

**DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: On-site Inspection**

N599764128

FACILITY: Granger Wood Street Landfill		SRN / ID: N5997
LOCATION: 16980 Wood Road, LANSING		DISTRICT: Lansing
CITY: LANSING		COUNTY: CLINTON
CONTACT: Steve Blayer , Environmental Engineer		ACTIVITY DATE: 08/19/2022
STAFF: Michelle Luplow	COMPLIANCE STATUS: Non Compliance	SOURCE CLASS: MAJOR
SUBJECT: Onsite inspections of the Granger Wood Street Landfill and EDL RNG Plant to determine compliance with MI-ROP-N5997-2020a, PTI 178-19 and PTI 177-19A.		
RESOLVED COMPLAINTS:		

Inspected by: Michelle Luplow

Wood Street Landfill Personnel Present:

Steve Blayer (sblayer@grangernet.com), Environmental Engineer

Kim Smelker (ksmelker@grangernet.com), Operations Manager, Granger

Serenity Skillman (sskillman@grangernet.com), Environmental Compliance Specialist, Granger

Summer Hitchens, Consultant (Impact C&T)

EDL Personnel Present:

Patrick Triscari (Patrick.triscari@edlenergy.com), RNG Plant Manager

Phil Jaworsky, Operations Technician

Courtney Truett (virtually) (Courtney.truett@edlenergy.com), Compliance Specialist

Meghan Stackhouse (virtually) (Meghan.stackhouse@edlenergy.com), Senior Environmental Manager

Elizabeth Park (virtually)

Purpose

Conduct an announced, onsite, partial compliance evaluation (PCE) inspections of the Wood Street Landfill and EDL Wood Street Renewable Natural Gas (RNG) Plant. Compliance was determined using MI-ROP-N5997-2020a (which contains the new 40 CFR Part 62, Subpart OOO and 40 CFR Part 63, Subpart AAAA templates) as well as PTI 177-19A for two new open flares at the landfill and PTI 178-19 for the RNG facility. These activities were conducted as part of a full compliance evaluation (FCE). The ROP contains 3 sections: Granger Wood St Landfill (Section 1), Granger Container Service (Section 2) and EDL Wood Street Generating Station (Section 3).

Facility Background/Regulatory Overview

The Granger Wood Street Landfill (Granger) is a municipal solid waste landfill with an associated Renewable Natural Gas (RNG) plant that is owned and operated by Energy Developments Lansing (EDL). The primary activity of this source is accepting municipal solid waste, consisting mostly of construction and demolition (C & D) waste; asbestos-containing materials (ACM) subject to the NESHAP for asbestos, 40 CFR, Part 61, Subpart M; municipal solid sludge; general refuse; and contaminated soils. Granger is considered a MSW Type II landfill. Due to past odor issues, Granger has stopped taking municipal solid sludge from a particular municipality, as it was identified by Granger staff that the sludge odors were particularly strong. Granger manages municipal sludge by having waste material on-hand to immediately cover sludge as it is received. K. Smelker said that sludge is not taken after 3 p.m.

Granger has a gas collection and control system (GCCS) that routes all collected landfill gas to 2 flares or to EDL's gas treatment system (RNG Plant) where the landfill gas is treated via filtration, dewatering, compression and removal of contaminants including H₂S. The gas is then sent to Consumer's pipeline for beneficial use.

The landfill itself was installed July 16, 1984, which initially made the landfill subject to 40 CFR 62 Subpart GGG, as it commenced construction before May 30, 1991. The landfill then received an expansion permit from the Materials Management Division (MMD) after May 30, 1991 (specifically, according to Steve Blayer, former MMD staffperson, Construction Permit # 0410 on April 21, 2002 and Construction Permit #4056 on January 30, 2004), thus making the landfill subject to 40 CFR Part 60, NSPS Subpart WWW.

Tier II testing was conducted on the landfill May 23 and May 24, 2016, the findings of which (69.14 Mg NMOC/year) indicated that Granger had exceeded the 50 Mg/year threshold for NMOC under NSPS Subpart WWW and therefore became required to submit a gas collection and control system (GCCS) plan by July 25, 2017. The initial (draft) GCCS plan was received by AQD on July 26, 2017. The final, approved draft, of the GCCS plan was received March 21, 2018. The AQD and MMD approved the GCCS plan on April 2, 2018.

The NSPS Subpart XXX applies to all landfills that are modified, new, or reconstructed after July 17, 2014. Granger has not modified the landfill after July 17, 2014 and therefore the NSPS Subpart XXX does not apply. However, new emission guidelines (Part 62 Subpart OOO) and the new MACT Subpart AAAA apply to Granger and EDL. MI-ROP-N5997-2020a includes all requirements for EG Subpart OOO and MACT Subpart AAAA. These two regulations have replaced the NSPS Subpart WWW and NSPS Subpart Cc. Both Granger and EDL opted in to comply with the MACT Subpart AAAA in lieu of certain portions of the EG Subpart OOO.

Granger also owns and operates the Paulson Street Landfill (~51-acre site located south of the Wood Street Landfill), which is included in the GCCS plan and gas from this site is also routed to the RNG plant. Granger purchased the site in 1973 and continued operations until 1986 when final cover was placed. The gas collection system for this site was installed in 1985.

On March 27, 2020, Granger received PTI 177-19 for the installation and operation of 2 new open flares and removal of their current open flare, as part of a project with EDL, who was permitted for a Renewable Natural Gas Plant under 178-19 on March 27, 2020. PTI 177-19A was issued September 30, 2021 to remove the operating hour restrictions. Granger can now operate the flares 8760 hours per year.

EDL previously owned and operated four G3516 CAT engines and three G3520 CAT engines. With the issuance of PTI 178-19, EDL was permitted to install and operate the RNG plant which includes EUTOX and EUCONDYSYS. The RNG plant replaced the 7 engines.

EDL is currently under a Consent Order (AQD No. 2021-09) which they entered into on January 22, 2021. The order was issued as the result of operating a major modification for SO₂ without first obtaining the proper Permit to Install. EDL is required to comply with stipulations in the Consent Order as well as the Schedule of Compliance in Appendix 2-3 of the ROP. Partial Compliance Evaluations have been conducted throughout the year to ensure EDL's compliance with these two sets of requirements.

Inspection

On August 10, 2022, I conducted an onsite inspection of the Granger Wood Street Landfill and on August 19, 2022 I conducted an onsite inspection of EDL's RNG plant. At approximately 8:00 a.m. on August 10, 2022, I met with Steve Blayer, Serenity Skillman, Kim Smelker and Summer Hitchens to conduct Granger's onsite inspection. At approximately 9:00 a.m. on August 19, 2022 I met with EDL staffperson Patrick Triscari onsite (and Courtney Truett, Meghan Stackhouse, and Elizabeth Park virtually) to conduct an inspection of EDL's RNG plant.

These facilities were inspected under MI-ROP-N5997-2020a, PTI 177-19A (Granger) and PTI 178-19 (EDL).

SECTION 1: GRANGER WOOD STREET LANDFILL INSPECTION

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PTI 177-19A: FGNEWFLARES (EUUF1, EUUF2)

PTI 177-19 was issued to Granger for the installation of two new open utility flares with rated design capacities of 4,000 scfm and 2,000 scfm (EUUF1 and EUUF2, respectively). PTI 177-19A was issued September 30, 2021 to remove the synthetic minor limits in PTI 177-19, which restricted the operation of the flares to less than 8760 hours per year. PTI 177-19A allows for 8760 hours of operation.

These flares are used to combust off-spec gas from EDL's RNG plant or to combust landfill gas when the RNG plant is not operational.

Installation of the flares was completed on August 30, 2021. Both flares are non-assisted and were being utilized to burn gas from the RNG plant (off-spec or otherwise) during the inspection.

Emission Limits, Testing/Sampling & Monitoring/Recordkeeping

Within 60 days after achieving maximum production rate, but not later than 180 days after commencement of initial startup, Granger is required to verify the net heating value of the combusted landfill gas from both flares and determine the flare gas exit velocity as well as evaluate the visible emissions from EUUF1 and EUUF2.

Testing was conducted November 4, 2021. Visible Emissions are limited to 0% opacity and are based upon Method 22 analyses to ensure the presence of visible emissions did not exceed 5 minutes during a 2-hour period. The flares met this requirement and therefore they are in compliance with the 0% opacity limit during testing. During the inspection I noted some VE's emitting from the two flares, but they were sporadic in nature, similar to their presence during the Method 22 opacity testing. AQD believes the opacity seen during the inspection is in compliance with the 0% standard using Method 22.

During the visible emissions test event, the average net heating value of the landfill gas for both flares was determined to be 17.18 MJ/m³. The average exhaust gas exit velocity for EUUF1 and EUUF2 was determined to be 38.60 ft/sec and 34.01 ft/sec, respectively.

NO_x & CO

NO_x and CO emissions are limited to 0.068 lb/MMBTU and 0.37 lb/MMBTU, respectively. These two values are based on a higher heating value (HHV) of landfill gas equal to 557 BTU/scf and are used as part of the NO_x and CO emissions calculations. Granger is required to continuously monitor and record the gas flow rate and to monitor and record the monthly higher heating value (BTU/scf) of the landfill gas burned for EUUF1 and EUUF2 to calculate the NO_x and CO emissions according to Appendix A of PTI 177-19A.

Granger calculates the higher heating value monthly for both the raw landfill gas and the treated gas (from the RNG plant) based on the moisture content and methane content of the gas. Records (attached) indicate that a 51% raw landfill gas methane content, a 96% treated gas methane content, and a moisture content of 8% were consistently used for the monthly calculations of September 2021 – July 2022. I have informed Granger that the methane content of both types of gasses, as well as the moisture content, need to be monitored and recorded every month based on that month's data, as required by the permit. The records indicate that Granger is assuming a 96% methane content for the treated gas. I have requested that actual methane content of the treated landfill gas be obtained from EDL on a monthly basis, rather than using an assumptive value.

Hourly and daily hours of operation that each type of gas (raw landfill gas, desulfurized gas, or RNG) is combusted, and a record of each type of gas combusted during those hours, is required to be recorded. Hourly NO_x and Co calculations are also required. Future discussions will be had with Granger staff to determine if hourly NO_x and CO calculations are being conducted as well as the hours of operation when each type of gas was being combusted, as required by the permit. The records provided indicate monthly calculations and monthly gas usage per type of gas combusted.

CO is limited to 325.0 tons per year (tpy) for both flares combined, based on a 12-month rolling period. Granger provided CO mass emissions data for September 2021 – July 2022. CO emissions for this 11-month period were 63.3 tons.

NO_x is limited to 60.0 tpy for both flares combined, based on a 12-month rolling period. Granger provided NO_x mass emissions data for September 2021 – July 2022. NO_x emissions for this 11-month period were 11.6 tons.

SO₂

PTI 177-19 requires that 180 days prior to initial startup of either flare, Granger verify the H₂S or TRS concentrations in the landfill gas on a daily basis using Draeger tube testing (5 days per week, excluding weekends and holidays) for 12 consecutive weeks and weekly using a USEPA approved method and laboratory

analysis. This data collection is required in order for AQD to determine variability in gas sulfur concentration as well as ensure that sulfur concentrations do not exceed 600 ppm.

The test plan for determining sulfur concentrations was submitted on June 4, 2020. Granger began their daily and weekly testing on July 14, 2020. I requested records from test start date through the end of July 2020. Records indicate that Granger conducts daily sampling and weekly lab analysis. All data suggests total sulfur concentrations are below 600 ppm at this time.

SO₂ is limited to 40.2 pph. Granger is required to calculate the SO₂ lb/hr for each flare any time the flares are combusting raw landfill gas. In the event that the SO₂ emissions exceed 30 lb/hr combined from both flares, Granger is required to route the gas through the desulfurization process at the RNG plant before flaring until they are able to demonstrate that the SO₂ is maintained below 30 pph for at least 5 consecutive business days. Currently, Granger's records indicate that the combined total of both flares has not exceeded 14 lb/hr (see attached).

SO₂ is limited to 59.1 tpy from both flares combined, based on a 12-month rolling period. Granger provided SO₂ mass emissions data for September 2021 – July 2022. SO₂ emissions for this 11-month period were 9.5 tons. Granger appears to have conducted the monthly and 12-month rolling calculations using monthly TRS averages and total flow to the flares each month rather than calculating SO₂ on a daily basis (using weekly gas sampling data, daily gas usage, and daily hours of operation, as required by the PTI. Future discussions will be had between AQD and Granger concerning how SO₂ is calculated in more detail.

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Material Limits

The net heating value of the landfill gas is limited to less than or equal to 200 BTU/scf for non-assisted flares. The November 2021 test results indicated that the net heating value of the gas is 17.18 MJ/m³, which is equivalent to 461.5 Btu/scf.

Process/Operational Restrictions

Granger is required to have a PM/MAP plan that is implemented and maintained and that includes the identification of equipment and the supervisory personnel responsible for overseeing inspection, maintenance and repair; a description of the items or conditions to be inspected and frequency of the inspections or repairs; identification of the equipment operating parameters that shall be monitored to detect a malfunction or failure; the normal operating range of these parameters and a description of the method of monitoring or surveillance procedures, identification of the major replacement parts maintained in inventory, and a description of the corrective procedures or operational changes that shall be taken in the event of a malfunction or failure to achieve compliance with the applicable emission limits.

Granger has submitted this MAP on 6/14/2021. After a review of the MAP with Granger's records, it appears that both flares are operating in accordance with the MAP.

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Stack/Vent Restrictions

During the November 2021 VE testing on the flares the Nikon Forestry Pro II rangefinder was used to confirm compliance with the permitted stack heights of 45' (EUUF1) and 35' (EUUF2) (See 11/4/2021 Stack Test Observation Report).

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EUASBESTOS

During the 2018 inspection, Jeremy Brown (Asbestos TPU) and I conducted a joint inspection of Granger for compliance with the NESHAP Subpart M, under EUASBESTOS. We had determined, based on this inspection, that Granger Wood Street does not need to submit asbestos notifications through AQD's Asbestos Notification System (ANS) for landfill drilling activities because they keep all asbestos trenches logged and in one location and do not drill through these locations. J. Brown did say, however, that if Granger is drilling and they happen to drill through asbestos waste (unknowingly or not), and AQD finds asbestos cuttings, Granger runs the risk of violating the requirement to notify 45 days before drilling.

K. Smelker said that asbestos-containing material (ACM) is deposited into the trenches at the landfill and that the majority of non-friable ACM is also deposited into the ACM trenches. She said they also will put dusty materials (saw dust, for example) into the trenches to prevent fugitive dust issues, as well as medical waste, and animal remains.

Asbestos is received daily at this site. Granger has a waste acceptance program where operators are trained as to what should and should not be present in each load in order to identify any asbestos that may come through under non-asbestos loads, including unbagged asbestos or ripped bags.

There are currently no Emission Limits, Material Limits, Testing/Sampling, or Stack/Vent Restrictions requirements for EUASBESTOS.

Process/Operational Restrictions

Instead of ensuring that there are no visible emissions from the asbestos active disposal site and ensuring that either a natural barrier or warning signs and fencing are posted, Granger has opted to cover the ACM at the end of each operating day. K. Smelker said that a spray-on cover (ground newspaper with tackifier) is used at the end of each day. K. Smelker said this tackifier is approved by EGLE MMD. Dirt is used at the top once the ACM cell is full. The tackifier also has odorants; however, if the trench is causing odors even with tackifier, they will spread additional dirt cover.

Design/Equipment Parameters & Monitoring/Recordkeeping

Under 40 CFR 62 Subpart OOO, gas collection devices are required to control all gas-producing areas except segregated areas of asbestos or non-degradable materials, and records of the nature, date of deposition, amount and location of asbestos-containing waste excluded from collection is required to be maintained. All ACM trenches are excluded from gas collection. K. Smelker explained that the trenches are lined up in rows and asbestos cells are stacked on top of each other. They will not dig through these areas to add gas collectors (horizontal/verticals); therefore, gas collection is not occurring throughout these areas. She said that they also keep a perimeter surrounding the trenches of about 20' of waste to segregate the trenches from the rest of the landfill. Records of nature, date of deposition and amount is also required by the Subpart M NESHAP, which also includes the requirement to keep records of the depth and area and quantity in cubic meters (or cubic yards) of asbestos-containing waste material within the disposal site on a map or diagram of the disposal area. S. Blayer provided me with the asbestos trench map for where the most recent asbestos load was deposited (trench dug on 7/20/22), containing the depth of the trench ("Top of Trench" minus "Bottom of Trench"), the trench area, the location (northing and easting coordinates), and the quantity (cubic yards). See attached.

Granger is required to keep waste shipment records containing the date of receipt; the name, address, and phone number of the waste generator and transporter(s); and the quantity of asbestos-containing waste material in cubic yards. The Asbestos NESHAP Subpart M (61.154(e)(1)) states that the owner or operator of the active waste disposal site shall maintain waste shipment records using a form similar to that shown in Figure 4 of 61.154, that includes among other items, the telephone numbers of the waste generator and transporter(s). S. Blayer provided me with multiple asbestos waste manifests, which I reviewed. Some of the forms were for manifesting of non-friable asbestos, which is not subject to the NESHAP Subpart M (according to C. Dechy, AQD Asbestos inspector). The following was missing from the remaining forms where friable asbestos was being manifested: Transporter phone numbers were missing from Granger Forms 104262, 104259, and the Alma College manifest; Generator phone numbers were missing from Pitsch Form 4209, 4206, 4204, 4203, 4201 and 4211; and Granger form 10631; and Quantity of material was missing for Granger form 89387. Granger does have access to these phone numbers and provided them to the AQD; however, the Asbestos NESHAP is clear in that the information should be contained on the form. A Violation Notice will be sent to address these deficiencies.

Granger has cameras set up at each of the gates to view what is in each of the loads entering the landfill. If the ACM quantity reported in the waste manifest does not appear to match the quantity of ACM in the manifest, she said they turn the trucks away. K. Smelker said they will tape measure the incoming truck to gauge the volume of ACM coming in to verify reported quantity is the quantity being brought in. All transporters take the ACM waste directly to the ACM trench upon entering Granger. K. Smelker said they will also inspect loads once per week by pulling a random load of the truck to check for asbestos.

FGLANDFILL-000

This flexible group contains requirements from 40 CFR Part 62, Subpart 000.

There are no Emission Limits, Material Limits, Process/Operational Restrictions, Testing/Sampling or Stack/Vent Restrictions for this flexible group.

Design/Equipment Parameters

Granger is required to route all collected landfill gas to at least one of the following: non-enclosed flare designed in accordance with 60.18; a control system designed and operated to reduce NMOC by 98 wt% or reduce the outlet NMOC concentration to less than 20 ppmv on a dry basis, as hexane at 3% oxygen; or to a treatment system that processes the collected gas for subsequent sale or beneficial use.

Granger will send all landfill gas to EDL's RNG treatment plant where the gas is processed (see EDL section of this report) unless the RNG plant is either not operating or not operating at full capacity. In those cases, Granger will use their 2 open flares (FGNEWFLARES, PTI 177-19A) to combust the untreated landfill gas. See discussions under FGNEWFLARES, FGOPENFLARE-000, and FGOPENFLARE-AAAA for compliance checks with NSPS Subpart A flare requirements.

