

Groundwater Monitoring Plan

Draft

February 4, 2021

Prepared by

NewFields

9400 Station Street, Suite 300

Lone Tree, CO 80124

Tel 720 508 3300 Fax 720 508 3339

www.newfields.com

Table of Contents

Section 1	Introduction	1-1
	1.1 Plan Purpose	1-1
	1.2 Local Hydrogeology	1-1
	1.3 Storage Cavern Field Groundwater Monitoring	1-3
	1.4 Brine Evaporation Pond Groundwater Monitoring.....	1-4
Section 2	Groundwater Monitoring Methods	2-1
	2.1 Storage Cavern Field Groundwater Level Monitoring Methods	2-1
	2.2 Storage Cavern Field Groundwater Quality Monitoring Methods	2-2
	2.3 Brine Evaporation Ponds Groundwater Quality Monitoring Methods	2-3
	2.3.1 Exceedances.....	2-4
Section 3	Agency Reporting and Notification.....	3-1
	3.1 Storage Cavern Field Groundwater Level Reporting and Notification	3-1
	3.2 Storage Cavern Field Groundwater Quality Reporting and Notification.....	3-1
	3.3 Brine Evaporation Pond Groundwater Quality Reporting and Notification.....	3-1
	3.4 Brine Evaporation Pond Leak Detection System Reporting, Notification, and Corrective Action.....	3-3
Section 4	Record Retention.....	4-1
	4.1 Records	4-1
 Tables		
	Table 1: Summary of Local Hydrology	1-2
	Table 2: Storage Cavern Field Groundwater Level Monitoring Schedule	2-2
	Table 3: Storage Cavern Field Groundwater Quality Monitoring Schedule	2-3
	Table 4: DWQ Interim Groundwater Protection Levels.....	2-4
	Table 5: Brine Evaporation Pond Groundwater Quality Monitoring Schedule.....	2-4
	Table 6: Brine Evaporation Pond Maximum Allowable Leakage Rates	3-4
 Figures		
	Figure 1 Hydrostratigraphy of the Project Area	1-3
	Figure 2 Aquifer Monitoring Well Network.....	1-5
 Appendices		
	Appendix A. Groundwater Sampling Quality Assurance Procedures	
	Appendix B. Monitoring Forms	

This page left intentionally blank.

DRAFT

Section 1

Introduction

1.1 Plan Purpose

This Groundwater Monitoring Plan has been developed to describe the processes and procedures for groundwater monitoring and agency reporting for the Magnum Solution Mining, LLC (Company) hydrogen production and storage facility. The facility is located approximately ten miles north of Delta in Millard County, Utah on lands leased from the School and Institutional Trust Lands Administration (SITLA). The storage facility consists of a Storage Cavern Field; a series of electrolyzer banks, an approximately 168-acre brine pond; a substation with an associated electric distribution and high voltage system; office and warehouse buildings; water production wells; and associated buried piping and utilities. The monitoring procedures in this Plan pertain only to the monitoring of potential effects to groundwater relative to the construction and operation of storage caverns within the Storage Cavern Field and the operation of the brine pond.

The Company has committed to groundwater monitoring within the confines of the facility using a network of existing and proposed groundwater production, observation and monitoring wells. Groundwater monitoring activities for the facility are under the jurisdiction of the Department of Environmental Quality, Division of Water Quality (DWQ). The Plan is written to comply with the requirements of all project permits.

1.2 Local Hydrogeology

Groundwater beneath the hydrogen storage facility occurs in unconsolidated sediments within the Sevier Desert Basin aquifer system. Four aquifers units are of interest (from shallowest to deepest):

- The water table aquifer;
- The shallow artesian aquifer;
- The deep artesian aquifer; and
- The basement aquifer.

Table 1 provides a summary of the four aquifers. Figure 1 is a graphical depiction of the aquifers' hydrostratigraphy. The aquifers depths have been refined utilizing a geologic model constructed based on drilling data from wells constructed by the Company.

There is currently a network of groundwater production, observation and monitoring wells for monitoring groundwater levels and groundwater quality within the aquifers depicted in Figure 1. The Company also has permission from the adjacent landowners to monitor groundwater levels in their respective water production wells. Figure 2 depicts the location of the network of groundwater wells that will be used for groundwater monitoring.

Table 1: Summary of Local Hydrology

Depth (feet bgs)	Aquifer Name	Aquifer Description and Use
0 to 250	Water table aquifer	The water table aquifer is unconfined and generally not used within the area due to high total dissolved solids and poor quality conditions. (The Sawtooth GA and the Company's B-P wells are currently used to monitor water quality)
300 to 600	Shallow artesian aquifer	Confining zones vary in thickness and location and can include several hundred feet of the identified depths. This aquifer is generally used for agricultural and drinking water purposes. (The Sawtooth DA wells and Egg Farm off-site well are currently used to monitor water levels)
700 to 1,400	Deep artesian aquifer	Confining zones vary in thickness and location and can include several hundred feet of the identified depths. This aquifer is generally used for industrial and drinking water purposes. This is the aquifer from which water will be produced for the facility. (The Sawtooth DA wells and the IPP off-site well are currently used to monitor water levels)
> 1,650 to 3,000	Basement aquifer	This aquifer extends to bedrock or the salt structure and includes several small inter-bedded sand and gravel units within significant silt and clay zones. (Sawtooth currently owns and operates the MH wells to monitor water levels and quality and DA wells to monitor water levels)

