UTAH DIVISION OF WATER QUALITY

CLASS V AREA PERMIT

FOR AQUIFER STORAGE AND RECOVERY

UNDERGROUND INJECTION CONTROL (UIC) PROGRAM

UIC Permit Number: UTU-49-AP-4C52E67

Utah County, Utah

Permit Issued to:

Provo City Public Works Division
1377 S 350 E
Provo, Utah 84606

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PART I. AUTHORIZATION TO CONSTRUCT AND INJECT

Pursuant to the Utah Underground Injection Control (UIC) Program Regulations codified in the Utah Administrative Code (UAC) R317-7,

City of Provo Public Works Division
1377 S 350 E
Provo, UT 84606

is hereby authorized to construct and operate Class V Aquifer Storage and Recovery (ASR) wells in Utah County, Utah. A general location map is included as Attachment A.

The City of Provo will be altering two of its drinking water wells (the Riverwoods and 5600 North wells) to Class V Aquifer Storage and Recover (ASR) Wells in order to inject excess treated water from the Provo culinary water system into the Pre-Lake Bonneville Aquifer.

The project will take place in two wells: the Riverwoods well located NW ¼ of SW ¼ of Section 18, Twp 6S, Range 3E, while the 5600 North Well is located SW ¼ of SW ¼ of Section 7, Twp 6S, Range 3E. A map showing the area of review including the proposed Class V ASR wells and the project area is included as Attachment B.

All references to UAC R315-2-3, UAC R317-7, and to Title 40 of the Code of Federal Regulations (40 CFR) are to all regulations that are in effect on the date this permit becomes effective. The following are incorporated as enforceable attachments to this permit:

Attachment A - General Location Map of the Provo Aquifer Storage & Recovery Project, Utah County.

Attachment B - Map of the UIC Area of Review including the Class V ASR Wells and the Project Area

Attachment C - Corrective Action Plan for Artificial Penetrations into Injection Zone within Area of Review

Attachment D - Driller's Logs for Provo City's Riverwoods and 5600 North Well Including Injection Well Construction Plan and Details

Attachment E - Injection Well Operating Plan and Procedures

Attachment F - Monitoring Parameters, Schedule, Recording, and Reporting Plan

This permit is based upon representations made by the permittee and other information contained in the administrative record. **It is the responsibility of the permittee to read and understand all provisions of this permit.**

Any person who violates the Utah Water Quality Act (UWQA), or any permit, rule, or order adopted under it, is subject to the provisions of section UCA 19-5-115 of the UWQA governing violations.

This permit shall become effective **March 30, 2023**

This permit and the authorization to inject shall be issued for 5 years, unless terminated, and will expire on **March 30, 2028**.

John K. Mackey, P.E.
Director
Utah Division of Water Quality

PART II. GENERAL PERMIT CONDITIONS

A. EFFECT OF PERMIT

The permittee is allowed to engage in underground injection in accordance with the conditions of this permit. The permittee, authorized by this permit, shall not construct, operate, maintain, convert, plug, abandon or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water (USDW), if the presence of that contaminant may cause a violation of any primary drinking water standard under the Utah Public Drinking Water Administrative Rules, UAC R309-200 and 40 CFR Part 141, or may otherwise adversely affect the health of persons. Any underground injection activity not specifically authorized in this permit is prohibited unless otherwise authorized-by-rule or by another UIC permit. Compliance with this permit does not constitute a defense to any action brought under the Utah Water Quality Act (UWQA) Title 19, Chapter 5 Utah Code Annotated 1953, or any other common or statutory law or regulation. Issuance of this permit does not authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local law or regulations. Nothing in this permit shall be construed to relieve the permittee of any duties under applicable regulations.

B. SEVERABILITY

The provisions of this permit are severable. If any provision of this permit or the application of any provision of this permit to any circumstance is held to be invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

C. CONFIDENTIALITY

In accordance with Utah Code 19-1-306 (Records of the Department of Environmental Quality), Utah Code 63G-2-309 (Confidentiality Claims), and Utah Code 19-5-113 (DWQ Records and Reports Required by Owners/Operators) any information deemed by the permittee to be entitled to trade secret protection submitted to the DWQ pursuant to this permit may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission by stamping the words "Confidential Business Information" on **each** page containing such information. If no claim is made at the time of submission, the DWQ may make the information available to the public without further notice. Claims of confidentiality may be denied by the DWQ according to the procedures detailed in Utah Code 63G-2 and the federal Freedom of Information Act (FOIA). Claims of confidentiality for the following information will be denied as per UAC R317-7-9.7:

1. The name and address of the permittee.

2. Information that deals with the existence, absence or level of contaminants in drinking water.

D. CONDITIONS APPLICABLE TO ALL UIC PERMITS (40CFR144.51)[1]

The following conditions are required for all UIC permits. Specific requirements for implementing these conditions are included in Part III of this permit, as necessary.

1. Duty to Comply (40CFR144.51(a))

   The permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Safe Drinking Water Act and the UWQA and is grounds for enforcement action; permit termination, revocation and re-issuance, modification; or for denial of a permit renewal application; except that the permittee need not comply with the provisions of this permit to the extent and for the duration such noncompliance is authorized in an emergency permit issued in accordance with UAC R317-7-8 (40 CFR 144.34). Such noncompliance may also be grounds for enforcement action under the Utah Solid and Hazardous Waste Act (USHWA), Title 19, Chapter 6, Utah Code Annotated 1979.

2. Duty to Reapply (40CFR144.51(b))

   If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. The permittee shall submit a complete permit renewal application at least 180 days before this permit expires.

3. Need to Halt or Reduce Activity Not a Defense (40CFR144.51(c))

   It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

4. Duty to Mitigate (40CFR144.51(d))

   The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.

5. Proper Operation and Maintenance (40CFR144.51(e))

   The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance include effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this permit.

[1] Parenthetical references to the Code of Federal Regulations (CFR) and / or the Utah Administrative Code (UAC) for the UIC Program indicate the requirement for inclusion in the permit.

6. Permit Actions

(40CFR144.51(f), 40 CFR 124.5, 40 CFR 144.38, 40 CFR 144.39, 40 CFR 144.40, 40 CFR 144.41)
This permit may be modified, revoked and reissued, or terminated either at the request of any interested person (including the permittee) or upon the Director's initiative. However, permits may only be modified, revoked and reissued, or terminated for the reasons specified in sections a) and b) below. All requests shall be in writing and shall contain facts or reasons supporting the request. The filing of a request for a permit modification, revocation and re-issuance, or termination on the part of the permittee, does not stay any permit condition. This permit may be transferred according to the procedures given in section d).

a) Modify or Revoke and Re-Issue Permits

When the Director of the Utah Division of Water Quality (hereafter referred to as 'the Director') receives any information (for example, inspects the facility, receives information submitted by the permittee as required in the permit, receives a request for modification or revocation and reissuance, or conducts a review of the permit file), the Director may determine whether or not one or more of the causes listed in paragraphs (1) and (2) of this section for modification or revocation and reissuance or both exist. If cause exists, the Director may modify or revoke and reissue the permit accordingly, subject to the limitations of paragraph (3) of this section, and may request an updated application if necessary. When a permit is modified, only the conditions subject to modification are reopened. If a permit is revoked and reissued, the entire permit is reopened and subject to revision and the permit is reissued for a new term. If cause does not exist under this section a) or under section c) for minor modifications, the Director shall not modify or revoke and reissue the permit. If a permit modification satisfies the criteria for minor modifications in section c) the permit may be modified without a draft permit or public review. Otherwise, a draft permit must be prepared and other procedures in 40 CFR 124, incorporated by reference into the Utah UIC Program rules (hereafter referred to as '40 CFR 124'), must be followed.

(1) Causes for modification. For Class V wells the following may be causes for revocation and reissuance as well as modification if the permittee requests or agrees.

i. Alterations. There are material and substantial alterations or additions to the permitted facility or activity which occurred after permit issuance which justify the application of permit conditions that are different or absent in the existing permit.

ii. Information. The Director has received information. For UIC area permits, this cause shall include any information indicating that cumulative effects on the environment are unacceptable.

iii. New regulations. The standards or regulations on which the permit was based have been changed by promulgation of new or amended standards or regulations or by judicial decision after the permit was issued. Permits for Class V wells may be modified during their permit terms for this cause only as follows:

(i) For promulgation of amended standards or regulations, when:

(A) The permit condition requested to be modified was based on a promulgated part 146 regulation; and

(B) EPA has revised, withdrawn, or modified that portion of the regulation on which the permit condition was based, and

(C) A permittee requests modification in accordance with § 124.5 within ninety (90) days after Federal Register notice of the action on which the request is based.

(ii) For judicial decisions, a court of competent jurisdiction has remanded and stayed EPA promulgated regulations if the remand and stay concern that portion of the regulations on which the permit condition was based and a request is filed by the permittee in accordance with § 124.5 within ninety (90) days of judicial remand.

iv. Compliance schedules. The Director determines good cause exists for modification of a compliance schedule, such as an act of God, strike, flood, or materials shortage or other events over which the permittee has little or no control and for which there is no reasonably available remedy. See also paragraph (3) under section c) – Minor Modification of Permit).

(2) Causes for modification or revocation and reissuance. The following are causes to modify or, alternatively, revoke and re-issue a permit:

i. Cause exists for termination under section b), and the Director determines that modification or revocation and re-issuance is appropriate.

ii. The Director has received notification (as required in the permit, see paragraph (4) under section c) – Minor Modification of Permit) of a proposed transfer of the permit. A permit also may be modified to reflect a transfer after the effective date of an automatic transfer (see paragraph (2) of section d) – Transfer of Permit) but will not be revoked and re-issued after the effective date of the transfer except upon the request of the new permittee.

iii. A determination that the water being injected is a hazardous waste as defined in 40 CFR 261.3 either because the definition has been revised, or because a previous determination has been changed.

(3) Facility siting. Suitability of the facility location will not be considered at the time of permit modification or revocation and reissuance unless new information or standards indicate that a threat to human health or the environment exists which was unknown at the time of permit issuance.

b) Termination of Permit

(1) The Director may terminate a permit during its term, or deny a permit renewal application for the following causes:

i. Noncompliance by the permittee with any condition of the permit;

ii. The permittee's failure in the application or during the permit issuance process to disclose fully all relevant facts, or the permittee's misrepresentation of any relevant facts at any time; or

iii. A determination that the permitted activity endangers human health or the environment and can only be regulated to acceptable levels by permit modification or termination;

(2) The Director shall follow the applicable procedures in 40 CFR 124 in terminating any permit under this section.

c) Minor Modification of Permit

Upon the consent of the permittee, the Director may modify a permit to make the corrections or allowances for changes in the permitted activity listed in this section, without following the procedures of 40 CFR 124. Any permit modification not processed as a minor modification under this section must be made for cause and with 40 CFR 124 draft permit and public notice as required in section a). Minor modifications may only:

(1) Correct typographical errors;

(2) Require more frequent monitoring or reporting by the permittee;

(3) Change an interim compliance date in a schedule of compliance, provided the new date is not more than 120 days after the date specified in the existing permit and does not interfere with attainment of the final compliance date requirement; or

(4) Allow for a change in ownership or operational control of a facility where the Director determines that no other change in the permit is necessary, provided that a written agreement containing a specific date for transfer of permit responsibility, coverage, and liability between the current and new permittees has been submitted to the Director.

(5) Change quantities or types of fluids injected which are within the capacity of the facility as permitted and, in the judgment of the Director, would not interfere with the operation of the facility or its ability to meet conditions described in the permit and would not change its classification.

(6) Change construction requirements approved by the Director pursuant to 40 CFR 144.52(a)(1) (establishing UIC permit conditions), provided that any such alteration shall comply with the requirements of 40 CFR 144 and 40 CFR 146.

(7) Amend a plugging and abandonment plan which has been updated.

d) Transfer of Permit

(1) Transfers by Modification. Except as provided in paragraph (2) of this section, a permit may be transferred by the permittee to a new owner or operator only if the permit has been modified or revoked and reissued (under paragraph (2)(ii) under section a)), or a minor modification made (under paragraph (4) of section c)) to identify the new permittee and incorporate such other requirements as may be necessary under the Safe Drinking Water Act.

(2) Automatic Transfers. As an alternative to transfers under paragraph (1) of this section, any UIC permit for a well not injecting hazardous waste or injecting carbon dioxide for geologic sequestration may be automatically transferred to a new permittee if:

i. The current permittee notifies the Director at least 30 days in advance of the proposed transfer date referred to in paragraph (2)(ii) of this section;

ii. The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them, and the notice demonstrates that the following financial responsibility requirements of 40 CFR 144.52(a)(7) will be met by the new permittee:

The permittee, including the transferor of a permit, is required to demonstrate and maintain financial responsibility and resources to close, plug, and abandon the underground injection operation in a manner prescribed by the Director until:

(A) The well has been plugged and abandoned in accordance with an approved plugging and abandonment plan and submitted a plugging and abandonment report; or

(B) The well has been converted; or

(C) The transferor of a permit has received notice from the Director that the owner or operator receiving transfer of the permit, the new permittee, has demonstrated financial responsibility for the well.

The permittee shall show evidence of such financial responsibility to the Director by the submission of a surety bond, or other adequate assurance, such as a financial statement or other materials acceptable to the Director.

iii. The Director does not notify the existing permittee and the proposed new permittee of intent to modify or revoke and re-issue the permit. A modification under this paragraph may also be a minor modification under section c) – Minor Modification of Permit. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in paragraph (2)(ii) of this section.

7. Property Rights (40 CFR 144.51(g))

This permit does not convey any property rights of any sort, or any exclusive privilege.

