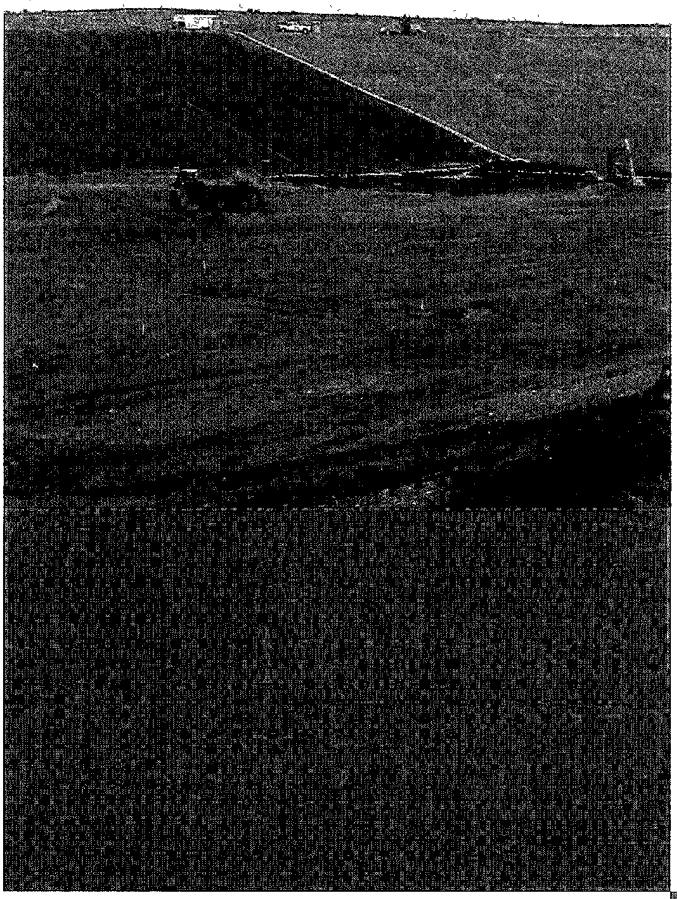
Attachment 2
Groundwater Monitoring Plan

Groundwater Monitoring Plan for Bayview Municipal Solid Waste Landfill



NUERA Bayview Landfill

July 20, 2020

Contents

Appendices

This page is intentionally left blank.

1 Introduction

This groundwater monitoring plan (GMP) addresses the groundwater monitoring and sampling program at the Northern Utah Environmental Resource Agency's (NUERA) Bayview Landfill. The GMP is required by Utah Administrative Code (UAC) Rule R315-303-3(7)(b) and will meet the requirements under UAC R315-308, Ground Water Monitoring Requirements.

The Bayview Landfill is located in southwestern Utah County about 6 miles north of Elberta, Utah and about 3 miles west of Goshen Bay of Utah Lake. The Bayview Landfill is owned and operated by NUERA, which purchased Bayview in 2016 from the South Utah Valley Solid Waste District (SUVSWD). NUERA is an organization made up of 6 solid waste entities[1] along the Wasatch Front jointed together by an inter-local agreement.

2 Groundwater Monitoring System

The groundwater flow at the Bayview Landfill can generally be described as flowing northeast across the site towards Utah Lake[2]. Compliance monitoring wells are, therefore, placed east and north of landfill environmental protection features (liner and leachate collection system sumps and leachate ponds).

The groundwater monitoring system for the Bayview Landfill consists of nine deep monitoring wells (DMW), DMW-1 through DMW-9. The wells serve to monitor the groundwater associated with the landfill's three operating units or "cells". The Bayview cells and monitoring wells are described in more detail below. Appendix Aprovides a map showing the location of the cells, wells, and other features across the site.

Not all of the deep monitoring wells are sampled because the current operation does not require that all wells are monitored. The next section of this report describes the current (2020) operating cells, the wells that are being sampled, and the statistical analysis approach used to demonstrate compliance with UAC R315-308.

The groundwater monitoring system also includes six shallow groundwater monitoring wells, SMW-1 through SMW-6. However, none of the six shallow monitoring wells have contained water sufficient to either purge or sample on any sampling event, and these wells are not included remainder of this document.

Additional monitoring wells will be added to the system as new cells or leachate basins are designed and constructed.

---

[1] The NUERA entities are North Pointe Solid Waste Special Service District, South Utah Valley Solid Waste District, Trans-Jordan Cities, Wasatch Integrated Waste Systems, Weber County, and Logan City.

[2] SUVSWD Bayview Class I Landfill Permit Application, October 2019

2.1 Landfill Operating Cells

2.1.1 Cell 1

Cell 1 was the first landfill unit constructed at the site and is now closed. Cell 1 reached final permitted grades and a final cover was placed in 2005. Cell 1 is in post closure care.