Monitoring/Recordkeeping

Granger is required to keep a record of the design capacity report that triggered 40 CFR 62.16714(e), keeping a record of the current amount of solid waste in-place and the year-by-year waste acceptance rate. The design

capacity report that triggered 40 CFR 62.16714(e) was last revised March 2018. As of 2018, Granger's design capacity is 20.5 million Mg.

S. Blayer provided me with the current amount of solid waste in place through 2021 for both the Paulson Street Landfill and Wood Street Landfill, in Mg (see attachment). The waste acceptance rate for 2021, including ash and contaminated soil was 498,711 Mg. Total Waste in the landfill through 2021, including Ash and contaminated soil is 12,224,896 Mg.

Landfill owners or operators who convert design capacity from volume to mass or mass to volume to demonstrate that the landfill design capacity is less than 2.5 million Mg or 2.5 million cubic meters must keep records of the annual recalculation of site-specific density, design capacity and supporting documentation. Granger has a design capacity greater than 2.5 million Mg and therefore these calculations are unnecessary.

The year-by-year acceptance rates are also reported to MMD under the WDS database. These records are accessible to the public. The following link is for MMD's Annual Report year-by-year waste acceptance rate: <http://www.deq.state.mi.us/wdsp/SolidWaste/AnnualLandfillReports.aspx?w=470523>. Wood St's Facility number is 470523.

K. Smelker confirmed that Granger does not and has not recirculated leachate in the waste mass for over 7 years and also confirmed that Granger does not add liquids to the waste mass. No recordkeeping of engineering calculations or records used to estimate quantities of leachate or liquids added is necessary at this time.

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FGLANDFILL-AAAA

This flexible group contains requirements from 40 CFR Part 63, Subpart AAAA.

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Emission Limits, Testing/Sampling & Monitoring/Recordkeeping

Granger is required to conduct surface emission monitoring around the perimeter of the collection area and along a pattern that traverses the landfill at 30-meter (~100 ft) intervals in addition to where visual observations indicate elevated concentrations of landfill gas (such as distressed vegetation and cracks or seeps in the cover). The surface testing should also be conducted at all surface penetrations and monitor the area of the landfill where waste has been placed and gas collection system is required. This monitoring includes documenting the monitoring route on a topographical map of the landfill. Surface monitoring is required to be conducted quarterly to determine compliance with the methane concentration limit of 500 ppm above background level.

During the inspection Granger and I discussed the SEM maps. The goal for the next SEM survey reports (submitted by March 15, 2023 for Q3 and Q4 of 2022) is for Granger to ensure the actual route is traversed or that the map has a planned monitoring route that shows the cover penetrations are being surveyed (include a description of the penetrations and areas of avoidance), plus a rationale for any deviations made in the planned route (steep slopes, hazardous waste, including the non-NSPS, active and unsafe conditions), and the locations (lat/long) and concentrations for exceedances of 500 ppm. The SEM is required to be conducted using an organic vapor analyzer, flame ionization detector, or other portable monitor. The quarterly reports identify an IRwin analyzer, which uses infrared technology. K. Smelker confirmed that the readings are taken in 98-foot intervals,

within the 100-foot requirement. K. Smelker said they plan a route that avoids the asbestos pit and residential waste active areas.

All quarterly SEM reports are reviewed for compliance with the 500-ppm methane limit during the semi-annual report submittals. During the inspection, Granger provided details that Q1 and Q2 surveys were conducted in March and June 2022, respectively. These reports will be reviewed once received in September 2022. Granger said that during their most recent survey they found 7 exceedances of the 500-ppm limit, all of them surface penetrations (wells). The resolution was to apply a watery clay (bentonite slurry) around the well. Review of their reports during the semi-annual submittals will confirm whether Granger complied with the MACT AAAA requirements by doing the following: cover maintenance or adjustments to vacuum be made prior to re-monitoring within 10 days of the initial exceedance. If the 10-day re-monitoring shows a second exceedance, corrective actions are required to be taken, and the location re-monitored within another 10 days. If a third exceedance is detected, a new well or other collection device is required to be installed within 120 calendar days of the first exceedance. If there is not a second or third exceedance, the location is required to be re-monitored at one month from the first exceedance, and if there is no exceedance at one month, quarterly monitoring can be resumed.

Monitoring/Recordkeeping

A program to monitor the cover integrity and to implement cover repairs as necessary is required to be implemented on a monthly basis. Records of the cover integrity and cover repairs are required to be kept. K. Smelker described Granger's cover integrity monitoring plan as follows: During monthly gas well measurements (pressure, oxygen, temperature) those conducting the well monitoring will also look at cover integrity, and inform Granger of any issues they spot. K. Smelker said Granger staff also walk the landfill to look for cover issues, including dead grass in final or interim cover, roots, washouts, and small rills that could develop into big rills. They are aware of how heavy rain events impact cover integrity as well and erosion from these events is mitigated as soon as possible. Most of the fixes involve cover up with dirt; large areas are filled in. Cover integrity is conducted across both the Paulson Street and Wood Street Landfills.

Granger keeps cover integrity records for January – June 2022, as requested by AQD (attached). According to these records, cover integrity is checked multiple times per month, but each time focuses on a different aspect of cover integrity: final cover areas, vegetated interim cover, and active areas. Small rills less than an inch were noted in the active areas in March, and interim cover was added to the side slopes of Cell 16 of the active areas in April.

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FGACTIVECOLL-000

This flexible group contains requirements from 40 CFR Part 62, Subpart 000 for the active landfill gas collection system.

There are no Emission Limits, Material Limits, Process/Operational Restrictions, Testing/Sampling, or Stack/Vent Restrictions for FGACTIVECOLL-000 at this time.

Process/Operational Restrictions & Monitoring/Recordkeeping

An active collection system is required to be installed that meets the following: designed to handle the maximum expected gas flow rate from the landfill area that warrants control; gas is collected from each area, cell, or group of cells in the landfill in which the initial solid waste has been placed for a period of 5 years or more if active or 2 years or more if closed or at final grade; collect gas at a sufficient extraction rate, and designed to minimize

offsite migration of subsurface gas. Granger is required to keep up-to-date records of the maximum expected gas generation flow rate and the density of wells, horizontal collectors, surface collectors or other gas extraction devices determined using the procedures in 62.16728(a)(1).

Granger provided records of the maximum expected gas generation flow rate, as calculated via LandGEM (which uses an equation similar to the one used in 62.16720(a)(1)). The maximum expected gas generation flow rate for 2022 was calculated at 47,320,000 m³ (K. Smelker this is equivalent to 4,959 scfm). K. Smelker explained that their well design plan is created for max generation flow rate. Granger submitted information regarding how it is determined whether they have a sufficient density of landfill as collectors (see attached). The majority of their considerations take into account the radius of influence (ROI) for the wells. The calculations involve consideration of the landfill gas flow rate, the design capacity, the collection efficiency, the in-place refuse density, the depth of the well and the well flow rate. These all appear to be considerations in alignment with the procedures outlined in 62.16728(a)(1).

K. Smelker said they also rely upon the quarterly SEM events and internal site inspections to determine if there is sufficient well density. They use horizontal collectors, in part, in areas that will not reach final grade within 5 years of initial waste deposition, which allows for extraction of landfill gas from areas that are not easily accessible with vertical wells (including active fill areas).

Granger includes, in their semi-annual reporting the portions of the landfill with waste-in-place for 5 years or more and 2 years or more as a continuous log for when collection systems should be put in place in these areas.

Subpart 000 also requires that a plot map showing each existing and planned collector in the system be kept and up-to-date with unique identification location labels for each collector that matches the labeling on the plot map, as well as installation dates and locations of all newly installed collectors. Installation dates are required to ensure collectors are installed no later than 60 days after the date on which the initial solid waste has been in place (2-year and 5-year periods). I did not confirm whether the collectors were placed within that 60-day timeframe.

Granger provided a plot map for both the Wood Street and Paulson Landfills with unique identification labels for all wells, and they also included a listing of all the wells with their associated installation (drill) dates and their northing and easting coordinates (see attached).

S. Blayer stated that there are no areas from which collection wells have been excluded based on non-productivity; however, K. Smelker said that they do exclude ash and contaminated soil from collection.

Provisions for the control of off-site migration of subsurface gas are also required. K. Smelker said Granger has toe drains (leachate lines that are present only to collect gas that may escape) are located at the outside edge of the landfill.

FGACTIVECOLL-AAAA

This flexible group contains the requirements from 40 CFR Part 63, Subpart AAAA for active collection systems.

There are no Emission Limits, Material Limits, Testing/Sampling or Stack/Vent Restrictions at this time.

Process/Operational Restrictions & Monitoring/Recordkeeping

Each wellhead is required to be operated under negative pressure, with an interior wellhead temperature less than 145°F. Since the institution of the MACT Subpart AAAA at this facility in September 2021, there have been no exceedances of interior wellhead temperature and no positive pressure incidents. The wells are required to be monitored on a monthly basis for these parameters. Negative pressures are not required if there is a fire or increased well temperature, if a geo-membrane or synthetic cover are used, or if the well is decommissioned. Higher operating values (HOVs) for temperature and oxygen can be established for wells if Granger can demonstrate with supporting data that the elevated temperature or oxygen value does not cause fires or significantly inhibit anaerobic decomposition (via killing of methanogens).

Reporting

Granger has submitted all active collection system records, as applicable under the MACT Subpart AAAA, covering September – December 2021, under the first semi-annual report. Second semi-annual reports will be received September 15, 2022.

FGOPENFLARE-OOO

This flexible group contains the requirements from 40 CFR Part 62, Subpart OOO for all open flares located at the facility. Granger owns and operates 2 open flares: EUUF1 and EUUF2 (PTI 177-19A).

There are no Material Limits, Design/Equipment Parameters or Stack/Vent Restrictions at this time.

Emission Limits, Testing/Sampling & Monitoring/Recordkeeping

VE's are limited to periods not to exceed 5 minutes during any 2 consecutive hours and testing is required to be conducted to verify this, as well as the net heating value of the gas combusted, and the exit velocity of the non-assisted flare. Refer to "FGNEWFLARES" of this report for the compliance discussion.

Design/Equipment Parameters

The flare is required to be operated with a flame present at all times. S. Blayer said natural gas is used for the pilot flame, which Granger keeps lit.

FGOPENFLARE-AAAA

This flexible group contains the requirements from 40 CFR Part 63, Subpart AAAA for all open flares located at the the facility. Granger owns and operates 2 open flares: EUUF1 and EUUF2 (PTI 177-19A). See FGNEWFLARES discussion in this report for details on each of these flares.

There are no Material Limits or Stack/Vent Restrictions at this time.

Emission Limits & Testing/Sampling

See “FGOPENFLARE-OOO” and “FGNEWFLARES” in this report for a discussion on how the conditions under these sections are being met.

Monitoring/Recordkeeping

Granger is required to keep monthly records of continuous gas flow to the flares, as well as continuous records of the flare pilot flame or open flare flame and periods where the pilot flame or the flare flame is absent. Granger provided monthly records of total gas flow to each flare. Future inspections will be necessary to determine continuous records are kept for the flow and flare or pilot flame presence.

Granger does not operate either flare with a bypass.

Compliance Statement: Granger Wood Street Landfill appears to be in non-compliance with Section 1 of MI-ROP-N5997-2020a (EUASBESTOS) and in compliance with PTI 177-19A at this time.

SECTION 2: GRANGER CONTAINER SERVICE INSPECTION**FGRULE287(2)(c)**

This flexible is used for all surface coating equipment exempt under Rule 287(2)(c). Granger has 1 paint booth that they use to repaint roll-off trash canisters or to repaint garbage truck parts. Table 2 contains a list of monthly coating usage in 2018 – 2022, as provided by Granger. S. Blayer said that the 2021 records are based on gallons of paint purchased per month. The AQD requires that actual paint usages be tracked to ensure compliance with the exemption. Failure to do so for future recordkeeping may result in a violation notice. I have informed Granger of this requirement. Based on paint purchase records in 2021 and 2022, it appears Granger is staying within the 200-gallon/month limit.

Table 2. Paint Usage

	2018	2019	2020	2021	2022
Month	Gallons	Gallons	Gallons	Gallons	Gallons
January	37.9	37.5	66.7	**	27
February	32.6	100	71.7	**	27

March	24.1	100	66.7	**	100
April	120.6	100	66.7	**	100
May	100	50	66.7	**	100
June	100	50	166.7	**	100
July	184	100	100	**	NA
August	166	100	NA	27	NA
September	58.5	100	NA	27	NA
October	58.5	100	NA	27	NA
November	58.5	100	NA	27	NA
December	75	100	NA	27	NA

**** Did not request these records**

Filters are also required to be installed properly. During the 2016 inspection, there were 2-3 filters that did not completely cover the vents. I mentioned this to K. Smelker at the time that filters must be installed properly in the future. During the 2018 inspection there were 2 entire filter panels removed, although no painting operations were being conducted. K. Smelker and S. Skillman reinstalled the filter panels while I was there. I informed them that it is important to ensure that these panels are installed properly, especially during paint booth use. During the 2020 inspection, S. Skillman and I observed that the panel filters, although installed, were not installed properly – notable gaps around several of the panel filters were observed. In response to this, S. Skillman posted a sign (photo attached) of how to correctly install filters.

During this inspection I confirmed onsite that the sign was posted; however, although there were improvements noted with the filter installations, I also noted that there were still gaps between the filters and the exhaust openings, particularly in the corners of the exhaust openings. Filters were tucked in by S. Skillman during the inspection. A violation may be cited in the future for any improper filter installations.

FGCOLDCLEANERS

Granger owns one parts washer onsite. The lid was open, but not in use during the inspection, which S. Skillman closed when I pointed it out. Operating instructions were not present on the unit. I sent Granger AQD orange sticker operating instructions for Granger to use to ensure compliance with exemption Rule 281(2)(h). Granger sent a photo demonstrating that the operating instructions had been posted (see attached).

Sand Blasting Operations

S. Skillman took me to the bay garage where the sandblasting equipment is housed. I noted that the area is currently being used as storage space, although the sandblaster equipment was still present. There appears to be no exhaust to the outside air. K. Smelker said in the past they used this to clean the garbage containers prior to welding, but now they ship out this work. In the event Granger makes this unit operational, it would likely be exempt under Rule 285(2)(l)(vi)(B).

Compliance Statement: Granger Container Service appears to be in compliance with Section 2 of MI-ROP-N5997-2020a; however, particular attention should be paid to the filter installations and paint booth recordkeeping during the next inspection.

SECTION 3: EDL RNG INSPECTION

The RNG inspection was conducted on August 19, 2022. I arrived at the site at 9:00 am. This is the first time the facility is being inspected under PTI 178-19 and MI-ROP-N5997-2020a with the new Part 63 MACT Subpart AAAA and Part 62 Subpart OOO requirements.

A continuous H₂S monitor is installed and owned by Consumer's Energy that allows Consumer's to see the concentration of H₂S in the gas that it is purchasing from EDL. This monitor is not used by EDL to determine H₂S concentration.

PTI 178-19: EUCONDSYS, EUTOX, FGRNG&NEWFLARES

This PTI allows for the installation of EUCONDSYS and EUTOX (components of the renewable natural gas [RNG] plant) with the caveat that EDL shuts down their engines (still contained in MI-ROP-N5997-2020a) by October 1, 2021. All 7 engines are still present onsite; however, during the inspection I confirmed onsite that the landfill gas lines servicing the 3 3520 engines and the 4 3516 engines have been air-gapped (see attached photos), thus confirming that the engines have been decommissioned (as of August 30, 2021) by rendering them permanently inoperable at the site. EDL sent notice of the decommissioned engines in a timely manner.

Startup of EUTOX and EUCONDSYS began on September 9, 2021.

EDL was sending on-spec, treated gas (high methane content) to Granger's flares during the inspection. EDL does have times where they are producing more treated gas than the Consumer's pipeline can take.

EUCONDSYS

EUCONDSYS is a landfill gas conditioning system that uses membrane filtering technology to treat the landfill gas into renewable natural gas by removing sulfur compounds, VOC, CO₂, N₂ and oxygen from the gas. Desulfurization involves use of a regenerative scrubber system, followed by non-regenerative dry media. The tail-end gas created by removal of these pollutants is combusted in the thermal oxidizer (EUTOX). EUCONDSYS only send waste gas to EUTOX, none of the gas from this conditioning system is sent to Granger's flares.

The processed gas is routed to a natural gas pipeline for sale. If the gas does not meet pipeline specification or if the RNG has excess processed gas, these two gas streams are sent to Granger Wood Street Landfill's FGNEWFLARES. EDL will also send on-spec gas to the flares in the event that Consumer's Energy cannot receive it all.

The conditioning system was operating during the onsite inspection.

There are no Emission Limits, Material Limits, Design/Equipment Parameters, or Testing/Sampling requirements at this time.

Process/Operational Restrictions & Monitoring/Recordkeeping

No later than 30 days after startup, EDL is required to submit a written Malfunction Abatement/Preventative Maintenance Plan (MAP/PMP) to AQD for review and approval for EUCONDSYS and EUTOX which should include:

- Identification of the equipment and supervisory personnel responsible for overseeing the inspection, maintenance, and repair;
- Description of the item or conditions to be inspected and frequency of the inspections or repairs;
- Identification of the equipment operating parameters that shall be monitored to detect a malfunction of failure, the normal operating range of these parameters, and a description of the method of monitoring or surveillance procedures. This should include, at a minimum:
 - Method for evaluating breakthrough of adsorption media
 - Process to replace media
 - Description of media redundancy during changeouts
 - How to determine when the bypass following the sulfur removal system will be used
 - How the flow of gas will be switched between the bypass or the full conditioning system
- identification of the major replacement parts maintained in inventory for quick replacement;
- and a description of the corrective procedures or operational changes that shall be taken in the event of a malfunction or failure to achieve compliance with the applicable emission limits.

EDL's initial MAP was received October 8, 2021. The final approved MAP was submitted on 2/22/22, after multiple discussions between AQD and EDL. EDL then submitted a revised MAP to AQD on August 18, 2022. This MAP was reviewed during the inspection with C. Truett and P. Triscari and the updates made to the MAP were found acceptable. AQD approved this revised MAP on 9/23/22

All maintenance activities conducted according to the MAP/PMP are required to be recorded. MAP recordkeeping was reviewed based on the 8/18/22 MAP.

H2S Removal

The MAP provides various processes that are checked and the frequency with which they are checked. The H2S removal system is nonregenerative carbon media consisting of 2 redundant vessels in a lead-lag configuration. This system cannot be bypassed. EDL conducts weekly checks on the "lead" carbon vessel to determine if

breakthrough is detected. EDL defines breakthrough as an H₂S concentration that's half the concentration of the inlet. The landfill gas entering the system is typically around 400 ppm H₂S and EDL has routinely been changing out the carbon when they detect 100 ppm at the outlet of the carbon vessel (sooner than required). EDL staff, Sean Pelfery, ran a Draeger tube of the outlet H₂S during the inspection. Table 1 contains the typical operating ranges for the H₂S removal system and the operating data recorded during the inspection. H₂S removal system appeared to be operating properly based on the operating ranges established in the MAP.

