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GROUND WATER DISCHARGE PERMIT UGW270004

STATEMENT OF BASIS

Intermountain Power Service Corporation

Introduction

This Statement of Basis describes the facilities, hydrogeology, ground water quality, basis of permit issuance and specific conditions, and corrective actions for Ground Water Discharge Permit UGW270004 for the Intermountain Generating Station in Millard County, Utah. UGW270004 was issued to Intermountain Power Service Corporation in 2001. Subsequent renewals of the permit were issued in January 2006, February 2011, May 2016, and March 2023. This is a modification of Permit UGW270004, not a renewal. The following change is being made to the permit:

- Compliance monitoring well RW-9 is being replaced with nearby downgradient well BAC-11. Both wells are screened at similar depths in the same formation.

Major changes to the permit since the last renewal include:

- The addition of seven Evaporation Ponds constructed directly west of the facility's existing Evaporation Ponds. The new Evaporation Ponds are now functional and the existing Evaporation Ponds will be decommissioned and abandoned in consultation with the Division of Water Quality ("Division").

- Inclusion of compliance schedule items under Part II.E of the permit related to the construction of the new Evaporation Ponds, including:

  a) A Modified Monitoring Plan that addresses the inadequacies of the proposed compliance monitoring well network;
  b) Monitoring Well As-Built Reports for any newly installed monitoring wells; and,
  c) An updated Sampling and Contingency Plan for Division of Water Quality ("Division") review and approval.

Facility Description

Intermountain Power Service Corporation ("IPSC") operates the Intermountain Generating Facility ("IGF") in Millard County, Utah. IGF is a coal fired power plant with integrated transmission facilities. IGF was built in the early 1980s and placed on-line in 1986. IGF has an electrical output capacity of 1900 megawatts. This station was in operation prior to the 1989 promulgation of the Utah Ground Water Quality Protection Rules (Utah Admin. Code R317-6) and is thus defined as an "existing facility".

IGF is situated on 4614.78 acres located 10 miles northeast of Delta, Utah. This station is located in portions of Section 18 and 19, T15S, R6W, and portions of Sections 10, 11, 12, 13, 14, 15, 22, 23, and 24, T15S, R7W, Salt Lake Meridian, Utah.

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Extensive geotechnical studies of the site were conducted between 1978 and 1983 prior to designing and building the power plant and support facilities. These investigations were incorporated into the siting and construction of the process water and ground water monitoring system.

IGF does not discharge any process water effluent or leachate directly onto the ground surface or into the subsurface. IGF uses a series of 13 ponds in a four-tiered system to settle, clarify, recirculate, and evaporate process waters. Tier 1, the best quality, is the Settling Basin. The water quality degrades progressively as it moves through the tiers: Tier 2 (Bottom Ash Basin), Tier 3 (Wastewater Basin), and Tier 4 (Evaporation Ponds). Water in the evaporation ponds is unusable due to high levels of alkalinity, salinity, and mineralization (calcium and magnesium). Other than the makeup water storage ponds, the IGF ponds hold water that is not compatible with the ground water due to elevated concentrations of total dissolved solids (TDS). The Bottom Ash, Wastewater, and Evaporation ponds are lined with a single layer of 80-mil high-density polyethylene (HDPE). The Settling Basin and Coal Pile Runoff Basin are lined with a bentonite clay-natural soil mixture.

In 2022, IPSC submitted plans to construct seven new Evaporation Ponds immediately to the west of the existing Evaporation Ponds. The new ponds were installed with engineered embankments and lined with a single layer of 60-mil HDPE. The new ponds were interconnected via a series of HDPE transfer pipes and valve system designed to allow one pond to remain empty at all times. The new ponds were constructed with an observation sump system consisting of perforated polyethylene pipe (CPeP) connected to a sump located at the lowest point of each pond cell. The observation sump system was installed beneath the liner and runs along the interior slopes of each pond cell to allow for the periodic monitoring of any water escaping the liners. The plans and Engineering Design Report were reviewed by a Division staff engineer and a Construction Permit and Authorization to Use have been issued. Since the new Evaporation Ponds have been constructed and are operational, the current Evaporation Ponds have been decommissioned and abandoned in compliance with Division guidelines and industry best practices, and the compliance monitoring well network needs to be updated to provide adequate monitoring for leak detection. The Sampling and Contingency Plan will also be updated to reflect the changes.