DRAFT

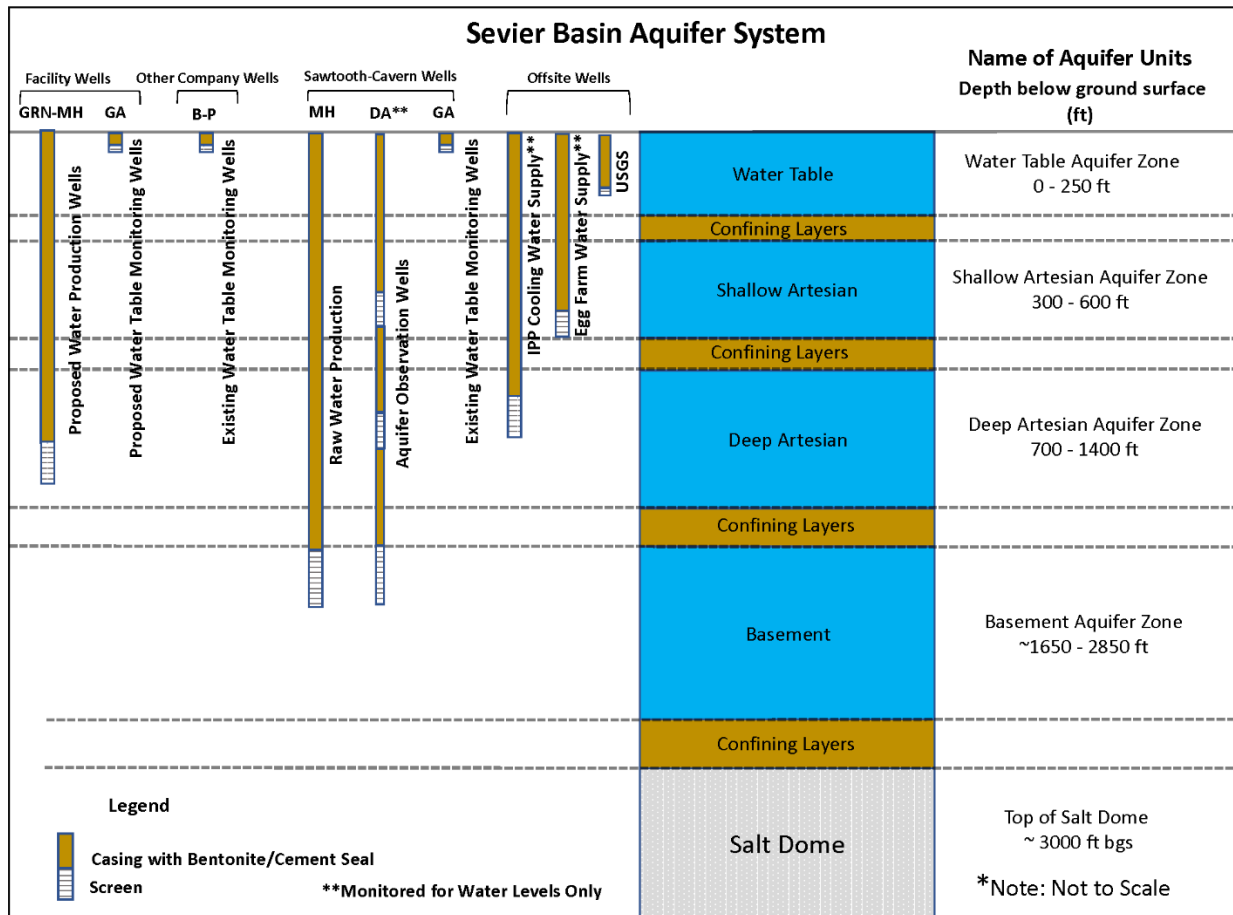


Figure 1 Hydrostratigraphy of the Project Area

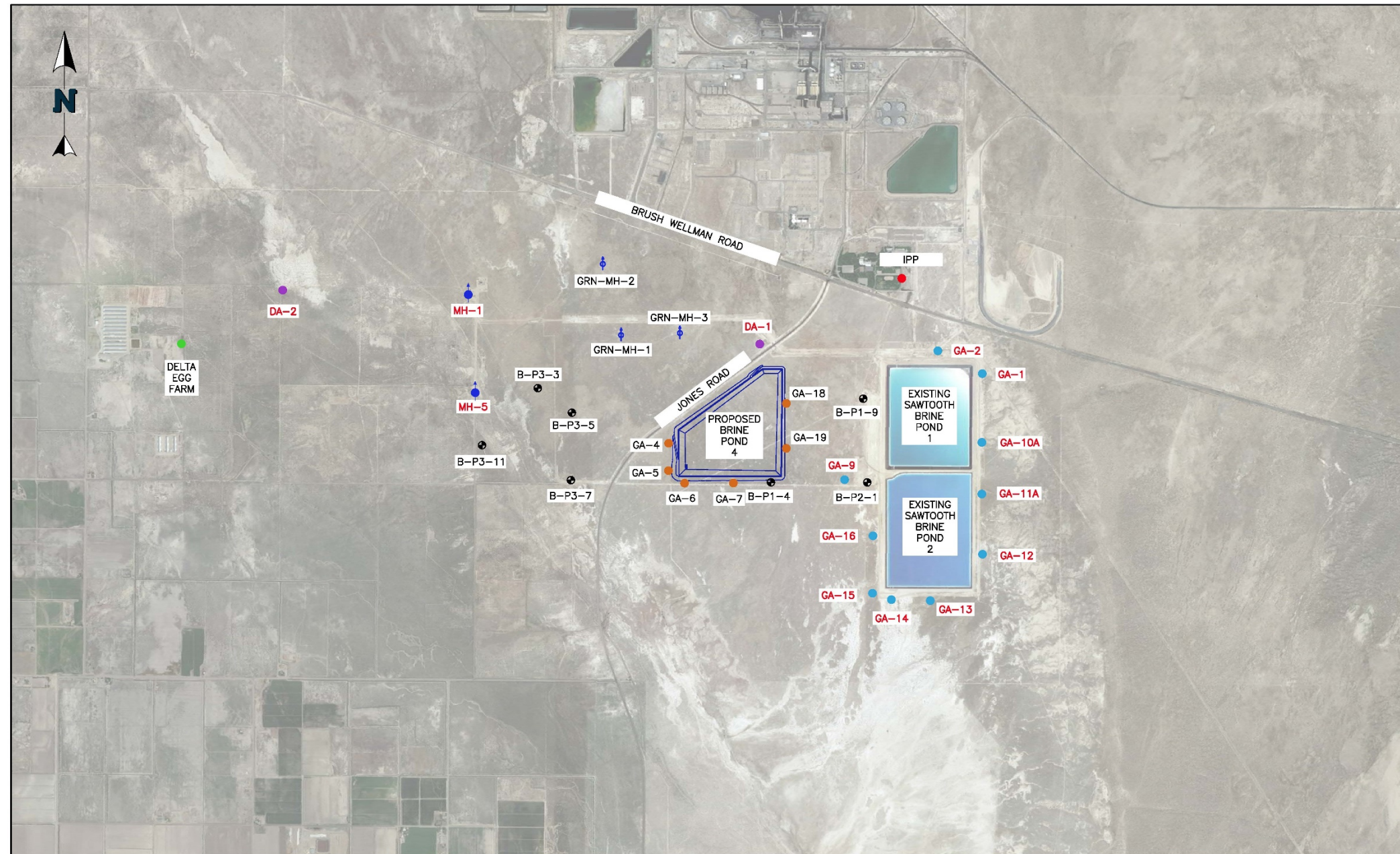
1.3 Storage Cavern Field Groundwater Monitoring