2.1.2 Cell 1.5

Cell 1.5 is located between Cells 1 and 2. It was constructed in 2020 and is approximately 6 acres in size. The cell bottom liner ties into the liner of both adjacent cells (Cells 1 and 2). Cell 1.5 is graded so that any leachate generated in this cell would be collected and conveyed into the leachate collection and removal system constructed in Cell 2, described below. NUERA will

2.1.3 Cell 2

Cell 2 is an active cell with two stages. Stage 1 is a 20 acres cell located in northwest portion of the large Cell 2 and was constructed by SUVSWD in late 2004. Stage 2 is a 23 acre cell located south of Stage 1. The liner for Stage 2 Cell 2 was constructed in 2009. The leachate collection system for Cell 2 Stage 2 conveys leachate to the leachate collection and removal system in Cell 2 Stage 1.

2.2 Deep Monitoring Wells

2.2.1 Upgradient Monitoring Wells

DMW-1 and DMW-7 are located along the western boundary of the site. These monitoring wells serve as the upgradient or background wells for the landfill cells which have been constructed and filled with waste or are scheduled for development over the next 25 to 50 years. DMW-7 currently serves as the upgradient monitoring well for the landfill.

2.2.2 Compliance Monitoring Wells for Cell 1

Monitoring wells DMW-3 and DMW-8 were located east and adjacent to Cell 1 and served as downgradient compliance wells for Cell 1. DMW-3 and DMW-8 were abandoned for the construction of landfill Cell 1.5 in 2020[3]. Monitoring well DMW-9 serves as the groundwater monitoring compliance well for Cell 1, which is in post closure care. DMW-9 is located 200 feet north of Cell 2 Stage 1.

[3] Well abandonment and a groundwater monitoring program variance was approved by the Director of Division of Waste Management and Radiation Control on [date].

2.2.3 Compliance Monitoring Wells for Cell 2

Monitoring well DMW-9 serves as the downgradient compliance well for Cell 2 Stage 1 and Stage 2. DMW-9 is located within 500 feet of Cell 2 and is hydraulically downgradient of the leachate sump for Cell 2, where a pump removes leachate from Cell 2 Stages 1 and 2.

Two future compliance monitoring wells will be installed along the northern boundary of Cell 2 as the landfill development continues to the east within Cell 2. The location of these two wells will be determined after the limits of future stages of Cell 2 are defined.

2.2.4 Compliance Monitoring Wells for Cell 1.5

Cell 1.5 is located between Cells 1 and 2. Cell 1.5 is graded so that any leachate generated in this small cell would be collected and conveyed into the leachate collection and removal system constructed in Cell 2, described above. Therefore, DMW-9 also serves as the compliance well for Cell 1.5.

2.2.5 Additional Monitoring Wells for Leachate Basin 1

Monitoring well DMW-6 is located along the eastern property boundary and downgradient of from a former leachate retention basin that collected leachate from Cell 1. A new leachate retention basin was constructed with Cell 2 Stage 1. The new leachate pond collects and retains any leachate generated from all closed (Cell 1) and active cells (Cells 1.5 and 2). This leachate pond is double lined with a leak detection system in place to monitor leaks from the primary (upper) liner. DMW-6 could also serve as a compliance monitoring point for future stages of Cell 2, depending on the design of these future cells.

2.2.6 Property Boundary Wells

The remaining wells serve as property boundary wells. Wells DMW-2 and DMW-5 are located along the northern boundary, downgradient from Cells 1 and 2. DMW-4 is on the southern site boundary, upgradient of future cells.

2.3 Well Construction

Well construction records, including drilling logs, are presented in Appendix E of the Bayview Landfill Permit[4]. Generally, wells have been constructed of 4- or 4½ -inch diameter PVC pipe with a 20-foot screened interval and a 1-foot silt sump.

3 Groundwater Sampling Procedures

Groundwater sampling procedures generally consist of first measuring the groundwater elevation, then purging the monitoring wells of stagnant water, collecting field parameters (pH, temperature, and conductivity) and then collecting groundwater samples for laboratory analysis. The following sections will describe each of these procedures in

[4] See footnote #2.

greater detail. During each monitoring event, monitoring wells will also be inspected for damage to the upper well casing, protective cover, lock, well cap, and concrete pad. In addition, the ground surface around the well pads will be inspected for erosion. If any problems are discovered, they will be repaired or replaced as soon as practicable.

