------|----------------|-------------|-------------|-----------------|------------------------|----------------|-------------------|--------------|---------|-------------|--------------|-----------------|------------|
| DAT | E: 16.01.2 | 025 | | | | | | | | | | | | | | |
| Writ | ten By: Pa | wan Chav | bhary . | | | | | | | | | | | | | |
| | 205 | | | | 1 | | Operating | Condition | | | Dryness | (wt%) | | | Odor | |
| No | START | END | Start kWh | End kWh | Drum | Pressroll | Supply | DC | D | с | | | Dischared | Storage | Measu | e Result |
| | (hh:mm) | (hh:mm) | (kWh) | (kWh) | (Hz) | (Hz) | (HZ) | Voltage (V) | Cur (A(min) | rent - A(Max)) | Centrifuge | ELO | (kg) | Time (hr) | ELO | Centrifuge |
| 1 | 8:32 | 9:24 | 1,463.7 | 1,499.1 | 36 | 40 | 55 | 60 | 416 | 601 | - | - | 110 | 190 | - | |
| 2 | 9:50 | 12:51 | 1,501.4 | 1,613.9 | 36 | 40 | 55 | 60 | 417 | 602 | 16% | 39% | 270 | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | Operat | tional stat | us and irre | gularities | | | | | | | Ren | narks | |
| - Th | ickness of | Discharge | d Sludge: 2 mm | | | | | | | | | | | | | |
| - W | dth of Disc | harged Slu | idge: 380 mm | | | | | | | | | | | | | |
| - TI | ghtening | the Nut/E | Bolt of Input devi | | | | | | | | | | | | | |
| - G | reasing T | ime 08:2 | 5 AM, 10:30 AM | | | | | | | | | | | | | |
| - Ba | - Greasing Time 08:25 AM, 10:30 AM Bag Drop off time 11:45 AM, 13:05 PM | | | | | | | | | | | | | | | |
| | Bag Drop off time 11:45 AM, 13:05 PM | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | 10 | | | | | | | | | | | |
| 1203 | | | | _ | - | - | _ | Pictures | | | - 10 | 7 | | | | |
| and the | | 1 | 108 | | | | Contractor | and the second second | | | Inne. | A HALL | | | | |
| 1 | 1916 | - | | dial (| | 1010 1011 | MARY 24 THE ST. | | | - | Te | N | | | | |
| | | - | al this got - | Hir Da T | | and the st | Many on both | rang his br | | En | | ne. | | | | |
| | | - | | | , d | | | _ | | 1 | D | 4 | 0 | 1 | here | |
| 14 | | | APR - | K 7 | h | | | | | 15 | ţţ | | HE NOTW MAD | 4.4 | : - 425 H200 | 0900 |
| the second | | | start a start of | and the second | | 6 | | | | h | | | 2 | 000 | 15 133 | |
| P | 1- | the state | 1-1-00 | -10 | | 15 | - | | | - | | | - | | 17Y | |
| | - | | 4 | SIN - | 12 | 17 | | 1 | | | 1 | - mar | - | | 1 | |
| C.Mar | | - | Contraction of the second | 127 | 7 | | _/ | | | | A COLUMN TOL | 200 | P. | 00 | • | |
| and the second | in the second | | -1. | 12 | | - | E | | | | | - 200 | | 000 | | |
| Carles | 0 | Sal . | | | * | 1º | 4 | | | | | | 7 | | | |
| 1 | and the second | > | | | | li | 1 | - | | | 0 | 000 | 9 | ale. | P | |
| | 1 | - | 1 deres | | -/ | - All | 1 | | | L | | ERCAL W | | | | |

