

GROUND WATER QUALITY DISCHARGE PERMIT UGW510004
STATEMENT OF BASIS
September 2020

Royal Street Landfill:
Olson/Neihart Tailings Relocation
Wasatch County, Utah

U.S. Bureau of Reclamation
Jordanelle Reservoir
Bonneville Unit: Central Utah Project

Introduction

The Division of Water Quality (DWQ) under the authority of the Utah Ground Water Quality Protection Rules¹ (Ground Water Rules) issues ground water discharge permits to facilities which have a potential to discharge contaminants to ground water². As defined by the Ground Water Rules, such facilities include landfills and dumps.³ The Ground Water Rules are based on an anti-degradation strategy for ground water protection as opposed to non-degradation; therefore, discharge of contaminants to ground water may be allowed provided that current and future beneficial uses of the ground water are not impaired and the other requirements of Rule 317-6-6.4.A are met.⁴ Following this strategy, ground water is divided into classes based on its quality⁵; and higher-quality ground water is given greater protection⁶ due to the greater potential for beneficial uses.

DWQ has developed permit conditions consistent with R317-6 and appropriate to the nature of the stored material, facility operations, maintenance, best available technology⁷ (BAT) and the hydrogeologic and climatic conditions of the site, to ensure that the operation would not contaminate ground water.

Basis for Permit Renewal

This Permit is being renewed in accordance with R317-6-6.8 which states that a permit may be terminated or a renewal denied if any one of the four items below applies:

- A. Noncompliance by the permittee with any condition of the Permit where the permittee has failed to take appropriate action in a timely manner to remedy the Permit violation;
- B. The Permittee's failure in the application or during the Permit approval process to disclose fully all significant relevant facts at any time;

¹ Utah Admin. Code Rule 317-6

² https://deq.utah.gov/ProgramsServices/programs/water/groundwater/docs/2008/08Aug/GWQP_PermitInfo.pdf

³ Utah Admin Code Rule 317-6-6.1A

⁴ Preamble to the Ground Water Quality Protection Regulations of the State of Utah, sec. 2.1, August, 1989

⁵ Utah Admin. Code Rule 317-6-3

⁶ Utah Admin. Code Rule 317-6-4

⁷ Utah Admin. Code Rule 317-6-1(1.3)

- C. A determination that the permitted facility endangers human health or the environment and can only be regulated to acceptable levels by plan modification or termination; or
- D. The Permittee requests termination of the Permit.

Basis for Modification and Permit Issuance

Under Rule 317-6-6.4A, DWQ may issue a ground water discharge permit if:

- 1) The applicant demonstrates that the applicable class TDS limits, ground water quality standards protection levels and permit limits established under R317-6-6.4E will be met;
- 2) The monitoring plan, sampling and reporting requirements are adequate to determine compliance with applicable requirements;
- 3) The applicant is using best available technology to minimize the discharge of any pollutant; and
- 4) There is no impairment of present and future beneficial uses of ground water.

Description of Facility and Background Information

On March 12, 1990 the U.S. Bureau of Reclamation (USBR) applied for a ground water discharge permit for the Royal Street Landfill to be constructed in the SE1/4 of the SE1/4, of Section 24, Township 2 South, Range 4 East, Wasatch County, Utah (Figure 1). The landfill was constructed for the permanent disposal of mine tailings from the Olson/Neihart Reservoir and associated spillage, located approximately one mile southeast of the proposed landfill site. The tailings, originally from the nearby Mayflower Mine, were relocated to prevent them from inundation by the Jordanelle Reservoir.

Compliance and Previous Permits

Ground Water Discharge Permit UGW510004 was issued to USBR on June 13, 1990. Subsequent renewals of the permit were issued on November 8, 1993, July 13, 1999, April 14, 2005, July 20, 2010, and September 24, 2015. This will be the sixth renewal of the permit.

No modifications to the existing permit are proposed for the current permit renewal.

The permit has a lengthy history of monitoring and compliance. Timely compliance reports were provided during the previous permit cycle. Leachate in the leachate collection sump remained less than 15 feet in depth (as required). Exceedances of the Protection Levels for TDS and nitrate were recurrently observed at downgradient wells, particularly MW-2E. However, these exceedances are interpreted to originate from a different source than the landfill due to the elevated (but compliant) concentrations of barium and chromium reported at MW-2E. Comparable concentrations of barium and chromium are not reported at the background well

(MW-1A) or the leachate solution, suggesting a different source. Sulfate and chloride concentrations at the downgradient wells are also relatively stable suggesting that the landfill is not a substantial contaminant source. While TDS and nitrate concentrations exceed the calculated Protection Levels and the source is unknown, it is noted that the reported nitrated concentrations are well below the Utah Ground Water Quality Standard for nitrate, and reported TDS concentrations are typically below 1,000 mg/L.

Basis for Specific Permit Conditions

1. Ground Water Classification – ground water in the shallow alluvial aquifer has been classified as Class IA Pristine Ground Water based on a total dissolved solids (TDS) concentration of 461 mg/L from monitoring well MW-1A (Figure 2), located approximately 50 feet west, and upgradient of the landfill site. In addition, no parameters had concentrations above Utah Ground Water Quality Standards.
2. Background Ground Water Quality - background ground water quality has been determined by analytical results of six (6) quarterly samples collected from monitoring wells MW-1A, MW-2E, MW-3B, and MW-4A (Table 1). Monitoring well MW-1A is located hydraulically upgradient of the Royal Street landfill site, and monitoring wells MW-2E, MW-3B, and MW-4A are located hydraulically downgradient of the Royal Street landfill (Figure 2). No industrial development has been located upgradient of monitoring well MW-1.