Table 1. H₂S Removal System Operating Parameters

Monitored Parameter	Typical Operating Range	Data Collected During Inspection
H ₂ S Outlet Concentration	0 – 10 ppm	0 ppm (indicative of 100% H ₂ S removal)
LFG Inlet/Outlet Pressures	8 – 12 psi (inlet) 6 – 10 psi (outlet)	7 psi (inlet & outlet)
LFG Inlet/Outlet Flow (FI-213 on EDL's monitor)	0 – 4200 scfm	Not recorded

EDL provided me with weekly H₂S Draeger tube breakthrough check data for beginning of operations through June 2022. All data indicates the H₂S at the outlet did not exceed 100 ppm. The concentration dropped to 0 ppm from 100 ppm, indicating the carbon media was changed out.

VOC/CO₂ Removal

VOC and CO₂ are removed from the gas stream via a membrane-based separation process. High pressures filter undesirable gas components from the gas stream (CO₂, VOCs, O₂). The waste gas from this process is sent to EUTOX. The system includes 2 non-regenerative carbon towers to remove VOCs and any remaining H₂S prior to membrane treatment. This system cannot be bypassed.

The MAP specifies that VOC breakthrough is checked monthly via Draeger tubes. A separate Draeger tube is used for each species of VOC present in the gas. VOCs include xylene, benzene, and MEK. Acetone is also present. Weekly records are kept.

EDL is also required to keep records of the monthly hours of operation of EUCONDSYS. Hours of operation were tracked on a monthly basis from September 2021 – June 2022 (see attached).

EUTOX

EUTOX is a 2,000 scfm thermal oxidizer (enclosed flare) used for destruction of waste gas removed from the gas stream during the conditioning process. Supplemental natural gas is used to maintain the process temperature.

This unit is not subject to the MACT AAAA for controlling vent gas from the treatment system. See 11/30/2021 Regulatory Applicability Determination report for this source for additional information.

EUTOX was operating during the inspection.

Emission Limits, Testing/Sampling & Monitoring/Recordkeeping

NOx and CO are limited to 0.060 lb/MMBtu and 0.20 lb/MMBtu, respectively. Testing was conducted June 8, 2022 (a retest of the April 22, 2022 test event – see stack test observation report for details). Test results indicate compliance with both limits at 0.032 lb/MMBtu (NOx) and 0.06 lb/MMBtu (CO). These values are required to be used for the calculation of NOx and CO mass emissions (per Appendix A of PTI 178-19).

NOx and CO are limited to 6.40 tpy and 21.3 tpy, respectively, based on a 12-month rolling time period, as determined at the end of each calendar month. Records were provided for the 10-month period of September 2021 (beginning of operations)– June 2022. Records indicate 10-month totals for NOx and CO at 2.6 and 8.8 tons, respectively.

SO2 is limited to 0.40 lb/hr. Testing was conducted on April 22, 2022 and test results indicated SO2 emissions at 0.02 lb/hr, in compliance with the limit. SO2 is also limited to 1.65 tpy on a 12-month rolling basis, as determined at the end of each calendar month. EDL is required to calculate the SO2 mass emissions using the equations in Appendix A of PTI 178-19, including using the ppm sulfur as determined by monthly gas sampling (lab analysis). EDL provided the monthly gas lab analysis results. Lab analyses on the gas have been conducted monthly from October 2021 through August 2022. Records for monthly and 12-month rolling SO2 emissions were provided for September 2021 – June 2022. Total SO2 emissions for this 10-month time period were 0.07 tons.

AQD will have future discussions with EDL staff on the details of how NOx, CO, and SO2 are calculated to ensure each is being calculated according to Appendix A of the permit.

Material Limits

EDL is permitted to burn only sulfur-conditioned landfill gas (landfill gas that has passed through the desulfurization process of EUCONDYSYS) or pipeline quality natural gas in EUTOX. My understanding of the facility's configuration for EUTOX is that only waste gasses removed from the process post-treatment are sent to EUTOX and there currently is not a way to combust sulfur-conditioned gas in this unit. EUTOX is capable and does burn pipeline quality natural gas as a supplement to maintain processing temperatures in the unit.

Process/Operational Restrictions & Design/Equipment Parameters

No later than 30 days after startup, EDL is required to submit a written Malfunction Abatement/Preventative Maintenance Plan (MAP/PMP) to AQD for review and approval for EUCONDYSYS and EUTOX. The MAP/PMP should include:

- Identification of the equipment and supervisory personnel responsible for overseeing the inspection, maintenance, and repair;
- Description of the item or conditions to be inspected and frequency of the inspections or repairs;

- Identification of the equipment operating parameters that shall be monitored to detect a malfunction or failure, the normal operating range of these parameters, and a description of the method of monitoring or surveillance procedures. This should include, at a minimum:
- identification of the major replacement parts maintained in inventory for quick replacement;
- and a description of the corrective procedures or operational changes that shall be taken in the event of a malfunction or failure to achieve compliance with the applicable emission limits.

The MAP for EUTOX was reviewed and approved. Table 2 contains a list of the proper operating ranges for each operating parameter defined in the MAP. It also includes the operating parameters recorded during the stack test and a row of comparison data collected during this inspection. All parameters appear to fall within the ranges specified in the MAP, as well as within 10% of the maximum routine operating parameters recorded during the 2022 stack test.

According to the MAP, there are 3 UV self-checking flame scanners on EUTOX used to detect the presence of a flame.

Table 2. Operating Parameter Observations

	Temperature (TE-202B) (°F)	Waste Gas Fuel Flow (FT 607) (scfm)	Natural Gas Fuel Flow (FT 107) (scfm)	Total Fuel Flow (scfm)	Methane (%)
2022 Stack Test Observed Operating Parameters	1,739	1,240	125.97	1,365.97	7.9
Operating Parameters (recorded during inspection)	1,632	1,508	111	1,619	9.0
MAP	1,400 – 2,000 F	0 – 2,000 scfm	0 – 250 scfm	NA	NA

EDL is required not to exceed a heat input capacity of 24.4 MMBtu/hr for EUTOX. EDL noted in their 2021 second semi-annual compliance report that this heat input capacity was exceeded as the result of a malfunction with the nitrogen removal system, which caused unexpectedly high concentrations of methane to EUTOX for a 12-hour period between 12/2 and 12/3/2021. EDL is required to modify the MAP within 45 days of the malfunction and submit these amendments to AQD for review and approval. EDL has not done this. I will request that EDL submit

an amendment MAP that addresses the nitrogen removal system malfunction that resulted in the increased methane content within 45 days of date requested.

FGRNG&NEWFLARES

FGRNG&NEWFLARES covers EUCONDSYS, EUTOX, and Granger Wood Street Landfill's flares, EUUF1 and EUUF2.

FGRNG&NEWFLARES only includes Emission Limits and Monitoring/Recordkeeping requirements.

SO₂ is limited to 35.9 tpy and CO is limited to 89.4 tpy based on a 12-month rolling period, as determined at the end of each calendar month. These limits include emissions from both the RNG plant and Granger's flares. EDL and Granger records were reviewed side-by-side for these emissions to ensure each facility was reporting the same quantity of SO₂ and CO emissions for the flare component of the calculations.

EDL provided records from September 2021 – July 2022, as requested. Total emissions from EUCONDSYS, EUTOX, EUUF1 and EUUF2 during this period, as determined at the end of July 2022 were 72.5 tons of CO and 9.53 tons of SO₂. It appears that EDL is meeting these emission limits at this time.

AQD will have future discussions with EDL to gain a better understanding of how these emissions are calculated.

FGTREATMENTSYS-000

This flexible group covers the treatment system that is regulated under 40 CFR Part 62, Subpart 000. The treatment system is defined as filtration, dewatering and compression of landfill gas. A portion of EDL's EUCONDSYS is the treatment system for landfill gas.

There currently only Process/Operational Restrictions, Monitoring/Recordkeeping, and Reporting requirements under this flexible group.

Process/Operational Restrictions

Emissions from any atmospheric vents or stack associated with the treatment system are subject to the requirements of 40 CFR Part 62.16714(c)(1) or (2) (combustion in an enclosed or open flare). The EUCONDSYS treatment system does not have any vents or stacks that release gasses from the treatment system.

Monitoring/Recordkeeping

EDL has chosen to comply with the MACT Subpart AAAA in lieu of the Part 62, Subpart 000. A record for the date they chose to comply with the MACT is kept.

Reporting

All reports are required to be submitted through EPA's Electronic Reporting Tool website and CEDRI.

FGTREATMENTS-AA

This flexible group covers the treatment system that is regulated under 40 CFR Part 63, Subpart AAA. The treatment system is defined as filtration, dewatering and compression of landfill gas. A portion of EDL's EUCONDSYS is the treatment system for landfill gas.

There are no Emission Limits, Material Limits, or Testing/Sampling requirements at this time.

Process/Operational Restrictions

As addressed under FGTREATMENTS-OO, the EUCONDSYS treatment system does not have any vents or stacks that release gasses from the treatment system.

EDL is required to develop a site-specific treatment system monitoring plan which addresses monitoring of the filtration, dewatering and compression parameters; methods, frequencies and operating ranges for each monitoring operating parameter; documentation of the monitoring methods and ranges; a list of responsible staff; processes and methods used to collect the necessary data; and a description of the procedures and methods used for quality assurance, maintenance and repair of all continuous monitoring systems.

During the inspection, EDL showed me the hard copy of this plan, which includes an additional plan entitled "Continuous System Quality Control Plan." Evaluation of this plan against the requirement of the MACT AAAA will be necessary during future inspections.

Design/Equipment Parameters & Monitoring/Recordkeeping

A gas flow rate measuring device is required to be installed, calibrated and maintained in order to record the gas flow to the treatment system at least every 15 minutes. Gas flow is measured continuously (via computer monitors). Meter FI-110 measures the flow rate at the blower of the skid (outside the plant) and meter FI-213 measures the flow to the treatment system inside the plant, after the chilling process and prior to treatment. The FI-110 meter is owned by Granger, the FI-213 meter is owned by EDL and it was last calibrated in October 2021. P. Triscari said calibrations are conducted annually. The meter appeared to be in operating order.

Monthly records of continuous flow to the treatment system are required to be kept. Continuous flow records were provided for June 1 – June 7, 2022, per my request. All records indicate continuous records are being kept (flow data is recorded every 5 minutes). Attached is a screenshot of the flows through the system during the inspection.

Compliance Statement: EDL appears to be in compliance with Section 3 of MI-RQP-N5997-2020a and PTI 178-19 at this time.

NAME Michelle Lupton

DATE 9/27/22

SUPERVISOR RB

WASTE SHIPMENT RECORD

REPORT DATE

GENERATOR	1. Work site name and mailing address <i>Cobb Hall 204 W Broomfield St Mount Pleasant MI 48858</i>		Owner's Name <i>Danielle Sinclair</i>	Owner's telephone no. <i>989 744 3313</i>		
	2. Operator's name and address <i>Quality Environmental Services, Inc. 2175 S. Hockaday Rd. Beaverton, MI 48612</i>			Operator's telephone no. <i>(989) 435-2946</i>		
	3. Waste Disposal Site (WDS) Name <i>Granger Landfill</i> Mailing Address <i>16500 Wood Rd Lansing MI 48906</i> Physical Site Location _____		WDS telephone no. <i>517 372 2800</i> Additional Information _____			
	4. Name and address of responsible agency <i>Michigan Department of Environmental Quality, Air Quality Division P.O. Box 30260 Lansing, Michigan 48909</i>					
	5. Description of materials <i>Flooring</i> Friable Asbestos Material Other _____		6. Containers No. _____ Type BAX2	7. Total quantity m ³ (yd ³) <i>40 yds</i>		
	8. Special handling instructions and additional information AS PER CURRENT NESHAP AND FEDERAL CLEAN AIR ACT; LOCAL, STATE, AND FEDERAL REGULATIONS					
	9. OPERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and government regulations. HAZARDOUS SUBSTANCE, SOLID, N.O.S., ORM-E, NA, 9188 (ASBESTOS)RQ					
	Printed/typed name & title <i>Jeremy Hignett Supervisor</i>		Signature <i>[Signature]</i>		Month Day Year <i>7/26/22</i>	
	TRANSPORTER	10. Transporter 1 (Acknowledgment of receipt of materials)				
Printed/typed name & title <i>Brian Price Driver</i>		Signature <i>[Signature]</i>		Month Day Year <i>7 27-22</i>		
Address and telephone no. <i>16500 Wood Rd Lansing 517 372 2800</i>						
TRANSPORTER	11. Transporter 2 (Acknowledgment of receipt of materials)					
	Printed/typed name & title		Signature		Month Day Year	
Address and telephone no.						
DISPOSAL SITE	12. Discrepancy indication space					
	13. Waste disposal site owner or operator: Certification of receipt of asbestos materials covered by this manifest except as noted in Item 12.			Grid Coordinates East _____ North _____ El _____		
	Printed/typed name & title <i>[Signature]</i>		Signature <i>[Signature]</i>		Month Day Year <i>7 27 22</i>	

WASTE SHIPMENT RECORD

REPORT DATE

GENERATOR	1. Work site name and mailing address <i>Alma College Learning Center 14 West Superior St. Alma MI 48801</i>		Owner's Name <i>Gray</i> <i>Tom Grider</i>	Owner's telephone no. <i>989-259-1995</i>		
	2. Operator's name and address Quality Environmental Services, Inc. 2175 S. Hockaday Rd. Beaverton, MI 48612			Operator's telephone no. <i>(989) 435-2946</i>		
	3. Waste Disposal Site (WDS) Name <i>Glycer Landfill</i> Mailing Address <i>14500 Wood Rd Lansing MI 48906</i>		WDS telephone no. <i>517-372-2800</i>	Additional Information		
	Physical Site Location <i>14500 Wood Rd Lansing MI 48906</i>					
	4. Name and address of responsible agency Michigan Department of Environmental Quality, Air Quality Division P.O. Box 30260 Lansing, Michigan 48909					
	5. Description of materials <i>non-friable windows</i> Friable Asbestos Material Other		6. Containers No. <i>1 bundle</i> Type <i>BAX2</i> <i>30 window panels</i>	7. Total quantity <i>40 yd</i> m ³ (yd ³)		
	8. Special handling instructions and additional information AS PER CURRENT NESHAP AND FEDERAL CLEAN AIR ACT; LOCAL, STATE, AND FEDERAL REGULATIONS					
	9. OPERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and government regulations. HAZARDOUS SUBSTANCE, SOLID, N.O.S., ORM-E, NA, 9188 (ASBESTOS)RQ					
	Printed/typed name & title <i>Zack Branch Supervisor</i>		Signature <i>Zack Branch</i>	Month <i>7</i>	Day <i>26</i>	Year <i>22</i>
TRANSPORTER	10. Transporter 1 (Acknowledgment of receipt of materials)					
	Printed/typed name & title <i>Brian Price</i>		Signature <i>Brian Price</i>		Month <i>7</i>	
	Address and telephone no. <i>14500 Wood Rd Lansing 517 372 2800</i>				Day <i>27</i>	Year <i>22</i>
11. Transporter 2 (Acknowledgment of receipt of materials)						
Printed/typed name & title		Signature		Month	Day	Year
Address and telephone no.						
DISPOSAL SITE	12. Discrepancy indication space					
	13. Waste disposal site owner or operator: Certification of receipt of asbestos materials covered by this manifest except as noted in Item 12.			Grid Coordinates East _____ North _____ El _____		
	Printed/typed name & title		Signature <i>H Smiley</i>		Month <i>7</i>	Day <i>27</i>



NON-HAZARDOUS WASTE & ASBESTOS MANIFEST

No. 104260

Section I. GENERATOR (Generator completes all of Section I)											
a. Generator Name: <u>North West Kubler MS</u>	b. Generating Location: (if different) _____										
c. Address: <u>6700 River Junction Rd</u>	d. Address: _____										
COUNTY <u>Jackson</u>	COUNTY _____										
e. Phone No.: <u>517 937-3783</u>	f. Phone No.: <u>SAME</u>										
If owner of the generating facility differs from the generator, provide:											
g. Owner's Name: _____	h. Owner's Phone No.: _____										
i. GRANGER APPROVAL CODE <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table>									j. Description of Waste: <u>Tile + Mastic</u>		
I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.											
<u>Alan III</u> Generator Authorized Agent Name	<u>[Signature]</u> Signature										
MO DAY YEAR <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table>					k. Quantity Units <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table> <u>08 cy</u>						
Section II. TRANSPORTER (Transporter I complete a-g, Transporter II complete h-n) TRANSPORTER II (if necessary) ATTENTION! CALL GRANGER BEFORE LOADING TO CONFIRM LANDFILL CONDITIONS (517) 372-2800											
a. Name: <u>ALAM LLC</u>	h. Name: _____										
b. Address: <u>2505 Precision St Jackson MI 49202</u>	i. Address: _____										
c. Driver Name/Title: <u>[Signature]</u> PRINT/TITLE	j. Driver Name/Title: _____ PRINT/TITLE										
d. Phone No.: _____ e. Truck No.: <u>01</u>	k. Phone No.: _____ l. Truck No.: _____										
f. Vehicle License No./State: <u>AX 83901 MI</u>	m. Vehicle License No./State: _____										
Acknowledgement of Receipt of Materials. MO DAY YEAR <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table>					Acknowledgement of Receipt of Materials. MO DAY YEAR <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table>						
g. <u>[Signature]</u> Driver Signature	n. _____ Driver Signature										
Section III. DESTINATION Check appropriate box											
a. <input checked="" type="checkbox"/> Granger Wood Street Landfill 16980 Wood Rd. • Lansing, MI 48906 (517) 372-2800	b. <input type="checkbox"/> Granger Grand River Avenue Landfill 8550 W. Grand River • Grand Ledge, MI 48837 (517) 372-2800										
c. Discrepancy Indication Space: _____											
I hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate.											
d. <u>[Signature]</u> Name of Authorized Agent	<u>[Signature]</u> Signature										
	MO DAY YEAR <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table> Receipt Date										
Section IV. ASBESTOS (Generator completes a-d, f, g. Operator* completes e.) NESHAP Coordinator: MDEQ/AQD, PO Box 30260, Lansing, MI 48906											
a. Operator's Name: _____	b. Monitored Emergency Response No.: _____										
c. Operator's Address: <u>Scott Hiller Corp</u>											
d. Special Handling Instructions and additional information: _____											
OPERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and government regulations.											
e. Operator's* Name & Title: <u>Scott Hiller Corp</u> PRINT/TITLE	<u>[Signature]</u> OPERATOR'S SIGNATURE										
f. Name and Address of Responsible Agent: <u>AQD MI ENR PO Box 30026 Lansing MI</u>	MO DAY YEAR <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table>										
g. <input type="checkbox"/> Friable; <input checked="" type="checkbox"/> Non-friable; <input type="checkbox"/> Both _____ % friable <u>100</u> % non-friable											
* Operator refers to the company which owns, leases, operates, controls, or supervises the facility being demolished or renovated, or the demolition or renovation operation, or both.											