| | | | | | | ELO Pi | ilot Test | in Seeb S | TP in On | nan | | | | | | |
|-----------------|--|----------------|--------------------|------------------|--------------|-------------------|----------------|----------------------|-----------------------|------------------------|------------|-------|-----------------------------|-------------------------|------|------------------------|
| | | | | | | | т. т | est Resul | t | | | | | | | |
| DAT | E: 19.01.20 | 025 | D. | | | | | | | | | | | | | |
| Writ | ten By: M. | Nouman K | hen | | | | | | | | | | | | | |
| | | | | | | | Operating | Condition | | | Dryness | (wt%) | | | Odor | Dervilà |
| No. | START (hh:mm) | END (hh:mm) | Start kWh (kWh) | End kWh (kWh) | Drum (Hz) | Pressroll (Hz) | Supply (HZ) | DC Voltage (V) | D Cur (A(min) - | C rent • A(Max)) | Centrifuge | ELO | Dischared Weight (kg) | Storage Time (hr) | ELO | e Result Centrifuge |
| 1 | 9:50 | 11:42 | 1,633.7 | 1,708.0 | 36 | 40 | 55 | 60 | 410 | 600 | 19% | 38% | 170 | (*) | - | - |
| 2 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | Operational status and irregularities Remarks - Thickness of Discharged Sludge: 2 mm | | | | | | | | | | | | | | | |
| - Th | - Thickness of Discharged Sludge: 2 mm - Width of Discharged Sludge: 380 mm - Width o | | | | | | | | | | | | | | | |
| - Wi | - Checking of Input device 08:20 AM | | | | | | | | | | | | | | | |
| - C | Width of Discharged Sludge: 380 mm - Checking of Input device 08:20 AM - Greasing Time 08:30 AM | | | | | | | | | | | | | | | |
| - G | Checking of Input device 08:20 AM Greasing Time 08:30 AM | | | | | | | | | | | | | | | |
| | Greasing Time 08:30 AM | | | | | | | | | | | | | | | |
| | Pictures | | | | | | | | | | | | | | | |
| × | | | | | | | | | | | | | | | | |
| A Low A Low Law | | | | | 1 | | 1 | | | | | | | | | |

Measure Result

<NAMA Lab Dryness Measure #1 – Sludge After ELO #1>



| Reported Date: | | 08/01/2025 | | | керс | on No: 2 | 125-45/2/0 | version: | 1 |
|------------------|----|--|----------------|-------------|------|--------------|------------|------------|----------|
| | | | CUSTOMER INFO | ORMATIO | N | | | | |
| Contact | : | Intisar Al Sulaimi | Emai | il | : | intisar.sula | aimi@oww | sc.nama.or | n |
| Customer | : | Intisar Al Sulaimi | Phor | ne No | | +968-241 | 16320 | | |
| Address | : | NAMA WATER SERVICES COMPAN Engineering_DT | Y /Asset | | | | | | |
| | | | SAMPLE INFOR | RMATION | [] | | | | |
| Sample ID | | : 437270 | Sampling Da | te and Tim | e | : | 06/01/20 | 25 10:00 | |
| Sampled By | | : Customer | Received Da | te and Tim | e | : | 06/01/20 | 25 13:52 | |
| Plant Name/ Plan | nt | | Date Comple | ted | | : | 07/01/20 | 25 9:09 | |
| Sample Point | | : | Sampling Pro | ocedure | | : | APHA 2 | 540 G | |
| Sample Condition | n | : Acceptable | Enviromenta | l Condition | i | : | Not App | licable | |
| Sample Method | | : Grab | Analysis Star | rt Date and | Time | 2 | 1/6/2025 | 1:52:01 PM | Λ |
| Sample Descript | ic | n Al Seeb STP 60V Sludge | 1000 Y | | | : | | | |
| | | Analysis | Method | LOQ | Unit | Std Limit | U(k=2) | Results | Analyzed |
| | | | Chemical Lab A | Analyses | | | | | |
| SSC | | Sludge Solids Concentrate (SSC)* | APHA 2540 G | 1 | % | | ±1 | 42 | CENTRAL |

| Remarks: | MD145/93(Wastewater Re-use&Discharge),MD159/2005(Discharge Liquid Waste to Ma | rine Env),OS8/2012(Unbottled Drinking Water |
|--------------|---|---|
| | Std),RD115/2001(Discharge Nonhousehold liquid Waste into SewageSystem).Results b uncertainty factors,Micro result calculated based on log 10 | ased on specification std limit, excluding |
| Approved By: | | |
| | Legend: | LOQ = Limit of Quantification |