8. Duty to Provide Information (40 CFR 144.51(h))

The permittee shall furnish to the Director within a time specified, any information which the Director may request to determine whether cause exists for modifying, revoking and re-issuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director upon request, copies of records required to be kept by this permit.

9. Inspection and Entry (40 CFR 144.51(i))

The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by the law, to:

a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b) Have access to and copy, at reasonable times, any records that are kept under the conditions of this permit;

c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

d) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the SDWA and / or UWQA any substances or parameters at any location.

10. Monitoring and Records (40 CFR 144.51(j))

a) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

b) The permittee shall retain records of all monitoring information, including the following:

(1) Calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this

permit, for a period of at least 3 years from the date of the sample, measurement, report, or application. This period may be extended by request of the Director at any time; and

(2) The nature and composition of all injected fluids until three years after the completion of any plugging and abandonment as appropriate. The Director may require the owner or operator to deliver the records to the Director at the conclusion of the retention period.

c) Records of monitoring information shall include:

(1) The date, exact place, and time of sampling or measurements;

(2) The individual(s) who performed the sampling or measurements;

(3) The date(s) analyses were performed;

(4) The names of individual(s) who performed the analyses;

(5) The analytical techniques or methods used; and

(6) The results of such analyses.

11. Signatory Requirements (40 CFR 144.51(k))

All reports or other information, submitted as required by this permit or requested by the Director, shall be signed and certified as follows:

a) Applications. All permit applications shall be signed as follows:

(1) For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means;

i. A president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or

ii. the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

Note:
DEQ does not require specific assignments or delegations of authority to responsible corporate officers identified in 40 CFR 144.32(a)(1)(i). DEQ will presume that these responsible corporate officers have the requisite authority to sign permit applications unless the corporation has notified the Director to the contrary. Corporate procedures governing authority to sign permit applications may provide for assignment or delegation to applicable corporate positions under 40 CFR 144.32(a)(1)(ii) rather than to specific individuals.

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes: (i) The chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

b) Reports. All reports required by permits and other information requested by the Director shall be signed by a person described in section a), or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in paragraph a) of this section;

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and

(3) The written authorization is submitted to the Director.

c) Changes to authorization. If an authorization under section b) is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of section b) must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative.

d) Certification. Any person signing a document under section a) or b) shall make the following certification:

"I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM, OF THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS."

12. Reporting Requirements (40 CFR 144.51(l))

Specific requirements for reporting the following items are included in Part III of the permit.

a) Planned Changes
The permittee shall give written notice to the Director, as soon as possible, of any planned physical alterations or additions to the UIC-permitted facility. Notification of planned changes on the part of the permittee, does not stay any permit condition.

b) Anticipated Noncompliance
The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity that may result in noncompliance with permit requirements. Notification of anticipated noncompliance on the part of the permittee, does not stay any permit condition.

c) Permit Transfers
This permit is not transferable to any person except in accordance with section d) of Permit Actions – Transfer of Permit. The Director may require modification or revocation and re-issuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Safe Drinking Water Act and / or the UWQA.

d) Monitoring Reports
Monitoring results shall be reported at the intervals specified in Part III of this permit.

e) Compliance Schedule
Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule specified in Part III B of this permit shall be submitted no later than 30 days following each schedule date.

f) Endangering Noncompliance
The permittee shall report to the Director any noncompliance that may endanger health or the environment, as follows:

(1) Twenty-four Hour Reporting
Endangering noncompliance information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. Such reports shall include, but not be limited to, the following information:

i. Any monitoring or other information that indicates any contaminant may cause an endangerment to a USDW, or

ii. Any noncompliance with a permit condition, or malfunction of the injection system, which may cause fluid migration into or between USDWs.

(2) Five-day Reporting
A written submission shall be provided within five days of the time the permittee becomes aware of the circumstances of the endangering

noncompliance. The written submission shall contain a description of the noncompliance and its cause, the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

g) Other Noncompliance

The permittee shall report all instances of noncompliance not reported under 12d) (Monitoring Reports), 12e) (Compliance Schedule Reports), or 12f) (Endangering Noncompliance Monitoring) of this section in the next Monitoring Report. The reports shall contain a description of the noncompliance and its cause, the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

h) Other Information

When the permittee becomes aware of a failure to submit any relevant facts in the permit application or submitted incorrect information in a permit application or in any report to the Director, the permittee shall submit such facts or information within 10 days after becoming aware of the failure to submit relevant facts.

13. Requirements Prior to Commencing Injection (40 CFR 144.51(m))

a) For new injection well authorized by individual permit, a new injection well may not commence injection until construction is complete, and

(1) The permittee has submitted notice of completion of construction to the Director; and

(2) Either of the following:

i. The Director has inspected or otherwise reviewed the new injection well and finds it is in compliance with the conditions of the permit; or

ii. The permittee has not received notice from the Director of his or her intent to inspect or otherwise review the new injection well within 13 days of the date of the notice in section a), in which case prior inspection or review is waived and the permittee may commence injection. The Director shall include in his notice a reasonable time period in which he shall inspect the well.

b) For new injection wells authorized by an area permit under UAC R317-7-7 (40 CFR 144.33), requirements prior to commencing injection shall be specified in Part III of the permit.

14. Notification Prior to Conversion or Abandonment. (40 CFR 144.51(n))

The permittee shall notify the Director at such times as the permit requires before conversion or abandonment of the well or in the case of area permits before closure of the projects.

15. Plugging and Abandonment Requirements. (40 CFR 144.51(o))

A Class V permit may include, conditions for developing a plugging and abandonment plan that meets the applicable requirements of UAC R317-7 to ensure that plugging and abandonment of the well will not allow the movement of fluids into or between USDWs. If the plan meets the plugging and abandonment requirements of UAC R317-7, the Director shall incorporate it into the permit as a permit condition. Where the review of the plan submitted in the permit application indicates the plan is inadequate, the Director may require the applicant to revise the plan, prescribe conditions meeting the requirements of this paragraph, or deny the permit. For purposes of this paragraph, temporary or intermittent cessation of injection operations is not abandonment. Requirements for implementing the approved plugging and abandonment plan are specified in Part III of this permit.

16. Plugging and Abandonment Report. (40 CFR 144.51(p))

If a plugging and abandonment plan is required, requirements for submitting a plugging and abandonment report are specified in Part III of this permit.

PART III. SPECIFIC PERMIT CONDITIONS

A. DURATION OF PERMIT
(R317-7-9.5 and 40CFR144.36)

This UIC Class V ASR area well permit (Category UIC Well 5B4) shall be issued for 5 years.

B. COMPLIANCE SCHEDULE
(40 CFR 144.53)

There are no compliance schedule items.

C. CONSTRUCTION REQUIREMENTS

This permit does not authorize the construction of new ASR wells. If Provo City wishes to construct a new ASR well, an application for a major permit modification will be required.

D. REQUIREMENTS PRIOR TO INJECTION
(40 CFR 146.34(b))

In accordance with Part II (D)(13) of this permit, the following requirements must be met prior to commencing injection:

1. Demonstration of Adequate Monitoring Equipment

   Prior to commencing injection, Provo City must demonstrate to the Director that adequate instrumentation and methods have been put in place to acquire the monitoring data of Part III (F) of this permit.

2. Director's Approval to Commence Injection

   Prior to commencing injection, Provo City must receive written notice from the Director granting approval to commence injection.

E. OPERATING REQUIREMENTS
(R317-7-10.2(A))

1. Class V ASR Injection Well Operation Standards

   Class V ASR wells shall be operated to meet the performance standard (R317-7-5.3 and 40 CFR 144.12(a)) for the UIC Program which states that:

   > No owner or operator of an injection well shall construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that

allows the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation or may otherwise adversely affect the health of persons.

2. Operating Plan

   The approved and enforceable Operating Plan that meets all the operating requirements of this section is included as Attachment E of this permit.

3. Maximum Allowable Injection rate:

   The injection water will be discharged into the wells at a rate no greater than described in the permit application which sets the maximum injection rate of 1,500 gallons per minute (gpm) in the 5600 North Well, and 2,000 gpm into the Riverwoods Well. Injection rate may be increased with notification and approval.

4. Maximum Allowable Surface Injection Pressure (MASIP)

   Except during well stimulation, the maximum allowable surface injection pressure (MASIP) at the wellhead shall be calculated to assure that pressure in the injection zone during injection does not initiate new fractures or propagate existing fractures in the injection zone. In no case shall the injection pressure initiate fractures in the confining zone or cause the migration of injection or formation fluids into an USDW.

5. Borehole – Casing Annulus Injection Prohibited

   Injection between the outermost casing protecting USDW's and the well bore is prohibited.

6. Injection Zone

   Injection is explicitly limited to the Pre-Lake Bonneville Aquifer.

7. Injection Fluid Limitations

   a) Fluid injected is limited to water originating from the Provo City culinary supply.

   b) Injected water shall meet all Federal and State Maximum Contaminate Levels for Drinking Water (MCLSs) and State Groundwater Quality Standards. The Maximum Total Dissolved solids of the injected water shall not exceed 500 milligrams per liter (mg/L).

   c) The Permittee shall not inject any hazardous waste as defined by UAC R315-2-3 or 40 CFR 261 at any time during the operation of the facility.

d) The permittee shall notify the Director in writing within 10 days of any changes in the injection fluid or process additives that may alter the quality or chemical composition of the injection fluid.

e) Upon notification of a spill or contamination incident which may adversely affect the quality of the injectate or any finding by the permittee or the Director that the injection fluid has exceeded Federal or State MCLs, state Groundwater Quality Standards, TDS of 500 mg/L, or may otherwise affect the health of person, the permittee shall stop injection immediately. Injection shall not recommence until approval has been received by the director.

8. Security

a) The Pump Houses shall be secured at all times.

F. MONITORING AND RECORDING REQUIREMENTS
(R317-7-10.3(B), 40 CFR 144.54, and 40 CFR 146.34)

1. Class V ASR Injection Well Monitoring and Recording Standards

Monitoring and recording requirements for the drilling and solution mining of each well are set forth in R317-7-10.3(B) and 40 CFR 144.54 details of which are included in the following permit conditions.

2. Monitoring, Recording, and Reporting Plan

The approved and enforceable Monitoring, Recording and Reporting Plan that meets all the monitoring and recording requirements of this section is included as Attachment F of this permit.

3. Monitoring Equipment and Methods

All monitoring equipment shall be properly selected, installed, used, and maintained according to the manufacturer's specifications so as to yield data which are representative of the monitored activity. All monitoring methods shall be properly selected and implemented at appropriate intervals and frequency so as to yield data which are representative of the monitored activity. Documentation verifying, if applicable, the proper selection, installation, use, and maintenance of monitoring equipment and the proper implementation of monitoring methods shall be made available to the Director upon request.

4. Injectate Characterization

Provo City shall monitor the nature of injected fluids with sufficient frequency to yield representative data on its characteristics. The permittee shall provide qualitative analysis and ranges in concentrations of all constituents of injected fluids as indicated in Part J Section 1.4.2 of Attachment F. Whenever the injection fluid is modified to the extent that this analysis is incorrect or incomplete, a new

analysis shall be provided to the Director. The applicant may request confidentiality in accordance with Part II C of this permit. If the information is proprietary an applicant may, in lieu of the ranges in concentrations, choose to submit maximum concentrations which shall not be exceeded. In such a case the applicant shall retain records of the undisclosed concentrations and provide them upon request to the Director as part of any enforcement investigation.

5. Injection Pressure, Injection Rate, and Injection Volume

   Provo City shall monitor the injection pressure and either the injection rate or injection volume semi-monthly, or metering and daily recording of injected and produced fluid volumes as appropriate.

6. Injection Zone Fluid Level

   Provo City shall monitor the fluid level in the injection zone semi-monthly, where appropriate.

G. REPORTING REQUIREMENTS
(R317-7-10.4(B) and 40 CFR 144.54)

1. Quarterly Monitoring Reports

   a) Schedule for Submitting Quarterly Monitoring Report

Quarter		Report Due On:
1st Quarter	Jan 1 – Mar 31	Apr 15
2nd Quarter	Apr 1 – Jun 30	July 15
3rd Quarter	Jul 1 – Sep 30	Oct 15
4th Quarter	Oct 1 – Dec 31	Jan 15

   b) Content of Quarterly Monitoring Reports

   Monitoring data for the following shall be included in the quarterly monitoring reports:

   (1) Injectate Characterization

   (2) Injection Pressure, Rate, Volume

   (3) Injection Zone Fluid Level

   (4) Monitoring Wells

   (5) Noncompliance Not Previously Reported – Such reports shall contain a description of the noncompliance and its cause, the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and

steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

(6) If no injection has occurred during the specified quarter, a letter documenting the lack of injection is sufficient.

(7) Other Required Monitoring

c) Reduction of Sampling Frequency

(1) If water quality remains consistent over time, Provo City may request the Division of Water Quality to approve a reduction in sampling frequency to semi-annual or annual.

2. Endangering Noncompliance Reporting

Provo City shall report to the Director any noncompliance that may endanger health or the environment, as follows:

a) Twenty-four Hour Reporting
Endangering noncompliance information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. Such reports shall include, but not be limited to, the following information:

(1) Any monitoring or other information that indicates any contaminant may cause an endangerment to a USDW, or

(2) Any noncompliance with a permit condition, or malfunction of the injection system, which may cause fluid migration into or between USDWs.

b) Five-day Reporting
A written submission shall be provided within five days of the time the permittee becomes aware of the circumstances of the endangering noncompliance. The written submission shall contain a description of the noncompliance and its cause, the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

3. Planned Changes

The permittee shall give written notice to the Director, as soon as possible, of any planned physical alterations or additions to the UIC-permitted facility. Notification of planned changes on the part of the permittee, does not stay any permit condition.