NON-HAZARDOUS WASTE & ASBESTOS MANIFEST

No. 104259

Section I. GENERATOR (Generator completes all of Section I)

a. Generator Name: MCHS b. Generating Location: (if different) _____
 c. Address: 400 STATE ST d. Address: _____
Jackson MI COUNTY Jackson COUNTY _____
 e. Phone No.: 517-247-9266 f. Phone No.: _____

If owner of the generating facility differs from the generator, provide:
 g. Owner's Name: _____ h. Owner's Phone No.: _____

i. GRANGER APPROVAL CODE
 j. Description of Waste: Tile + Mastic
Sprayed on covering

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

Generator Authorized Agent Name: Alan IK Signature: [Signature] MO DAY YEAR: 07 28 2022 Shipment Date
 k. Quantity: 03 Units: 01

Section II. TRANSPORTER (Transporter I complete a-g, Transporter II complete h-n) **TRANSPORTER II** (if necessary)
ATTENTION! CALL GRANGER BEFORE LOADING TO CONFIRM LANDFILL CONDITIONS (517) 372-2800

a. Name: Alan IK h. Name: _____
 b. Address: 2505 Precision ST i. Address: _____
Jackson MI 49202
 c. Driver Name/Title: [Signature] PRINT/TITLE _____ j. Driver Name/Title: _____ PRINT/TITLE _____
 d. Phone No.: _____ e. Truck No.: 01 k. Phone No.: _____ l. Truck No.: _____
 f. Vehicle License No./State: AL 83901 MI m. Vehicle License No./State: _____

Acknowledgement of Receipt of Materials. MO DAY YEAR: 07 28 2022 Shipment Date
 g. Driver Signature: [Signature] n. Driver Signature: _____ Shipment Date: _____

Section III. DESTINATION Check appropriate box

a. Granger Wood Street Landfill
 16980 Wood Rd. • Lansing, MI 48906
 (517) 372-2800
 b. Granger Grand River Avenue Landfill
 8550 W. Grand River • Grand Ledge, MI 48837
 (517) 372-2800

c. Discrepancy Indication Space: _____
 I hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate.

d. Name of Authorized Agent: [Signature] Signature: [Signature] MO DAY YEAR: 07 28 2022 Receipt Date

Section IV. ASBESTOS (Generator completes a-d, f, g. Operator* completes e.) NESHAP Coordinator: MDEQ/AQD, PO Box 30260, Lansing, MI 48906

a. Operator's Name: _____ b. Monitored Emergency Response No.: _____
 c. Operator's Address: Same as Transport
 d. Special Handling Instructions and additional information: _____

OPERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and government regulations.

e. Operator's* Name & Title: Scott Miller PRINT/TITLE: owner OPERATOR'S SIGNATURE: [Signature] MO DAY YEAR: 07 28 22
 f. Name and Address of Responsible Agent: ADD MI DLR 70, Box 30028 Lansing MI

g. Friable; Non-friable; Both 20 % friable 80 % non-friable

* Operator refers to the company which owns, leases, operates, controls, or supervises the facility being demolished or renovated, or the demolition or renovation operation, or both.



GRANGER Job # 1034

NON-HAZARDOUS WASTE & ASBESTOS MANIFEST

No. 89386

Section I. GENERATOR (Generator completes all of Section I)

a. Generator Name: Everett High School
b. Generating Location: (if different)
c. Address: 3900 Stoller St, Lansing, MI 48912
d. Address: Same
e. Phone No.:
f. Phone No.:

If owner of the generating facility differs from the generator, provide:

g. Owner's Name:
h. Owner's Phone No.:
i. GRANGER APPROVAL CODE
j. Description of Waste: TAR PAPER A.C.M. RQ, NA 2212, Asbestos, 9, PG III (RQ1/454) ERG#171

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

Generator Authorized Agent Name: Rod McCausley
Signature: [Signature]
Shipment Date: 08/11/2022
k. Quantity: 4
Units:

Section II. TRANSPORTER (Transporter I complete a-g, Transporter II complete h-n) TRANSPORTER II (if necessary) ATTENTION! CALL GRANGER BEFORE LOADING TO CONFIRM LANDFILL CONDITIONS (517) 372-2800

a. Name: Asbestos Abatement Inc.
b. Address: 2420 N Grand River, Lansing, MI 48906
c. Driver Name/Title: Rod McCausley / Foreman
d. Phone No.: 517-323-0052
e. Truck No.: 550
f. Vehicle License No./State: BC09967
h. Name: Granger
i. Address: 16980 Wood Road, Lansing, MI 48906
j. Driver Name/Title:
k. Phone No.: 517-372-2800
l. Truck No.:
m. Vehicle License No./State:

Acknowledgement of Receipt of Materials. MO DAY YEAR
g. Driver Signature: [Signature] Shipment Date: 08/10/2022
n. Driver Signature: Shipment Date:

Section III. DESTINATION Check appropriate box

a. [X] Granger Wood Street Landfill 16980 Wood Rd. • Lansing, MI 48906 (517) 372-2800
b. [] Granger Grand River Avenue Landfill 8550 W. Grand River • Grand Ledge, MI 48837 (517) 372-2800

c. Discrepancy Indication Space:

I hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate.

d. Name of Authorized Agent: [Signature] Signature: [Signature] Receipt Date: 08/11/2022

Section IV. ASBESTOS (Generator completes a-d, f, g. Operator* completes e.) NESHAP Coordinator: MDEQ/AQD, PO Box 30260, Lansing, MI 48906

a. Operator's Name: Asbestos Abatement Inc.
b. Monitored Emergency Response No.: 517-323-0052
c. Operator's Address: 2420 N Grand River, Lansing, MI 48906
d. Special Handling Instructions and additional information:

OPERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and government regulations.

e. Operator's* Name & Title: Rod McCausley, Foreman
f. Name and Address of Responsible Agent: Asbestos Abatement Inc., 2420 N Grand River, Lansing, MI 48906

g. [] Friable; [X] Non-friable; [] Both % friable 100% % non-friable

* Operator refers to the company which owns, leases, operates, controls, or supervises the facility being demolished or renovated, or the demolition or renovation operation, or both.

Section I. GENERATOR (Generator completes all of Section I)

a. Generator Name: Everett High School b. Generating Location: (if different) _____
 c. Address: 2900 W. Hill St d. Address: _____
Lansing, MI 48910 COUNTY Ingham COUNTY Ingham

e. Phone No.: _____ f. Phone No.: _____

If owner of the generating facility differs from the generator, provide:

g. Owner's Name: _____ h. Owner's Phone No.: _____

i. GRANGER
 APPROVAL CODE

j. Description of Waste: TR. PAPER A.C.M.
RQ, NA 2212, Asbestos, 9, PG III (RQ1/454) ERG#171

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

Generator Authorized Agent Name: Paul McCaushey Signature: Paul McCaushey Shipment Date: 08102022 MO DAY YEAR
 k. Quantity: Units:

Section II. TRANSPORTER (Transporter I complete a-g, Transporter II complete h-n) **TRANSPORTER II** (if necessary)
ATTENTION! CALL GRANGER BEFORE LOADING TO CONFIRM LANDFILL CONDITIONS (517) 372-2800

a. Name: Asbestos Abatement Inc. h. Name: Granger
 b. Address: 2420 N Grand River i. Address: 16980 Wood Road
Lansing, MI 48906 Lansing, MI 48906

c. Driver Name/Title: Paul McCaushey / Foreman j. Driver Name/Title: _____
 PRINT/TYPE PRINT/TYPE
 d. Phone No.: 517-323-0052 e. Truck No.: 550 k. Phone No.: 517-372-2800 l. Truck No.: _____
 f. Vehicle License No./State: PC09967 m. Vehicle License No./State: _____

Acknowledgement of Receipt of Materials. MO DAY YEAR
 g. Paul McCaushey 08102022 n. _____
 Driver Signature Shipment Date Driver Signature Shipment Date

Section III. DESTINATION Check appropriate box

a. Granger Wood Street Landfill b. Granger Grand River Avenue Landfill
 16980 Wood Rd. • Lansing, MI 48906 8550 W. Grand River • Grand Ledge, MI 48837
 (517) 372-2800 (517) 372-2800

c. Discrepancy Indication Space: _____

I hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate.

d. Name of Authorized Agent: [Signature] Signature: [Signature] Receipt Date: 08102022 MO DAY YEAR

Section IV. ASBESTOS (Generator completes a-d, f, g. Operator* completes e.) NESHAP Coordinator: MDEQ/AQD, PO Box 30260, Lansing, MI 48906

a. Operator's Name: Asbestos Abatement Inc. b. Monitored Emergency Response No.: 517-323-0052
 c. Operator's Address: 2420 N Grand River, Lansing, MI 48906
 d. Special Handling Instructions and additional information: _____

OPERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and government regulations.

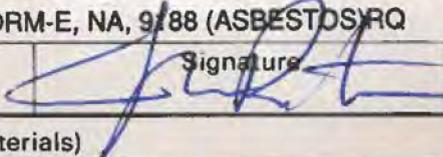
e. Operator's* Name & Title: Paul McCaushey / Foreman Paul McCaushey 08102022
 PRINT/TYPE OPERATOR'S SIGNATURE MO DAY YEAR
 f. Name and Address of Responsible Agent: Asbestos Abatement Inc., 2420 N Grand River, Lansing, MI 48906

g. Friable; Non-friable; Both _____ % friable 100 % non-friable

* Operator refers to the company which owns, leases, operates, controls, or supervises the facility being demolished or renovated, or the demolition or renovation operation, or both.

WASTE SHIPMENT RECORD

REPORT DATE

GENERATOR	1. Work site name and mailing address <i>ALMA COLLEGE 614 W. SUPERIOR ALMA, MI 48801</i>		Owner's Name <i>ALMA COLLEGE</i>		Owner's telephone no. <i>989 43-7111</i>	
	2. Operator's name and address <i>Quality Environmental Services, Inc. 2175 S. Hockaday Rd. Beaverton, MI 48612</i>				Operator's telephone no. <i>(989) 435-2946</i>	
	3. Waste Disposal Site (WDS) Name <i>WOOD STREET LANDFILL</i> Mailing Address <i>16980 WOOD RD LANSING MI 48906</i> Physical Site Location <i>SAME AS ABOVE</i>			WDS telephone no.		Additional Information
	4. Name and address of responsible agency <i>Michigan Department of Environmental Quality, Air Quality Division P.O. Box 30260 Lansing, Michigan 48909</i>					
	5. Description of materials <i>WINDOWS, FRAMES</i> Friable Asbestos Material <i>20</i> Other <i>PLASTER CEILING</i>			6. Containers No. Type <i>39 BAX2 BAGS</i>		7. Total quantity m ³ (yd ³) <i>15 yd</i>
8. Special handling instructions and additional information AS PER CURRENT NESHAP AND FEDERAL CLEAN AIR ACT; LOCAL, STATE, AND FEDERAL REGULATIONS						
9. OPERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and government regulations. HAZARDOUS SUBSTANCE, SOLID, N.O.S., ORM-E, NA, 9188 (ASBESTOS)RQ						
Printed/typed name & title <i>JASON RUTLEDGE</i>			Signature 		Month Day Year <i>08 10 22</i>	
TRANSPORTER	10. Transporter 1 (Acknowledgment of receipt of materials)					
	Printed/typed name & title <i>Leo Kester</i>			Signature 		Month Day Year <i>08 10 2022</i>
	Address and telephone no. <i>16980 Wood Rd Lansing MI 48906</i>					
11. Transporter 2 (Acknowledgment of receipt of materials)						
Printed/typed name & title			Signature		Month Day Year	
Address and telephone no.						
DISPOSAL SITE	12. Discrepancy indication space					
	13. Waste disposal site owner or operator: Certification of receipt of asbestos materials covered by this manifest except as noted in Item 12.				Grid Coordinates East _____ North _____ El _____	
	Printed/typed name & title			Signature <i>Hornblay</i>		Month Day Year <i>8 10 22</i>



No. 4209

NON-HAZARDOUS SPECIAL WASTE MANIFEST

GENERATOR

Generator Name S. J. ...

Generator Location _____

Address 615 ...

Address _____

Phone No. -

Phone No. -

Description of Waste	Quantity	Units	Containers	
			No.	Type
<u>Used ...</u>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input checked="" type="checkbox"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>

- Type
- D - Drum
- C - Carton
- B - Bag
- T - Truck
- P - Pounds
- Y - Yards
- O - Other

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

Generator Authorized Agent Name ... Signature ... Shipment Date

TRANSPORTER

Truck No. ...
Transporter Name P. Pitsch Co.
Address ...

Phone No. ...
Driver Name (Print) Juan ...
Vehicle License No./State MI
Pitsch Job No. ...

I hereby certify that the above named material was picked up at the generator site listed above.

I hereby certify that the above named material was delivered without incident to the destination listed below.

Driver Signature ... Shipment Date

Driver Signature ... Delivery Date

DESTINATION

Site Name ...
Address _____

Phone No.

I hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate.

Name of Authorized Agent ... Signature ... Receipt Date



Companies

No. 4206

NON-HAZARDOUS SPECIAL WASTE MANIFEST

GENERATOR

Generator Name Sparrow Hospital

Generator Location _____

Address 915 Michigan St

Address _____

LANSING Mich

Phone No. -

Phone No. -

Description of Waste

VERMICULITE + Block

Quantity	Units	Containers No.	Type
<input type="text"/>	<input type="text"/>	<u>20</u>	<u>1</u>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

- Type
- D - Drum
 - C - Carton
 - B - Bag
 - T - Truck
 - P - Pounds
 - Y - Yards
 - O - Other

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

Joe Cham
Generator Authorized Agent Name

Joe Cham
Signature

08/1/22
Shipment Date

TRANSPORTER

Truck No. 73 Roll off

Phone No. 616-3634895

Transporter Name PITSCHECO

Driver Name (Print) RANDY ELLIS

Address 675 Richmond NW

Vehicle License No./State Mich

Grand Rapids MI

Pitsch Job No. #21109

I hereby certify that the above named material was picked up at the generator site listed above.

I hereby certify that the above named material was delivered without incident to the destination listed below.

Randy Ellis
Driver Signature

08/1/22
Shipment Date

Randy Ellis
Driver Signature

Delivery Date

DESTINATION

Site Name Gauge

Phone No. -

Address _____

I hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate.

David Wansor
Name of Authorized Agent

[Signature]
Signature

08/1/22
Receipt Date

HOME OFFICE:

675 Richmond, N.W., Grand Rapids, MI 49504
Telephone: (616) 363-4895
FAX: (616) 363-5585

SANITARY DIVISION:

7905 Johnson Rd., Belding, MI 48809
Telephone: (616) 794-3050
FAX: (616) 794-1769



No. 4204

NON-HAZARDOUS SPECIAL WASTE MANIFEST

GENERATOR

Generator Name SPARKING H. SPRAY

Generator Location _____

Address 715 Michigan St
Lansing Mich

Address _____

Phone No. -

Phone No. -

Description of Waste	Quantity	Units	Containers No.	Type
Vermiculite & Block	<input type="text"/>	<input type="text"/>	20	Y
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Quantity	Units	Containers No.	Type
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

- Type
- D - Drum
 - C - Carton
 - B - Bag
 - T - Truck
 - P - Pounds
 - Y - Yards
 - O - Other

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

Generator Authorized Agent Name Joe Elmer

Signature Joe Elmer

Shipment Date 08/1/22

TRANSPORTER

Truck No. 73 Roll-off

Phone No. 616-3634895

Transporter Name Pitsch

Driver Name (Print) RANDY ELLIS

Address 675 Richmond
Grand Rapids MI

Vehicle License No./State Mich

Pitsch Job No. 21109

I hereby certify that the above named material was picked up at the generator site listed above.

I hereby certify that the above named material was delivered without incident to the destination listed below.

Driver Signature Randy Ellis Shipment Date 08/1/22

Driver Signature Randy Ellis Delivery Date 08/1/22

DESTINATION

Site Name Granger

Phone No. -

Address _____

I hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate.

Name of Authorized Agent Hornutley Signature

Receipt Date 8/1/22

HOME OFFICE:
675 Richmond, N.W., Grand Rapids, MI 49504
Telephone: (616) 363-4895
FAX: (616) 363-5585

SANITARY DIVISION:
7905 Johnson Rd., Belding, MI 48809
Telephone: (616) 794-3050
FAX: (616) 794-1769



No. 4203

NON-HAZARDOUS SPECIAL WASTE MANIFEST

GENERATOR

Generator Name Spaulding Hospital
 Address 915 Michigan Street
 Lansing Mich
 Phone No. -

Generator Location _____
 Address _____
 Phone No. -

Description of Waste
VERMICULITE + Block

Quantity	Units	Containers No.	Type
<input type="text"/>	<input type="text"/>	<u>20</u>	<u>14</u>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

- Type
 D - Drum
 C - Carton
 B - Bag
 T - Truck
 P - Pounds
 Y - Yards
 O - Other

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

Generator Authorized Agent Name Joe Zhem Signature [Signature] Shipment Date 08/1/22

TRANSPORTER

Truck No. 43 - Roll off
 Transporter Name Pitsch Co
 Address 675 Richmond
Grand Rapids MI

Phone No. 616 363 4895
 Driver Name (Print) RANDY ELLIS
 Vehicle License No./State Mich
 Pitsch Job No. 2109

I hereby certify that the above named material was picked up at the generator site listed above.

I hereby certify that the above named material was delivered without incident to the destination listed below.

Driver Signature [Signature] Shipment Date 08/1/22

Driver Signature [Signature] Delivery Date 08/1/22

DESTINATION

Site Name Granger
 Address _____

Phone No. -

I hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate.

Name of Authorized Agent _____ Signature [Signature] Receipt Date 08/1/22

HOME OFFICE:
 675 Richmond, N.W., Grand Rapids, MI 49504
 Telephone: (616) 363-4895
 FAX: (616) 363-5585

SANITARY DIVISION:
 7905 Johnson Rd., Belding, MI 48809
 Telephone: (616) 794-3050
 FAX: (616) 794-1769



No. 4201

NON-HAZARDOUS SPECIAL WASTE MANIFEST

GENERATOR

Generator Name _____

Generator Location _____

Address 915 _____

Address _____

Phone No. -

Phone No. -

Description of Waste

Waste material

Quantity	Units	Containers No.	Type
<input type="text"/>	<input type="text"/>	<u>20</u>	<input checked="" type="checkbox"/> Y
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>

- Type
- D - Drum
 - C - Carton
 - B - Bag
 - T - Truck
 - P - Pounds
 - Y - Yards
 - O - Other

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

Generator Authorized Agent Name _____

Signature _____

Shipment Date 05/02/22

TRANSPORTER

Truck No. HQ 73 _____

Phone No. 616 3624815 _____

Transporter Name Pitsch CO _____

Driver Name (Print) BANDY ELIOT _____

Address 675 Richmond Ave _____

Vehicle License No./State Mich _____

Grand Rapids Mich _____

Pitsch Job No. 21109 _____

I hereby certify that the above named material was picked up at the generator site listed above.

I hereby certify that the above named material was delivered without incident to the destination listed below.