3.1 Groundwater Elevation Monitoring Procedures

Prior to each groundwater sampling event, the groundwater level in each monitoring well and the total well depth will be measured. Groundwater elevation measurements will be collected using either an electric well sounder marked to determine the depth to the nearest ½-inch (0.04-foot) increment. For each monitoring event, the total well depth will be measured to evaluate whether silt has collected in the well casing. Water levels in the wells will be measured prior to purging or sampling to record the static water level. The groundwater elevation measurements will be recorded to the nearest 0.04 foot from the top of the well casing. Water level measurements will always be referenced to the survey mark on the well casing. When a measurement is collected, the measuring device will be raised and lowered several times to be sure the correct measurement is recorded.

During each monitoring event, the current water level readings will be compared to the readings from the previous monitoring event in order to avoid discrepancies. If an obvious discrepancy is encountered, the water level will be measured again to ensure the measurement was recorded correctly.

Prior to collecting water level measurements, the measuring device will be checked for damage, including bends or kinks in the tape. To maintain consistency and precision, and to the degree possible, the same measuring device will be used during each monitoring event and will be decontaminated between each well (see Section 3.7, Decontamination Procedures). Also once each year, the tape will be checked against a calibrated tape measure to verify its accuracy.

3.2 Monitoring Well Purging Procedures

Purging refers to the removal stagnant water from the well in order to prevent stagnant water from entering sample containers. .During the purging activities, disposable latex gloves will be worn by the sampling team and changed between wells. Temperature, conductivity, and pH will be continuously measured during purging and recorded in the field data collection form (see Appendix B for the field data collection form).Once all these parameters stabilize, indicating stagnant water in the well has been replaced by formation water, purging will be considered complete. If a well dewaters prior to achieving the stabile water quality parameters, it will be allowed to recharge before sampling.

Prior to conducting the well purging activities, the pH and conductivity meters will be calibrated. Calibration of the instruments will be in accordance with the manufacturer's procedures for the particular instrument. At a minimum, the pH meter will be calibrated using standard calibration solutions as recommended by the manufacturer. The conductivity meter will be calibrated using standard solutions as recommended or supplied by the manufacturer. The same instrumentation will be used for each monitoring event.

The method of well purging for this site consists of using a dedicated submersible pump system for each well where the discharge rate can be regulated for sampling. The pump intake will be placed within the screened section of the well casing. For wells that sustain continuous pumping without dewatering, the discharge rate on the pump will be set to allow minimal drawdown in the well. This procedure will minimize any cascading effects that may volatilize constituents in the groundwater entering the well casing and will also minimize agitating sediment collected in the bottom of the well. If the main pump system fails, temporary portable pumps will be used as backups. If portable pumps are needed, the intake will be gently lowered into the upper most portion of the water column to minimize agitating any residual sediment that has collected in the bottom of the well. If a portable pump is used for more than one well, then proper cleaning of the pump is necessary to minimize the potential of cross contamination (refer to Section 3.0).

During the purging operations, a record of the climatic conditions, condition of the wells and surrounding ground surface, field collected water quality, color, odors, water level will be recorded. The information will be recorded in indelible ink, will be stored either on site at the landfill office and will become part of the site operating record for the landfill.

3.3 Groundwater Collection and Handling Procedures

3.3.1 Groundwater Collection Procedures

During groundwater collection disposable latex gloves will be worn, and changed between wells to minimize cross contamination of samples and to reduce the possibility of coming into contact with groundwater containing contaminants. Prior to collecting a groundwater sample, the monitoring wells will be purged of groundwater as described in Section 3.2. The wells will be sampled in the same order they are purged and samples will be collected within 24-hours following purging. If sufficient recharge does not occur within 7 days following purging, then the well will be considered dry and a sample will not be collected. NUERA will follow the laboratory's QA/QC protocols regarding sampling containers, preservation, and holding times.

Groundwater samples will be collected off the pump discharge. The pump discharge will be regulated at the time of sampling to maintain as slow discharge rate as possible (typically 0.1 liter per minute) to minimize cascading and volatilization as the sample containers are being filled. Once the discharge rate is set for sampling, it will be maintained at that rate for several minutes so that the sample collected will not be from the period of time when the pump was operating at a higher discharge rate, and to ensure that air has been adequately purged from the discharge line. Sample containers will be held at a slight angle to allow a slow steady stream of water to run down the inner wall. The sample containers will be held as close to the pump discharge as possible without touching.If not already done, preservative should be added immediately after filling a sample container. Sample containers for VOCs will be completely filled and sealed carefully to prevent air bubbles. If an air bubble is present, then the sample will be discarded and the sample will be collected again. All other sample containers will be filled as completely as possible.