4. Anticipated Noncompliance

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity that may result in noncompliance with permit

requirements. Notification of anticipated noncompliance on the part of the permittee, does not stay any permit condition.

5. Permit Transfers

This permit is not transferable to any person except in accordance with Part II (D)(6)(d) of this permit. The current permittee shall notify the Director at least 30 days in advance of the proposed transfer date. Notification shall comply with the requirements in Part II(D)(6)(d) of this permit.

6. Compliance Schedule Reporting

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule specified in Part III B of this permit shall be submitted no later than 30 days following each schedule date.

7. Mechanical Integrity Reporting

a) Mechanical Integrity Demonstration - The permittee shall submit the results of any MI demonstration within 60 days after completion of the test. The permittee shall include in the report, a detailed description of the tests and the methods used to demonstrate MI. In the case of MI failure, the permittee shall also describe in detail what and when steps were taken to reestablish MI.

b) Loss of Mechanical Integrity –

(1) In the event of a mechanical integrity failure which may potentially endanger an USDW, report to the Director verbally within 24 hours followed by submission of a written report within 5 days.

(2) Within 15 days after loss of MI, submit to the Director a schedule indicating what will be done to restore MI to the well, or if it will be plugged.

8. Plugging and Abandonment ("As-Plugged") Report

Within 60 days after permanently or temporarily plugging and abandoning a well, the permittee shall submit a Plugging and Abandonment Report to the Director. The report shall be certified as accurate by the person who performed the plugging operation, and shall consist of either:

a) A statement that the well was plugged in accordance with the P&A Plan(s) previously submitted to, and all conditions of approval provided by, the Director; or

b) If the actual plugging differed from the approved plan(s), a statement and diagrams defining the actual plugging and why the Director should approve such deviation. Any deviation from the previously approved individual plugging and abandonment plans required by this permit which may endanger waters of the State of Utah, including USDWs, is cause for the Director to require the operator to re-plug the well.

9. Permit Review Report

   Within 30 days after receipt of this permit, the permittee shall report to the Director that the person(s) responsible for implementing this permit has read and is personally familiar with all terms and conditions of this permit.

10. Electronic Reporting

    In addition to submittal of the hard copy data, Provo City shall submit the required monitoring data in the electronic format specified by the Director.

H. MECHANICAL INTEGRITY
(R317-7-10.3(B) and 40CFR146.8)

Mechanical integrity testing is not required of Class V ASR wells for the protection of USDWs.

I. PLUGGING AND ABANDONMENT REQUIREMENTS
(40 CFR 146.10 and R317-7-10.5)

In the event the Provo City ASR wells are required to be plugged and abandoned, it shall be done so in such a manner as to be protective of any USDW and according to the closure requirements of the Utah Divisions of Water Rights and Drinking Water.

J. FINANCIAL RESPONSIBILITY
(R317-7-9.1(24) and 40 CFR 144.52)

Provo City is not required to maintain financial responsibility and resources to plug and abandon the permitted injection well facilities beyond that which is required by the Utah Divisions of Water Rights and Drinking Water.

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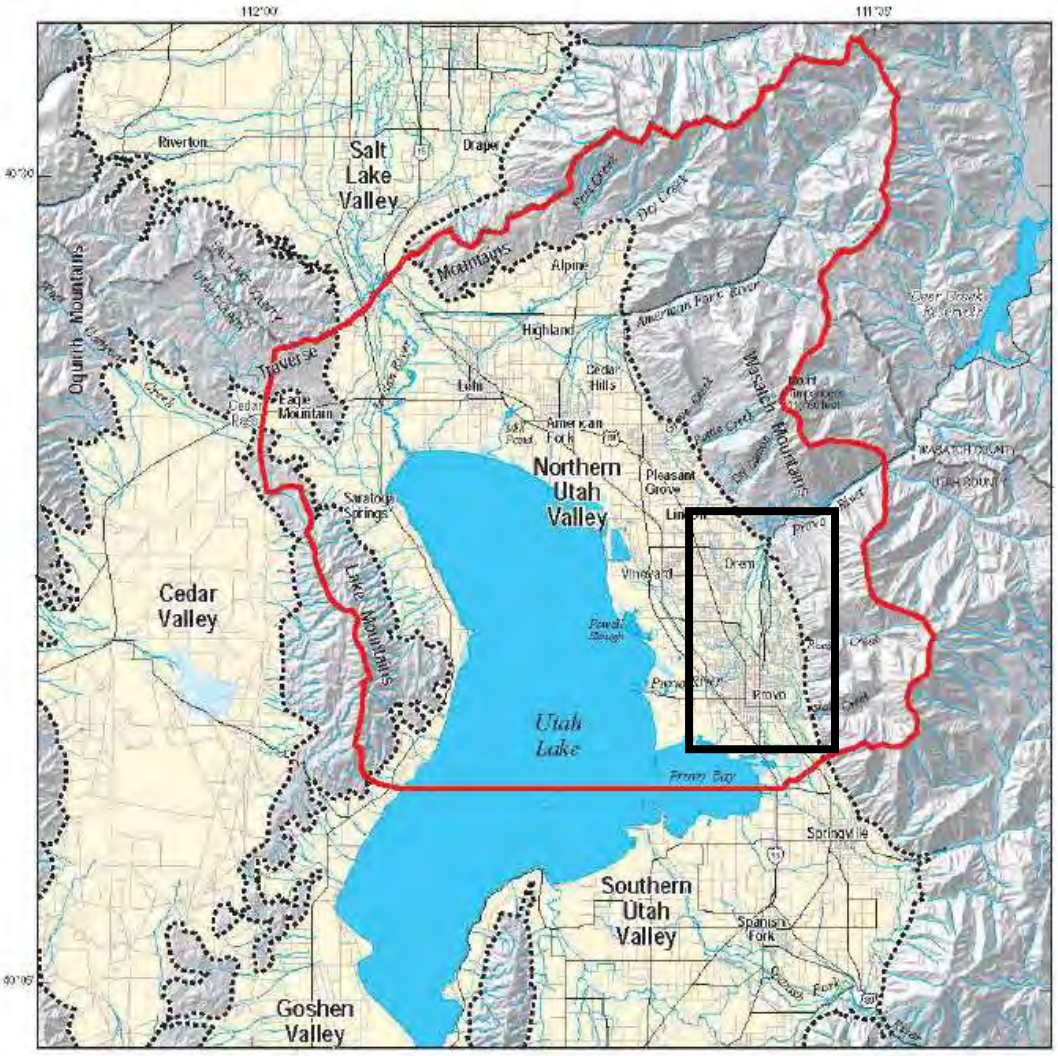
Attachment A

General Location Map of the Provo Aquifer Storage & Recovery Project, Utah County.

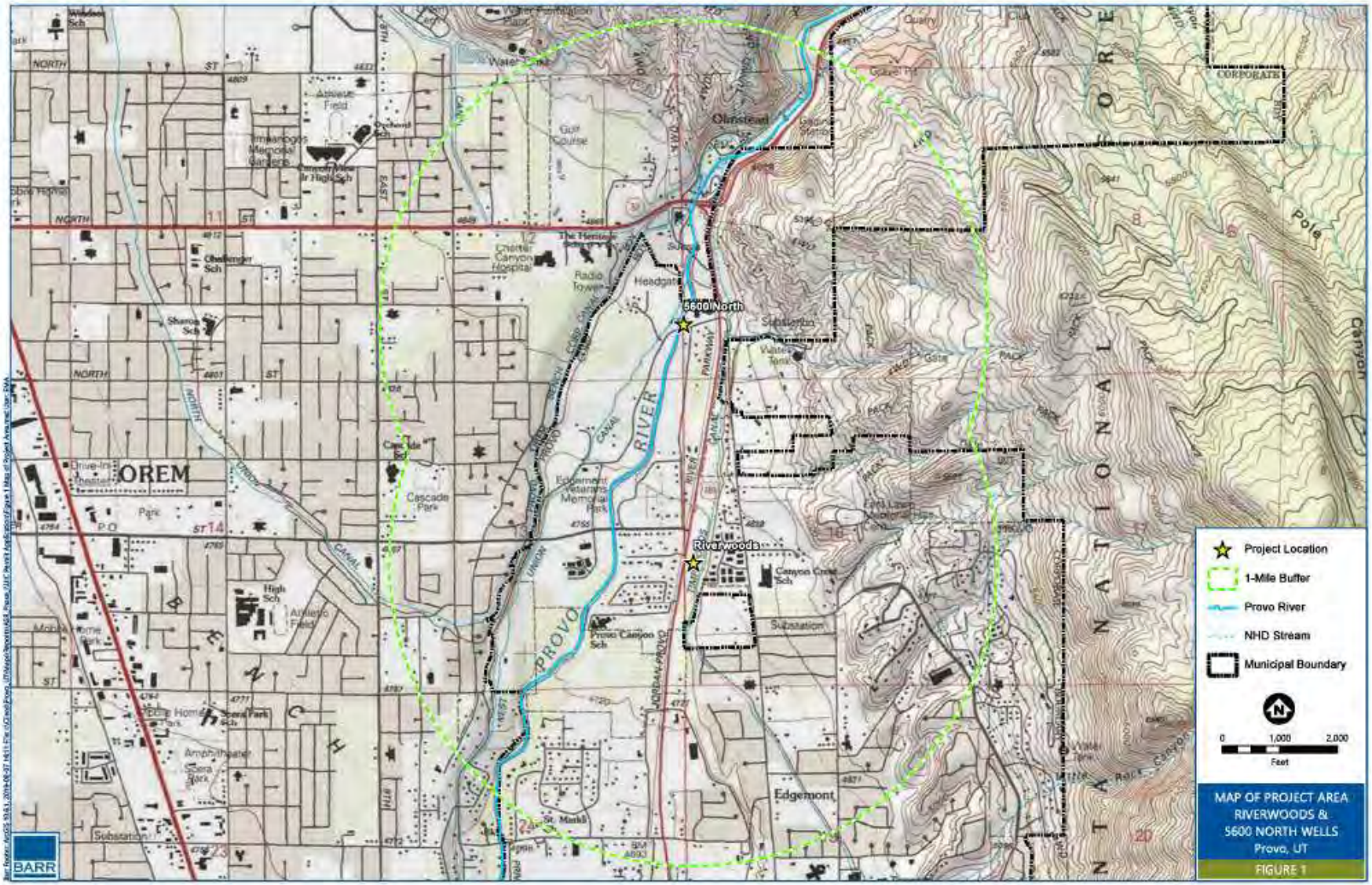


Source: Cederberg et al. (2009)

[redacted]

Attachment B

Map of the UIC Area of Review
Including the Class V ASR
Wells and the Project Area


OREM
5600 North
Riverwoods
Project Location
1-Mile Buffer
Provo River
NHD Stream
Municipal Boundary
0
1,000
2,000
Feet
MAP OF PROJECT AREA
RIVERWOODS &
5600 NORTH WELLS
Provo, UT
FIGURE 1
BARR

Attachment C

Corrective Action Plan for Artificial Penetrations into Injection Zone within Area of Review
(At the Time of the effective date of this permit no corrective action was required.)

Attachment D

Driller's Logs for Provo City's
Riverwoods and 5600 North Well
Including Injection Well
Construction Plans and Details

Riverwoods Well
WIN 26943

WELL DRILLER'S REPORT

State of Utah
Division of Water Rights
For additional space, use "Additional Well Data Form" and attach

RECEIVED
MAY - 6 2003
WATER RIGHTS
SALT LAKE

Well Identification CHANGE APPLICATION: a22983(51-1021)

Owner *Note any changes*

Provo City Water Resources
1377 South 350 East
Provo, UT 84603

Contact Person/Engineer: Dee Hansen

Well Location *Note any changes*

COUNTY: Utah
NORTH 600 feet EAST 1880 feet from the SW Corner of
SECTION 7, TOWNSHIP 6S, RANGE 3E, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #) south of Hwy #52, east of Hwy. #8
Provo City.

Drillers Activity

Start Date: March 21, 2003 Completion Date: April 25, 2003

Check all that apply: [x] New [ ] Repair [ ] Deepen [ ] Clean [ ] Replace [x] Public Nature of Use:

If a replacement well, provide the location of the new well. ____ feet north/south and ____ feet east/west of the existing well.