Driver Signature _____

Shipment Date 08/10/22

Driver Signature _____

Delivery Date 08/10/22

DESTINATION

Site Name _____

Phone No. -

Address _____

I hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate.

Name of Authorized Agent _____

Signature H Smitley

Receipt Date 8/10/22

HOME OFFICE:

675 Richmond, N.W., Grand Rapids, MI 49504

Telephone: (616) 363-4895

FAX: (616) 363-5585

SANITARY DIVISION:

7905 Johnson Rd., Belding, MI 48809

Telephone: (616) 794-3050

FAX: (616) 794-1769



No. 4211

NON-HAZARDOUS SPECIAL WASTE MANIFEST

GENERATOR

Generator Name SPRINT

Generator Location _____

Address 915 Wagon St

Address _____

Phone No. -

Phone No. -

Description of Waste

VERMILLITE 5 BUCK

Quantity	Units	Containers	
		No.	Type
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

- Type
- D - Drum
- C - Carton
- B - Bag
- T - Truck
- P - Pounds
- Y - Yards
- O - Other

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

Generator Authorized Agent Name Joe Zacher

Signature [Signature]

Shipment Date 071222

TRANSPORTER

Truck No. 732 off

Phone No. 616 21575

Transporter Name Pitsch

Driver Name (Print) _____

Address 675 Richmond Ave

Vehicle License No./State MI

Pitsch Job No. 119

I hereby certify that the above named material was picked up at the generator site listed above.

I hereby certify that the above named material was delivered without incident to the destination listed below.

Driver Signature _____ Shipment Date 071222

Driver Signature _____ Delivery Date 071222

DESTINATION

Site Name _____

Phone No. -

Address _____

I hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate.

Name of Authorized Agent _____ Signature [Signature]

Receipt Date 071222

HOME OFFICE:
675 Richmond, N.W., Grand Rapids, MI 49504
Telephone: (616) 363-4895
FAX: (616) 363-5585

SANITARY DIVISION:
7905 Johnson Rd., Belding, MI 48809
Telephone: (616) 794-3050
FAX: (616) 794-1769

GRANGER WOOD STREET LANDFILL

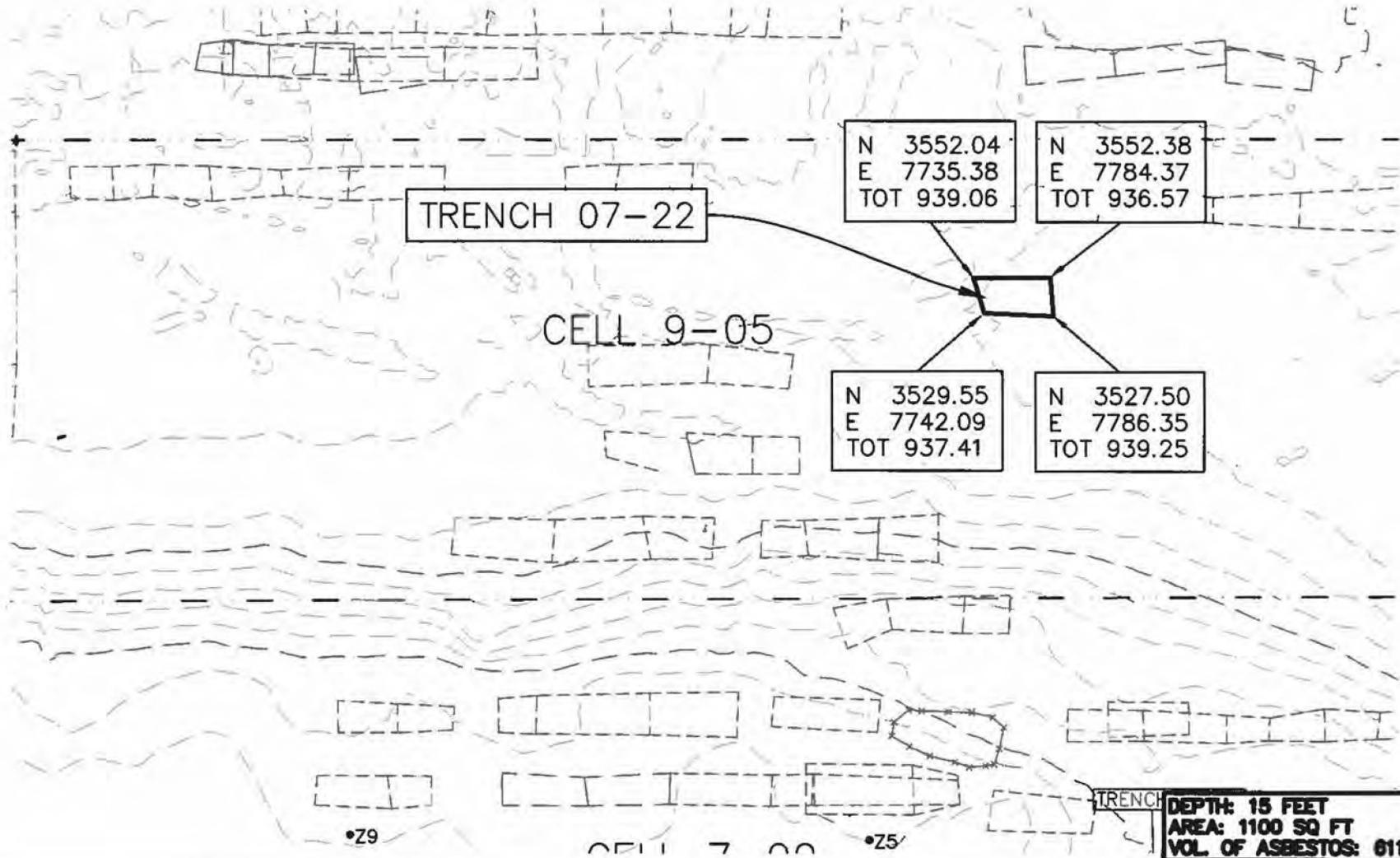
DRAWING NAME:
ASBS0722
EXCAVATED 07/20/22

NOTE:

TOT = TOP OF TRENCH

BOTTOM OF TRENCH = 924

SCALE 1"=100'



**WOOD STREET LANDFILL
MONTHLY SURFACE INTEGRITY CHECK**

MONTH: _____

YEAR: _____

PAULSON STREET LANDFILL	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

FINAL COVER AREAS	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

VEGETATED INTERIM COVER	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

ACTIVE AREAS	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

**WOOD STREET LANDFILL
MONTHLY SURFACE INTEGRITY CHECK**

MONTH: _____

YEAR: _____

PAULSON STREET LANDFILL	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

FINAL COVER AREAS	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

VEGETATED INTERIM COVER	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

ACTIVE AREAS	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

**WOOD STREET LANDFILL
MONTHLY SURFACE INTEGRITY CHECK**

MONTH: _____

YEAR: _____

PAULSON STREET LANDFILL	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

FINAL COVER AREAS	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

VEGETATED INTERIM COVER	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

ACTIVE AREAS	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

**WOOD STREET LANDFILL
MONTHLY SURFACE INTEGRITY CHECK**

MONTH: _____

YEAR: _____

PAULSON STREET LANDFILL	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

FINAL COVER AREAS	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

VEGETATED INTERIM COVER	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

ACTIVE AREAS	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

**WOOD STREET LANDFILL
MONTHLY SURFACE INTEGRITY CHECK**

MONTH: _____

YEAR: _____

PAULSON STREET LANDFILL	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

FINAL COVER AREAS	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

VEGETATED INTERIM COVER	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

ACTIVE AREAS	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

**WOOD STREET LANDFILL
MONTHLY SURFACE INTEGRITY CHECK**

MONTH: _____

YEAR: _____

PAULSON STREET LANDFILL	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

FINAL COVER AREAS	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

VEGETATED INTERIM COVER	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

ACTIVE AREAS	
DATE: _____	INITIALS: _____
Is cover integrity OK? YES NO	
IF NO, PLEASE EXPLAIN BELOW:	

Items needed for Air Inspection:

The parts washer/cold cleaner fluorescent orange operating instructions (2 sheets) are in the mail. We put your name on the envelope. When you get the instructions posted, please send me a photo of it, as well as a photo of Serenity's updated laminated communications sheet for the paint booth filters.

Pictures are attached.

FGNEWFLARES

- Monthly net heating value (BTU/scf) of landfill gas burned in both flares September 2021 – June 2022. See Granger Flares Notebook, Rolling Monthly Tab
- H2S and TRS gas sampling and analysis on the raw landfill gas (not gas processed in RNG) to the flares and any corrective actions taken to determine exceedance of sampling concentrations for September 2021 – June 2022. See Granger Flares Notebook, Draegar – RNG and New Flares tab, and pdf document attached.
- Calculations and records of hourly, monthly and 12-month rolling total SO₂, NO_x, and CO mass emissions from both flares for September 2021 – June 2022. See Granger Flares Notebook, Rolling Monthly tab.
- Daily and monthly hours of operation and the type of gas burned in each flare during those operating hours for September 2021 – June 2022. See Granger Flares Notebook, Rolling Monthly tab.
- Records of when flares were not operating September 2021 – June 2022 Attached
- Confirm the type of gas that is used to keep the pilot flame lit. Natural Gas is used for the pilot flame.
- Also – Forgot to look at this during the inspection – can you give me the flow rate on flare #2 for the 10:45 a.m. data point? The data point right before Serenity pushed the button 😊 Just looking for that max flow rate prior to shutdown. Picture attached.

FGOPENFLARE-AAAA

- Monthly records of the continuous gas flow to the flare and continuous records of the open flare pilot flame or open flare flame monitoring, including all periods of operations during which the pilot flame or flare flame is absent for the months of November 2021 and June 2022. See the Granger Flares Notebook

FGLANDFILL-AAAA

- Monthly cover integrity and cover repairs records for Jan – June 2022. Attached as PDF's.
- Current amount of solid waste in place. Attached
- Year-by-year waste acceptance rate. Attached

FGACTIVECOLL-OOO

- Current maximum expected gas generation flow rate Attached
- Data that was used to determine there was sufficient density of wells, horizontal collectors, surface collectors, or other gas extraction devices and the gas mover equipment sizing for the gas generation flow rate. Response Attached
- The sum of the gas generation flow rates for all areas from which collection wells have been excluded based on non-productivity and the calculations of gas generation flow rate for each excluded area. No excluded areas.

- 1 page of lat/long data for the associated SEM readings. If you can pull lat/longs for the penetrations where there were exceedances, that would be most beneficial. **Response Attached**
- Provide the plot map that has the existing and planned collectors for the system, with their ID labels, including installation dates, and the locations noted for all newly installed collectors. Note that as we discussed yesterday, the plans may not have IDs for all wells because they are tentative plans, and installation dates do not need to be directly marked on the map, but an adjacent document with that information should be available. **Response Attached**

EUASBESTOS

- For last 5 loads of ACM received provide the waste manifests **Manifests Provided**
- For the most recent load of ACM received, provide a map with date, location, depth and area and quantity in cubic meters (cubic yards) of most recent ACM material received. **Map is provided.**
- Phil Question: Are there any particular projects (land bank, large demos, etc) that Granger is currently receiving, as far as asbestos loads are concerned? **N/A**
- If there are particular projects coming through the landfill at this time, I'd also like the 5 most recent waste manifests submitted for one of the projects. **Provided**

Granger Container Service Coating Booth Rule 287(2)(c)

- Monthly volume of coating used in the booth, as applied, minus water, in gallons for August 2021 – June 2022. **See Table Below. Based on Gallons of paint purchased in the time period.**

Month	Paint Used (Gallons)
August 2021	27
September 2021	27
October 2021	27
November 2021	27
December 2021	27
January 2022	27
February 2022	27
March 2022	100
April 2022	100
May 2022	100
June 2022	100

SDS for all coatings used. **See Attached**

- ***Data that was used to determine there was sufficient density of wells, horizontal collectors, surface collectors, or other gas extraction devices and the gas mover equipment sizing for the gas generation flow rate.***

Granger uses the quarterly SEM events, internal site inspections of the facility, and technical calculations to determine whether there is sufficient density of the existing collectors.

The existing vertical extraction wells have an average well spacing between 180 feet or less throughout the fill area. Depending on the situation in an area, vertical wells have been installed fifty feet apart. Proposed vertical wells are installed according to the attached Vertical Well ROI Calculations.

Horizontal collection trenches have been utilized in areas that will not reach final grade within five years of initial waste deposition. Horizontal collection trenches allow extraction of LFG from areas that are not easily accessible by vertical wells, including active fill areas. Trenches will generally be spaced at a frequency of approximately 250 feet horizontally and 50 feet vertically.

The Wood Street Facility currently utilizes a permitted Renewable Natural Gas Facility (RNG) owned and operated by EDL. The RNG Facility has a maximum capacity of 4,000 scfm of landfill gas. There are also two permitted flares with design capacities of 4,000 scfm and 2,000 scfm which can operate in conjunction with or separately from the RNG facility. According to the attached landfill gas generation model, the maximum flow at the Wood Street Facility is estimated at 4,959 scfm. The GCCS system has been designed and constructed anticipating a gas flow rate of approximately 6,000 scfm.

- ***Provide the plot map that has the existing and planned collectors for the system, with their ID labels, including installation dates, and the locations noted for all newly installed collectors. Note that as we discussed yesterday, the plans may not have IDs for all wells because they are tentative plans, and installation dates do not need to be directly marked on the map, but an adjacent document with that information should be available.***

Granger Wood Street Facility will continue waste filling operations in accordance with the Facility Operating License and its internal fill progression plans. Installation of GCCS components is anticipated to be coordinated with fill development and as otherwise required by NSPS regulations regarding installation of GCCS components stipulated in §60.752(b)(2)(ii)(A)(2). Due to operational changes, the GCCS design included with this submittal may be altered to maintain compliance with the provisions of the NSPS and to accommodate actual field conditions at the time of construction.

The GCCS is designed to be expanded as fill operations proceed to reach final grade or to install interim systems. Vertical wells will typically be installed in areas that have reached final grade. Vertical wells and/or interim horizontal collection trenches may be installed as an interim control measure in disposal areas that have been in place for more than five years, but that are not yet at final waste grades.

Vertical extraction wells installed prior to reaching final grade will either be extended to the final grade level or abandoned and replaced. This determination will be made based upon the

physical condition of the wells, their ability to provide effective LFG extraction, and field conditions at the time of final cap installation.

A second map has been included that shows the existing GCCS with special areas highlighted, actual IDs on existing collectors and proposed vertical wells for 2022.

COMPUTATION SHEET

PROJECT TITLE: Wood Street Landfill PROJECT NO: 160797

DESCRIPTION: Vertical Well ROI Calculation CALC NO: _____ SHEET 1 OF 6

PREPARED BY: JPS CHECKED BY: EJJ APPROVED BY: TAB DATE: 07/06/17

Required: Determine the radius of influence (ROI) for vertical LFG extraction wells, using both EMCON and NSPS methods for the average flow rate condition.

Purpose: The ROI is calculated in the design of an active gas extraction system to properly locate extraction wells. The location of the extraction well will dictate the well depth, once the refuse depth is known. A detail of each well can then be created with respect to total well depth, depth to slotted pipe, applied vacuum and rate of extraction.

Although horizontal collectors are not modeled directly by this analysis, the effected flow patterns developed by horizontal collectors are analogous to those created by vertical extraction wells. The net result is that vertical well spacing criteria can be translated directly to horizontal collectors in a similar environment.

Method: The following methods were used to estimate the theoretical ROI for an LFG extraction well.

A) EMCON Method (from *Methane Generation and Recovery from Landfills*, EMCON, 1982, pg. 81)

$$Q_w = \frac{k \pi R^2 t D r}{C}$$

where: Q_w = individual extraction well LFG flow rate [L/s]
 k = conversion factor (1.157×10^{-9}) [(L/s)/(mL/day)]
 R = radius of influence [m]
 t = perforated pipe length [m]
 D = in-place refuse density [kg/m^3]
 r = methane production rate [mL/kg/day]
 C = fractional methane concentration [-]

1. Noting that the methane production rate (r) divided by the fractional methane concentration (C) is equal to the LFG production rate (G), and solving for the ROI yields:

$$R = \left(\frac{Q_w}{k \pi t D G} \right)^{1/2}$$

COMPUTATION SHEET

PROJECT TITLE: Wood Street Landfill PROJECT NO: 160797

DESCRIPTION: Vertical Well ROI Calculation CALC NO: _____ SHEET 2 OF 6

PREPARED BY: JPS CHECKED BY: EJJ APPROVED BY: TAB DATE: 07/06/17

2. Converting from metric to English units yields the following conversion factors (allowing input in English units):

Q_w (from cfm to L/s):

$$\frac{1 \text{ ft}^3}{\text{min}} \times \frac{1 \text{ min}}{60 \text{ sec}} \times \frac{28.317 \text{ L}}{\text{ft}^3} = 0.47195$$

t (from ft to m):

$$1 \text{ ft} \times \frac{0.3048 \text{ m}}{\text{ft}} = 0.3048$$

D (from lb/cy to kg/m^3):

$$\frac{1 \text{ lb}}{1 \text{ cy}} \times \frac{0.4536 \text{ kg}}{1 \text{ lb}} \times \frac{1 \text{ cy}}{27 \text{ ft}^3} \times \left(\frac{1 \text{ ft}}{0.3048 \text{ m}} \right)^3 = 0.5932$$

In addition, converting G from flow per volume to flow per mass equals:

G (from cfm/cy to mL/kg/day):

$$\frac{1 \text{ ft}^3}{\text{min yd}^3} \times \left(\frac{1}{D} \times \frac{1 \text{ yd}^3}{1 \text{ lb}} \right) \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{24 \text{ hr}}{1 \text{ day}} \times \frac{28.317 \text{ L}}{\text{ft}^3} \times \frac{1 \text{ lb}}{0.4536 \text{ kg}} \times \frac{1000 \text{ mL}}{\text{L}}$$

$$= \frac{89,895,238}{D}$$

Therefore:

$$R = \left[\frac{0.47195 Q_w}{1.157 \times 10^{-8} \pi (0.3048 t) (0.5932 D) \left(\frac{89,895,238}{D} \times G \right)} \right]^{1/2}$$

Where: R is in meters

Q_w is in cfm

t is in feet

D is in lb/cy

G is in cfm/cy

COMPUTATION SHEET

PROJECT TITLE: Wood Street Landfill PROJECT NO: 160797
DESCRIPTION: Vertical Well ROI Calculation CALC NO: _____ SHEET 3 OF 6
PREPARED BY: JPS CHECKED BY: EJJ APPROVED BY: TAB DATE: 07/06/17

Then:

$$R = 0.8938 \left(\frac{Q_w}{tG} \right)^{1/2}$$

Converting results from meters to feet (1 ft = 0.3048 m):

$$0.3048R = 0.8938 \left(\frac{Q_w}{tG} \right)^{1/2}$$

$$R = 2.932 \left(\frac{Q_w}{tG} \right)^{1/2}$$

B) NSPS Method (from EPA NSPS Bid, 1991, pg. G-1)

$$R = \left(\frac{Q_w DC}{\pi L \rho Q_{gen} \eta} \right)^{1/2}$$

Where: ρ = in-place density of refuse [kg/m³]
 Q_w = LFG flow rate per well [m³/s]
DC = design capacity of landfill [kg]
L = perforated pipe length [m]
 Q_{gen} = peak LFG generation rate [m³/s]
 η = system collection efficiency [%]
R = radius of influence [m]