Groundwater monitoring activities associated with the storage caverns will entail both groundwater level and groundwater quality monitoring. The storage caverns will be constructed in a salt formation that is located approximately 3,000 feet below the ground surface (bgs) using standard solution mining technology. Water for the solution mining process will be obtained through off-site water supply agreements and/or from three proposed water production wells (GRN-MH-1, GRN-MH-2, and GRN-MH-3; see Figure 2). Water chemistry testing indicates that water from the basement aquifer is not suitable for all facility components (e.g.: cooling towers), therefore the Company is proposing to produce groundwater for this facility from the deep artesian aquifer. While multiple hydrological analyses indicate that Company’s production from the deep artesian and basement aquifers will not drawdown the overlaying shallow artesian aquifers, the Company has committed to monitoring the shallow artesian, deep artesian, and basement aquifers to ensure groundwater levels are not negatively affected by solution mining activities (see Table 1 and Figure 1).

In addition to water level monitoring, the Company has also committed to monitoring groundwater quality in the deep artesian aquifer during solution mining and storage cavern operations.

1.4 Brine Evaporation Pond Groundwater Monitoring

Groundwater monitoring activities associated with the brine evaporation ponds will entail groundwater quality monitoring and leak detection system monitoring to protect the water table aquifer. The 168-acre pond will be constructed with a double geomembrane liner system with a leak detection system composed of a Leak Collection and Recovery System (LCRS) between the liners and a Process Component Monitoring System (PCMS) below the liners. The purpose of monitoring the leak detection system is to ensure that the system is working in accordance with the pond design, thereby reducing the potential for significant leaks through the bottom pond liner. In addition, groundwater monitoring wells around the perimeter and on the berms of the pond will be installed in the water table aquifer, as shown in Figure 2. The purpose of the monitoring wells is to monitor water level and for elevated conductivity, sodium, TDS, or chloride levels that could indicate a leak in the double liner system. In sum, the design provides for three levels of protection to ensure groundwater quality in the water table aquifer is not negatively affected by the brine pond: 1) the double geomembrane liner system; 2) the dual leak detection and collection system; and 3) the network of groundwater monitoring wells.



LEGEND:

- PROPOSED BRINE POND
- GA-4 PROPOSED WATER TABLE AQUIFER MONITORING WELL
- GRN-MH4 PROPOSED DEEP ARTESIAN AQUIFER WATER PRODUCTION WELL

EXISTING SAWTOOTH WELLS:

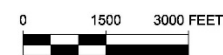
- GA-1 WATER TABLE AQUIFER MONITORING WELL
- MH-1 BASEMENT AQUIFER WATER PRODUCTION WELL
- DA-2 MULTI-AQUIFER MONITORING WELL

OTHER WELLS:

- DELTA EGG FARM SHALLOW ARTESIAN AQUIFER WATER PRODUCTION WELL
- IPP DEEP ARTESIAN AQUIFER WATER PRODUCTION WELL
- B-P1-4 MAGNUM WATER TABLE AQUIFER MONITORING WELL

NOTES:

1. AERIAL IMAGE WAS OBTAINED FROM GOOGLE EARTH AND IS DATED AUGUST 19, 2019



	CLIENT	MAGNUM SOLUTION MINING, LLC	
	PROJECT	BRINE POND 4	
TITLE	AQUIFER MONITORING WELL NETWORK	FILENAME	475.0093.020.GWDP.1-1
		FIGURE NO.	APP.D.2
		REVISION	B

Figure 2 - Aquifer Monitoring Well Network

This page left intentionally blank.