Table 1: Background ^(a) Ground Water Quality (mg/L)

Parameter	MW-1A Upgradient	MW-2E Downgradient	MW-3B Downgradient	MW-4A Downgradient
pH (units)	7.09	7.09	7.09	7.09
Nitrate	0.1341	0.7492	1.4258	0.4966
Arsenic	0.005 ^(b)	0.005 ^(b)	0.0051	0.0053
Barium	0.1046	0.0967	0.0860	0.1143
Cadmium	0.0041	0.004 ^(b)	0.004 ^(b)	0.0041
Chromium	0.0127	0.0072	0.007 ^(b)	0.007 ^(b)
Copper	0.0756	0.0549	0.0686	0.0457
Lead	0.005 ^(b)	0.0089	0.0060	0.0079
Mercury	0.0002 ^(b)	0.0003	0.0002 ^(b)	0.0003
Selenium	0.002 ^(b)	0.0021	0.002 ^(b)	0.002 ^(b)
Silver	0.0064	0.0045	0.0043	0.0043
Zinc	0.0189	0.0221	0.0841	0.0811
TDS	461	366	304	370

(a) Background equals mean concentration.

(b) Equals method detection limit for the reported analytical method.
mg/L milligrams per liter

- TDS Total dissolved solids
3. Best Available Technology - the landfill has been designed and constructed by USBR to prevent infiltration of precipitation and runoff and thereby prevent the formation and discharge of leachates to ground water. Computer simulation results from HELP modeling has been used to demonstrate this “no-discharge” design. The leachate collection system will be operated and maintained to provide free drainage in the landfill above the maximum 15-foot water depth. Any leachates collected in the leachate collection manhole will be analyzed and the leachate depth will be managed in an appropriate manner to prevent discharge to ground water.
 4. Compliance Monitoring - compliance ground water quality monitoring will be conducted using ground water protection levels for downgradient monitoring wells MW-2E, MW-3B, and MW-4A (Table 2).

**Table 2: Ground Water Protection Levels (mg/L)
Downgradient Monitoring Wells**

Parameter	MW-2E	MW-3B	MW-4A
pH (units)	6.5-8.5	6.5-8.5	6.5-8.5
Nitrate	1.00 ^(a)	2.206 ^(b)	1.00 ^(a)
Arsenic	0.005 ^(a)	0.005 ^(a)	0.005 ^(a)
Barium	0.2 ^(a)	0.2 ^(a)	0.282 ^(b)
Cadmium	0.0005 ^(a)	0.0005 ^(a)	0.0005 ^(a)
Chromium	0.01 ^(a)	0.01 ^(a)	0.01 ^(a)
Copper	0.2395 ^(b)	0.1908 ^(b)	0.172 ^(b)
Lead	0.0120 ^(b)	0.0141 ^(b)	0.015 ^(d)
Mercury	0.0002 ^(a)	0.0002 ^(a)	0.0002 ^(a)
Selenium	0.005 ^(a)	0.005 ^(a)	0.005 ^(a)
Silver	0.01 ^(a)	0.01 ^(a)	0.01 ^(a)
Zinc	0.500 ^(a)	0.500 ^(a)	0.500 ^(a)
TDS	550 ^(b)	410 ^(b)	474 ^(c)

(a) Equals 0.1 x Ground Water Quality Standard.

(b) Equals Mean + 2 Standard Deviations

(c) Equals 1.25 x Background

(d) Equals Ground Water Quality Standard

Compliance monitoring will be conducted on a semi-annual basis and will include water level measurements where practical (report dry if no water is present), ground water sampling and analysis of upgradient and downgradient wells, and sampling and analysis of the leachate collection manhole. Visual observation of the manhole shall be conducted annually.

Sample analysis will be conducted by State-certified laboratories using approved methods. Analytes include field measurements of pH, temperature, and specific conductance, the compliance parameters in Table 2, and major ion species to help

determine the geochemical signature of ground water. Any water occurring in the leachate collection manhole above the 15 feet depth requirement will be sampled in accordance with the same criteria and land applied to the tailings cover system.

Other post-closure inspections will be conducted to determine general conditions of the landfill including: condition of the cap, surface drainage, access, and monitoring well surface casings.

5. Non-Compliance Status – USBR will evaluate ground water monitoring data to determine probable-out-of-compliance or out-of-compliance status in accordance with the permit procedures. This includes Director notification, accelerated monitoring, and a Source and Contamination Assessment Study Plan.
6. Reporting Requirements – the permit specifies reporting requirements for semi-annual compliance monitoring, and the results of other post-closure monitoring. The reporting schedule may also be modified by the Director.

Figures

Figure 1 – Site Area Map

Figure 2 – Site Features Map

Related References

A Hydrogeologic Evaluation of the Proposed Jordanelle Reservoir, Uintex Corporation, USBR Contract No. 2-07-40-S3080, February, 9, 1987, Table C2.

Evaluation Study: Geology and Mineral Potential Park City - Jordanelle – Park Imperial Area, Summit & Wasatch Counties, Utah, M.C. Godbe III, November 1, 1986, pp.30-31, and Map D 36U-448.

Geologic Map of the Heber Quadrangle, Wasatch and Summit Counties, Utah, U.S. Geological Survey, Map GQ-852, 1970.

Hazardous Waste Assessment for the Mayflower Site, Delft Geotechnics and Bingham Engineering, December, 1988, Volume 5, Table C-3A.

Water Resources of the Park City Area, Utah with Emphasis on Ground Water, Utah Department of Natural Resources, Tech. Pub. No. 85, 1986, Table 14.