1. Converting from metric to English units yields the following conversion factors (allowing input in English units):

Q_w (from cfm to m³/s):

$$\frac{1 \text{ ft}^3}{1 \text{ min}} \times \frac{1 \text{ min}}{60 \text{ sec}} \times \left(\frac{0.3048 \text{ m}}{\text{ft}} \right)^3 = 4.719 \times 10^{-4}$$

DC (from tons to kg):

$$1 \text{ ton} \times \frac{2,000 \text{ lb}}{1 \text{ ton}} \times \frac{0.4536 \text{ kg}}{1 \text{ lb}} = 907.2$$

COMPUTATION SHEET

PROJECT TITLE: Wood Street Landfill PROJECT NO: 160797

DESCRIPTION: Vertical Well ROI Calculation CALC NO: _____ SHEET 4 OF 6

PREPARED BY: JPS CHECKED BY: EJJ APPROVED BY: TAB DATE: 07/06/17

L (from ft to m):

$$1 \text{ ft} \times \frac{0.3048 \text{ m}}{\text{ft}} = 0.3048$$

ρ (from lb/cy to kg/m³):

$$\frac{1 \text{ lb}}{\text{yd}^3} \times \frac{0.4536 \text{ kg}}{1 \text{ lb}} \times \frac{1 \text{ yd}^3}{27 \text{ ft}^3} \times \left(\frac{1 \text{ ft}}{0.3048 \text{ m}} \right)^3 = 0.5933$$

Converting results from meters to feet (1 ft = 0.3048 m):

$$0.3048R = \left[\frac{(4.719 \times 10^{-4}) Q_w (907.2) DC}{\pi (0.3048L) (0.5933\rho) (4.719 \times 10^{-4} Q_{\text{gen}}) \eta} \right]^{1/2}$$

$$R = \frac{1}{0.3048} \left[\frac{(4.719 \times 10^{-4}) Q_w (907.2) DC}{\pi (0.3048L) (0.5933\rho) (4.719 \times 10^{-4} Q_{\text{gen}}) \eta} \right]^{1/2}$$

Example Calculation:

Estimate the ROI for the following average LFG flow rate condition at the XYZ Landfill

Given:

Design Capacity	=	2.5 x 10 ⁷ tons
Collection efficiency	=	70%
Average LFG generation rate	=	2,469 scfm
In-place refuse density	=	1,400 lb/cy
Depth of well	=	100 ft
Well flow rate	=	26 scfm

COMPUTATION SHEET

PROJECT TITLE: Wood Street Landfill PROJECT NO: 160797

DESCRIPTION: Vertical Well ROI Calculation CALC NO: _____ SHEET 5 OF 6

PREPARED BY: JPS CHECKED BY: EJJ APPROVED BY: TAB DATE: 07/06/17

A) EMCON Method

$$R = 2.932 \left[\frac{26 \text{ scfm}}{(100 \text{ ft}) \left(\frac{2,469 \text{ scfm}}{25,000,000 \text{ tons}} \right) \left(\frac{1 \text{ ton}}{2,000 \text{ lb}} \right) \left(\frac{1,400 \text{ lb}}{1 \text{ cy}} \right)} \right]^{1/2}$$

R = 180 ft

B) NSPS Method

$$R = \frac{1}{0.3048} \left[\frac{(4.719 \times 10^{-4})(26 \text{ scfm})(907.2)(25,000,000 \text{ tons})}{\pi (0.3048)(100 \text{ ft})(0.5933)(1,400 \text{ lb / cy})(4.719 \times 10^{-4})(2,469 \text{ scfm})(0.70)} \right]^{1/2}$$

R = 215 ft

COMPUTATION SHEET

PROJECT TITLE: Wood Street Landfill PROJECT NO: 160797

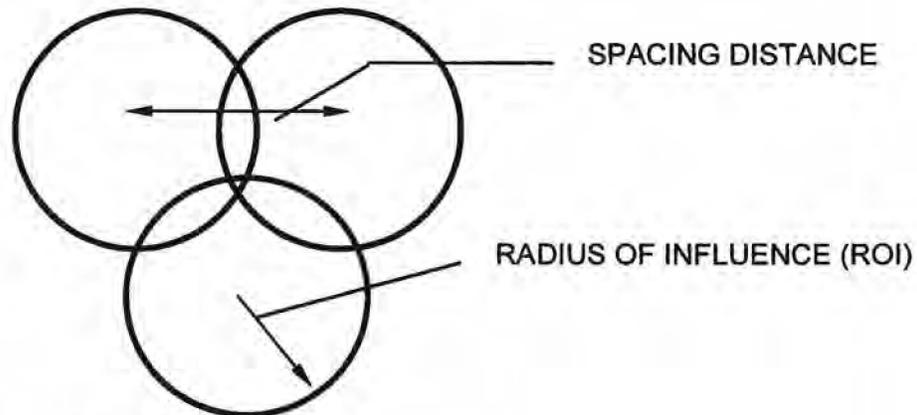
DESCRIPTION: Vertical Well ROI Calculation CALC NO: _____ SHEET 6 OF 6

PREPARED BY: JPS CHECKED BY: EJJ APPROVED BY: TAB DATE: 07/06/17

Well Spacing

Utilizing the more conservative (EMCON) value for ROI of R = 180 ft for this extraction well, and applying the criteria for well spacing of:

$$\text{SPACING} = \sqrt{3} \text{ ROI}$$



$$\text{SPACING} = 312 \text{ ft}$$

Site Specific Calculations:

ROI calculations for the facility are shown on the following spreadsheet. These calculations were performed for a series of typical well depths, ranging from 40 feet to 100 feet and will be utilized as the basis for determining well placement across the selected area of the Project.

**Landfill Gas Extraction Well Radius of Influence
Based on Volume of Affected Refuse
Wood Street Landfill**

Well Number ^(c)	Well Depth (ft)	LFG Flow Rate Condition	LFG Flow Rate (scfm)	Radius of Influence (ft) ^{(a)(b)}	
				NSPS	EMCON
A	40	Low	10	108	94
		Average	15	133	115
		High	20	153	133
B	60	Low	20	125	108
		Average	25	140	121
		High	30	153	133
C	80	Low	30	133	115
		Average	40	153	133
		High	50	171	148
D	100	Low	50	153	133
		Average	60	168	145
		High	70	181	157

Design Capacity	20,538,860 Mg	LFG Generation Rate	6,345 scfm
Design Tonnage	22,644,829 tons	Refuse Density	1,740 lb/cy
Design Volume	26,028,539 cy	NSPS Collection Efficiency	75 %

Average ROI of Shallow Wells (< 45 Feet in Depth)	115 feet	Well Spacing =>	199 feet
Average ROI of Medium Depth Wells (45 to 80 Feet in Depth)	127 feet	Well Spacing =>	220 feet
Average ROI of Deep Wells (>80 feet in Depth)	145 feet	Well Spacing =>	251 feet

Notes:

- a) Radius of influence based on the estimated capacity of the facility and the anticipated LFG generation rate.
- b) Calculations assume 20 feet of solid well casing from ground surface to start of perforations.
- c) Well number is general for the typical depth shown.



Summary Report

Landfill Name or Identifier: Granger Wood Street Landfill

Date: Monday, August 15, 2022

Description/Comments:

Paulson is 51 acres. 2,742,666.7 yds of waste. There has been no adjustment for waste composition (the composition for the average landfill has been used). Approximately 2/3 of Paulson was assumed to be 30' thick with waste. The other 1/3 was assumed to be 40' thick with waste. Since there is no recirculation or liquids added to the landfill, the CAA conventional numbers have been used in the gas estimates.

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^n \sum_{j=0.1}^1 kL_o \left(\frac{M_i}{10} \right) e^{-kt_{ij}}$$

Where,

Q_{CH_4} = annual methane generation in the year of the calculation ($m^3/year$)

i = 1-year time increment

n = (year of the calculation) - (initial year of waste acceptance)

j = 0.1-year time increment

k = methane generation rate ($year^{-1}$)

L_o = potential methane generation capacity (m^3/Mg)

M_i = mass of waste accepted in the i^{th} year (Mg)

t_{ij} = age of the j^{th} section of waste mass M_i accepted in the i^{th} year (decimal years, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at <http://www.epa.gov/ttnatw01/landfill/landflpg.html>.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for conventional landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	1974	
Landfill Closure Year (with 80-year limit)	2042	
Actual Closure Year (without limit)	2042	
Have Model Calculate Closure Year?	Yes	
Waste Design Capacity	20,538,860	<i>megagrams</i>

MODEL PARAMETERS

Methane Generation Rate, k	0.040	<i>year⁻¹</i>
Potential Methane Generation Capacity, L ₀	100	<i>m³/Mg</i>
NMOC Concentration	595	<i>ppmv as hexane</i>
Methane Content	50	<i>% by volume</i>

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	Total landfill gas
Gas / Pollutant #2:	Methane
Gas / Pollutant #3:	Carbon dioxide
Gas / Pollutant #4:	NMOC

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
1974	82,938	91,232	0	0
1975	82,938	91,232	82,938	91,232
1976	82,938	91,232	165,877	182,464
1977	82,938	91,232	248,815	273,696
1978	82,938	91,232	331,753	364,928
1979	82,938	91,232	414,691	456,160
1980	82,938	91,232	497,630	547,393
1981	82,938	91,232	580,568	638,625
1982	82,938	91,232	663,506	729,857
1983	82,938	91,232	746,444	821,089
1984	82,938	91,232	829,383	912,321
1985	146,251	160,876	912,321	1,003,553
1986	200,314	220,345	1,058,572	1,164,429
1987	221,168	243,284	1,258,886	1,384,774
1988	229,445	252,390	1,480,053	1,628,059
1989	219,275	241,203	1,709,499	1,880,448
1990	195,345	214,880	1,928,774	2,121,651
1991	169,181	186,099	2,124,119	2,336,531
1992	162,791	179,070	2,293,300	2,522,630
1993	177,063	194,769	2,456,090	2,701,699
1994	201,350	221,485	2,633,153	2,896,468
1995	181,242	199,366	2,834,503	3,117,953
1996	121,601	133,761	3,015,745	3,317,319
1997	133,611	146,972	3,137,345	3,451,080
1998	204,285	224,714	3,270,956	3,598,052
1999	230,402	253,442	3,475,241	3,822,765
2000	245,129	269,642	3,705,643	4,076,207
2001	262,053	288,259	3,950,773	4,345,850
2002	278,693	306,563	4,212,826	4,634,108
2003	278,747	306,622	4,491,519	4,940,671
2004	282,303	310,533	4,770,266	5,247,293
2005	286,030	314,633	5,052,569	5,557,826
2006	290,447	319,492	5,338,600	5,872,460
2007	293,057	322,362	5,629,047	6,191,951
2008	276,202	303,823	5,922,103	6,514,314
2009	244,359	268,795	6,198,306	6,818,136
2010	232,007	255,208	6,442,665	7,086,931
2011	238,427	262,270	6,674,672	7,342,139
2012	249,904	274,894	6,913,099	7,604,409
2013	307,131	337,844	7,163,003	7,879,304

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
2014	360,392	396,431	7,470,134	8,217,148
2015	378,941	416,835	7,830,526	8,613,579
2016	384,094	422,503	8,209,467	9,030,414
2017	402,095	442,305	8,593,561	9,452,917
2018	403,191	443,510	8,995,656	9,895,222
2019	382,973	421,270	9,398,847	10,338,732
2020	436,580	480,238	9,781,820	10,760,002
2021	476,125	523,738	10,218,400	11,240,240
2022	476,125	523,738	10,694,525	11,763,977
2023	476,125	523,738	11,170,650	12,287,715
2024	476,125	523,738	11,646,775	12,811,452
2025	476,125	523,738	12,122,900	13,335,190
2026	476,125	523,738	12,599,025	13,858,927
2027	476,125	523,738	13,075,150	14,382,665
2028	476,125	523,738	13,551,275	14,906,402
2029	476,125	523,738	14,027,400	15,430,140
2030	476,125	523,738	14,503,525	15,953,877
2031	476,125	523,738	14,979,650	16,477,615
2032	476,125	523,738	15,455,775	17,001,352
2033	476,125	523,738	15,931,900	17,525,090
2034	476,125	523,738	16,408,025	18,048,827
2035	476,125	523,738	16,884,150	18,572,565
2036	476,125	523,738	17,360,275	19,096,302
2037	476,125	523,738	17,836,400	19,620,040
2038	476,125	523,738	18,312,525	20,143,777
2039	476,125	523,738	18,788,650	20,667,515
2040	476,125	523,738	19,264,775	21,191,252
2041	476,125	523,738	19,740,900	21,714,990
2042	321,835	354,019	20,217,025	22,238,727
2043	0	0	20,538,860	22,592,746
2044	0	0	20,538,860	22,592,746
2045	0	0	20,538,860	22,592,746
2046	0	0	20,538,860	22,592,746
2047	0	0	20,538,860	22,592,746
2048	0	0	20,538,860	22,592,746
2049	0	0	20,538,860	22,592,746
2050	0	0	20,538,860	22,592,746
2051	0	0	20,538,860	22,592,746
2052	0	0	20,538,860	22,592,746
2053	0	0	20,538,860	22,592,746

Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
1974	0	0	0	0	0	0
1975	8.139E+02	6.517E+05	4.379E+01	2.174E+02	3.259E+05	2.189E+01
1976	1.596E+03	1.278E+06	8.586E+01	4.263E+02	6.389E+05	4.293E+01
1977	2.347E+03	1.879E+06	1.263E+02	6.269E+02	9.397E+05	6.314E+01
1978	3.069E+03	2.457E+06	1.651E+02	8.198E+02	1.229E+06	8.256E+01
1979	3.763E+03	3.013E+06	2.024E+02	1.005E+03	1.506E+06	1.012E+02
1980	4.429E+03	3.546E+06	2.383E+02	1.183E+03	1.773E+06	1.191E+02
1981	5.069E+03	4.059E+06	2.727E+02	1.354E+03	2.030E+06	1.364E+02
1982	5.684E+03	4.552E+06	3.058E+02	1.518E+03	2.276E+06	1.529E+02
1983	6.275E+03	5.025E+06	3.376E+02	1.676E+03	2.512E+06	1.688E+02
1984	6.843E+03	5.480E+06	3.682E+02	1.828E+03	2.740E+06	1.841E+02
1985	7.389E+03	5.916E+06	3.975E+02	1.974E+03	2.958E+06	1.988E+02
1986	8.534E+03	6.834E+06	4.592E+02	2.280E+03	3.417E+06	2.296E+02
1987	1.017E+04	8.140E+06	5.469E+02	2.715E+03	4.070E+06	2.735E+02
1988	1.194E+04	9.558E+06	6.422E+02	3.188E+03	4.779E+06	3.211E+02
1989	1.372E+04	1.099E+07	7.382E+02	3.665E+03	5.493E+06	3.691E+02
1990	1.533E+04	1.228E+07	8.250E+02	4.096E+03	6.139E+06	4.125E+02
1991	1.665E+04	1.333E+07	8.958E+02	4.447E+03	6.666E+06	4.479E+02
1992	1.766E+04	1.414E+07	9.500E+02	4.716E+03	7.069E+06	4.750E+02
1993	1.856E+04	1.486E+07	9.987E+02	4.958E+03	7.432E+06	4.993E+02
1994	1.957E+04	1.567E+07	1.053E+03	5.228E+03	7.836E+06	5.265E+02
1995	2.078E+04	1.664E+07	1.118E+03	5.551E+03	8.320E+06	5.590E+02
1996	2.174E+04	1.741E+07	1.170E+03	5.808E+03	8.706E+06	5.849E+02
1997	2.208E+04	1.768E+07	1.188E+03	5.899E+03	8.842E+06	5.941E+02
1998	2.253E+04	1.804E+07	1.212E+03	6.018E+03	9.020E+06	6.061E+02
1999	2.365E+04	1.894E+07	1.272E+03	6.317E+03	9.469E+06	6.362E+02
2000	2.498E+04	2.001E+07	1.344E+03	6.674E+03	1.000E+07	6.721E+02
2001	2.641E+04	2.115E+07	1.421E+03	7.055E+03	1.057E+07	7.105E+02
2002	2.795E+04	2.238E+07	1.504E+03	7.465E+03	1.119E+07	7.518E+02
2003	2.959E+04	2.369E+07	1.592E+03	7.903E+03	1.185E+07	7.959E+02
2004	3.116E+04	2.495E+07	1.677E+03	8.323E+03	1.248E+07	8.383E+02
2005	3.271E+04	2.619E+07	1.760E+03	8.737E+03	1.310E+07	8.799E+02
2006	3.423E+04	2.741E+07	1.842E+03	9.144E+03	1.371E+07	9.209E+02
2007	3.574E+04	2.862E+07	1.923E+03	9.547E+03	1.431E+07	9.615E+02
2008	3.722E+04	2.980E+07	2.002E+03	9.941E+03	1.490E+07	1.001E+03
2009	3.847E+04	3.080E+07	2.070E+03	1.027E+04	1.540E+07	1.035E+03
2010	3.936E+04	3.151E+07	2.117E+03	1.051E+04	1.576E+07	1.059E+03
2011	4.009E+04	3.210E+07	2.157E+03	1.071E+04	1.605E+07	1.078E+03
2012	4.086E+04	3.272E+07	2.198E+03	1.091E+04	1.636E+07	1.099E+03
2013	4.171E+04	3.340E+07	2.244E+03	1.114E+04	1.670E+07	1.122E+03
2014	4.309E+04	3.450E+07	2.318E+03	1.151E+04	1.725E+07	1.159E+03
2015	4.493E+04	3.598E+07	2.418E+03	1.200E+04	1.799E+07	1.209E+03
2016	4.689E+04	3.755E+07	2.523E+03	1.252E+04	1.877E+07	1.261E+03
2017	4.882E+04	3.909E+07	2.627E+03	1.304E+04	1.955E+07	1.313E+03
2018	5.085E+04	4.072E+07	2.736E+03	1.358E+04	2.036E+07	1.368E+03
2019	5.281E+04	4.229E+07	2.842E+03	1.411E+04	2.115E+07	1.421E+03
2020	5.450E+04	4.364E+07	2.932E+03	1.456E+04	2.182E+07	1.466E+03
2021	5.665E+04	4.536E+07	3.048E+03	1.513E+04	2.268E+07	1.524E+03
2022	5.910E+04	4.732E+07	3.180E+03	1.579E+04	2.366E+07	1.590E+03
2023	6.145E+04	4.921E+07	3.306E+03	1.642E+04	2.461E+07	1.653E+03