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	19	48	Rotary	Bentonite and fresh water
19	151	38	Rotary	Bentonite and fresh water
151	1220	26	Rotary	Bentonite and fresh water

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition, density, plasticity, shape, cementation, consistancy, water bearing, odor, fracturing, minerology, texture, degree of weathering, hardness, water quality, etc.)
0	20					x	x	x				Alluvium		
20	90						x	x					Brown & Black	
90	105				x		x						Brown	5% Clayey fines
105	135				x	x							Brown	20% Clayey fines
135	420							x					Brown	Angular cuttings, well graded gravel
420	430				x		x						Yellow & Brown	
430	470							x					Brown	Angular cutting, well graded gravel
470	480				x			x					Yellow & Brown	40% Clayey fines
480	525					x		x					Brown	Subangular gravel, 10% fines
525	595							x					Brown	Clean washed gravel, trace of fines

Static Water Level

Date April 23, 2003 Water Level 220 feet Flowing? ☐ Yes ☒ No

Method of Water Level Measurement water sounded If Flowing, Capped Pressure N/A PSI

Point to Which Water Level Measurement was Referenced ground level Ground Elevation (If known) ____

Height of Water Level reference point above ground surface N/A feet Temperature cool ☐ °C ☐ °F

Well Log

Construction Information

DEPTH (feet) FROM	TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	TO	☐ SCREEN ☐ PERFORATIONS ☐ OPEN BOTTOM: SCREEN SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
0	19	Steel	.250	42					
0	151	Steel	.375	30					
+2	316	Steel	.375	20	316	346	.070	20	Stainless Steel Wire Wrap
346	387	Steel	.375	20	387	417	.070	20	"
417	437	Steel	.375	20	437	457	.070	20	"

Well Head Configuration: Locking cap Access Port Provided? ☐ Yes ☒ No

Casing Joint Type: welded Perforator Used: N/A

Was a Surface Seal installed? ☒ Yes ☐ No Depth of Surface Seal: 151 feet Drive Shoe? ☐ Yes ☒ No

Surface Seal Material Placement Method: pumped cement through trimmie pipe Provide Seal Material description below:

SURFACE SEAL / INTERVAL SEAL / FILTER PACK / PACKER INFORMATION

DEPTH (feet) FROM	TO	SEAL MATERIAL, FILTER PACK and PACKER TYPE and DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal.,# bag mix, gal./sack etc.)
0	151	Portland Cement	6½ super sacks	16 lb. / gal.
151	1220	Gravel Pack (CSI 6-9)	82 super sacks	

Well Development and Well Yield Test Information

Date	Method	Yield	Units Check One GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
4/22 & 4/23/03	Pump test	2800	x		360	24 hours

Pump (Permanent)

Pump Description: _____ Horsepower: _____ Pump Intake Depth: _____ feet

Approximate maximum pumping rate: _____ Well disinfected upon completion? ☐ Yes ☐ No

Comments Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment procedures. *Use additional well data form for more space.*

Well Driller Statement

This well was drilled and constructed under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name Lang Exploratory Drilling (Person, Firm, or Corporation - Print or Type) License No. 568

Signature Alan Lang (Licensed Well Driller) Date 5/2/03

Construction Information (con't)

DEPTH (feet)		CASING			DEPTH (feet)		☐ SCREEN ☐ PERFORATIONS ☐ OPEN BOTTOM		
FROM	TO	CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	FROM	TO	SCREEN SLOT SIZE OR PERF SIZE (in.)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
475	507	Steel	.375	20	507	527	.070	20	Stainless Steel Wire
527	547	Steel	.375	20	547	587	.070	20	Wrap "
587	627	Steel	.375	20	627	647	.070	20	"
647	738	Steel	.375	20	738	778	.070	20	"
778	818	Steel	.375	20	818	838	.070	20	"
838	888	Steel	.375	20	888	908	.070	20	"
908	948	Steel	.375	20	948	988	.070	20	"
988	1028	Steel	.375	20	1018	1058	.070	20	"
1058	1099	Steel	.375	20	1099	1119	.070	20	"
1119	1149	Steel	.375	20	1149	1169	.070	20	"
1169	1210	Steel	.375	20					

DEPTH (feet)		FILTER PACK / GROUT / PACKER / ABANDONMENT MATERIAL		
FROM	TO	ANNULAR MATERIAL, ABANDONMENT MATERIAL and/or PACKER DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack, etc.)

Comments (con't)

Well Driller Statement

This well was drilled and constructed under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name Lang Exploratory Drilling (Person, Firm, or Corporation - Print or Type) License No. 568

Signature Alan Lang (Licensed Well Driller) Date 5/2/03

ADDITIONAL WELL DATA FORM

Water Right # a22983 (51-1021)

OWNER NAME

Well Log DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (e.g. relative %, grain size, sorting, angularity, bedding, grain composition, density, plasticity, shape, cementation, consistency, water bearing, odor, fracturing, mineralogy, texture, degree of weathering, hardness, water quality, etc.)
595	680							x					Brown	Clean washed, angular gravel
680	690						x	x					Brown	Subangular gravel, 10% fines
690	715				x			x					Yellow & Brown	Clay with minor gravel
715	800				x			x					Yellow & Brown	Gravel with 10-15% clayey fines
800	810				x			x					Yellow & Brown	Decreased in fines
810	880				x			x					Yellow & Brown	Gravel with 10-15% clayey fines
880	915							x					Brown	Clean washed angular gravel
915	930				x			x					Yellow & Brown	Gravel and clay, calcite on cuttings
930	1000							x					Brown	Gravel, angular to subangular
1000	1080							x					Brown	Clean washed angular gravel
1080	1095					x		x					Brown	Gravel, trace of fines
1095	1200							x					Brown & Gray	Gravel, angular quartzite
1200	1220				x			x					Yellow & Brown	Gravel, clay increase 20%

Barr Engineering Company
170 South Main Street Suite 500
Salt Lake City, UT 84101
Telephone: 801-333-8400

LOG OF WELL MW-RW1

Project:	Provo Aquifer Storage and Recovery Pilot Study	Surface Elevation:	4752.4 ft	Top of Casing Elev.:	4755.1 ft
Project No.:	44251008.00	Drilling Method:	Rotosonic		
Location:	Provo, Utah	Sampling Method:	Rotosonic - Continuous Coring		
Coordinates:	UTM 12N N:4460798.172m, E:444162.7478m				
Datum:	Horizontal: NAD83, Vertical: NAVD88	Completion Depth:	420.0 ft		

Depth, feet	Sample Type & Recovery	Sample No.	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
0			NONE		(NONE): no recovery.	Top Protective Casing: 2.67 ft-ags (8' pipe)	4755
5						Bottom Protective Casing: 5.33 ft-bgs	4750
10		1AB	GP		POORLY GRADED GRAVEL (GP): fine to medium grained; 10YR 4/2 (dark grayish brown); dry; subrounded; strong HCl reaction.		4745
15		2AB					4740
20		3AB	SP		POORLY GRADED SAND (SP): fine grained; 10YR 6/4 (light yellowish brown); dry; weak HCl reaction.	4"-diameter Schedule 80 PVC Casing (-2.67'-380')	4735
25		4AB	SC		CLAYEY SAND (SC): fine grained; 10YR 6/4 (light yellowish brown); moist; weak HCl reaction; iron staining.	Bentonite Grout (0'-367')	4730
30		5AB	SP-SC		POORLY GRADED SAND WITH CLAY (SP-SC): fine grained; 10YR 6/4 (light yellowish brown); moist; weak to moderate HCl reaction; iron staining in bands.		4725
35		6AB					4720
40		7AB					4715
45		8AB					4710
50		9AB	SP		POORLY GRADED SAND (SP): fine to medium grained; 10YR 6/4 (light yellowish brown); dry to moist; very loose; none to weak HCl reaction; iron staining.		4705
55		10AB					4700
60		11AB					4695
65		12AB					4690
70		13AB	SP		POORLY GRADED SAND (SP): fine to medium grained; 2.5Y 6/3 (light yellowish brown); dry; no HCl reaction; massive/homogenous.		4685
75		14AB					4680
80		15AB					4675
85		16AB					4670
90		17AB					4665
95		18AB					4660
100		19AB	SP		GEOTECHNICAL SAMPLE #1 (#19A)- (97'-102').		4655

Date Boring Started:	5/12/20
Date Boring Completed:	5/16/20 11:30 am
Logged By:	CRJ2
Drilling Contractor:	Cascade
Drill Rig:	Pro Sonic 600

Remarks: Composite Samples sent for Geochemical Analysis: Comp 1 (17'-135'), Comp 2 (140'-167'), Comp 3 (167'-265')*, Comp 4 (265'-317'), Comp 5 (317'-342'), Comp 6 (342'-352'), Comp 7 (352'-373'), Comp 8 (373'-389'), Comp 9 (389'-420')*
*. *= missing interval (217'-220'), (392-394')

Additional data may have been collected in the field which is not included on this log.

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LOG OF WELL MW-RW1

Project:	Provo Aquifer Storage and Recovery Pilot Study	Surface Elevation:	4752.4 ft
Project No.:	44251008.00	Drilling Method:	Rotosonic
Location:	Provo, Utah	Sampling Method:	Rotosonic - Continuous Coring
Coordinates:	UTM 12N N:4460798.172m, E:444162.7478m	Top of Casing Elev.:	4755.1 ft
Datum:	Horizontal: NAD83, Vertical: NAVD88	Completion Depth:	420.0 ft

Depth, feet	Sample Type & Recovery	Sample No.	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
100					POORLY GRADED SAND (SP): fine grained; 10YR 6/3 (pale brown); dry to moist; very loose; none to weak HCl reaction. *(continued)*		4650
105		20AB				Bentonite Grout (0'-367')	
					Significant iron staining, mica biotite flakes present (107'-127').		4645
110		21AB					
							4640
115		22AB	SP			4"-diameter Schedule 80 PVC Casing (-2.67'-380')	
120		23AB					4635
							4630
125		24AB					
					POORLY GRADED GRAVELLY SAND (SP): fine to coarse grained; 10YR 5/4 (yellowish brown); dry to moist; rounded; no HCl reaction.		4625
130		25AB	SP				
135		26AB					4620
							4615
140					POORLY GRADED SANDY GRAVEL (GP): fine to medium grained; 2.5Y 6/3 (light yellowish brown); moist; very loose; subrounded; strong HCl reaction; chert and limestone present, some iron staining.		4610
145		27AB					
			GP				4605
150		28AB					
155		29AB					4600
							4595
160		30AB			POORLY GRADED SANDY GRAVEL (GP): fine to medium grained; 10YR 5/2 (grayish brown); moist; subrounded; strong HCl reaction; iron staining, 2 boulders encountered.		
			GP				4590
165		31AB					
					WELL GRADED GRAVEL WITH SILT (GW-GM): very fine to coarse grained; 7.5YR 5/1 (gray); moist; loose; subangular; moderate HCl reaction; blue limestone present, some boulders and trace clay.		4585
170		32AB					
							4580
175		33AB	GW-GM				
							4575
180		34AB					
							4570
185		35AB					
					WELL GRADED GRAVEL WITH CLAY (GW-GC): very fine to coarse grained; 10YR 6/3 (pale brown); wet; subrounded to subangular; moderate HCl reaction.		4565
190		36AB					
							4560
195		37AB	GW-GC				
							4555
200		38AB					

Date Boring Started:	5/12/20
Date Boring Completed:	5/16/20 11:30 am
Logged By:	CRJ2
Drilling Contractor:	Cascade
Drill Rig:	Pro Sonic 600

Remarks: Composite Samples sent for Geochemical Analysis: Comp 1 (17'-135'), Comp 2 (140'-167'), Comp 3 (167'-265')*, Comp 4 (265'-317'), Comp 5 (317'-342'), Comp 6 (342'-352'), Comp 7 (352'-373'), Comp 8 (373'-389'), Comp 9 (389'-420')*
*. *= missing interval (217'-220'), (392-394')

Additional data may have been collected in the field which is not included on this log.

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LOG OF WELL MW-RW1

Project:	Provo Aquifer Storage and Recovery Pilot Study	Surface Elevation:	4752.4 ft	Top of Casing Elev.:	4755.1 ft
Project No.:	44251008.00	Drilling Method:	Rotosonic		
Location:	Provo, Utah	Sampling Method:	Rotosonic - Continuous Coring		
Coordinates:	UTM 12N N:4460798.172m, E:444162.7478m				
Datum:	Horizontal: NAD83, Vertical: NAVD88	Completion Depth:	420.0 ft		

Depth, feet	Sample Type & Recovery	Sample No.	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
200			GW-GC		WELL GRADED GRAVEL WITH CLAY (GW-GC): very fine to coarse grained; 10YR 6/3 (pale brown); wet; subrounded to subangular; moderate HCl reaction. *(continued)*		4550
205		39AB			GEOTECHNICAL SAMPLE #2 (#42A)- (202'-224').	Bentonite Grout (0'-367')	4545
210		40AB	GW-GM		WELL GRADED GRAVEL WITH SILT (GW-GM): very fine to coarse grained; 10YR 6/4 (light yellowish brown); moist to wet; subrounded to subangular; moderate to strong HCl reaction; quartzite and limestone boulders encountered (16"), trace iron staining.		4540
215		41AB				4"-diameter Schedule 80 PVC Casing (-2.67'-380')	4535
220		42C 42AB	GC		CLAYEY GRAVEL (GC): very fine to fine grained; 2.5Y 7/3 (pale yellow); moist; soft to medium stiff; subrounded to subangular; low to medium plasticity; weak HCl reaction; 4 boulders encountered (max 14").		4530
225		43AB	GM		SILTY GRAVEL (GM): fine to coarse grained; 2.5Y 6/4 (light yellowish brown); moist; soft; subrounded to subangular; low plasticity; moderate HCl reaction; 2 boulders encountered.		4525
230		44AB					4520
235							4515
240		45AB	GW-GM		WELL GRADED GRAVEL WITH SILT (GW-GM): very fine to coarse grained; 2.5Y 7/3 (pale yellow); wet; loose; subrounded to subangular; low plasticity; moderate HCl reaction; boulder encountered, traces of pyrite in quartzite, iron staining.		4510
245		46AB					4505
250		47AB					4500
255		48AB					4495
260		49AB					4490
265		50AB					4485
270		51AB	SP		POORLY GRADED SAND WITH GRAVEL (SP): medium to coarse grained; 10YR 5/2 (grayish brown); wet; subangular; medium plasticity; strong HCl reaction; interbedded trace clays.		4480
275		52AB					4475
280		53AB	GP		POORLY GRADED SANDY GRAVEL (GP): fine to coarse grained; 10YR 6/2 (light brownish gray); wet; very loose; subrounded to subangular; strong HCl reaction; boulder encountered, quartzite and limestone.		4470
285		54AB					4465
290		55AB					4460
295		56AB					4455
300		57AB	GP				

Date Boring Started:	5/12/20
Date Boring Completed:	5/16/20 11:30 am
Logged By:	CRJ2
Drilling Contractor:	Cascade
Drill Rig:	Pro Sonic 600

Remarks: Composite Samples sent for Geochemical Analysis: Comp 1 (17'-135'), Comp 2 (140'-167'), Comp 3 (167'-265')*, Comp 4 (265'-317'), Comp 5 (317'-342'), Comp 6 (342'-352'), Comp 7 (352'-373'), Comp 8 (373'-389'), Comp 9 (389'-420')*
*. *= missing interval (217'-220'), (392-394')

Additional data may have been collected in the field which is not included on this log.