Marwa Al Rubkhi - RG Manager



Limit LOQ = Limit of Quantification U = Expanded Measurement Uncertainity at k=2 n/a = Not Available (*) = Negative ND = Not Detected Results in Red /* = Out of Limits (**) = parameters not accredited by GAC

The Results indicated in the test report related to the sample(s) collected and received. The signature(s) of the person authorizing this report is computer generated in accordance with the information system in-placed and the roles defined therein. The Report may not be reproduced or in part and in fill without the approval from NAMA Water Laboratory Management. The remarks / interpretation in the non accredited parameters of this report are with the information are constructed or in part and in fill without the approval from NAMA Water Laboratory Management. The remarks / interpretation in the non accredited parameters of this report are with the information of the provided or in part and in fill without the approval from NAMA Water Laboratory Management.

outside the scope of Nama Central Lab accredition.

Page1of1

<NAMA Lab Dryness Measure #2 – Sludge After ELO #2>

| | J S P.O. Box | Al Ansab Bu Ghala, Al Ansab, M Tel: +968 24 Fax: +968 24 Website: <u>www</u> 1047 PC 133 Al K | iilding, Iuscat, Om 529530 592744 .nama.om huwair, Mu | an 1scat, Or | nan | ة.ة Movi with | ingForward Confidence | روية <u>متعان (2000</u> |
|------------------------------|---|--|--|-----------------|--------------|--------------------------------|--------------------------|-------------------------|
| | Central | Laborator | y Test | Rep | ort | | | |
| Reported Date: 08/01/202 | 5 | | | Repo | ort No: 20 | 25-437271 | Version: | 1 |
| | C | USTOMER INFO | ORMATIO | N | | | | 2 |
| Contact : Intisar A | l Sulaimi | Emai | | : | intisar.sula | imi@oww | sc.nama.on | 1 |
| Address : NAMA W Engineer | I Sulaimi ATER SERVICES COMPANY /A: 'ing_DT | sset | IE NO | ł. | +968-2411 | 6320 | | ł) |
| | | SAMPLE INFOR | MATION | | | | | 6 |
| Sample ID : 4372 | 271 | Sampling Da | te and Tim | e | : | 06/01/20 | 25 10:00 | 5 |
| Sampled By : Cust | omer | Received Da | te and Time | e | : | 06/01/20 | 25 13:52 | |
| Plant Name/ Plant : | | Date Comple | ted | | : | 07/01/20 | 25 9:09 | 19 |
| Sample Point : | | Sampling Pro | ocedure | | : | APHA 2 | 540 G | 12 |
| Sample Condition : Acc | eptable | Enviromenta | l Condition | | : | Not App | licable | |
| Sample Method : Grat | 2 | Analysis Star | t Date and | Time | : | 1/6/2025 | 1:52:01 PN | 1 |
| Sample Description Al See | eb STP 65V Sludge | | | | : | | | |
| Analy | vsis | Method | LOQ | Unit | Std Limit | U(k=2) | Results | Analyzed |
| | | Chemical Lab A | Analyses | 98 | | | | |
| SSC Sludge | Solids Concentrate (SSC)* | APHA 2540 G | 1 | % | | ±1 | 43 | CENTRAL |

MD145/93(Wastewater Re-use&Discharge),MD159/2005(Discharge Liquid Waste to Marine Env),OS8/2012(Unbottled Drinking Water Std),RD115/2001(Discharge Nonhousehold liquid Waste into SewageSystem).Results based on specification std limit,excluding uncertainty factors,Micro result calculated based on log 10 Remarks:

Approved By:

Marwa Al Rubkhi - RG Manager



Legend:

LOQ = Limit of Quantification U = Expanded Measurement Uncertainity at k=2 n/a = Not Available (-) = Not Available (-) = Negative ND = Not Detected Results in Red /* = Out of Limits (**) = parameters not accredited by GAC

The Results indicated in the test report related to the sample(s) collected and received. The signature(s) of the person authorizing this report is computer generated in accordance with the information system in-placed and the roles defined therein. The Report may not be reproduced or in part and in fill without the approval from NAMA Water Laboratory Management. The remarks / interpretation in the non accredited parameters of this report are outside the scope of Nama Central Lab accredition.

Page1of1

<NAMA Lab Dryness Measure #3 – Sludge After ELO #3>

| | ama ama RVICES | Ghala. W P.O. Box 1047 | Al Ansab Bo Al Ansab, M Tel: +968 24 Fax: +968 24 ebsite: www PC 133 Al K | uilding, Muscat, On 1529530 1592744 <u>nama.om</u> Chuwair, M | uscat, Or | man | قة Movi with | ngForward Confidence | روبة ع <u>مان 2000</u> |
|--------------------|--|------------------------------|--|--|-----------|--------------|-------------------------------|-------------------------|------------------------|
| | C | Central La | borato | ry Test | Rep | ort | | | |
| Reported Date: | 08/01/2025 | | | | Rep | ort No: 20 | 25-437272 | Version: | 1 |
| | | CUSTO | OMER INFO | ORMATIC | N | | | | |
| Contact : | Intisar Al Sulaimi | | Ema | | : | intisar.sula | imi@oww | sc.nama.om | |
| Address : | Intisar Al Sulaimi NAMA WATER SERVICES CO Engineering_DT | MPANY /Asset | Pho | ne No | | +968-2411 | 6320 | | |
| | | SAM | PLE INFOI | RMATION | [| | | | 8 |
| Sample ID | : 437272 | | Sampling Da | ate and Tim | e | : | 06/01/20 | 25 10:00 | |
| Sampled By | : Customer | | Received Da | te and Tim | e | : | 06/01/20 | 25 13:52 | |
| Plant Name/ Plant | : | | Date Comple | eted | | : | 07/01/20 | 25 9:09 | |
| Sample Point | : | | Sampling Pr | ocedure | | ; | APHA 2 | 540 G | |
| Sample Condition | : Acceptable | | Enviromenta | l Condition | i l | : | Not Appl | licable | |
| Sample Method | : Grab | | Analysis Sta | rt Date and | Time | : | 1/6/2025 | 1:52:01 PM | 1 |
| Sample Description | on Al Seeb STP 70V Sludge | | | | | : | | | 5 |
| | Analysis | М | ethod | LOQ | Unit | Std Limit | U(k=2) | Results | Analyzed |
| | | Ch | emical Lab | Analyses | | | | | |
| SSC | Sludge Solids Concentrate (SSC | C)* APH/ | A 2540 G | 1 | % | | ±1 | 42 | CENTRAL |

 Std),RD115/2001(Discharge Nonhousehold liquid Waste into SewageSystem).Results based on specification std limit,excluding uncertainty factors,Micro result calculated based on log 10

 Approved By:
 Logend:
 LOQ = Limit of Quantification U = Expanded Measurement Uncertainty at k=2 m/a = Not Available (-) = Negative ND = Not Detected Results in Red /* = Out of Limits (**) = parameters not accredited by GAC

 The Results indicated in the test report related to the sample(s) collected and received. The signature(s) of the person authorizing this report is computer generated in accordance with the information

MD145/93(Wastewater Re-use&Discharge),MD159/2005(Discharge Liquid Waste to Marine Env),OS8/2012(Unbottled Drinking Water

The Results indicated in the test report related to the sample(s) collected and received. The signature(s) of the person authorizing this report is computer generated in accordance with the information system in-placed and the roles defined therein. The Report may not be reproduced or in part and in fill without the approval from NAMA Water Laboratory Management. The remarks / interpretation in the non accredited parameters of this report are outside the scope of Nama Central Lab accredition.