The following IGF facilities are permitted by rule in accordance with Utah Admin. Code R317-6-6.2:

- Onsite reservoir
- Storm water runoff basin
- Storm water runoff ditch
- Aboveground and underground storage tanks
- Pipelines that do not transport process water to facility ponds
- Septic tanks

Hydrogeology

The IGF site is located over an unconsolidated basin-fill aquifer in the Sevier Desert, a large

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intermontane valley in the Basin and Range Physiographic Province. This area was once covered by ancient Lake Bonneville, and complex series of Tertiary and Quaternary age sediments were deposited as a result of historic changes in water level. The near surface deposits at the site consist of sands, silts, and clays of aeolian, fluvial, and lacustrine origin. Surface sediments consist primarily of granular soils and extend to depths ranging from 7 to 35 feet below the existing ground surface. Loose, near surface soils consist primarily of silty sands and sandy silts but may also contain clean sands and clays. These soils, typically encountered in the upper 2 to 4 feet of the subsurface profile, have a porous structure, relatively low densities, and contain some organic material. Soils below depths of 2 to 4 feet are primarily medium dense to very dense fine sands. Interbedded with the sands are layers of very stiff to hard silty clays and silts. A continuous fine-grained low-permeability interval, which contains few sand lenses, is present beneath facilities monitored in this permit. The ground water surface is typically below this low-permeability clay layer.

The saturated sediments underlying the IGF site represent a multiple aquifer system. The sediments are zoned into three coarse-grained, permeable aquifers: 1) a shallow water table aquifer, 2) an upper confined aquifer, and 3) a lower confined aquifer. All three zones are separated by laterally extensive clay layers that act as aquitards. The lower confined aquifer is used as a culinary water supply source for the general area. Recharge to the valley-fill sediments occurs primarily by infiltration of snow melt, surface runoff, and direct precipitation. Ground water recharge to the IGF site is predominantly from the North Tintic and Tintic Mountains to the northeast. Ground water discharge is principally through evapo-transpiration, interbasin flow, and ground water pumpage by wells.

The shallow unconfined water table aquifer is composed of layered sand, silt, and clay. All units below the water table are saturated. Hydraulic conductivities for all of the aquifers are similar and range from 1.9 x 10^{-5} cm/sec for the silty sands to 9.6 x 10^{-9} cm/sec for clay. Based on measurements collected from the monitoring well network, ground water flow direction is westerly to southwesterly. An upward vertical hydraulic gradient exists between the aquifers.

Ground Water Quality

In general, ground water quality within the Sevier Desert is poor except in the Delta area and is too saline for agricultural purposes without special treatment. Ground water from the unconfined aquifer is predominantly a magnesium sulfide type and has elevated concentrations of sodium, potassium, carbonate or bicarbonate, sulfate, and chloride. Barium and iron are the main trace metals, but chromium, manganese, arsenic, lead, and zinc are also present. Ground water quality data have been collected since 1982 from IGF monitoring wells. Background ground water quality is based on historical data prior to original permit issuance and subsequent compliance data collected as a permit requirement from the monitoring wells screened in site aquifers. Ground water quality in the unconfined aquifer is generally Class II with TDS in the upgradient unconfined aquifer ranging from 750 mg/l to over 1,100 mg/l. TDS has been demonstrated to be variable across the 4,614-acre site. Chlorides are typically near or exceeding the secondary drinking water standard of 250 mg/l.

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Basis of Permit Issuance

The determination of impacts from present day releases to ground water is a major concern in ground water management. IPSC has proposed a zero discharge approach by using containment technology with a monitoring component to assess potential impacts to ground water quality from the operation of the IGF. This permit incorporates lined ponds, ground water monitoring wells, perched monitoring wells, and Best Management Practices as the compliance mechanisms. Existing ponds, basins, sumps, and reservoirs were not constructed with direct leak detection and removal mechanisms such as double liners and sump pumps.

The administration of the permit, to assure compliance with ground water protection regulations, is founded on the use of periodic monitoring of ground water quality in wells to assess potential impacts to ground water quality from the IGF discharges. IGF will monitor compliance wells located adjacent to and downgradient from the lined ponds and permitted facilities as described in the Sampling and Contingency Plan (Appendix B). These ground water monitoring wells are completed in the unconfined aquifer (IGF Type II wells). Compliance limits for the wells were established from background data collected and analyzed by IPSC over the life of the design, construction, and operation of the IGF station. The Utah Division of Water Quality has collected ground water samples that confirm the historical data.