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Telephone: 801-333-8400

LOG OF WELL MW-RW1

Project:	Provo Aquifer Storage and Recovery Pilot Study	Surface Elevation:	4752.4 ft
Project No.:	44251008.00	Drilling Method:	Rotosonic
Location:	Provo, Utah	Sampling Method:	Rotosonic - Continuous Coring
Coordinates:	UTM 12N N:4460798.172m, E:444162.7478m	Completion Depth:	420.0 ft
Datum:	Horizontal: NAD83, Vertical: NAVD88	Top of Casing Elev.:	4755.1 ft

Depth, feet	Sample Type & Recovery	Sample No.	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
300					POORLY GRADED GRAVEL (GP): fine to medium grained; 10YR 6/2 (light brownish gray); wet; very loose; subrounded to subangular; weak HCl reaction. *(continued)*		4450
305		58AB	GP		GEOTECHNICAL SAMPLE #3 (#58A)- (302'-307').	Bentonite Grout (0'-367')	4445
310		59AB					4440
315		60AB				4"-diameter Schedule 80 PVC Casing (-2.67'-380')	4435
320		61AB	GW		WELL GRADED GRAVEL WITH SAND (GW): fine to coarse grained; 10YR 7/2 (light gray); saturated; very loose; subangular; strong HCl reaction; cobbles encountered (max 8"), quartzite and limestone.		4430
325		62AB					4425
330		63AB	GW		WELL GRADED GRAVEL WITH SAND (GW): fine to coarse grained; 10YR 6/2 (light brownish gray); saturated; subangular to rounded; weak HCl reaction; boulder encountered, some red sandstone.	Vibrating Wire Piezometer (VWP) Placement @ 330'	4420
335		64AB					4415
340		65AB					4410
345		66AB	GC		CLAYEY GRAVEL WITH SAND (GC): fine to coarse grained; 2.5YR 6/2 (pale red); wet; very soft; subangular to subrounded; medium to high plasticity; weak HCl reaction; cobbles encountered (max 9"), sandstone and limestone.		4405
350		67AB					4400
355		68AB	GW-GM		WELL GRADED GRAVEL WITH SAND (GW-GM): fine to coarse grained; 10YR 7/3 (very pale brown); wet; subangular to subrounded; weak HCl reaction; cobbles encountered (max 8"), sandstone and limestone.		4395
360		69AB					4390
365		70AB					4385
370		71AB	GW-GM		WELL GRADED GRAVEL WITH SILT AND SAND (GW-GM): fine to coarse grained; 10YR 7/3 (very pale brown); saturated; loose; subangular; weak HCl reaction; black vitreous mettalic flakes in clayey sections.	Bentonite Chips (367'-377.5')	4380
375		72AB	GC		CLAYEY GRAVEL (GC): 10YR 7/4 (very pale brown); wet; subrounded; medium to high plasticity; moderate to strong HCl reaction.		4375
380		73AB				Top of Screen (380')	4370
385		74AB			GEOTECHNICAL SAMPLE #4 (#74A)- (384'-389').	4"-diameter 0.01 Slotted Schedule 80 PVC Screen (380'-420')	4365
390		75AB	GW-GM		WELL GRADED GRAVEL WITH SILT AND SAND (GW-GM): fine to coarse grained; 10YR 7/3 (very pale brown); saturated; very loose; subangular to subrounded; weak HCl reaction.		4360
395		76AB			GEOTECHNICAL SAMPLE #5 (#76A)- (394'-400').	Washed 10/20 Silica Sand (377'-420')	4355
400							

Date Boring Started:	5/12/20
Date Boring Completed:	5/16/20 11:30 am
Logged By:	CRJ2
Drilling Contractor:	Cascade
Drill Rig:	Pro Sonic 600

Remarks: Composite Samples sent for Geochemical Analysis: Comp 1 (17'-135'), Comp 2 (140'-167'), Comp 3 (167'-265')*, Comp 4 (265'-317'), Comp 5 (317'-342'), Comp 6 (342'-352'), Comp 7 (352'-373'), Comp 8 (373'-389'), Comp 9 (389'-420')*
*. *= missing interval (217'-220'), (392-394')

Additional data may have been collected in the field which is not included on this log.

Barr Engineering Company
170 South Main Street Suite 500
Salt Lake City, UT 84101
Telephone: 801-333-8400

LOG OF WELL MW-RW1

Project:	Provo Aquifer Storage and Recovery Pilot Study	Surface Elevation:	4752.4 ft
Project No.:	44251008.00	Drilling Method:	Rotosonic
Location:	Provo, Utah	Sampling Method:	Rotosonic - Continuous Coring
Coordinates:	UTM 12N N:4460798.172m, E:444162.7478m	Completion Depth:	420.0 ft
Datum:	Horizontal: NAD83, Vertical: NAVD88	Top of Casing Elev.:	4755.1 ft

Depth, feet	Sample Type & Recovery	Sample No.	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
400		77AB	ML		SAND SILT WITH GRAVEL (ML): very fine to fine grained; 7.5YR 7/6 (reddish yellow); wet; subangular; strong HCl reaction.		4350
405		78AB	GW-GM		WELL GRADED GRAVEL WITH SILT AND SAND (GW-GM): fine to coarse grained; 10YR 6/4 (light yellowish brown); very loose to loose; subangular to subrounded; strong HCl reaction; weak cementation; cobbles encountered (max 9"), some quartz monzanite and granite cobbles.		4345
410		79AB			GEOTECHNICAL SAMPLE #6 (#78A)- (402'-407').		4340
415		80AB	GW		WELL GRADED GRAVEL WITH SAND (GW): fine to coarse grained; 10YR 6/3 (pale brown); saturated; very loose; subangular; strong HCl reaction.		4335
					GEOTECHNICAL SAMPLE #7 (#80A)- (413'-419').		
420		81AB	GC		CLAYEY GRAVEL (GC): 10YR 6/1 (gray); saturated; soft; subangular; medium plasticity; strong HCl reaction; moderate cementation.	Base of Screen/ Well TD: 420 ft-bgs	4330
425					End of well 420.0 feet		4325
430							4320
435							4315
440							4310
445							4305
450							4300
455							4295
460							4290
465							4285
470							4280
475							4275
480							4270
485							4265
490							4260
495							4255
500							

Date Boring Started:	5/12/20
Date Boring Completed:	5/16/20 11:30 am
Logged By:	CRJ2
Drilling Contractor:	Cascade
Drill Rig:	Pro Sonic 600

Remarks: Composite Samples sent for Geochemical Analysis: Comp 1 (17'-135'), Comp 2 (140'-167'), Comp 3 (167'-265')*, Comp 4 (265'-317'), Comp 5 (317'-342'), Comp 6 (342'-352'), Comp 7 (352'-373'), Comp 8 (373'-389'), Comp 9 (389'-420')*
*. *= missing interval (217'-220'), (392-394')

Additional data may have been collected in the field which is not included on this log.

5600 North Well

Examined ____ Recorded: B. C. ____ D. ____ Inspection Sheet ____ Copied (2-6-3) 7 cc b

REPORT OF WELL DRILLER
STATE OF UTAH

Application No. A 26902
Claim No. ____
Coordinate No. ____ Cert. - 2208

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name Provo City
Address ____

(2) LOCATION OF WELL:
County Utah Ground Water Basin (leave blank) ____
North 953 feet, East 27 feet from SW Corner of Section 7, T. 6 S, R. 3 E, SLBM (strike out words not needed) USM

(3) NATURE OF WORK (check): New Well XX
Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure: ____

(4) NATURE OF USE (check):
Domestic ☐ Industrial ☐ Municipal XX Stockwater ☐
Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☐ Dug ☐ Jetted ☐
Cable XX Driven ☐ Bored ☐

(6) CASING SCHEDULE: Threaded ☐ Welded XX
24 " Diam. from 0 feet to 50 feet Gage Std.
20 " Diam. from 0 feet to 346 feet Gage Std.
16 " Diam. from 336 feet to 423 feet Gage Std.
New XX Reject ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes XX No ☐
Type of perforator used ____
Size of perforations ____ inches by ____ inches
195 feet to 212 17 feet
222 feet to 337 115 feet
346 feet to 402 56 feet
____ feet to ____ feet
____ feet to ____ feet

(8) SCREENS: Well screen installed? Yes ☐ No XX
Manufacturer's Name ____
Type ____ Model No. ____
Diam. ____ Slot size ____ Set from ____ ft. to ____
Diam. ____ Slot size ____ Set from ____ ft. to ____

(9) CONSTRUCTION:
Was well gravel packed? Yes ☐ No XX Size of gravel: ____
Gravel placed from ____ feet to ____ feet
Was a surface seal provided? Yes XX No ☐
To what depth? 50 feet
Material used in seal: Bentonite--cement
Did any strata contain unusable water? Yes ☐ No XX
Type of water: ____ Depth of strata ____
Method of sealing strata off: ____
Was surface casing used? Yes XX No ☐
Was it cemented in place? Yes XX No ☐

(10) WATER LEVELS:
Static level 225 feet below land surface Date Feb. 75
Artesian pressure ____ lbs. feet above land surface Date ____

LOG RECEIVED: APR 1 1975 WATER RIGHTS SALT LAKE

(11) FLOWING WELL:
Controlled by (check) Valve ☐ Cap ☐ Plug ☐ No Control ☐
Does well leak around casing? Yes ☐ No ☐

(12) WELL TESTS: Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes XX No ☐ If so, by whom? Petersen Bros.
Yield: 1032 gal./min. with 63.5 feet drawdown after 24 hours
" 1200 " " 66 " " 6 "
" ____ " " ____ " " ____ "
Bailer test ____ gal./min. with ____ feet drawdown after ____ hours
Artesian flow ____ g.p.m. Date ____
Temperature of water ____ Was a chemical analysis made? No ☐ Yes ☐

(13) WELL LOG: Diameter of well 20 & 16 inches
Depth drilled 469 feet. Depth of completed well ____ feet.
NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	1										x	top soil
1	17	x				x	x					bould.-cobb. in clay gray
17	48	x			x	x						cobb.-gravel in clay gray
48	80	x			x							water gravel, gray clay
80	140	x			x							water gravel, gray clay
140	204				x							very little clay
204	212				x							water gravel
212	222	x										blue
222	304										x	cemented gravel
304	400	x			x							water gravel-clay balls
400	402	x										blue clay--a little gravel
402	403	x										cemented gravel--brown cla
403	422	x										blue clay--a little gravel
422	450	x								x		bedrock-dark blue
450	469	x								x		bedrock-dark blue

Work started Augest 19 74 Completed February 19 75

(14) PUMP:
Manufacturer's Name Peabody-Barnes
Type: Line Shaft Turbine H. P. 200
Depth to pump or bowles 330 feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.
Name Petersen Bros. Drilling Co. Inc. (Person, firm, or corporation) (Type or print)
Address 1775 No. Beck St., Salt Lake City, Ut. 84116
(Signed) ____ (Well Driller)
License No. 249 Date April 17, 19 75

USE OTHER SIDE FOR ADDITIONAL REMARKS

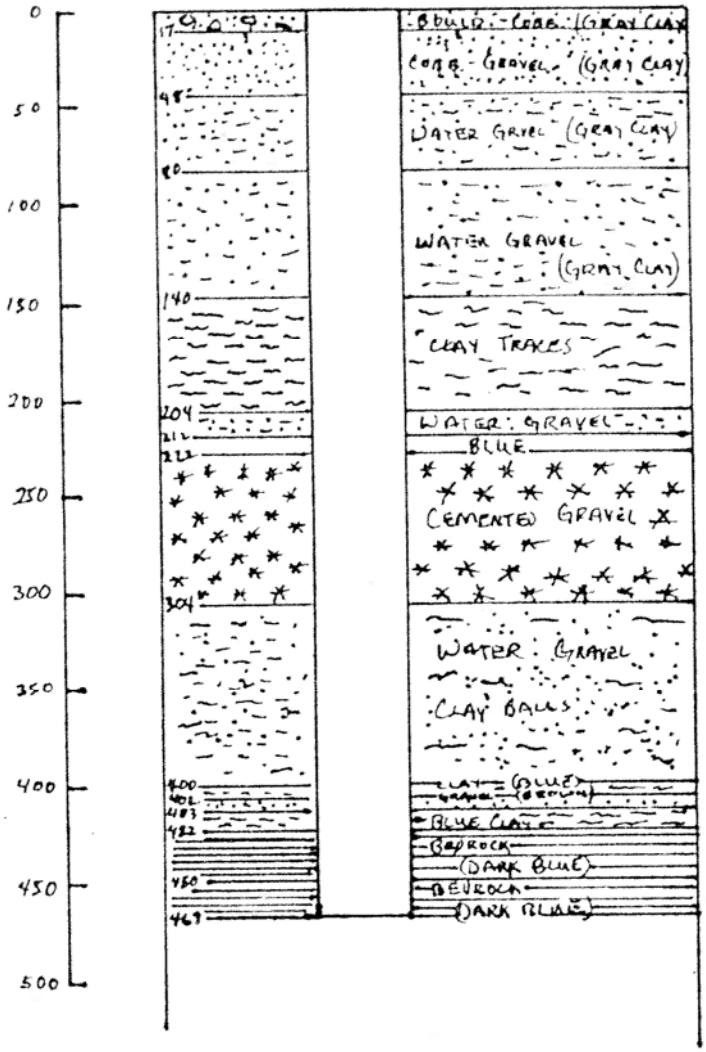
MICROFILMED

5600 WELL

VERTICLE SCALE 1" = 100

20" CASING 0-336'