DRAFT

Section 2

Groundwater Monitoring Methods

Baseline data for the groundwater system that the facility will be producing from has been collected since 2009. Baseline data collection for groundwater level in the shallow artesian, deep artesian, and basement aquifers was first initiated in 2009 when MH-1 was first drilled and developed, and has continued as MH-5, DA-1 and DA-2 have been drilled and developed. (Water production wells MH-1 and MH-5, and the multi-aquifer monitoring wells DA-1 and DA-2, were previously owned by the Company). Data collection for groundwater level baseline conditions also includes data collected since 2009 from an Intermountain Power Agency (IPA) industrial water well, a private commercial water well owned by the Delta Egg Farm, and a well installed and monitored by the U.S. Geological Survey (USGS). Baseline data for groundwater levels and quality of the water table aquifer directly beneath the brine evaporation ponds have been collected since 2010. These baseline conditions are kept on file at the facility and are incorporated into the required agency reporting as necessary.

2.1 Storage Cavern Field Groundwater Level Monitoring Methods

The facility will conduct groundwater level monitoring in association with the storage caverns using a network of proposed and existing groundwater production and observation wells that are located both within the facility and off-site. The wells within the facility that will be used to monitor groundwater levels are the planned production wells GRN-MH-1 through GRN-MH-3 as they are drilled and put into service. The off-site wells that will be used to monitor groundwater levels include Sawtooth's MH-1 and MH-5 water production wells and observation wells DA-1 and DA-2, an industrial water well owned by the Intermountain Power Agency (IPA), and a private commercial water well owned by the Delta Egg Farm. Figure 2 depicts the location of all the wells that will be used for groundwater level monitoring. This network of wells will allow the Company to monitor groundwater levels in the shallow artesian, deep artesian, and basement aquifers. Figure 1 illustrates the individual well depths and monitoring points in relation to the groundwater system. Note that the Company will only be able to monitor the groundwater aquifer conditions from the off-site locations with landowner cooperation.

Existing monitoring wells are equipped with transducers to measure groundwater levels; future wells will be similarly equipped. The transducers are installed within monitoring tubes located within the production casings of the individual wells. Each of the Sawtooth, Delta Egg Farm and the IPA water wells each have a single monitoring tube installed to monitor the respective aquifer in which each well is completed. DA-1 and DA-2 are equipped with monitoring tubes that enable monitoring of shallow artesian, deep artesian, and basement aquifers.

The data loggers connected to each transducer have been set to record groundwater level measurements daily. Data from the transducers at each monitoring well will be downloaded and analyzed monthly during periods of solution mining. Groundwater level measurements will be documented to the nearest 0.1 foot. The functionality of transducers will be checked monthly the first year of operations and quarterly thereafter; adjustments to transducer settings will be made accordingly. Table 2 summarizes the groundwater level monitoring schedule as described above.

Table 2: Storage Cavern Field Groundwater Level Monitoring Schedule

Well	Aquifer Monitoring Point	Data Collection Interval	Data Download and Analysis Frequency ¹
GRN-MH-1 – GRN-MH-3 Water Production Wells ²	Deep artesian	Daily	Monthly
Sawtooth DA-1 and DA-2 Observation Wells ³	Shallow artesian, deep artesian, and basement	Daily	Monthly
Sawtooth MH-1 and MH-5	Basement	Daily	Monthly
IPA Water Production Well ⁴	Deep artesian	Daily	Monthly
Delta Egg Farm Water Production Well ⁵	Shallow artesian	Daily	Monthly
USGS Well	Shallow artesian	Daily	As available ⁶

¹Data will be downloaded and analyzed monthly during periods of solution mining, quarterly otherwise.

²Planned Company-owned wells.

³Wells owned by Sawtooth NGLs, LLC. Owner permission required to monitor.

⁴Well owned by Intermountain Power Agency. Owner permission required to monitor.

⁵Well owned by Delta Egg Farm. Owner permission required to monitor.

⁶Data recorded daily by USGS but made publicly available at irregular intervals, approximately every six months.

2.2 Storage Cavern Field Groundwater Quality Monitoring Methods

The Company will conduct groundwater quality monitoring in association with the hydrogen storage caverns using the planned production wells GRN-MH-1 through GRN-MH-3. These wells are proximal to the storage cavern field and will produce water from the deep artesian aquifer at elevations between 700 to 1,400 feet bgs (see Figures 1 and 2).

Groundwater samples will be collected monthly from GRN-MH-1, GRN-MH-2, and GRN-MH-3. Groundwater sampling methods will be per the Groundwater Sampling Quality Assurance Procedures included as Appendix A. The sampling methods include:

- Water samples will be collected from the sample port that is closest to each wellhead.
- A hand-held multi-gas meter will be used to monitor the headspace of each well for the presence of combustible gas, including but not limited to hydrogen and hydrocarbons, prior to sampling. If combustible gas is detected, subsequent analysis can be done.
- The water level will be measured prior to sampling.
- Samples will be collected directly into laboratory-provided containers and delivered per the laboratory-required protocols.
- Information pertinent to the sampling effort will be documented on preprinted field sheets.
- The handling of all samples collected will be traceable from the time of collection, through analysis, until final disposition. Documentation of the sample history is referred to as chain-of-custody.

- Samples will be sent to and analyzed by a State of Utah certified laboratory for the analysis of sodium, chloride, and total dissolved solids.

Table 3 summarizes the groundwater quality monitoring schedule associated with the storage caverns as described above.

Table 3: Storage Cavern Field Groundwater Quality Monitoring Schedule

Well	Aquifer Monitoring Point	Water Sample Frequency
GRN-MH-1 – GRN-MH-3 water production wells ¹	Deep artesian	Monthly

¹ Planned facility-owned wells.