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2024	6.372E+04	5.102E+07	3.428E+03	1.702E+04	2.551E+07	1.714E+03
2025	6.589E+04	5.276E+07	3.545E+03	1.760E+04	2.638E+07	1.773E+03
2026	6.798E+04	5.444E+07	3.657E+03	1.816E+04	2.722E+07	1.829E+03
2027	6.999E+04	5.604E+07	3.765E+03	1.869E+04	2.802E+07	1.883E+03
2028	7.191E+04	5.759E+07	3.869E+03	1.921E+04	2.879E+07	1.935E+03
2029	7.377E+04	5.907E+07	3.969E+03	1.970E+04	2.953E+07	1.984E+03
2030	7.555E+04	6.049E+07	4.065E+03	2.018E+04	3.025E+07	2.032E+03
2031	7.726E+04	6.186E+07	4.157E+03	2.064E+04	3.093E+07	2.078E+03
2032	7.890E+04	6.318E+07	4.245E+03	2.107E+04	3.159E+07	2.123E+03
2033	8.048E+04	6.444E+07	4.330E+03	2.150E+04	3.222E+07	2.165E+03
2034	8.199E+04	6.566E+07	4.412E+03	2.190E+04	3.283E+07	2.206E+03
2035	8.345E+04	6.682E+07	4.490E+03	2.229E+04	3.341E+07	2.245E+03
2036	8.485E+04	6.795E+07	4.565E+03	2.266E+04	3.397E+07	2.283E+03
2037	8.620E+04	6.902E+07	4.638E+03	2.302E+04	3.451E+07	2.319E+03
2038	8.749E+04	7.006E+07	4.707E+03	2.337E+04	3.503E+07	2.354E+03
2039	8.873E+04	7.105E+07	4.774E+03	2.370E+04	3.553E+07	2.387E+03
2040	8.992E+04	7.201E+07	4.838E+03	2.402E+04	3.600E+07	2.419E+03
2041	9.107E+04	7.293E+07	4.900E+03	2.433E+04	3.646E+07	2.450E+03
2042	9.217E+04	7.381E+07	4.959E+03	2.462E+04	3.690E+07	2.480E+03
2043	9.172E+04	7.344E+07	4.935E+03	2.450E+04	3.672E+07	2.467E+03
2044	8.812E+04	7.056E+07	4.741E+03	2.354E+04	3.528E+07	2.371E+03
2045	8.466E+04	6.780E+07	4.555E+03	2.261E+04	3.390E+07	2.278E+03
2046	8.134E+04	6.514E+07	4.377E+03	2.173E+04	3.257E+07	2.188E+03
2047	7.816E+04	6.258E+07	4.205E+03	2.088E+04	3.129E+07	2.102E+03
2048	7.509E+04	6.013E+07	4.040E+03	2.006E+04	3.006E+07	2.020E+03
2049	7.215E+04	5.777E+07	3.882E+03	1.927E+04	2.889E+07	1.941E+03
2050	6.932E+04	5.551E+07	3.729E+03	1.852E+04	2.775E+07	1.865E+03
2051	6.660E+04	5.333E+07	3.583E+03	1.779E+04	2.666E+07	1.792E+03
2052	6.399E+04	5.124E+07	3.443E+03	1.709E+04	2.562E+07	1.721E+03
2053	6.148E+04	4.923E+07	3.308E+03	1.642E+04	2.461E+07	1.654E+03
2054	5.907E+04	4.730E+07	3.178E+03	1.578E+04	2.365E+07	1.589E+03
2055	5.675E+04	4.544E+07	3.053E+03	1.516E+04	2.272E+07	1.527E+03
2056	5.453E+04	4.366E+07	2.934E+03	1.456E+04	2.183E+07	1.467E+03
2057	5.239E+04	4.195E+07	2.819E+03	1.399E+04	2.098E+07	1.409E+03
2058	5.033E+04	4.031E+07	2.708E+03	1.344E+04	2.015E+07	1.354E+03
2059	4.836E+04	3.873E+07	2.602E+03	1.292E+04	1.936E+07	1.301E+03
2060	4.646E+04	3.721E+07	2.500E+03	1.241E+04	1.860E+07	1.250E+03
2061	4.464E+04	3.575E+07	2.402E+03	1.192E+04	1.787E+07	1.201E+03
2062	4.289E+04	3.435E+07	2.308E+03	1.146E+04	1.717E+07	1.154E+03
2063	4.121E+04	3.300E+07	2.217E+03	1.101E+04	1.650E+07	1.109E+03
2064	3.959E+04	3.171E+07	2.130E+03	1.058E+04	1.585E+07	1.065E+03
2065	3.804E+04	3.046E+07	2.047E+03	1.016E+04	1.523E+07	1.023E+03
2066	3.655E+04	2.927E+07	1.967E+03	9.763E+03	1.463E+07	9.833E+02
2067	3.512E+04	2.812E+07	1.889E+03	9.380E+03	1.406E+07	9.447E+02
2068	3.374E+04	2.702E+07	1.815E+03	9.012E+03	1.351E+07	9.077E+02
2069	3.242E+04	2.596E+07	1.744E+03	8.659E+03	1.298E+07	8.721E+02
2070	3.115E+04	2.494E+07	1.676E+03	8.320E+03	1.247E+07	8.379E+02
2071	2.993E+04	2.396E+07	1.610E+03	7.993E+03	1.198E+07	8.050E+02
2072	2.875E+04	2.302E+07	1.547E+03	7.680E+03	1.151E+07	7.735E+02
2073	2.762E+04	2.212E+07	1.486E+03	7.379E+03	1.106E+07	7.431E+02
2074	2.654E+04	2.125E+07	1.428E+03	7.089E+03	1.063E+07	7.140E+02



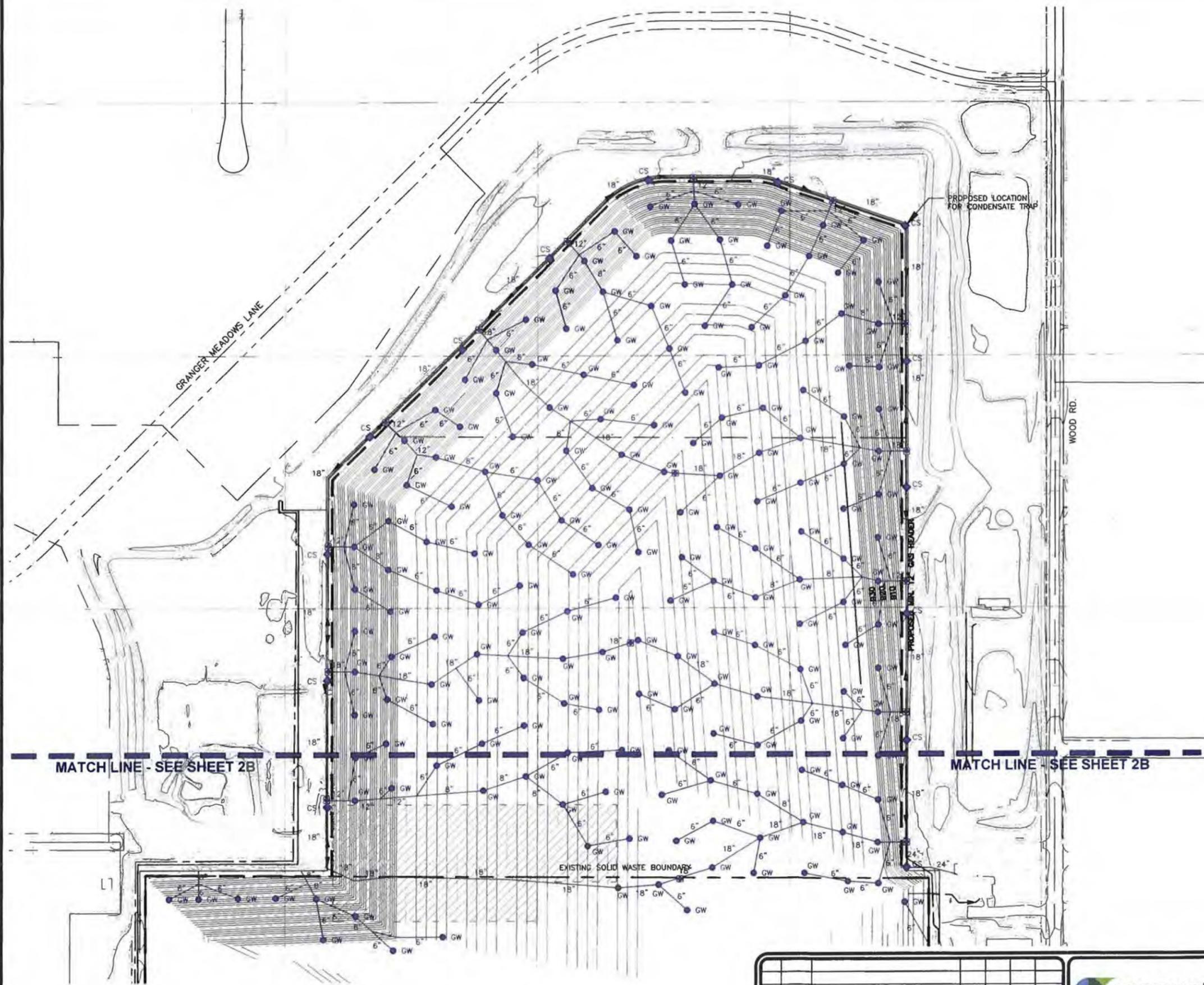
0 200 400
SCALE IN FEET

LEGEND

- PERMITTED SOLID WASTE BOUNDARY
- - - EXISTING 10' CONTOUR
- - - EXISTING 2' CONTOUR
- 12" EXISTING LANDFILL GAS HEADER
- - - EXISTING HORIZONTAL COLLECTOR
- CC2 EXISTING LFG EXTRACTION WELL
- SUMP 7 EXISTING CONDENSATE SUMP
- ⊕ EXISTING AIRLINE BLOWOFF/FORCEMAIN VALVE
- EXISTING RISER
- 18" PROPOSED GAS HEADER/LATERAL
- GW PROPOSED LFG EXTRACTION WELL
- ⊕ PROPOSED HEADER ACCESS RISER
- ◆ CS PROPOSED CONDENSATE SUMP
- INERT MATERIAL

NOTES:

1. GRADES REPRESENT PERMITTED TOP OF WASTE ELEVATIONS.
2. AS-BUILT WELL FIELD AND LFG PIPING INFORMATION OBTAINED FROM GRANGER DRAWING TITLED "WOOD STREET LANDFILL - PROPERTY DESCRIPTIONS," DATED JULY, 29, 2005.
3. ALL PROPOSED HEADER AND LATERAL PIPELINES WITHIN THE LIMITS OF WASTE TO BE INSTALLED AT A MINIMUM 3% SLOPE UNLESS OTHERWISE NOTED.
4. ALL PROPOSED HEADER AND LATERAL PIPELINES OUTSIDE THE LIMITS OF WASTE TO BE INSTALLED AT A MINIMUM 0.5% SLOPE UNLESS OTHERWISE NOTED.
5. FUTURE GCCS CONSTRUCTION PHASES TO BE PREPARED AND COMPLETED IN ACCORDANCE WITH NEW SOURCE PERFORMANCE STANDARDS (NSPS) INSTALLATION SCHEDULES.



MATCH LINE - SEE SHEET 2B

MATCH LINE - SEE SHEET 2B



REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

DATE OF ISSUE: 07/19/2017
 DRAWN BY: TJS
 DESIGNED BY: TAB
 CHECKED BY: GL
 APPROVED BY: TAB



GRANGER WASTE MANAGEMENT COMPANY
 AND GRANGER MEADOWS LLC
 WOOD STREET LANDFILL, LANSING MI

NSPS GCCS DESIGN PLAN
FINAL DEVELOPMENT CONDITIONS - NORTH

SHEET NO.
2A
 PROJECT NO.
 170438

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1" = 1/2" 0'
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 07/19/2017 10:58 AM
 TJS



0 200 400
SCALE IN FEET

LEGEND

- PERMITTED SOLID WASTE BOUNDARY
- - - EXISTING 10' CONTOUR
- - - EXISTING 2' CONTOUR
- 12" — EXISTING LANDFILL GAS HEADER
- - - EXISTING HORIZONTAL COLLECTOR
- GW-62 EXISTING LFG EXTRACTION WELL
- ◇ SUMP 7 EXISTING CONDENSATE SUMP
- ⊕ EXISTING AIRLINE BLOWOFF/FORCEMAIN VALVE
- EXISTING RISER
- 18" — PROPOSED GAS HEADER/LATERAL
- GW PROPOSED LFG EXTRACTION WELL
- ⊕ PROPOSED HEADER ACCESS RISER
- ◇ CS PROPOSED CONDENSATE SUMP
- INERT MATERIAL

NOTES:

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4. ALL PROPOSED HEADER AND LATERAL PIPELINES OUTSIDE THE LIMITS OF WASTE TO BE INSTALLED AT A MINIMUM 0.5% SLOPE UNLESS OTHERWISE NOTED.
5. FUTURE GCCS CONSTRUCTION PHASES TO BE PREPARED AND COMPLETED IN ACCORDANCE WITH NEW SOURCE PERFORMANCE STANDARDS (NSPS) INSTALLATION SCHEDULES.



REV	DATE	DESCRIPTION	DRN BY	DES BY	CHK BY	APP BY
	07/19/2017	DATE OF ISSUE	TJS	TAB	GI	TAB
		DESIGNED BY	TJS	DESIGNED BY	TAB	APPROVED BY



GRANGER WASTE MANAGEMENT COMPANY
AND GRANGER MEADOWS LLC
WOOD STREET LANDFILL, LANSING MI

NSPS GCCS DESIGN PLAN
FINAL DEVELOPMENT CONDITIONS - SOUTH

SHEET NO.
2B

PROJECT NO.
170438

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1" = 1/2" 0' 1"

File: E:\Projects\Granger\WOOD STREET\WOOD STREET.dwg User: thomas.dlugi Date: 7/19/2017 11:31 AM

WELL ID	DATE DRILLED	NORTHING	EASTING
BB1	11/28/2011	3126	6830.1
BB2	12/1/2011	3058.44	7006.39
BB3	11/29/2011	2707.45	7033.45
BB4	12/1/2011	2684.41	7182.17
BB5	2/28/2013	2863.92	7008.32
BB7	3/5/2013	2794.3	7340.96
BB8	3/1/2013	2988.23	7063.22
DD14	10/6/2016	3769.32	8375.16
DD3V14			
GCD 103	9/1/2015	3324.35	7292.64
GCD-101R	2/4/2016	3252.27	7844.65
GCD-102R	2/4/2016	3329.27	7602.87
GCW-1	9/9/2015	3522.27	6659.77
GCW3	9/3/2015	3426.11	6260.75
GCW4	9/2/2015	3523.23	6487.24
GW0152		3667.42	7638.74
GW0153	12/11/2018	3806.46	7775.17
GW0154	12/10/2018	3805.91	7971.56
GW0155	12/10/2018	3808.55	8170.95
GW0156	12/7/2018	3702.99	8286.66
GW0157	12/6/2018	3563.97	8324.67
GW0158	12/5/2018	3385.12	8437.27
GW0159		3456.11	7872.67
GW0160	12/4/2018	3147.70	7736.62
GW0161	12/5/2018	3200.47	7421.90
GW0162		3414.54	7700.09
GW0164		3612.91	7466.76
GW0165	12/12/2018	3317.76	7984.65
GW152R	9/28/2021	3667.2027	7646.7075
GW166	12/4/2017	3237.16	6527.43
GW167	12/4/2017	3467.59	6830.6
GW168	12/5/2017	3452.59	7303.49
GW169	12/5/2017	3423.51	7483.02
GW170	10/14/2019	1755.07	7973.92
GW171	10/15/2019	1927.80	8283.14
GW172	10/11/2019	2035.48	7901.36
GW173	10/14/2019	2252.75	7838.01
GW174	10/14/2019	2314.39	8040.29
GW175	10/11/2019	2370.62	8240.78
GW176	10/18/2019	2328.56	7607.82
GW177	10/18/2019	2790.08	8350.03
GW178	10/23/2019	3856.29	7617.81
GW179	10/17/2019	2470.51	7738.37
GW180	10/16/2019	2461.03	7888.00
GW181	10/16/2019	2535.42	8022.59
GW182	10/15/2019	2563.02	8140.45

GW183	10/17/2019	2643.95	7652.64
GW184	10/16/2019	2786.29	7736.70
GW185	10/22/2019	4091.65	7952.01
GW186	10/22/2019	4092.51	8151.32
GW187	10/23/2019	3982.69	8013.53
GW188	10/23/2019	3982.85	7812.73
GW189	10/22/2019	4169.19	8250.52
GW190	10/23/2019	3983.25	7652.31
GW191	10/24/2019	3870.77	7872.37
GW192	10/24/2019	3870.77	8074.90
GW193	10/24/2019	3611.2155	8169.6797
GW194	10/24/2019	3674.1469	8018.7653
GW195	10/24/2019	3648.0244	7848.8382
GW196	10/23/2019	3542.8475	7702.0579
GW197	5/13/2020	3079.51	7385.13
GW199	5/11/2020	2720.75	8055.69
GW200	5/12/2020	2780.7	8212.65
GW201	5/13/2020	4314.766	7918.0078
GW203	5/13/2020	4209.91	7866.04
GW204	5/14/2020	4230.13	8198.17
GW205	5/14/2020	4112.14	8101.29
GW207	5/14/2020	4141.83	8037.97
GW208	5/14/2020	4108.82	7999.67
GW209			
GW212	9/30/2021	3634.867	6886.706
GW213	9/30/2021	3586.131	7091.55
GW214	9/27/2021	3236.2232	7231.0982
GW215	9/28/2021	3563.52	7456.614
GW216	9/28/2021	3757.898	7494.312
GW217	10/1/2021	4012.176	7445.946
GW218	10/1/2021	4121.1161	7553.7974
GW220	9/29/2021	4079.078	6268.556
GW221	9/29/2021	4370.1603	6282.1326
GW222	9/24/2021	3327.232	7603.4149
GW223	9/24/2021	3250.9722	7845.5575
GW224	10/1/2021	4163.9364	7340.1251
GW225	10/1/2021	4219.334	7174.586
GW230	9/27/2021	2801.6057	7335.2604
GW231	9/23/2021	3234.8515	8116.2143
GW240	9/29/2021	4106.189	6507.6
GW241	9/29/2021	4107.96	6695.53
GW244	9/30/2021	4094.592	7255.131
GW249	9/23/2021	3301.3228	8279.0045
GW250	10/5/2021	2988	7068.98
K15		2509.44	7389.6004
K16		2509.97	7198.8812
K17		2511.04	6999.82