16" CASING 336-423'



Barr Engineering Company
170 South Main Street Suite 500
Salt Lake City, UT 84101
Telephone: 801-333-8400

LOG OF WELL MW-5600N1

Project:	Provo Aquifer Storage and Recovery Pilot Study	Surface Elevation:	4795.7 ft	Top of Casing Elev.:	4798.2 ft
Project No.:	44251008.00	Drilling Method:	Rotosonic		
Location:	Provo, Utah	Sampling Method:	Rotosonic - Continuous Coring		
Coordinates:	UTM 12N N:4462065.323m, E:444128.0402m				
Datum:	Horizontal: NAD83, Vertical: NAVD88	Completion Depth:	377.0 ft		

Depth, feet	Sample Type & Recovery	Sample No.	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
0		1	GP		POORLY GRADED GRAVEL WITH SAND (GP): 5YR 4/2 (dark reddish gray); moist; strong HCl reaction. Asphalt Surface.	Top Protective Casing: 2.5 ft-ags (8' pipe)	4795
5		2	SP		POORLY GRADED SAND (SP): medium grained; 10YR 4/2 (dark grayish brown); moist; strong HCl reaction; cobbles present.	Bottom Protective Casing: 5.5 ft-bgs	4790
10		3			POORLY GRADED GRAVEL WITH SAND (GP): coarse grained; 10YR 3/3 (dark brown); moist; strong HCl reaction; limestone cobbles present (max 8").	10" borehole	4785
15		4	GP			Bentonite Grout (0'-200')	4780
20		5			Large cobbles and boulders present.	4"-diameter Schedule 80 PVC Casing (-2.5'-270')	4775
25		6	GP		POORLY GRADED GRAVEL WITH SAND (GP): coarse grained; 2.5YR 4/3 (reddish brown); moist; strong HCl reaction.		4770
30		7			POORLY GRADED GRAVEL WITH SAND (GP): coarse grained; 5YR 5/1 (gray); moist; strong HCl reaction.		4765
35 ▽		8			Coarse grained; wet; coarser sand in gravel. limestone cobbles present.		4760 ▽
40		9					4755
45		10					4750
50		11					4745
55		12					4740
60		13					4735
65		14	GP				4730
70		15					4725
75		16					4720
80		17					4715
85		18					4710
90		19					4705
95		20					4700
100							

Date Boring Started:	5/22/20 11:00 am
Date Boring Completed:	6/2/20 3:00 pm
Logged By:	JSR
Drilling Contractor:	Cascade
Drill Rig:	Pro Sonic 600

Remarks: Composite Samples sent for Geochemical Analysis: Comp 1 (6'-164'), Comp 2 (164'-194'), Comp 3 (194'-213'), Comp 4 (217'-224'), Comp 5 (224'-267'), Comp 6 (267'-307'), Comp 7 (307'-337'), Comp 7 (337'-371')

Additional data may have been collected in the field which is not included on this log.

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LOG OF WELL MW-5600N1

Project:	Provo Aquifer Storage and Recovery Pilot Study	Surface Elevation:	4795.7 ft	Top of Casing Elev.:	4798.2 ft
Project No.:	44251008.00	Drilling Method:	Rotosonic		
Location:	Provo, Utah	Sampling Method:	Rotosonic - Continuous Coring		
Coordinates:	UTM 12N N:4462065.323m, E:444128.0402m				
Datum:	Horizontal: NAD83, Vertical: NAVD88	Completion Depth:	377.0 ft		

Depth, feet	Sample Type & Recovery	Sample No.	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
100		21	GP		Higher clay volume 101'-103'.	Bentonite Grout (0'-200')	4695
105		22	SP		POORLY GRADED SAND WITH GRAVEL (SP): medium to coarse grained; 10YR 5/3 (brown); wet; strong HCl reaction.		4690
110		23					4685
115		24	GC		CLAYEY GRAVEL WITH COBBLES (GC): 5YR 5/1 (gray); wet; strong HCl reaction.		4680
120		25	GP		POORLY GRADED GRAVEL WITH SAND (GP): 5YR 5/2 (reddish gray); wet; strong HCl reaction.		4675
125		26					4670
130		27					4665
135		28				4"-diameter Schedule 80 PVC Casing (-2.5'-270')	4660
140		29					4655
145		30					4650
150		31					4645
155		32					4640
160		33					4635
165		34	GC		CLAYEY GRAVEL WITH COBBLES (GC): 5YR 4/1 (dark gray); wet; strong HCl reaction.		4630
170		35					4625
175		36					4620
180		37	GC		CLAYEY GRAVEL WITH COBBLES (GC): 5YR 4/1 (dark gray); wet; strong HCl reaction.		4615
			SP		POORLY GRADED SAND (SP): medium grained; brown; wet.		
185		38	GC		CLAYEY GRAVEL WITH COBBLES (GC): wet.		4610
190		39	GP		POORLY GRADED GRAVEL (GP): wet; strong HCl reaction; limestone cobbles present.		4605
195		40					4600
200		41	GC		CLAYEY GRAVEL WITH COBBLES (GC): 7.5YR 5/2 (brown); wet.		

Date Boring Started:	5/22/20 11:00 am
Date Boring Completed:	6/2/20 3:00 pm
Logged By:	JSR
Drilling Contractor:	Cascade
Drill Rig:	Pro Sonic 600

Remarks: Composite Samples sent for Geochemical Analysis: Comp 1 (6'-164'), Comp 2 (164'-194'), Comp 3 (194'-213'), Comp 4 (217'-224'), Comp 5 (224'-267'), Comp 6 (267'-307'), Comp 7 (307'-337'), Comp 7 (337'-371')

Additional data may have been collected in the field which is not included on this log.

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Telephone: 801-333-8400

LOG OF WELL MW-5600N1

Project:	Provo Aquifer Storage and Recovery Pilot Study	Surface Elevation:	4795.7 ft	Top of Casing Elev.:	4798.2 ft
Project No.:	44251008.00	Drilling Method:	Rotosonic		
Location:	Provo, Utah	Sampling Method:	Rotosonic - Continuous Coring		
Coordinates:	UTM 12N N:4462065.323m, E:444128.0402m				
Datum:	Horizontal: NAD83, Vertical: NAVD88	Completion Depth:	377.0 ft		

Depth, feet	Sample Type & Recovery	Sample No.	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
200					CLAYEY GRAVEL WITH COBBLES (GC): 7.5YR 5/2 (brown); wet. *(continued)*		4595
205		42	GC				4590
210		43				Vibrating Wire Piezometer (VWP) Placement @ 210'	4585
215		44	GM		SILTY GRAVEL WITH SAND (GM): 5YR 5/1 (gray); wet; strong HCl reaction.	8" borehole	4580
220		45	CL		LEAN CLAY (CL): 2.5YR 2.5/1 (reddish black); wet. GEOTECHNICAL SAMPLE #1 (#1000A)- (221'-222').	4"-diameter Schedule 80 PVC Casing (-2.5'-270')	4575
225		46	GC		CLAYEY GRAVEL WITH COBBLES (GC): 10YR 6/2 (light brownish gray); wet.		4570
230		47					4565
235		48	GP		POORLY GRADED GRAVEL (GP): 10YR 4/3 (brown); wet; strong HCl reaction.	Bentonite Chips (200'-268')	4560
240		49					4555
245		50					4550
250		51					4545
			GC		CLAYEY GRAVEL (GC): wet.		
255		52	GP		POORLY GRADED GRAVEL (GP): gray; wet; strong HCl reaction.		4540
260		53	GC		CLAYEY GRAVEL WITH SAND (GC): 10YR 4/3 (brown); wet; strong HCl reaction. GEOTECHNICAL SAMPLE #2 (#53A)- (257'-262').		4535
265		54					4530
270		55	GM		SILTY GRAVEL WITH SAND (GM): 10YR 6/2 (light brownish gray); wet. GEOTECHNICAL SAMPLE #3 (#56A)- (271'-277').	Top of Screen (270')	4525
275		56					4520
280		57	GP		POORLY GRADED GRAVEL (GP): wet.	4"-diameter 0.01 Slotted Schedule 80 PVC Screen (270'-360')	4515
285		58					4510
			GC		CLAYEY GRAVEL (GC): wet; boulder present- (287'-289').		
290		59	GP		POORLY GRADED GRAVEL WITH COBBLES (GP): wet.		4505
295		60	GC		CLAYEY AND SILTY GRAVEL WITH COBBLES (GC): moist. GEOTECHNICAL SAMPLE #4 (#61A)- (297'-303').		4500
300							

Date Boring Started:	5/22/20 11:00 am
Date Boring Completed:	6/2/20 3:00 pm
Logged By:	JSR
Drilling Contractor:	Cascade
Drill Rig:	Pro Sonic 600

Remarks: Composite Samples sent for Geochemical Analysis: Comp 1 (6'-164'), Comp 2 (164'-194'), Comp 3 (194'-213'), Comp 4 (217'-224'), Comp 5 (224'-267'), Comp 6 (267'-307'), Comp 7 (307'-337'), Comp 7 (337'-371')

Additional data may have been collected in the field which is not included on this log.

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LOG OF WELL MW-5600N1

Project:	Provo Aquifer Storage and Recovery Pilot Study	Surface Elevation:	4795.7 ft	Top of Casing Elev.:	4798.2 ft
Project No.:	44251008.00	Drilling Method:	Rotosonic		
Location:	Provo, Utah	Sampling Method:	Rotosonic - Continuous Coring		
Coordinates:	UTM 12N N:4462065.323m, E:444128.0402m				
Datum:	Horizontal: NAD83, Vertical: NAVD88	Completion Depth:	377.0 ft		

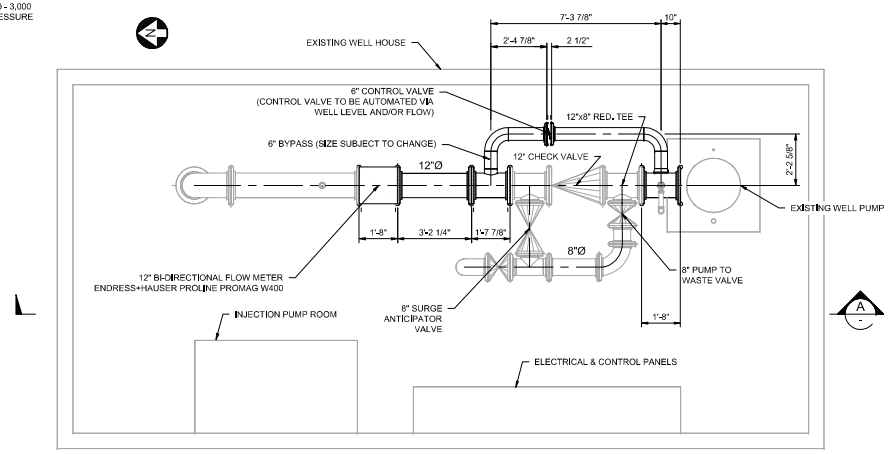
Depth, feet	Sample Type & Recovery	Sample No.	USCS	Graphic Log	LITHOLOGIC DESCRIPTION	WELL OR PIEZOMETER CONSTRUCTION DETAIL	Elevation, feet
300		61	GC		CLAYEY AND SILTY GRAVEL WITH COBBLES (GC): moist. *(continued)*		4495
			GP		POORLY GRADED GRAVEL (GP): wet.		
305		62					4490
			GC		CLAYEY GRAVEL WITH COBBLES (GC): 2.5Y 4/1 (dark gray); wet; strong HCl reaction.		
310		63					4485
					GEOTECHNICAL SAMPLE #5 (#64A)- (313'-317').		
315		64				Washed 10/20 Silica Sand (268'-362')	4480
320		65	GP		POORLY GRADED GRAVEL (GP): wet.		4475
			GM		SILTY GRAVEL WITH COBBLES (GM): wet.		
325		66					4470
			GP		POORLY GRADED GRAVEL (GP): wet.		
330		67					4465
			GC		CLAYEY GRAVEL WITH COBBLES (GC): wet; strong HCl reaction.		
335		68					4460
340		69	GP		POORLY GRADED GRAVEL (GP): wet; subangular; strong HCl reaction; limestone and quartzite cobbles present.		4455
345		70					4450
350		71					4445
			QUARTZITE		(QUARTZITE): pulverized rock. quartzite boulder.		
355		72			(LIMESTONE): angular; limestone and quartzite interbedded.		4440
			LIMESTONE				
360		73				Base of Screen (360')	4435
365		74			(QUARTZITE): angular; limestone and quartzite interbedded.		4430
370		75	QUARTZITE			Bentonite Chips (362'-377')	4425
375		76				Well TD: 377 ft-bgs	4420
					End of well 377.0 feet		
380							4415
385							4410
390							4405
395							4400
400							

Date Boring Started:	5/22/20 11:00 am
Date Boring Completed:	6/2/20 3:00 pm
Logged By:	JSR
Drilling Contractor:	Cascade
Drill Rig:	Pro Sonic 600

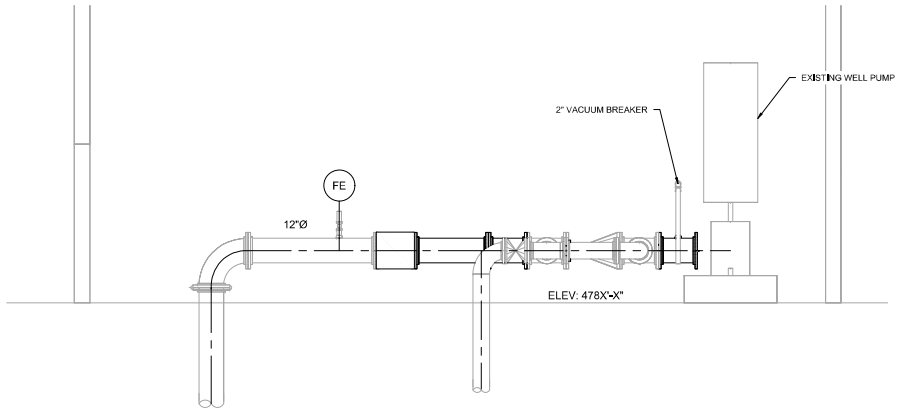
Remarks: Composite Samples sent for Geochemical Analysis: Comp 1 (6'-164'), Comp 2 (164'-194'), Comp 3 (194'-213'), Comp 4 (217'-224'), Comp 5 (224'-267'), Comp 6 (267'-307'), Comp 7 (307'-337'), Comp 7 (337'-371')

Additional data may have been collected in the field which is not included on this log.