2.3 Brine Evaporation Ponds Groundwater Quality Monitoring Methods

The Company will conduct groundwater quality monitoring of the water table aquifer in association with the brine evaporation ponds using the proposed monitoring wells GA-4, GA-5, GA-6, GA-7, GA-18, and GA-19. Following an accelerated sampling program and data evaluation, this list might be modified. These wells are placed in an array around and on the berms of the brine evaporation ponds (see Figure 2). All wells will be installed to a depth within the water table aquifer zone (see Figure 1 and Figure 2). GA-18 and GA-19 are intended to monitor upgradient groundwater quality of the brine evaporation ponds; the remaining wells are intended to monitor groundwater quality downgradient of the ponds. Water level measurements also will be taken during monitoring events.

Groundwater monitoring of the water table aquifer will be conducted in accordance with the requirements of the DWQ GWDP. The water table aquifer groundwater monitoring plan includes

- Monthly field parameter data collection for pH, temperature, TDS, and conductivity; and,
- Quarterly laboratory analysis for the parameters identified in Table 4.

In accordance with DWQ GWDP #(Insert New Permit Number), the Company will conduct field monitoring monthly for the parameters above. Monthly field monitoring will be conducted for a period of 24 months after the initiation of commercial operations. After the first 24 months of commercial operations, the frequency of field monitoring will be reduced to quarterly.

In addition, the DWQ GWDP requires Accelerated Background Monitoring on a quarterly basis for a period of 24 months to establish ground water protection levels for the storage facility. Accelerated Background Monitoring will initially include both the collection of field parameters and collection of groundwater samples for laboratory analysis on a quarterly basis for the parameters above. Analysis of all groundwater samples will be performed by laboratories certified by the Utah Department of Health, will follow methods cited in Utah Administrative Code (UAC) R317-6-6.3L, and will ensure that method detection limits are less than the Interim Ground Water Protection Levels for the water table aquifer zone described in Table 4.

After completion of the Accelerated Background Monitoring, the Company will submit an Accelerated Background Monitoring Report to the DWQ. After review and approval of the Accelerated Background Monitoring Report, the Director of DWQ (the Director) will establish

well-specific groundwater protection levels for each parameter in accordance with R317-6-4 of the Ground Water Quality Protection Rules. After specific well protection measures have been identified, sampling will be reduced to a semi-annual frequency.

Table 4: DWQ Interim Groundwater Protection Levels

Parameter	Protection Level (mg/L)
pH (units)	6.5 – 8.5 ¹
Chloride	150
Sodium	200
Total Dissolved Solids	750

¹Class II Groundwater Quality Standard

Table 5 summarizes the groundwater quality monitoring schedule for the evaluation of the DWQ Groundwater Quality Standards in the vicinity of the brine evaporation pond.

Table 5: Brine Evaporation Pond Groundwater Quality Monitoring Schedule

Well	Aquifer	Field Monitoring (0-24 mos.)	Field Monitoring (after 24 mos.)	Accelerated Background Monitoring (0-24 mos.)	Compliance Monitoring (after 24 mos.)
GA Monitoring Wells	Water table aquifer	Monthly	Quarterly	Quarterly	Semi-annual

2.3.1 Exceedances

Upon exceedance in a downgradient monitoring well of any one parameter listed in Table 4, the monitoring well(s) in which the exceedance was(were) detected will immediately be resampled for laboratory analysis of the exceeded protection level parameter(s). The analytical results will be submitted to the DWQ, and the Director will be notified of a probable out-of-compliance status within 30 days of the initial detection.

Upon exceedance of any one parameter listed in Table 4 for two consecutive sampling events, the Company will immediately notify the DWQ and Millard County and implement an accelerated schedule of monthly sampling and analysis. This monthly schedule will continue for at least two months or until the compliance status can be determined by the Director. Reports of the results of this sampling will be submitted to the Director as soon as they are available, but not later than 30 days from each date of sampling.

If the protection level for a parameter listed in Table 4 is exceeded in two consecutive samples from a compliance monitoring well, the well is out of compliance. The Director will be notified verbally of the exceedance within 24 hours of the receipt of data demonstrating out-of-compliance status; written notice will be provided within 5 days. Accelerated monthly groundwater monitoring will continue for at least two months, and until the facility is brought into compliance, or as determined by the Director.

Within 30 days after the written notice to the Director of out-of-compliance status, the Company will submit an assessment study plan and compliance schedule for:

- 1) Assessment of the source or cause of the contamination, and determination of steps necessary to correct the source.
- 2) Assessment of the extent of the ground water contamination and any potential dispersion.
- 3) Evaluation of potential remedial actions to restore and maintain ground water quality and ensure that the ground water standards will not be exceeded at the compliance monitoring wells.

Millard County will be immediately notified of any monitoring well that is out of compliance.

DRAFT

Section 3

Agency Reporting and Notification

3.1 Storage Cavern Field Groundwater Level Reporting and Notification

During the first year of solution mining, the Company will submit monthly water level measurement reports to Millard County during periods of solution mining. The reports will include water level as measured in depth to ground water from the surveyed casing measuring point, and ground water elevations as converted by casing measuring point elevations. The report will also include a graphical depiction of the water level data from all monitored wells. The Company will also submit an annual Water Rights and Water Usage Summary and Analysis to the State Engineer and Millard County by April 30 for the previous year in which solution mining activities have been conducted.

The facility managers will initiate a detailed internal review with a professional engineer/hydrogeologist if a sustained change in water levels greater than 12 feet below the historic recorded low is documented within the shallow and deep artesian aquifers in off-site monitoring wells. Once the internal review is complete, facility managers will meet with the owner of the off-site well, the Company or facility's professional engineer/hydrogeologist, and the State Engineer to review and coordinate any necessary action. The Company will notify Millard County of any official determination made by the State Engineer.