Page1of1

Remarks:

<NAMA Lab Dryness Measure #4 – Sludge Before ELO #1>

| Al Ansab Building, Ghala, Al Ansab, Muscat, Oman Tel: +968 24529530 Fax: +968 24592744 Website: <u>www.nama.om</u> P.O. Box 1047 PC 133 Al Khuwair, Muscat, Oman | | | | | ë.ë. Movi with | ارونه عنمان MovingForward المعلم بلنقة MovingForward 2000 | | | | |
|---|--------------------------------|--------------|---------------------------------------|--------------------------|----------------------|---|------------------|----------------|--|--|
| Central Laboratory Test Report | | | | | | | | | | |
| Reported Date: 08/01 | 1/2025 | | | Repo | ort No: 20 | 25-436655 | Version: | 1 | | |
| CUSTOMER INFORMATION | | | | | | | | | | |
| Customer : Intis | Contact : Intisar Al Sulaimi | | | Email : Intisar.sulaimi@ | | | wowwsc.nama.om | | | |
| Address | | | | | | | | | | |
| SAMPLE INFORMATION | | | | | | | | | | |
| Sample ID : • | 436655 | Sampling Da | te and Tim | e | : | 07/01/20 | 25 7:00 | | | |
| Sampled By : STP Operator | | Received Da | Received Date and Time | | | 07/01/2025 10:41 | | | | |
| Plant Name/ Plant : Seeb STP | | Date Comple | Date Completed : 0 | | | | 08/01/2025 11:05 | | | |
| Sample Point : SB_SL4_B | | Sampling Pro | Sampling Procedure : API | | | | | IA 2540 G | | |
| Sample Condition : Acceptable | | Enviromenta | Enviromental Condition : Not | | | | Applicable | | | |
| Sample Method : Grab An | | | Analysis Start Date and Time : 1/7/20 | | | | | 25 10:41:25 AM | | |
| Sample Description : | | | | | | | | | | |
| Analysis M | | Method | LOQ | Unit | Std Limit | U(k=2) | Results | Analyzed | | |
| Chemical Lab Analyses | | | | | | | | | | |
| SSC Slu | udge Solids Concentrate (SSC)* | APHA 2540 G | 1 | % | | ±1 | 20 | CENTRAL | | |

Remarks:

Results based on specification standard limit, excluding uncertainty factors, Micro result calculated based on log 10

Approved By:

Marwa Al Rubkhi - RG Manager

S Testing Legend:

LOQ = Limit of Quantification U = Expanded Measurement Uncertainity at k=2 n/a = Not Available (*) = Negative ND = Not Detected Results in Red /* = Out of Limits (**) = parameters not accredited by GAC

The Results indicated in the test report related to the sample(s) collected and received. The signature(s) of the person authorizing this report is computer generated in accordance with the information system in-placed and the roles defined therein. The Report may not be reproduced or in part and in fill without the approval from NAMA Water Laboratory Management. The remarks / interpretation in the non accredited parameters of this report are outside the scope of Nama Central Lab accredition.