NOTES:
1. RIVERWOODS SITE ANTICIPATED WELL INFLOW RANGE 1,500 - 3,000 GPM. SYSTEM HEADER PRESSURE 110 PSIG



PLAN: RIVERWOODS WELL HOUSE (SITE 1)
SCALE: 3/8" = 1'-0"



A ELEVATION: RIVERWOODS WELL HOUSE (SITE 1)
SCALE: 3/8" = 1'-0" (FACING EAST)

PROJECT LOCATION: RIVERWOODS WELL HOUSE (SITE 1)
NTS

BILL OF MATERIAL				
MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	12"	PIPE, SMLS, SCH STD, ASTM A106 GR B	4'-10"
2	1	6"	PIPE, SMLS, SCH STD, ASTM A106 GR B	7'-2"
3	2	6"	90 LR ELL, SCH STD, ASTM A234 GR WPB	
4	1	12"x6"	TEE RED, SCH STD, ASTM A234 GR WPB	
5	6	12"	FLG SLIP ON, 150LB, ASTM A105	
6	2	6"	FLG SLIP ON, 150LB, ASTM A105	
7	5	12"	GASKET, 150LB, 1/8" THK	
8	2	6"	GASKET, 150LB, 1/8" THK	
9	1	12"x2"	SOCK-O-LET, SW,3000LB, ASTM A105	
10	1	12"x6"	WELD-O-LET, BW, ASTM A105	
11	1	6"	BUTTERFLY VALVE, WAFER, 150LB	
12	1	12"	BI-DIRECTIONAL FLOW METER, ENDRESS+HAUSER PROLINE PROMAG W400	19,69"

*SMALL BORE ITEMS TO BE DETAILED AND ADDED IN FUTURE REVISIONS

PRELIMINARY
DRAFT

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION	RELEASED TO/FOR	DATE RELEASED
D	DJL	JMB	-	11/2/22	ISSUED FOR DESIGN	DESIGN	12/21 11/22
C	DJL	JMB	-	12/17/21	ISSUED FOR DESIGN	REVIEW	01/21
B	DJL	JMB	-	01/06/21	ISSUED FOR REVIEW	REFERENCE	11/20
A	DJL	JMB	-	11/20/20	ISSUED FOR REFERENCE		

BARR
Project Office:
BARR ENGINEERING CO.
170 SOUTH MAIN STREET
SUITE 500
SALT LAKE CITY, UT 84101
Ph: 1-800-632-2277
Fax: (952) 832-2601
www.barr.com
Corporate Headquarters:
Minneapolis, Minnesota
Ph: 1-800-632-2277

Scale	AS SHOWN
Date	11/20/20
Drawn	DJL
Checked	JMB
Designed	DJL
Approved	

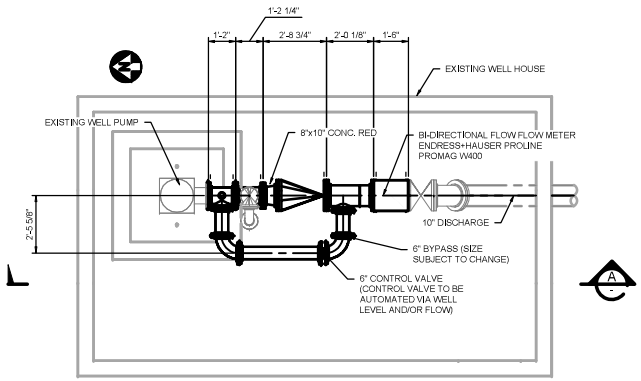
CITY OF PROVO
PROVO UTAH

PROVO CITY WATER
PROVO WELL SITE N. UNIVERSITY AVE

EXISITNG WELL PUMP

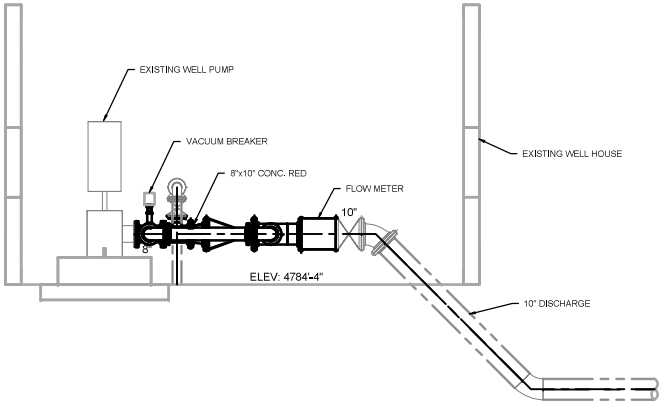
BARR PROJECT No. 44251008.00
CLIENT PROJECT No.
DWG. No. MECH-GA-001
REV. No. D

NOTES:
1. 5600N SITE ANTICIPATED WELL INFLOW RANGE 700 - 2,000 GPM. SYSTEM HEADER PRESSURE 60 PSIG



PLAN: 5600 N WELL HOUSE (SITE 2)
SCALE: 3/8" = 1'-0"

PROJECT LOCATION: 5600 N WELL HOUSE (SITE 2)
NTS



ELEVATION: 5600 N WELL HOUSE (SITE 2)
SCALE: 3/8" = 1'-0" (FACING EAST)

BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	10"	PIPE, SMLS, SCH STD, ASTM A106 GR B	2'-2"
2	1	2"	PIPE, SMLS, SCH STD, ASTM A106 GR B	6"
3	1	6"	PIPE, SMLS, SCH STD, ASTM A106 GR B	5'-9"
4	1	10"	45 ELL, SCH STD, ASTM A234 GR WPB	
5	2	6"	90 LR ELL, SCH STD, ASTM A234 GR WPB	
6	1	10"x6"	TEE RED, SCH STD, ASTM A234 GR WPB	
7	1	8"x4"	TEE RED, SCH STD, ASTM A234 GR WPB	
8	1	8"x6"	TEE RED, SCH STD, ASTM A234 GR WPB	
9	1	10"x8"	RED CONC, SCH STD, ASTM A234 GR WPB	
10	1	4"	FLG WELD NECK, 150LB, SCH STD, ASTM A105	
11	5	10"	FLG SLIP ON, 150LB, ASTM A105	
12	12	6"	FLG SLIP ON, 150LB, ASTM A105	
13	5	8"	FLG SLIP ON, 150LB, ASTM A105	
14	5	10"	GASKET, 150LB, 1/8" THK	
15	1	4"	GASKET, 150LB, 1/8" THK	
16	7	6"	GASKET, 150LB, 1/8" THK	
17	3	8"	GASKET, 150LB, 1/8" THK	
18	1	8"x2"	SOCK-O-LET, SW,3000LB, ASTM A105	
19	1	2"	BALL VALVE, THRD, 800LB	
20	1	6"	BUTTERFLY VALVE, WAFER, 150LB	
21	1	10"	CHECK VALVE, FLG, 150LB	
22	1	10"	GATE VALVE, FLG, 150LB	
23	1	10"	BI-DIRECTIONAL FLOW FLOW METER ENDRESS+HAUSER PROLINE PROMAG W400	

*SMALL BORE ITEMS TO BE DETAILED AND ADDED IN FUTURE REVISIONS

PRELIMINARY DRAFT

NO.	BY	CHK	APP	DATE	REVISION DESCRIPTION
C	DJL	JMB		12/17/21	ISSUED FOR DESIGN
B	DJL	JMB		01/05/21	ISSUED FOR REVIEW
A	DJL	JMB	-	11/20/20	ISSUED FOR REFERENCE

DESIGN 12/20
REVIEW 01/21
REFERENCE 01/20
RELEASED TO/FOR
DATE RELEASED

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Ph: 1-800-632-2277

Scale	AS SHOWN
Date	11/20/20
Drawn	DJL
Checked	JMB
Designed	DJL
Approved	

CITY OF PROVO
PROVO UTAH

PROVO CITY WATER
PROVO WELL SITE 5600N

EXISITNG WELL PUMP

BARR PROJECT No. 44251008.00
CLIENT PROJECT No.
DWG. No. MECH-GA-002
REV. No. C

Attachment E

Injection Well Operating Plan and Procedures

Part I-Injection Well Operation Plan and Procedures

1.1 Injection Volumes

The following injection volumes and rates shown in Table I-1 and Table I-2 will be used for the full-scale injection programs in the Riverwoods and 5600 North wells. Provo City plans to maintain a constant injection rate at each well. All injection volumes and rates are subject to modification based upon aquifer reaction. Significant changes in injection volume and rates will be submitted to the DEQ for approval prior to engaging in updated activities.

Table I-1 Riverwoods Well Injection

Stage	Estimated Injection Rate	Volume	Duration
Full-scale Final Project	2,000 gpm	Up to 2.9 MGD	When excess culinary water is available and well is not needed to provide water to the culinary system (e.g., typically 6 months from mid-October to mid-April, annually)
Full-scale Final Project Cumulative Total	**2,000 gpm (may be increased with notification)**	**Up to 529 MG per 6-month period**	When excess culinary water is available and well is not needed to provide water to the culinary system (e.g., typically 6 months from mid-October to mid-April, annually)

Table I-2 5600 North Well Injection

Stage	Estimated Injection Rate	Volume	Duration
Final Project	Up to 1,500 gpm	Up to 2.2 MGD	When excess culinary water is available and well is not needed to provide water to the culinary system (e.g., typically 6 months from mid-October to mid-April, annually)
Final Project Cumulative Total	**Up to 1,500 gpm (may be increased with notification)**	**Up to 402 MG per 6-month period**	When excess culinary water is available and well is not needed to provide water to the culinary system (e.g., typically 6 months from mid-October to mid-April, annually)

1.2 Injection Pressures

Culinary water injected in Riverwoods Well and 5600 North Well will flow into the wells from the distribution system through existing downhole piping and the pumps. Conservative water system modeling of a peak demand scenario indicates that under existing conditions (i.e., no injection) system pressures will be between 114 psi and 120 psi at the Riverwoods Well and between 22 psi and 24 psi at the 5600 North Well. Replacing pumping with injection at Riverwoods Well and 5600 North Well in the peak demand scenario (an occurrence that is unlikely to occur since planned operation calls for injection when the 5600 North Well and Riverwoods Well are not needed for water supply and excess culinary

water is available) indicates that the system pressure at the Riverwoods Well would be between 107 psi and 114 psi and at the 5600 North Well the system pressure would be between 11 psi and 14 psi.

1.3 Source of Injectate

Water from the Provo City culinary system will be used as the injection fluid in the Riverwoods and 5600 North wells.

Attachment F

Monitoring Parameters, Schedule, Recording, and Reporting Plan

Part J-Monitoring, Recording, and Reporting Plan

The monitoring, recording, and reporting plan below details how Provo City will demonstrate and ensure the protection of underground sources of drinking water (USDW) while implementing ASR injection at the Riverwoods and 5600 North Wells.

Monitoring

As stated in 40 CFR 144.51(j)(1), "*Samples and Measurements taken for the purpose of monitoring shall be representative of the monitored activity*". Treated drinking water from Provo City's culinary system will be used to charge the wells for the ASR injection. Therefore, prior to initiating the full-scale injection project at each well a representative water sample will be collected from Provo City's culinary system. Following initiation of the injection projects, Provo City's routine monitoring of the culinary system will be relied upon for continued monitoring of the injectate water. A groundwater monitoring program will also be implemented. Groundwater monitoring will include the following:

- Monitoring of groundwater elevations in the injection wells and associated monitoring wells.
- Monitoring groundwater quality at Riverwoods and 5600 North site by collecting samples from the monitoring well at each site.

Monitoring Well Network

The Riverwoods Well and 5600 North Well each have an associated monitoring well to monitor water levels and water quality. At the Riverwoods site, monitoring well MW-RW1 is located approximately 50 feet from the existing well house off University Avenue. At the 5600 North site monitoring well MW-5600N1 is located approximately 60 feet from the existing well house adjacent to the Provo River. The monitoring wells were sampled as part of the pilot injection testing at the sites to monitor water quality. Water levels in the monitoring wells have been monitored on an hourly basis using pressure transducers with onboard dataloggers since the commencement of the pilot projects. Both monitoring wells also have a water quality instrument installed that monitors turbidity, conductivity, pH, ORP, DO, and temperature.