3.2 Storage Cavern Field Groundwater Quality Reporting and Notification

The Company will prepare and file quarterly groundwater quality monitoring reports with the required agencies. The reports will include the groundwater analysis results and groundwater level measurements for each monitoring well. Reports will be submitted per the following schedule:

- First Quarter Report (January, February, March) – Due April 30.
- Second Quarter Report (April, May, June) – Due July 31.
- Third Quarter Report (July, August, September) – Due October 31.
- Fourth Quarter Report (October, November, December) – Due Jan 31.

The Company will immediately consult with agencies on an appropriate course of action if:

- Sodium or chloride concentrations measured in a groundwater sample are higher than the baseline concentrations by a factor of two.
- Combustible gases traceable to storage products are detected in the headspace of a well.

3.3 Brine Evaporation Pond Groundwater Quality Reporting and Notification

Quarterly groundwater quality monitoring reports will be submitted to the required agencies per the following schedule:

- First Quarter Report (January, February, March) – Due April 30.

- Second Quarter Report (April, May, June) – Due July 31.
- Third Quarter Report (July, August, September) – Due October 31.
- Fourth Quarter Report (October, November, December) – Due Jan 31.

The Company will also submit an Accelerated Background Monitoring Report to the required agencies per the requirements of the DWQ GWDP after eight quarterly sample events have been completed. The report will include all field data sheets (see Appendix B), laboratory analytical reports, and the following statistical calculations by well, presented in spreadsheet format for the interim groundwater protection parameters listed in Table 4.

- Non-detect values converted to the detection limit times 0.25
- Mean concentration
- Standard deviation
- Mean concentration plus 2 standard deviations
- Mean total dissolved solids concentration times 1.25
- Mean concentration of all other parameters times 1.25
- Ground water quality standard times 1.25

After Accelerated Background Monitoring is completed and the Director establishes well-specific groundwater protections parameters, ongoing groundwater quality monitoring reports will include the following information:

- Field Data Sheets (see Appendix B), or copies thereof, including the field measurements required as identified in Section 3.3 above, and other pertinent field data, such as well name/number, date and time, names of sampling crew, depth to water, type of sampling pump or bail, volume of water purged before sampling.
- Laboratory Analytical Results, including date sampled, date received; and the results of analysis for each parameter, including the value or concentration, units of measurement, reporting limit (minimum detection limit for the examination), analytical method, and the date of the analysis.
- A summary table of the analytical results from the current and previous monitoring events, a discussion of whether the monitoring wells comply with groundwater protection parameters, an evaluation of temporal and spatial trends in the data, a discussion laboratory data quality assurance/quality control, and any other information pertinent to the monitoring even.

3.4 Brine Evaporation Pond Leak Detection System Reporting, Notification, and Corrective Action

Leak detection system (LCRS and PCMS) monitoring will be reported monthly. The reports will be submitted to the required agencies and will include:

- A verification that the inspection schedule is being maintained;
- A verification that the measured LCRS and PCMS Maximum Allowable Leakage rates in Table 6 below have not been exceeded;
- The volume of fluid pumped from the LCRS and PCMS sumps, tabulated either daily or monthly depending on the monitoring interval;
- The disposition of any fluids pumped from the LCRS and PCMS sumps; and,
- If the Maximum Allowable Leakage Rates have been exceeded, the Director will be notified verbally as soon as possible, but no later than 24 hours after the Company becomes aware of the exceedance. The report shall be made to the Utah Department of Environmental Quality 24-hour number, (801) 536-4123, or to the Division of Water Quality, Ground Water Protection Section at (801) 536-4300, during normal business hours (Monday through Friday 8:00 am - 5:00 pm Mountain Time).
- Electronic and written submission will also be provided to the Director within five days of the time that the Company becomes aware of the exceedance. The electronic data in the format specified by the Director (e-mail, compact disc, or another approved transmittal mechanism). The written submission will contain:
 - A description of the exceedance and its cause;
 - The period of exceedance, including exact dates and times;
 - The estimated time the exceedance is expected to continue if it has not been corrected; and,
 - Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the exceedance.
- Out-of-compliance conditions will be evaluated by daily monitoring of pumping rates from the LCRS and PCMS sumps during the filling of the pond.
 - A sudden spike in flows indicates one or more leaks. Filling will be halted, and the pond will be inspected to determine the source of the leaks.
 - After the leak(s) is(are) identified and repaired, filling will continue, while continuing to monitor flows.
- After the pond has been filled and leakage rates stabilize or decline, the pumping rate of fluids pumped from the LCRS and PCMS sumps and returned to the pond will be monitored weekly and compared to the Maximum Allowable Leakage Rates.
- The maximum head in the LCRS sump will be managed by pumping leakage collected in sump back into the pond. Fluid will be pumped from the sump such that it is not necessary to pump at a rate greater than the Action Leakage Rates in Table 6 below.

- If a leak develops after filling the pond, the first step will be to monitor head in the space between the liners to narrow the location of the leak(s) to allow focused inspections and to confirm that head has been controlled between the liners.
 - If elevated head between the liners is identified as the source of leakage, head control will be reestablished as described in the Brine Evaporation Ponds Operating Manual.
 - If excessive leakage occurs because of a liner failure, the liner will be repaired prior to introducing additional fluids into the pond.

Table 6: Brine Evaporation Pond Maximum Allowable Leakage Rates

Monitoring System Component	Maximum Allowable Leakage Rate	Action Leakage Rate ¹
LCRS Sump	460 gallons per minute	370 gallons per minute
PCMS Sump	14.0 gallons per minute	11.2 gallons per minute

¹The Action Leakage Rate for each component is 80 percent of the respective Maximum Allowable Leakage Rate.