Sample containers will labeled with the well number, date and time collected, preservatives used, analyses to be run, and the sampler's initials and placed in zip-

locked plastic bags. Samples will be preserved within 15 minutes of collection and immediately placed on ice. The sample containers for each well will include as a minimum two-40 milliliter VOA glass vials with Teflon® septa screw caps for VOCs, and other bottles as provided by the laboratory.

Quality Assurance Samples

To provide screening of field procedures, trip blanks, field blanks, and field duplicates will be analyzed[5].

Trip Blank. A trip blank is a vial or bottle filled with laboratory reagent grade water. These blanks are tested to see if something contaminated the water in the bottles during transit. The purpose of the trip blank is to determine if any volatile samples have become contaminated with extraneous substances during storage and transport. Trip blanks are only necessary when collecting VOC, gasoline range organics (GRO), and petroleum volatile organic compound (PVOC) samples. Trip blanks will be prepared by the laboratory and will accompany the empty sample containers and collected samples to and from the laboratory. At least one trip blank will be prepared for each day of sampling or for every container transported to the laboratory. Trip blanks will be handled in a similar fashion as the other samples and will be analyzed for VOC constituents. If no VOCs are detected in the groundwater samples the trip blank samples do not need to be tested.

Field Blank. Field blanks, or decontamination blanks, consist of a sample of the reagent grade water supplied by the laboratory and used in the final rinse step of the equipment decontamination procedure. Field blanks evaluate the effectiveness of decontamination procedures when equipment is not dedicated to a well or disposed of after one use. Field blanks are not required if dedicated sampling equipment or disposable sampling equipment is used.

If decontamination procedures are effective, there should be no contamination in the field blanks. One field blank should be collected for every 10 or fewer samples collected. Decontaminate the sampling equipment for the field blank the same way you do when collecting other samples. After decontaminating the sampling device, fill it with laboratory reagent grade water, then collect a sample of the reagent grade water - this is your field blank. Collect the field blank from equipment used in a site's most contaminated well, if possible.

Field Duplicate. Field duplicate samples will be collected to assess the variability of the analytical results caused by the sampling equipment and procedures used. Field duplicates should be collected in wells in which the contaminant concentrations have been relatively stable over time and wells that are screened in relatively homogeneous material. This will minimize analytical variability caused by contaminant concentration gradients that may exist in the ground water system. One field duplicate should be collected for every 10 or fewer samples and handled in the same manner as the original sample; however, label them differently so the laboratory cannot tell they are duplicates.

[5] Utah Division of Solid and Hazardous Waste, Groundwater Monitoring Plan Guidance, 2006

3.3.2 Groundwater Sample Handling Procedures

Once the samples have been properly sealed and labeled as described above, they will be recorded on a chain-of-custody (COC) form and signed and dated by the sampling technician(s). An example of a typical COC is presented in Appendix C. The COC will accompany the samples to the laboratory. The samples will be placed in a plastic ice chest (similar to an Igloo ice chest) with ice or a re-freezable type product to maintain a temperature as close to 4°C as possible until the analyses are performed. Dry ice is not permitted due to the potential of freezing the samples and breaking the containers. Precautions will be taken to secure the samples in the ice chest to prevent them from breaking during transport. The samples will be delivered to the laboratory within 24-hours after collection, therefore it will not be necessary to preserve the samples in the field, except samples collected for dissolved constituent analyses. Any samples, other than the samples collected for dissolved constituent analyses, requiring preservatives will be collected in pre-preserved containers supplied by the laboratory.

3.4 Groundwater Sampling Frequency

The groundwater sampling schedule for detection monitoring consists of collecting samples from each monitoring well for the detection monitoring constituents on a semi-annual basis after background data has been established (see Section 4.1.2 for a discussion on detection monitoring constituents). Any changes to the frequency and/or number and type of constituents for detection monitoring must be approved by the Director prior to implementing the change. The schedule for establishing background data is discussed in Section 5.5.

3.5 Weather Protocol

To the extent possible, sampling of the monitor wells will not be permitted during inclement weather, thunderstorms, or periods when the temperature drops below freezing. Caution should be taken when the temperature exceeds 100°F.

3.6 Employee Health and Safety

Landfill personnel are required to participate in an ongoing safety program[6]. This program complies with the Occupational Safety and Health Administration (OSHA), and the National Institute of Occupational Safety and Health (NIOSH) regulations as applicable. This program is designed to make the site and equipment as secure as possible and to educate landfill personnel about safe work practices.

NUERA trains all of the landfill employees in First Aid, CPR, accident investigation, drug and alcohol policy, lock-out and tag-out procedures, confined space entry, blood born pathogen, hazard communication, defensive driving, spill prevention control and counter measure, hazardous waste, and commercial driving license requirements.