K18		2551.04	6827.49
M1	1994	1909.8324	7960.6982
M10	1996	1715.6831	7809.0888
M11R	10/11/2016	1876.94	7736.25
M13		2203.1812	7626.9695
M2		2050.2918	7910.7684
M3		2152.0914	7871.5085
M35		2447.8302	8373.5165
M36		2334.26	8365.59
M37		2200.86	8327.03
M37A		2279.92	8250.05
M38		2066.6812	8360.5867
M5		2091.3916	8051.1478
M5A		1985.8043	8090.9404
M6		2222.9111	8011.958
M8		2124.4915	8189.1672
M8A		2078.6916	8234.1972
M9		2251.091	8150.5674
N19		2886.6085	8407.8664
N20		2688.0792	8372.8765
O14	1997	2121.1713	8436.2659
O15	1997	2210.485	8445.2779
O16	1997	2300.1594	8453.3566
O17	1997	2385.0587	8460.9756
O18	10/12/2016	2167.24	8429.77
O3	1997	2451.5541	6900.4975
O4	1997	2450.9233	6994.3381
O5	1997	2434.1671	7200.4624
O6	1997	1717.6056	7926.3106
O7	1997	1753.615	8012.7762
O8	1997	1821.7185	8072.407
P1	2005	2676.3166	8331.632
P3	2005	2532.2705	8198.9406
P4	2005	2808.1989	8366.5816
Q2	2005	2497.3456	7897.4013
Q4	2005	2646.1372	7898.9274
Q6	2005	2811.5928	7898.6163
V1	2005		
V1601	2/3/2016	2923.8	8083.3
V1602	2/2/2016	3017.5	7919.78
V6	2/14/2011	3032.15	6779.96
V7	2/28/2013	3009.99	6872.04
W1		2850.52	6653.46
W2		2908.78	6577.69
W3		2951.56	6517.56
W4		2999.89	6454.52
W5R	10/10/2016	3048.2	6392.12

Well 1	12/12/2017	2008.17	8387.09
Well 10	11/30/2017	3021.11	7750.67
Well 11	12/6/2017	2784.61	7569.47
Well 12	12/8/2017	2828.84	7176.72
Well 13	12/1/2017	3537.78	6140.86
Well 16	12/6/2017	3516.81	8043.08
Well 3	12/12/2017	1851.96	8113.38
Well 6	12/11/2017	2067.34	7695.39
WR3	10/10/2016	2948.1	6521.26
X1	10/6/2016	3107.95	7155.24
Y10	2/1/2009	3377.6387	6288.4623
Y13R	10/3/2016	2938.39	7674.95
Y16R	9/4/2015	3398.61	6426.68
Y17	2/14/2011	3291.22	6557.61
Y18	2/15/2011	3167.92	6665.23
Y2	2/1/2009	3750.5098	5802.3893
Y4	2/1/2009	3747.142	5993.7698
Y5	2/5/2009	3697.957	5622.328
Y6			
Y7			
Y8			
Y9A	11/29/2011	3386.86	6221.95
Z12R	10/5/2016	2935.7	7375.69
Z13	11/28/2011	3259.21	7564.37
Z14	11/23/2011	3315.83	7426.26
Z16	11/28/2011	3202.99	7039.19
Z16AR	10/7/2016	3257.91	7177.42
Z16C	1/11/2012	3392.54	7088.03
Z19	11/9/2012	3417.23	7211.7
Z1B	12/5/2011	3303.7	7815.34
Z1B1	11/7/2014	3284.3	7705.39
Z22R	10/6/2016	2970.32	7237.5
Z23R	10/4/2016	2962.3	7509.3
Z2R	2/5/2016	3076.79	8075.87
Z3R	2/3/2016	3159.23	7932.22
Z6A	12/2/2011	3035.69	7518.5
Z6A1	11/11/2014	3094.34	7644.59



August 10, 2022

Ms. Kimberly Smelker
 Granger Waste Services, Inc.
 16980 Wood Road
 Lansing, MI 48906

**Subject: Surface Emissions Monitoring, Second Quarter 2022
 Wood Road Landfill, Lansing, Michigan**

Dear Ms. Smelker,

Enclosed, please find the second quarter 2022 report documenting the results of the Surface Emissions Monitoring event at Wood Road Landfill.

Monitoring, Control and Compliance, Inc. (MCC) performed the initial Surface Emissions Monitoring Scan on June 14, and June 15, 2022. Results of the scans indicated seven (7) locations in excess of the 500 ppm (above background) methane detection limit.

Second Quarter 2022 Surface Emissions Monitoring						
Exceedance Identifier	Latitude	Longitude	Initial Scan 6/14/22 & 6/15/22 (ppm)	1 st & 2 nd 10- Day Recheck 6/24/22 & 7/1/22 (ppm)	30-Day Recheck 7/15/22 (ppm)	30-Day+ 10-Day Recheck 7/21/22
E1(Z22R)	42.77026	- 84.529818	1032.794	0	519.5	0
E2	42.770536	- 84.530241	1263.6	0	0	NA
E3	42.770793	- 84.529824	892.8	0	0	NA
E4=E8 (Z19)	42.771514	- 84.529935	551.3566	0	1142.4	0
E5 (GW168)	42.771581	- 84.529578	595.9794	549.5/12.9	0	NA
E6 (GW169)	42.771503	- 84.528911	1234.885	3914.8/0	20.6	NA
E7 (12)	42.769853	- 84.530057	1684.375	757.4/0	67.3	NA

During the 1st 10 day rechecks, Identifier E4 was scanned without recording GPS coordinates. The location was again scanned using identifier E8 so GPS coordinates could be recorded. Identifier E4 was changed to identifier E8 in all subsequent scans.

**Waste Acceptance Rate
Wood Street Facility**

Year	Closed Landfill	Open Landfill		Combined
	Waste Accepted (Mg/yr) *			
	Total Waste	Total Waste	Ash/Contaminated Soil**	LandGEM Input
1974	82,938	0		82,938
1975	82,938	0		82,938
1976	82,938	0		82,938
1977	82,938	0		82,938
1978	82,938	0		82,938
1979	82,938	0		82,938
1980	82,938	0		82,938
1981	82,938	0		82,938
1982	82,938	0		82,938
1983	82,938	0		82,938
1984	82,938	0		82,938
1985	0	146,251		146,251
1986	0	214,556	14,242	200,314
1987	0	235,827	14,660	221,168
1988	0	244,658	15,212	229,445
1989	0	250,578	31,303	219,275
1990	0	295,426	100,081	195,345
1991	0	207,912	38,731	169,181
1992	0	174,884	12,093	162,791
1993	0	211,283	34,220	177,063
1994	0	213,420	12,070	201,350
1995	0	190,262	9,020	181,242
1996	0	128,503	6,902	121,601
1997	0	139,694	6,083	133,611
1998	0	220,980	16,695	204,285
1999	0	248,557	18,155	230,402
2000	0	267,192	22,062	245,129
2001	0	274,880	12,827	262,053
2002	0	302,491	23,798	278,693
2003	0	303,643	24,896	278,747
2004	0	300,657	18,353	282,303
2005	0	303,384	17,354	286,030
2006	0	305,042	14,595	290,447
2007	0	309,897	16,841	293,057
2008	0	314,932	38,729	276,202
2009	0	278,475	34,116	244,359
2010	0	504,293	272,286	232,007
2011	0	605,181	366,753	238,427
2012	0	542,618	292,714	249,904
2013	0	434,234	127,103	307,131
2014	0	673,489	313,097	360,392
2015	0	509,691	130,751	378,941
2016	0	453,528	69,434	384,094
2017	0	455,588	53,493	402,095
2018	0	461,896	58,705	403,191
2019	0	522,738	139,766	382,973
2020	0	479,546	42,966	436,580
2021	0	498,711	22,586	476,125
TOTAL	912,321	12,224,896	2,442,694	10,694,523

* Granger does not have a scale at the landfill. With EPA's approval, Granger uses

**Waste Acceptance Rate
Wood Street Facility**

Year	Closed Landfill	Open Landfill		Combined
	Waste Accepted (Mg/yr) *			
	Total Waste	Total Waste	Ash/Contaminated Soil**	LandGEM Input

periodic weights from different classes of materials to estimate the actual weight of incoming waste.



Photo taken during inspection. Filters not installed properly



Photo taken by Granger staff indicates
EGLE operating instructions have been
posted on unit.

Granger Rolling Monthly Data (NEW FLARES)

Methane Content in LFG	51%	Site Specific
Moisture Content	8%	Typical
LFG Higher Heating Value	479 Btu/ft3	Calculated
Treated Gas Higher Heating Value	972 Btu/ft3	Calculated assuming 96% Methane
CO emissions from Flare	0.37 lb/MMBtu	Flare Manufacture
NOx emissions from Flare	0.068 lb/MMBtu	Flare Manufacture
PM10 emissions from Flare	17 lb/MMCF CH4	AP42 5th Ed., Table 2.4-5, November 1998
PM2.5 emissions from Flare	17 lb/MMCF CH4	PM2.5 = PM10
NMOC (as Hexane) in LFG	595 ppmv	AP42 5th Ed., Table 2.4-2, November 1998
VOC fraction in LFG	39% of NMOC	AP42 5th Ed., Table 2.4-3, November 1998
VOC Destruction Efficiency	98%	AP42 5th Ed., Table 2.4-3, November 1998

Universal Gas Constant	0.7302 atm-ft3/lb-mol-R
Molar Mass of SO2	64.066 lb/lb-mol
Molar Mass of Hexane	86.1754 lb/lb-mol
Standard Temperature	519 R
Methane Higher Heating Value	1013 Btu/ft3

Month	Year	Flare 1 Volume (scf)	Flare 2 Volume (scf)	Total Volume (scf)	Volume of Treated Gas (scf)	Volume of Raw LFG (scf)	Heat Input (MMBTU)	Flare TRS (ppm) (as monthly avg)	Treated Gas TRS (ppm) (as monthly avg)	Raw LFG TRS (ppm) (as monthly avg)	CO (tons) (LIMIT 325.0 tpy)	NOx (tons) (LIMIT 60.0 tpy)	SO2 (tons) (LIMIT 59.1 tpy)	PM10 (tons)	PM2.5 (tons)	VOC (tons)
September	2021	68,330,050	29,377,830	97,707,880	0	97,707,880	46805	200	-	-	8.7	1.6	1.7	0.043	0.043	0.052
October	2021	53,653,380	22,282,930	75,936,310	61,410,032	14,526,278	43,544	187	15	444	8.1	1.5	0.6	0.056	0.056	0.040
November	2021	59,483,550	3,850,930	63,334,480	10,053,216	53,281,264	56,631	133	47	392	10.5	1.9	1.8	0.031	0.031	0.033
December	2021	50,086,580	22,251,300	72,337,880	7,233,788	65,104,092	66,778	342	115	418	12.4	2.3	2.4	0.034	0.034	0.038
TOTAL (mmcf)				309.31655												
TOTAL (tons)											39.54	7.27	6.46	0.16	0.16	0.16
TOTAL (lbs)											79,090	14,535	12,911	329.9	329.9	326.4

Granger Rolling Monthly Data (NEW FLARES)

Methane Content in LFG	51%	Site Specific
Moisture Content	8%	Typical
LFG Higher Heating Value	479 Btu/ft3	Calculated
Treated Gas Higher Heating Value	972 Btu/ft3	Calculated assuming 96% Methane
CO emissions from Flare	0.37 lb/MMBtu	Flare Manufacture
NOx emissions from Flare	0.068 lb/MMBtu	Flare Manufacture
PM10 emissions from Flare	17 lb/MMCF CH4	AP42 5th Ed., Table 2.4-5, November 1998
PM2.5 emissions from Flare	17 lb/MMCF CH4	PM2.5 = PM10
NMOC (as Hexane) in LFG	595 ppmv	AP42 5th Ed., Table 2.4-2, November 1998
VOC fraction in LFG	39% of NMOC	AP42 5th Ed., Table 2.4-3, November 1998
VOC Destruction Efficiency	98%	AP42 5th Ed., Table 2.4-3, November 1998

Universal Gas Constant	0.7302 atm-ft3/lb-mol-R
Molar Mass of SO2	64.066 lb/lb-mol
Molar Mass of Hexane	86.1754 lb/lb-mol
Standard Temperature	519 R
Methane Higher Heating Value	1013 Btu/ft3
Max Flow Rate	4000 scfm

Month	Year	Flare 1 Volume (scf)	Flare 2 Volume (scf)	Total Volume (scf)	Volume of Treated Gas (scf)	Volume of Raw LFG (scf)	Heat Input (MMBTU)	Total Methane Flared (MMCF)	Flare TRS (ppm) (as monthly avg)	Treated Gas TRS (ppm) (as monthly avg)	Raw LFG TRS (ppm) (as monthly avg)	CO (monthly tons)	NOx (monthly tons)	SO2 (monthly tons)	PM10 (tons)	PM2.5 (tons)	VOC (tons)	SO2 (pph) (assuming 4,000 scfm)	12-month rolling average		
																			CO (tons) (LIMIT 325.0 tpy)	NOx (tons) (LIMIT 60.0 tpy)	SO2 (tons) (LIMIT 59.1 tpy)
September	2021	68,330,050	29,377,830	97,707,880	0	97,707,880	46805	5.02	200	-	-	8.7	1.6	1.7	0.043	0.043	0.052	8.1	8.7	1.6	1.7
October	2021	53,653,380	22,282,930	75,936,310	61,410,032	14,526,278	43,544	6.64	187	15	444	8.1	1.5	0.6	0.056	0.056	0.040	7.6	16.7	3.1	2.3
November	2021	59,483,550	3,850,930	63,334,480	10,053,216	53,281,264	56,631	3.70	133	47	392	10.5	1.9	1.8	0.031	0.031	0.033	5.4	27.2	5.0	4.1
December	2021	50,086,580	22,251,300	72,337,880	7,233,788	65,104,092	66,778	4.04	342	115	418	12.4	2.3	2.4	0.034	0.034	0.038	13.9	39.5	7.3	6.5
January	2022	44,905,740	21,054,850	65,960,590	4,365,661	61,594,929	61,991	3.59	238	58	418	11.5	2.1	2.2	0.030	0.030	0.035	9.7	51.0	9.4	8.7
February	2022	30,239,670	21,542,570	51,782,240	43,472,718	8,309,522	28,905	4.60	411	58	411	5.3	1.0	0.5	0.039	0.039	0.027	16.7	56.4	10.4	9.2
March	2022	24,449,400	212,060	24,661,460	24,576,660	84,800	11,855	2.36	1	1	411	2.2	0.4	0.0	0.020	0.020	0.013	0.0	58.6	10.8	9.2
April	2022	4,355,940	691,020	5,046,960	5,046,960	0	2,418	0.48	418	1	418	0.4	0.1	0.0	0.004	0.004	0.003	17.0	59.0	10.8	9.2
May	2022	516,310	6,775,460	7,291,770	7,275,126	16,644	3,501	0.70	418	1	418	0.6	0.1	0.0	0.006	0.006	0.004	17.0	59.6	11.0	9.2
June	2022	7,967,000	8,670,850	16,637,850	10,827,716	5,810,134	10,837	1.34	196	1	392	2.0	0.4	0.2	0.011	0.011	0.009	8.0	61.7	11.3	9.4
July	2022	5,590,220	10,057,190	15,647,410	12,369,160	3,278,250	9,113	1.36	184	1	366	1.7	0.3	0.1	0.012	0.012	0.008	7.4	63.3	11.6	9.5

Granger Flare Flow

Month	Year	Flare 1 Volume start (scf)	Flare 1 Volume end (scf)	Flare 2 Volume start (scf)	Flare 2 Volume end (scf)
September	2021	4898510	73228560	2397220	31775050
October	2021	73228560	126881940	31775050	54057980
November	2021	126881940	186365490	54057980	57908910
December	2021	186365490	236452070	57908910	80160210
January	2022	236452070	281357810	80160210	101215060
February	2022	281357810	311597480	101215060	122757630
March	2022	311597480	336046880	122757630	122969690
April	2022	336046880	340402820	122969690	123660710
May	2022	340402820	340919130	123660710	130436170
June	2022	340919130	348886130	130436170	139107020
July	2022	348886130	354476350	139107020	149164210

Granger Flare Runtime

Limit: The permittee shall not operate FGNEWFLARES for more than 2,750 hours per 12-month as determined at the end of each calendar month.

2750

Date	Flare 1 Runtime (hours)	Flare 2 Runtime (hours)	Total Runtime (hours)	Running Total (hours)	Runtime Remaining (hours)
8/30/2021	14.75	14.75	14.75	14.75	2735.3
8/31/2021	24.00	24.00	24.00	38.75	2711.3
9/1/2021	23.67	23.67	23.67	62.42	2687.6
9/2/2021	21.92	21.92	21.92	84.34	2665.7
9/3/2021	24.00	24.00	24.00	108.34	2641.7
9/4/2021	24.00	24.00	24.00	132.34	2617.7
9/5/2021	24.00	24.00	24.00	156.34	2593.7
9/6/2021	24.00	24.00	24.00	180.34	2569.7
9/7/2021				180.34	2569.7
9/8/2021				180.34	2569.7
9/9/2021	24.00	24.00	24.00	204.34	2545.7
9/10/2021	24.00	10.83	24.00	228.34	2521.7
9/11/2021	23.98	19.17	23.98	252.32	2497.7
9/12/2021	24.00	24.00	24.00	276.32	2473.7
9/13/2021	23.98	13.00	23.98	300.30	2449.7
9/14/2021	22.97	20.78	23.68	323.99	2426.0
9/15/2021	23.80	21.45	23.80	347.79	2402.2
9/16/2021	23.42	20.87	23.60	371.39	2378.6
9/17/2021	23.90	22.25	23.90	395.29	2354.7
9/18/2021	23.72	23.37	23.78	419.07	2330.9
9/19/2021	24.00	24.00	24.00	443.07	2306.9
9/20/2021	23.98	21.13	23.98	467.05	2282.9
9/21/2021	24.00	0.00	24.00	491.05	2258.9
9/22/2021					
9/23/2021					
9/24/2021					
9/25/2021					
9/26/2021					
9/27/2021					
9/28/2021					
9/29/2021					
9/30/2021					
10/1/2021					

Granger Sulfur Sampling Data (Laboratory Sample) 2020

Created by Impact Compliance & Testing

Date	Plant 1 Flow (scfm)	Plant 1 H ₂ S (ppm)	Plant 1 TRS (ppm)	Plant 2 Flow (scfm)	Flare Flow (scfm)	Plant 2 H ₂ S (ppm)	Plant 2 TRS (ppm)	Flow Weighted Avg H ₂ S (ppm)	Flow Weighted Avg TRS (ppm)	H ₂ S:TRS	Mass flow of TRS (pph)	Testing Notes
7/13-7/17	1250	480	499	1500	0	580	602	535	555	0.96	15.5	
7/20-7/24	1280	500	526	1530	0	510	530	505	528	0.96	15.1	
7/27-7/31	1318	510	532	1570	0	470	493	488	511	0.96	15.0	
8/3-8/7	1261	530	556	1545	0	540	561	536	559	0.96	15.9	
8/10-8/14	1318	550	572	1543	0	555	582	553	577	0.96	16.8	
8/17-8/21	1344	540	565	1533	0	550	573	545	569	0.96	16.6	
8/24-8/28	1353	511	538	1550	0	552	581	533	561	0.95	16.5	
8/31-9/4	1034	n/a	n/a	1550	0	515	539	515	539	0.96	14.1	engine work going on in Plant 1, unsafe to enter
9/7-9/11	1314	630	659	1538	0	660	686	646	674	0.96	19.5	
9/14-9/18	1336	580	603	1514	0	450	478	511	537	0.95	15.5	
9/21-9/25	1345	575	604	1480	0	500	526	536	563	0.95	16.1	
9/28-10/2	1346	587	608	1556	0	480	506	530	553	0.96	16.3	
<i>Average</i>								536	560	0.96		