This page left intentionally blank.

DRAFT

Section 4

Record Retention

4.1 Records

The Company will retain copies at the storage facility of all monitoring data sheets, laboratory analyses and agency reports associated with groundwater level, water quality, and leak detection system monitoring. These records will be kept for the operational life of the facility.

DRAFT

This page left intentionally blank.

DRAFT



Appendix A
Groundwater Sampling Quality
Assurance Procedures

GROUNDWATER SAMPLING QUALITY ASSURANCE PROCEDURES

1.0 SAMPLING PROCEDURES

Groundwater samples will be collected monthly from production wells GRN-MH-1, GRN-MH-2, and GRN-MH-3, and analyzed for sodium, chloride, total dissolved solids, and dissolved gases. Groundwater samples from the water table aquifer monitoring wells GA-4, GA-5, GA-6, GA-7, GA-18, and GA-19 will be collected monthly initially, moving to semi-annually. Sampling events will be documented on field forms and reported in quarterly reports. Basic sampling procedures are as follows:

- Prior to sampling GRN-MH-1, GRN-MH-2, and GRN-MH-3, a hand-held multi-gas meter will be used to monitor the headspace of each well for the presence of combustible gases, including but not limited to hydrogen and hydrocarbons.
- Prior to sampling all monitoring wells, water levels also will be measured.
- Groundwater sampling will be performed by collecting a sample directly from the sample port that is closest to each wellhead in the case of GRN-MH-1, GRN-MH-2, and GRN-MH-3. In the case of the GA wells, sampling will be performed directly from the well.
- Each well will be purged prior to sampling. A minimum of three volumes of water in the well casing will be removed, unless the well runs dry. A well that runs dry will be revisited and sampled once the water level has recovered and sufficient water is available for sampling.
- Because exact flow rates are unknown, the well pumping and sampling point purge rates will be recorded.

2.0 SAMPLING QUALITY CONTROL

The quality control (QC) objective is to ensure that data are not biased by contamination or sampling error.

To meet this objective, the following QC samples will be collected in the field:

- Field duplicates will be collected with a minimum of 1 for every 10 samples. Field duplicates will be collected from the same source at the same time as the primary sample. The field duplicate will be labeled differently than the parent sample in order to appear as a separate sample to the analytical laboratory.

Matrix spike/matrix spike duplicate (MS/MSD) samples will not be collected. MS/MSDs will be analyzed by the analytical laboratory for each batch of samples run, but not necessarily from the samples collected at the site.

3.0 FIELD DOCUMENTATION

Information pertinent to the sampling effort will be documented on preprinted field sheets or bound logbooks. All entries will be made in indelible ink and all corrections will be made by drawing one line through the error and initialing and dating the correction.

At a minimum, entries on field documentation will include the following:

- Date,
- Project,
- Identification of sampling team members, and,
- Location and description of sampling points.
- Static water levels,
- Date and time of sample collection,
- Sample identification,
- Sampling methodology,
- Field observations, and
- Field instrument calibration results.

Documentation will contain sufficient information to reconstruct the sampling activity without relying on the sampler's memory. The field documentation will be kept on file at the sampling contractor's office.

4.0 DECONTAMINATION PROCEDURES

Because no field equipment will come into contact with groundwater samples, decontamination procedures are not required.

5.0 SAMPLE ANALYSIS AND CONTAINERS

Samples will be analyzed by a Utah certified laboratory for the following:

- Sodium by USEPA Method 200.7;
- Chloride by USEPA Method 300.0;
- Total Dissolved Solids by USEPA Method SM2540C; and
- Dissolved Gases by USEPA Method
- or equivalent.

6.0 SAMPLE HANDLING

At the time of sample collection, labels will be affixed to the sample containers. These labels will contain the following information:

- Sample identification number,
- Date and time of sampling,
- Preservative,

- Analyses requested, and
- Name of sampler.

Samples will be collected directly into laboratory-provided containers and placed on ice in an insulated cooler. All samples will be identified, labeled, and logged onto a chain-of-custody (COC) form, and handled under standard COC protocol. Samples will be considered to be under a person's custody if they remain:

- In a person's physical possession,
- In view of the person after he/she has taken possession,
- Secured by that person so that no one can tamper with the sample, or
- In a secure area accessible only to authorized personnel.

To establish the documentation necessary to trace sample possession from the time of collection, the COC record must be completed and accompany every sample shipment. At a minimum, COC records should contain the following information:

- Project name,
- Sample identification,
- Date and time of sample collection,
- Type of matrix,
- Number of containers,
- Preservative,
- Analyses requested,
- Method of shipment,
- Signature of sampler, and
- Date and time of each change in custody.

Each person who has custody of the samples will sign the record. The completed COC record will be sealed in a waterproof plastic bag and placed inside the sample cooler. The sampler will keep a copy of each COC record. Custody seals will be affixed to the front and back of the cooler and covered with clean tape during storage and shipping operations.

The laboratory will assess the integrity of the custody seals upon sample arrival. The laboratory will also verify and document the following information upon sample receipt:

- Condition of the shipping container,
- Condition of the sample container(s),
- Condition of the custody seals,
- Presence/absence of custody seals,
- Presence/absence of custody records,

- Presence/absence of sample labels,
- Agreement/non-agreement of documents,
- Cross-reference of laboratory numbers, and
- Temperature inside the shipping container.

The laboratory will document any problems or discrepancies with the samples or custody documents, contact the sampling organization, and document the resolution to the problems or discrepancies.