While in the field, personnel engaged in the monitoring program shall also adhere to the following minimum health and safety protocol.

[6] 2019 Bayview Landfill Class I Permit Renewal Application, October 30, 2019.

- **Latex gloves.** A new set of gloves shall be used for each monitoring well. Used gloves will be stored in a plastic bag and disposed in the landfill at the end of each sample event.
- **Eye protection**. Safety glasses shall be wore at all times.

If excessive contamination is detected in the groundwater sampling, NUERA will develop a more detailed health and safety plan for subsequent ground water monitoring activities. This will include purge water storage, testing, and disposal, protective clothing requirements, emergency decontamination procedures (eye wash), emergency response protocols, and medical monitoring.

3.7 Decontamination Procedures

Prior to beginning each sampling event and between monitoring wells, all non-dedicated equipment, including the water level measuring device, will be decontaminated thoroughly to minimize the potential for cross contamination. The minimum decontamination procedures will consist washing the equipment with a non-phosphate detergent solution (e.g., Alquinox® , Liquinox®) and then thoroughly rinsing the equipment with organic-free tap water[7]. Decontamination of larger items, such as dedicated pumps removed for repair, will be accomplished by steam cleaning.

4 Analytical Testing and Statistical Analysis

4.1 Laboratory Analysis

The analytical laboratory selected to perform the required analyses will be licensed and certified by the State of Utah (UAC R315-308-2(5)). At a minimum, the selected laboratory will apply quality control procedures in accordance with Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, EPA publication SW-846, Third Edition, Final Updates I (1993), II (1995), IIA (1994), IIB (1995), III (1997), IIIA (1999), IIIB (2005), IV (2008), and V (2015).

4.1.1 Laboratory Procedures

The laboratory will follow appropriate QA/QC protocols developed as part of its licensing and certification. At a minimum, upon receipt of the samples by the laboratory, the sample lot will be verified with the information on the COC. If there is a discrepancy with the samples, the responsible party that collected the samples will be notified and the problem will be resolved before the analyses are performed. The COC will be signed and dated by the designated receiving personnel at the laboratory. The COC will remain with the laboratory until the analyses are completed, then will be attached to the completed laboratory report. For samples that require overnight transport to the laboratory, the COC will be signed; including date and time received by the transporter. The COC will be attached to the sample container(s) and delivered to the laboratory and a copy of COC will be supplied by the transporter. After the analyses are completed and the laboratory

[7] Utah Division of Solid and Hazardous Waste, Groundwater Monitoring Plan Guidance, 2006

report finalized, the complete COC, or receipt if sent by certified mail, will be attached to the laboratory report. The laboratory will keep a copy of the COC and laboratory results for a period of at least three years.

The laboratory will adhere to its QA/QC plan developed as part of its licensing and certification. If possible, the laboratory will be required to achieve detection limits (DLs) that are at least one order of magnitude below the maximum contaminant levels (MCLs) for a constituent for which an MCL has been promulgated.

4.1.2 Constituents to be Analyzed and Test Methods

As specified in UAC Rule R315-308-4, the groundwater monitoring program at all solid waste landfills shall consist of detection monitoring that includes specific constituents. The constituents to be tested for during the detection-monitoring program are listed in Table 1. Testing methods used for all constituents will incorporate laboratory detection limits (DLs) that are below the Ground Water Protection Standards identified in UAC Rule R315-308-4 for each of the constituents. All samples will be analyzed within the required holding times for the particular analyses. The laboratory will report the CAS number for each constituent analyzed.

Table 4. Background/Detection Monitoring Constituents

table units

Background/Detection Monitoring Constituents[a]	
Inorganic Constituents	
Ammonia (7664-41-7)	Manganese (7439-96-5)
Carbonate/Bicarbonate	Nitrate (as N)
Calcium	pH
Chemical Oxygen Demand (COD)	Potassium
Chloride	Sodium
Iron (7439-89-6)	Sulfate
Magnesium	Total Dissolved Solids (TDS)
	Total Organic Carbon (TOC)
Heavy Metals	
Antimony (7440-36-0)	Lead
Arsenic (7440-38-2)	Mercury (7439-97-6)
Barium (7440-39-3)	Nickel (7440-02-0)
Beryllium (7440-41-7)	Selenium (7782-49-2)
Cadmium (7440-43-9)	Silver (7440-22-4)
Chromium	Thallium
Cobalt (7440-48-4)	Vanadium (7440-62-2)
Copper (7440-50-8)	Zinc (7440-66-6)