Page1of1

<NAMA Lab Dryness Measure #5 – Sludge Before ELO #2>

| | Al Ansab Building, Ghala, Al Ansab, Muscat, Oman Tel: +968 24529530 Fax: +968 24592744 Website: <u>www.nama.om</u> S P.O. Box 1047 PC 133 Al Khuwair, Muscat, Oman | | | | | बंद्ध Movi with | <u>ققة المعاممة المعامة معامة معامة معامة معامة معامة المعامة المعامة المعامة المعامة المعامة المعامة المعامة معامة معامة معامة معامة معامة معامة معامة معامة مع معامة المعامة المعامة المعامة معامة مع </u> | | | |
|--|---|------------------------------|------------------------------------|------------------|------------|-----------------------|--|----------|--|--|
| Central Laboratory Test Report | | | | | | | | | | |
| Reported Date: 08/01/202: | 5 | | | Repo | ort No: 20 | 25-437265 | Version: | 1 | | |
| CUSTOMER INFORMATION | | | | | | | | | | |
| Customer : Intisar A | Contact : Intisar Al Sulaimi | | | Email : intisar. | | | ulaimi@owwsc.nama.om | | | |
| Address : NAMA WATER SERVICES COMPANY /Asset : Figure and Figure a | | | | | | | | | | |
| SAMPLE INFORMATION | | | | | | | | | | |
| Sample ID : 4372 | Sampling Da | Sampling Date and Time : 06/ | | | | 01/2025 10:00 | | | | |
| Sampled By : Customer | | Received Da | Received Date and Time | | | : 06/01/2025 13:52 | | | | |
| Plant Name/ Plant : | | Date Completed | | | : | : 07/01/2025 9:09 | | | | |
| Sample Point : | | Sampling Pro | Sampling Procedure : | | | APHA 2540 G | | | | |
| Sample Condition : Acceptable | | Enviromenta | Enviromental Condition : | | | Not Applicable | | | | |
| Sample Method : Grab | | Analysis Star | Analysis Start Date and Time : 1/6 | | | 1/6/2025 | /2025 1:52:01 PM | | | |
| Sample Description Al Seeb STP Input Sludge : | | | | | | | | | | |
| Analysis | | Method | LOQ | Unit | Std Limit | U(k=2) | Results | Analyzed | | |
| Chemical Lab Analyses | | | | | | | | | | |
| SSC Sludge 5 | Solids Concentrate (SSC)* | APHA 2540 G | 1 | % | | ±1 | 19 | CENTRAL | | |

| MD145/93(Wastewater Re-use&Discharge),MD159/2005(Discharge Liquid V Std),RD115/2001(Discharge Nonhousehold liquid Waste into SewageSysten uncertainty factors,Micro result calculated based on log 10 | Vaste to Marin 1).Results base | e Env),OS8/2012(Unbottled Drinking Water ed on specification std limit,excluding |
|---|---|--|
| | | |
| | Legend: | LOQ = Limit of Quantification |
| RG Manager | | U = Expanded Measurement Uncertainity at k=2 n/a = Not Available |
| | | (-) = Negative |
| GCC ACCREDITATION CENTER | | ND = Not Detected |
| Testing | | (**) = parameters not accredited by GAC |
| ISO/IEC 17025:2017 ATL 0123 | | |
| | MD145/93(Wastewater Re-use&Discharge),MD159/2005(Discharge Liquid V Std),RD115/2001(Discharge Nonhousehold liquid Waste into SewageSystem uncertainty factors,Micro result calculated based on log 10 RG Manager | MD145/93(Wastewater Re-use&Discharge),MD159/2005(Discharge Liquid Waste to Marin Std),RD115/2001(Discharge Nonhousehold liquid Waste into SewageSystem).Results base uncertainty factors,Micro result calculated based on log 10 RG Manager RG Manager |

The Results indicated in the test report related to the sample(s) collected and received. The signature(s) of the person authorizing this report is computer generated in accordance with the information system in-placed and the roles defined therein. The Report may not be reproduced or in part and in fill without the approval from NAMA Water Laboratory Management. The remarks / interpretation in the non accredited parameters of this report are outside the scope of Nama Central Lab accredition.

Page1of1

Pictures



installation





ELOSYS

Operation Site View

Input Device

Sludge Input







Sludge Discharging

KOREA WATER TECHNOLOGY



KOREA WATER TECHNOLOGY







Discharged Sludge Weight Measure



Smell Checking Test



Sludge Disposal

KOREA WATER TECHNOLOGY



On-site Demonstration