The laboratory completing chemical analyses will be required to maintain samples in a secure location with limited access from the time of sample receipt through sample disposal. Samples collected during this investigation will be either shipped to the laboratory via an overnight carrier or will be hand delivered to the analytical laboratory. If the samples are shipped via an overnight carrier, the following procedure will be used for packaging:

- Inert cushioning material will be placed in the bottom of the cooler.
- The cooler will be lined with a large plastic bag.
- Each sample container will be sealed in a resealable plastic bag and placed upright in the cooler.
- For all coolers containing samples that require 4°C preservation, blue ice or wet ice and additional packaging materials will be placed around the containers. Wet ice will be double bagged.
- A temperature blank will be included in each cooler containing samples that require 4°C preservation.
- Pertinent paperwork such as the COC form will be placed in a re-sealable plastic bag and taped to the inside lid of the cooler.
- Signed custody seal will be attached to the cooler in two places and covered with clear tape in such a way that the custody seal must be broken to open the cooler.
- The cooler will be sealed with packaging tape.

A shipping label will be affixed to the outside of the cooler.



Appendix B

Monitoring Forms

DRAFT

**BRINE POND 4 MONITORING FORM
MAGNUM SOLUTION MINING, LLC
DELTA, UTAH**

Well I.D. and Depth of Well (DOW)	DATE mm/dd/yy	DTW (feet)	Water Column Thickness	Total Gallons Removed	TEMP. (°C)	Specific Conductance (µS/cm ³)	Conductivity (ohms)	Salinity (ppt)	TDS (mg/L)	pH	NOTES
GA-4 (TBD)											
GA-5 (TBD)											
GA-6 (TBD)											
GA-7 (TBD)											
GA-18 (TBD)											
GA-19 (TBD)											
Brine Pond Sump Monitoring											
LCRS Sump											
Water Present Y / N	Conductivity (ohms)		Salinity (ppt)		Flow Rate (GPM)		Meter Reading (gal)				
PCMS Sump											
Water Present Y / N	Conductivity (ohms)		Salinity (ppt)		Flow Rate (GPM)		Meter Reading (gal)				
Sump Equipment Inspection and Performance Verified				Y / N	Allowable Leakage Rate for the Pond Liner System Verified				Y / N		
Field Data Collection and Sample Collection Instructions											
Field Data Parameter Collection Instructions											
Step 1) Calibrate YSI meter prior to each use (follow instructions in manual)											
Step 2) Measure depth to groundwater with water interface probe											
Step 3) Calculate well volume to be removed from each well using Purge Volume Table and remove the calculated volume											
Step 4) Collect field parameter readings upon completion of Step 3 and record any unusual circumstances in the "NOTES" column above											
Step 5) Collect field parameter readings from sumps											
Groundwater Sampling Instructions											
Step 6) Upon completion of Step 4 collect groundwater samples from each well											
Step 7) Fill appropriate laboratory provided containers											
Step 8) Complete Laboratory Chain of Custody (see attached example)											
Laboratory Analysis Requirements											
Sodium by Method 200.7, Plastic Pint Container Preserved with HNO ₃											
Chloride by Method 300, Total Dissolved Solids (TDS) by Method SM-2540C, and pH, all collected in a 1/2 gallon plastic container with no preservative.											
COMMENTS											

**BRINE POND 4 FIELD MONITORING FORM
MAGNUM SOLUTION MINING, LLC
DELTA, UTAH**

Well I.D.	DATE mm/dd/yy	DTW (feet)	Flow Rate (gpm)	Draw Down (ft)	Headspace Gas (LEL)	TEMP. (°C)	Specific Conductance ($\mu\text{S}/\text{cm}^2$)	Conductivity (ohms)	Salinity (ppt)	TDS (mg/L)	pH	NOTES
GRN-MH-1												
GRN-MH-2												
GRN-MH-3												
DA-1 Shallow												
Deep												
Basement												
DA-2, Shallow												
Deep												
Basement												
Delta Egg Farm Well												
IPA												

Field Data Collection and Sample Collection Instructions

Field Data Parameter Collection Instructions

- Step 1) Calibrate YSI meter prior to each use (follow instructions in the equipment manual)
- Step 2) Calibrate combustible gas meter prior to each use (follow instructions in the equipment manual)
- Step 3) Measure combustible gas levels in GS-MH-1, GS_MH-2, GS-MH-3, GS-MH-4, and GS-MH-5 with portable combustible gas meter
- Step 4) Measure depth to groundwater manually using the water interface probe in GS-MH-1, GS_MH-2, GS-MH-3, GS-MH-4, and GS-MH-5
- Step 5) Collect field parameter readings and record any unusual circumstances in the "NOTES" column above
- Step 6) Confirm functionality of the water level transducers and download water table elevation data from each well to the laptop computer
- Step 7) Manually record WTE data from DA wells, and the Egg Farm and IPA Wells

Groundwater Sampling Instructions

- Step 7) Follow Steps 1-6 above. Collect groundwater samples from GS-MH-1, GS_MH-2, GS-MH-3, GS-MH-4, and GS-MH-5 in the laboratory-provided containers
- Step 8) Complete Laboratory Chain of Custody (see attached example)

Laboratory Analysis Requirements

Sodium by Method 200.7, Plastic Pint Container Preserved with HNO_3
 Chloride by Method 300, Total Dissolved Solids (TDS) by Method SM-2540C, and pH, all collected in a 1/2 gallon plastic container with no preservative.

Data Submittal

At the completion of each monthly data collection effort send electronic depth-to-water data to ATC Associates (jim.coletta@atcassociates.com).

COMMENTS

--