Table 4. Background/Detection Monitoring Constituents

table units

Background/Detection Monitoring Constituents[a]	
VOCs	
Acetone (67-64-1)	cis-1,3-Dichloropropene (100061-01-5)
Acrylonitrile (107-13-1)	trans-1,3-Dichloropropene (10061-02-6)
Benzene (71-43-2)	Ethylbenzene (100-41-4)
Bromochloromethane (74-97-5)	2-Hexanone (591-78-6)
Bromodichloromethane (75-27-4)	Methyl bromide (74-83-9)
Bromoform (75-25-2)	Methyl chloride (74-87-3)
Carbon disulfide (75-15-0)	Methylene bromide (74-95-3)
Carbon tetrachloride (56-23-5)	Methylene chloride (75-09-2) Methyl ethyl ketone; MEK
Chlorobenzene (108-90-7)	(78-93-3) Methyl iodide (74-88-4)
Chloroethane (75-00-3)	4-Methyl-2-pentanone (108-10-1)
Chloroform (67-66-3)	Styrene (100-42-5)
Dibromochloromethane (124-48-1)	1,1,1,2-Tetrachloroethane (630-20-6)
1,2-Dibromo-3-chloropropane (96-12-8)	1,1,2,2-Tetrachloroethane (79-34-5)
1,2-Dibromoethane (106-93-4)	Tetrachloroethylene (127-18-4)
1,2-Dichlorobenzene, ortho (95-50-1)	Toluene (108-88-3)
1,4-Dichlorobenzene, para (106-46-7)	1,1,1-Trichloroethane (71-55-6)
trans-1,4-Dichloro-2-butene (110-57-6)	1,1,2-Trichloroethane (79-00-5)
1,1-Dichloroethane (75-34-3)	Trichloroethylene (79-01-6)
1,2-Dichloroethane (107-06-2)	Trichlorofluoromethane; CFC-11 (75-69-4)
1,1-Dichloroethylene (75-35-4)	1,2,3-Trichloropropane (96-18-4)
cis-1,2-Dichloroethylene (156-59-2)	Vinyl acetate (108-05-4)
trans-1,2-Dichloroethylene (156-60-5)	Vinyl chloride (75-01-4)
1,2-Dichloropropane (78-87-5)	Xylenes (1330-20-7)

Source: UAC R315-308-4

[a] The CAS Number (if appropriate) is listed in parenthesis.

4.2 Establishment of Background Data

UAC R315-308-2 (5)(a) specifies that background data for the detection monitoring constituents (see Table 1) should be established during the first year of facility operation after wells are installed or an alternative schedule as approved by the Director. Background data consists of a minimum of eight independent samples from the upgradient and four independent samples from each downgradient well.

The background sampling for the site's original monitoring wells (DMW-1 through DMW-6) was performed from March 1991 to June 1992, at the beginning of landfill operations. Upgradient monitoring well DMW-7 was installed in 1999. Background samples were collected between 2000 to 2003. Prior to DMW-7 installation, DMW-1 served as the upgradient monitoring well.

Downgradient monitoring well DMW-9 was installed in 2004. Four background samples were collected in 2005[8], the first year of operations in Cell 2 Stage 1. Four additional samples were collected in 2006 and 2007. These samples showed no statistically

[8] Includes one sample from late 2004.

significant changes and therefore the data points were added to the background data set for the statistical analysis of subsequent samples.

The NUERA plans to install new monitoring wells adjacent to each Cell 2 Stage 3 and 4 as the cells are developed, which will be over the next 5 to 10 years. Wells will be installed one year prior to the estimated time of operations. Background data for groundwater from the new wells will be collected quarterly adhere to the protocols outlined in the cited regulations.

4.3 Statistical Methods to Evaluate Analytical Data

After each sampling event the groundwater monitoring data will be evaluated to determine if statistically significant changes from background values exist for each constituent listed in Table 1. The statistical analyses will be performed in accordance with UAC R315-308-2 (8).

The initial inter-well analysis of the groundwater chemistry indicated enough variability between wells to justify using an intra-well analysis approach. The results of the analysis were presented in a report submitted to the Utah Division of Waste Management and Radiation Control (DWMRC) on October 8, 1998. The software package, Sanitas, will be used to perform the statistical analysis of the groundwater data.

The current statistical analysis approach uses intra-well methods consisting of control charts and prediction limits. The purpose of these analyses are to determine whether there are any statistically significant changes (SSCs) in the compliance data relative to background concentrations. These methods establish limit values based on the background water quality data collected for each well.

Parametric prediction limits are flexible and straightforward to interpret. The mean and standard deviation of the background data are used to construct a concentration or prediction limit (PL) which is then compared to one or more compliance values. Compliance values are considered acceptable if they are below the PL.