Sampling Frequency

When excess culinary water is available and Riverwoods Well and 5600 North Well are not needed to provide water to the culinary system (e.g., typically 6 months from mid-October to mid-April, annually) culinary water will be injected in the wells. Injectate water from Provo City's culinary system along with groundwater from the monitoring wells at the sites will be sampled on a quarterly basis during injection periods. During periods when no injection is occurring samples will not be collected for the ASR program. If water quality remains consistent over time Provo City may request the Division of Water Quality to approve a reduction in sampling frequency to annual.

Sampling Methods

Injectate and groundwater samples will be collected in accordance with Provo City's Standard Operating Procedures (SOPs). Snap Samplers®, a QED technology, are installed in both MW-RW1 and MW-5600N1 to facilitate easy and accurate sampling. The Snap Samplers® are permanently set in each well. The Snap Sampler® bottles remain open to groundwater passing through the wells until they are pneumatically triggered at the surface using an electronic air pump. Once triggered, the sample bottles close and contain representative samples of the groundwater flowing through the wells. Sample bottles are then brought to the surface and the sample decanted into laboratory bottles. The full laboratory sample bottles will be placed on ice in a cooler. The sampling process is repeated if additional sample volume is required. Upon completion of sampling at each site, the Snap Samplers® will be redeployed into the wells to await the next sampling event. Samples in the cooler will be delivered to the laboratory under chain-of-custody procedures.

The pressure transducers with onboard dataloggers will continue to be utilized in both monitoring wells to record water level changes and the water quality instruments will continue to be used to monitor turbidity, conductivity, pH, ORP, DO, and temperature.

Injectate Water and Groundwater Analysis and Quality Control

Injectate water and groundwater samples will be analyzed for the parameters listed in Table J-1. Samples will be analyzed by Chemtech Ford Laboratories (Chemtech), of Sandy, Utah (or other State of Utah-certified laboratory), utilizing a level 2 Quality Control (QC) data package.

Table J-1 Injection Monitoring Parameter List

Analyte	CAS Number	Fraction	Units
Arsenic	7440-38-2	Total and Dissolved	mg/L
Aluminum	7429-90-5	Total and Dissolved	mg/L
Chloride	7647-14-5		mg/L
Iron	7439-89-6	Total and Dissolved	mg/L
Sodium		Total and Dissolved	mg/L
Manganese	7439-96-5	Total and Dissolved	mg/L
Sulfate	7757-82-6	Not Applicable	mg/L
Total Dissolved Solids	N/A	Not Applicable	mg/L
Ammonia (as Nitrogen)	7664-41-7	Not Applicable	mg/L
Total Nitrate + Nitrite (as N)	N/A	Not Applicable	mg/L
Turbidity	Field	Not Applicable	NTU
pH	Field	Not Applicable	pH units
Temperature	Field	Not Applicable	degrees C or F

Analyte	CAS Number	Fraction	Units
Dissolved Oxygen	Field	Not Applicable	mg/L
Specific Conductance	Field	Not Applicable	uS/cm
Oxidation/Reduction Potential	Field	Not Applicable	mV
Calcium	7440-70-2	Total and Dissolved	mg/L
Magnesium	7439-95-4	Total and Dissolved	mg/L
Potassium	7440-09-7	Total and Dissolved	mg/L
Total Hardness as $CaCO_3$	N/A	Not Applicable	mg/L
Alkalinity as CaCO3	N/A	Total	mg/L
Total Organic Carbon (TOC)	N/A	Not Applicable	mg/L

Recording

All analytical data and associated data will be recorded, kept, and reported. These records of monitoring data shall include:

- The date, exact place, and time of sampling or measurements.
- The individual(s) who performed the sampling or measurements.
- The date(s) analyses were performed.
- The individual(s) who performed the analyses.
- The analytical techniques or methods used.
- The results of such analyses.

Additional data that will be recorded, kept, and reported shall include the following:

- Static water levels in each well before and after each injection period.
- Injection pressures and rates for each well for each injection period.
- Total volumes of water injected into each well for each period.

All analytical and associated additional data will be backed up electronically and stored indefinitely.

Reporting

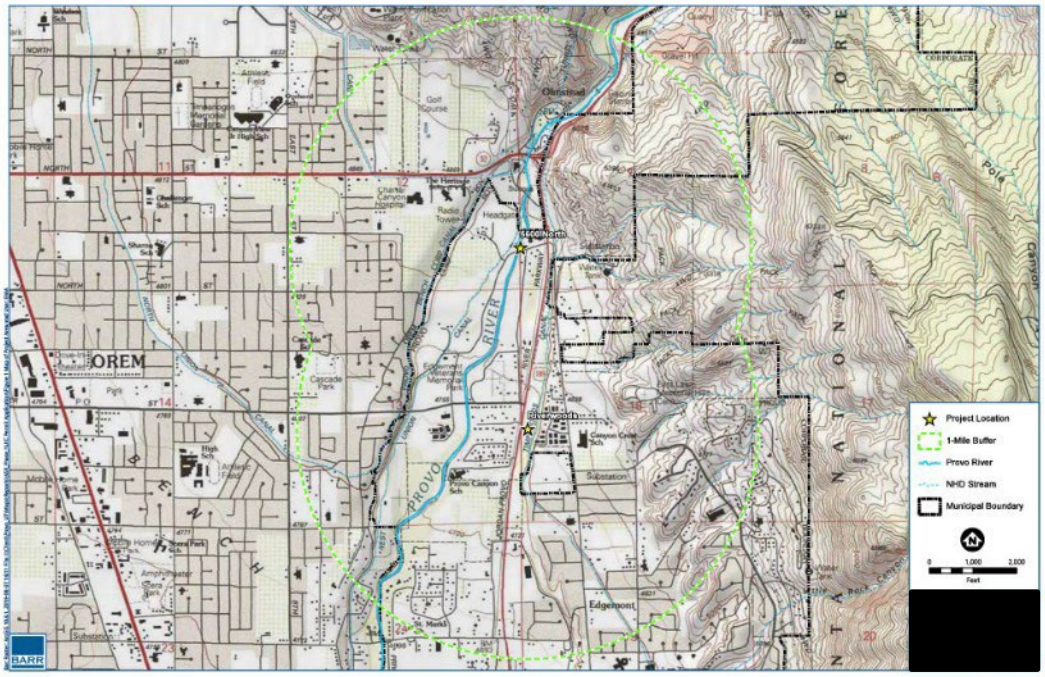
During injection periods, a quarterly monitoring report containing the above-mentioned data for each well will be prepared and submitted to the Division of Water Quality. For periods when no injection is occurring a quarterly report containing static water level measurements and stating that no injection or sampling occurred during the period will be prepared and submitted to the UIC program. If the Division of Water Quality approves a reduction in sampling frequency, an annual monitoring report for each well would be prepared and submitted to the Division of Water Quality.

UTAH DEPARTMENT of ENVIRONMENTAL QUALITY
WATER QUALITY

Fact Sheet and Statement of Basis Class V Area Permit Issuance UIC Permit Number UTU-49-AP-4C52E67 March 2023

Provo City
Provo, Utah 84606

Figure 1. Provo City UIC Class V Aquifer Storage and Recovery Well.



Location:	**Operator:**
Utah County, Utah	**Provo City**
Facility Contact: **Ryan York** **Public Works Division** **Public Works Office** **1377 S 350 E** **Provo, Utah 84606** **Ryork@provo.org Tel. (801)852-7789**	**Regulatory Contact:** **Porter Henze** **Utah Department of Environmental Quality** **Division of Water Quality** **UIC Program** **195 North 1950 West** **Salt Lake City, UT 84116** **pkhenze@utah.gov** **Tel. 385-566-7799**

Purpose of the Statement of Basis and Fact Sheet

The Utah Division of Water Quality (DWQ) has prepared this Fact Sheet and Statement of Basis (FSSOB) for the Underground Injection Control (UIC) Class V Well (Category UIC Well 5B4**)** Permit for Provo City. Pursuant to the Utah UIC administrative rules in Utah Administrative Code R317-7 et. seq. and federal regulations in Title 40 of the Code of Federal Regulations (CFR) incorporated by R317-7-1 the purpose of this FSSOB is to briefly describe the principal facts and the significant factual, legal, methodological and policy questions considered in preparing the permit. To meet these objectives, this FSSOB contains:

- Background information on the permit process and names and telephone numbers of contacts for additional information (listed on the first page of this FSSOB above);
- A description of the permit review process and public participation;
- A brief discussion of the facility and process;
- Basis for permit conditions.

Permit Process

Application and Review Period

In April of 2022 Provo City submitted a UIC Class V Aquifer Storage and Recovery (ASR) permit application for two wells at the Riverwoods and 5600 North. The DWQ completed its review of this application, held a public and has approved the Class V Permit.

Public Participation

The Permit was prepared by the DWQ for public notice and public comment. Public comments will be accepted by the DWQ for 30 days following the first day of public notice in the local newspaper that serves the affected community. A hearing may be held by the DWQ if public comments are substantial and the Permit requires revision based on these comments. Public notice was published on the Division's website and the Daily Herald on February 2nd, 2023. No comments were received by the Division during the comment period so the permit was issued to Provo City as drafted.

Description of Permitted Facility

Provo City proposes an ASR system as an integral part of their public water supply system. The purpose of the recharge and recovery system is to inject excess treated water from Provo's Culinary System into the Pre-Lake Bonneville Aquifer (PLBA).

Site Hydrogeology and Water System

Provo City currently has multiple aquifers and wells to supply water to the City. Provo City lies on an alluvial system of unconsolidated basin-fill sediments. Colluvial, alluvial, fluvial, and lacustrine processes deposited interbedded and alternating sequences of coarser and finer grained sediments, ranging from clays and silts to cobbles and boulders. Several normal faults cause vertical displacement along the Wasatch Front.

A number of unconfined and confined aquifers have been recognized in the unconsolidated basin-fill sediments. Four prominent aquifers include the Pre-Lake Bonneville unconfined aquifer (PLBA), the shallow Pleistocene confined aquifer (SPA), the deep Pleistocene aquifer (DP aquifer), and the Quaternary-Tertiary aquifer (QTA) have been used by Provo City for

groundwater. These aquifers vary in thickness and grain size composition, but are separated by fine grained layers that act as confining units. These units generally become thicker towards Utah Lake. The unconfined PLBA is found adjacent to the mountain front and is composed of thick sequences of sand, gravel, cobbles and boulders with thin, discontinuous interbeds of silt and clay. In the eastern portion of Northern Utah Valley, the thickness of this aquifer can be greater than 1,500 feet. As the PLBA lacks thick, continuous fine-grained confining layers, and is hydraulically connected to other confined aquifers, it is recognized as a major zone of surficial recharge to other confined aquifers sourced by Provo City.

Two wells have been identified to be converted to Injection wells. The 5600 North well was installed in 1975 to a depth of 469 feet with perforated intake intervals between 195 and 402 feet below ground surface (ft bgs). The Riverwoods well was installed in 2003 to a depth of 1,220 feet with multiple screened intervals between 316 and 1,210 ft bgs. Both wells draw from the PLBA and have been a reliable source of production.

Provo City intends to inject any excess water from the Culinary water supply and inject it into the PLBA via the 5600 North and Riverwood wells. Between the two wells, it is expected to inject up to 931 Million Gallons per 6-month period. This amount of water will be beneficial to the residents of Provo City when groundwater elevations have been declining for the past few decades. As the culinary water injected is of drinking water quality there should be no impacts to Underground Sources of Drinking Water. Chemically the water from the well and the culinary supply are very similar. During previous tests, injection caused the groundwater concentrations of Iron, Aluminum and magnesium increased, but are below drinking water standards. The pH of the spring and well water is circumneutral, the Langelier indices are approximately zero, and chloride concentrations are below 10 mg/L indicating little potential for scaling, corrosion, or metal mobilization.

Background Water Quality

The water quality from Provo's culinary water that is injected into the alluvial aquifer is generally a Class I water. Concentrations of dissolved trace metals and organic contaminants are very low and below drinking water standards.

Basis for Requiring Permit

Under UAC R317-7-5.1 and UAC R317-7-5.5 the Director of the DWQ (Director) is authorized to call for a permit for any Class V injection well that may endanger an underground source of drinking water (USDW). The source waters have historically shown the presence of coliform bacteria and the recharge area for the source waters may be subject to spills and to discharge of contaminants (e.g. pesticides, herbicides, fire retardants, etc.), thus it is the determination of the Director that the ASR project and well described above requires a UIC Class V permit.

The Utah Underground Injection Control (UIC) Class V permit is based on the following restrictions to ensure compliance with state and federal UIC Program rules and regulations and Utah Ground Water Quality Protection Program rules and regulations.

Permit Conditions

Part I of the permit is the Authorization to Construct and Inject. Part II includes all general permit conditions required in all UIC permit with the focus on Class III permits. Part III contains all the specific permit conditions required of all Class V ASR wells.

Standard Operating Procedures Plan

Provo City has submitted injection well Operating Plan (Permit Attachment E) that meets the requirements of Part III (E) of this permit. The Plan only includes injection of water via the Riverwoods and 5600 North wells

Monitoring, Testing and Reporting

Injectate Characterization - Each source of injectate will be analyzed for a complete suite of parameters once during the permit cycle. Additionally, any new source for injection will be analyzed for a complete suite of parameters annually for the permit cycle. Once a quarter, the source of the injectate will be analyzed for an abbreviated suite of parameters that include those constituents of concern and those constituents that have historically been detected. The monitoring parameter list and monitoring schedule are detailed in Attachments F of the permit, respectively.