Control charts are applicable in cases where the groundwater has not been contaminated. The preferred method recommended in the Unified Guidance from the U.S. Environmental Protection Agency (EPA) is the combined Shewhart-CUSUM control chart. The Shewhart portion is similar to a PL in that compliance measurements are compared against background data. The cumulative sum (CUSUM) portion sequentially analyzes each new measurement with prior compliance data. Baseline limit values are established with the mean and standard deviation of the background data.

Both parametric prediction limits and the combined Shewhart-CUSUM control charts require data to be normally distributed or transformed normal. Normality implies that the values are consistent and follow a normal, bell-shaped curve (Gaussian curve) and that the majority of the values (95%) are within two standard deviations from the mean of the concentration values. The Sanitas software tests the data for normality using the Shapiro-Wilk normality test (for data sets with 50 or fewer samples) or the Shapiro-Francia test (for data sets with more than 50 samples). The Shapiro-Wilk normality test is the preferred method based on EPA guidance. The data are not considered normal if the percentage of non-detects in the background data is greater than 50%.

A non-parametric prediction limit is used if the data set fails the normality test, cannot be transformed normal, or has greater than 50% non-detects. When a non-parametric approach is applied, the highest background concentration from the data set is used to set the prediction limit.

5 Reporting Requirements

Upon completion of each detection monitoring sampling event, the laboratory analytical data and statistical analysis of the data will be summarized in a report. The report will be submitted with the landfill's annual report unless more immediate notification is required, which is the case when statistically significant increases are observed.

5.1 Detection Monitoring

When a statistically significant increase over background data has been detected, the owner or operator must enter the information in the operating record and notify the Director of this finding in writing within 14 days of the completion of the statistical analysis of the sample results and within 30 days of the receipt of the sample results (UAC R315-308-2 (11)(a). The notification must indicate what constituents have shown statistically significant increases. In addition, the owner or operator must immediately resample groundwater in all monitoring wells for the constituents listed in Table 1. If a statistically significant increase is still present after resampling, the owner or operator must notify the Director in writing within seven days of the completion of the statistical analysis of the sample results. However, if the statistically significant increase over background data is believed to be caused by a source other than the landfill, then the owner or operator can prepare a report that explains the cause of the significant change. This report must be prepared and certified by a qualified groundwater scientist and submitted to the Director within 90 days after the sampling event for approval.

5.2 Assessment Monitoring

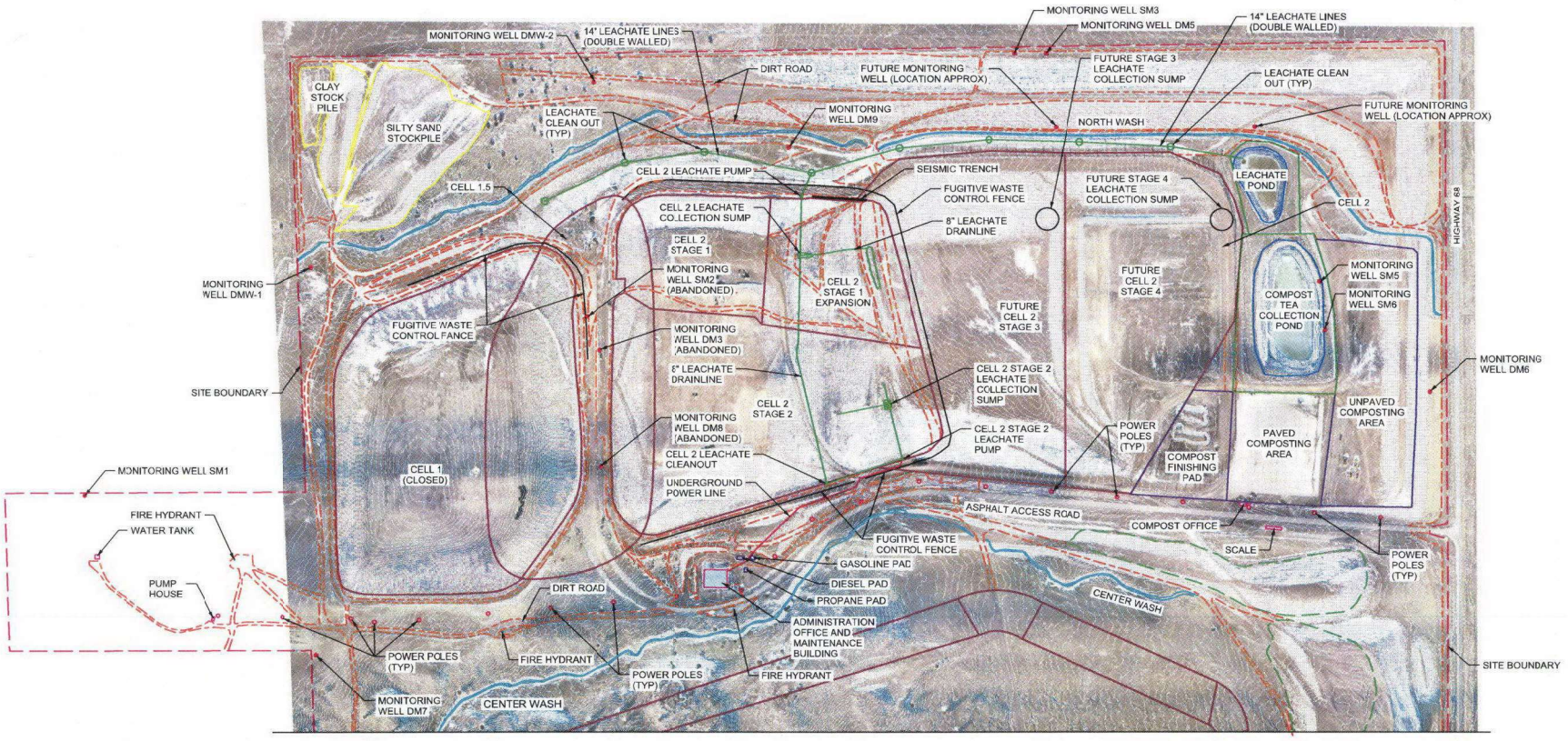
If the Director approves the report, then the landfill may return to Detection Monitoring. If the Director believes a satisfactory explanation is not given, the owner or operator must initiate the assessment monitoring program described in R315-308-2 (12).

5.3 Corrective Action

If after implementation of the assessment monitoring program, a successful demonstration is not made as described in R315-308-2(13)(e), NUERA will work with the Director to define the corrective actions to protect human health and the environment.

APPENDIX A

Bayview Municipal Solid Waste Landfill Site Map



SCALE 1:100

250 0 500 1000 1500 FEET

REVISIONS

NO. DATE APPROVED BY REMARKS

DRAWN BY

QC CHECKED BY

PIN

PROJECT

PROJECT NUMBER

SHEET NO.

APPENDIX B

Field Data Collection Form

GROUNDWATER MONITORING PROGRAM
BAYVIEW MUNICIPAL SOLID WASTE LANDFILL
NORTHERN UTAH ENVIRONMENTAL RESOURCE AGENCY

DATE:

SAMPLED BY:

RECORDED BY:

WEATHER:

Well Number	Depth of Well (feet)	Depth to Water (feet)	Temperature C___ F___	pH	Conductivity	Comments
DMW-1	300					
DMW-2	278					
DMW-3	308					
DMW-4	195					
DMW-5	210					
DMW-6	166					
DMW-7	295					
DMW-8	270					
DMW-9	242					

APPENDIX C

Typical Chain Of Custody

CHEMTECH - FORD ANALYTICAL LABORATORY

CHAIN OF CUSTODY

COMPANY: _____

ADDRESS: _____

CITY/STATE/ZIP: _____

PHONE #: _____ FAX: _____

CONTACT: _____ PROJECT: _____

EMAIL: _____

BILLING ADDRESS: _____

BILLING CITY/STATE/ZIP: _____

PURCHASE ORDER #: _____

CHEMTECH-FORD LABORATORIES

TURNAROUND REQUIRED:* _____

** Expedited turnaround subject to additional charge*

Lab Use Only	CLIENT SAMPLE INFORMATION					TESTS REQUESTED															Bacteria			
	LOCATION / IDENTIFICATION	DATE	TIME	MATRIX	Field: Residual Chlorine																Total Coliform + E. coli (Present/Absent)	Total Coliform + E. coli (Enumerated)	HPC (Plate Count)	E. Coli Only
	1.																							
	2.																							
	3.																							
	4.																							
	5.																							
	6.																							
	7.																							
	8.																							
	9.																							
	10.																							

Sampled by: [print] | Sampled by: [signature]

ON ICE NOT ON ICE Temp (C°):

Special Instructions:

Samples received outside the EPA recommended temperature range of 0-6 C° may be rejected.

Relinquished by: [signature]	Date/Time	Received by: [signature]	Date/Time
Relinquished by: [signature]	Date/Time	Received by: [signature]	Date/Time
Relinquished by: [signature]	Date/Time	Received by: [signature]	Date/Time

CHEMTECH-FORD
9632 South 500 West
Sandy, UT 84070

801.262.7299 PHONE
866.792.0093 FAX
www.ChemtechFord.com

Payment Terms are net 30 days OAC. 1.5% interest charge per month (18% per annum). Client agress to pay collection costs and attorney's fees.