Basis for Specific Permit Conditions

Upgradient Monitoring Wells
Ground water quality data from two upgradient monitoring wells will be used as a comparison standard for all other monitoring and observation wells on the site. Based on their extensive sampling history, these wells will be sampled once every 5 years prior to permit renewal.

Evaporation Ponds, Bottom Ash Basin, Wastewater Holding Basin, and Settling Basins
Monitoring wells completed in the unconfined water table aquifer on the downgradient (west) side of the permitted facilities will be used as a compliance mechanism for this permit. A long history of regular monitoring has established the background water quality from project design through construction and operation. The monitoring well data will assess use of overall best management practices at the IGF site to determine if ground water quality parameters are stable and not degrading over time. Table 1A of the permit lists the compliance monitoring wells and numeric protection levels. The minimum frequency of monitoring, sampling, and reporting will be semi-annually.

Prior to the operation of the new Evaporation Pond system, the Sampling and Contingency Plan will be modified to include an updated monitoring well system and sampling plan that will serve as a continued compliance mechanism for the new ponds.

Perched Wells
Because the perched wells are normally dry, they are, by design, primary indicators of leakage through a pond liner. The perched wells listed in Table 1B will also be used as a compliance mechanism of this permit. Water level measurements in the perched wells will be taken according to the schedule in Table 1B. The Sampling and Contingency Plan incorporates the

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procedures for using perched wells for process water leak detection.

Observation Sump System
Prior to the operation of the new Evaporation Pond system, the Sampling and Contingency Plan will be modified to incorporate periodic monitoring of the observation sump system to detect the presence of water that may be escaping the pond liners.

Corrective Actions

South End of Current Evaporation Ponds/Bottom Ash Basin/Waste Water Basin
Ground water investigations completed during the previous permit term indicated that one or more of the basins leaked process water into the shallow aquifer. IPSC has implemented corrective actions by installing three ground water extraction wells to remove ground water with elevated TDS concentrations from the shallow aquifer and to contain plume movement.

Since the last permit renewal, an expansive recovery well network consisting of 56 recovery wells located downgradient from the current Evaporation Ponds, the Waste Water Basin, and the Bottom Ash Basin were installed as part of a corrective action plan under the Federal Coal Combustion Residual Rule (CCR). The recovery well network will also provide mitigation for the ground water impacts observed under this permit. IPSC has activated a portion of these recovery wells, however additional recovery wells will be activated as monitoring results become available. The recovered water is pumped to the Recycle Basin for reuse in the process water system. Based on continued monitoring activities, the TDS plume is generally located to the southwest of the Bottom Ash Basin and the current Evaporation Ponds and follows the natural westward hydraulic gradient. The areal extent of the plume is contained within the facility boundaries. IPSC has revised the Sampling and Contingency Plan (Appendix B) for monitoring plume size and movement.

North End of the Current Evaporation Ponds
In 2021, IPSC began investigating a potential liner leak in the north end of Evaporation Pond No. 6 due to the detection of elevated concentrations of TDS in Compliance Monitoring Well EPW-27. IPSC conducted geophysical leak detection surveys of Evaporation Pond No. 5 and Evaporation Pond No. 6 and identified numerous defects in the HDPE liners. IPSC subsequently dewatered the ponds and repaired the defects.

IPSC conducted a contamination investigation of the groundwater impacts observed in EPW-27 by collecting ground water samples from three downgradient piezometers installed as part of a geotechnical investigation in 2020, 2021, and 2022. Ground water monitoring activities indicate that the ground water impacts should follow the natural southwest hydraulic gradient. The piezometers were sampled during four consecutive semi-annual monitoring events and the analytical results showed that the contaminant concentrations were within a range consistent with background levels. This indicates that groundwater impacts from the north end of the Evaporation Ponds have not migrated a significant distance from the pond area.

In compliance with the requirements of the permit, IPSC initiated accelerated monthly sampling of EPW-27. Monthly sampling continued for a period of several months with no significant

PI DRAFT

changes in the analytical results. Based on this information, IPSC and the Division determined that continued monthly sampling would not provide any additional benefit, and IPSC was allowed to resume monitoring EPW-27 on a semi-annual basis.

IPSC submitted an Amended, Proposed EPW-27 Replacement Well Report (dated December 5, 2022), which outlined IPSC's preferred approach to addressing the ground water impacts and future monitoring activities. Based on the findings of this report and the investigation and monitoring activities to date, the Division believes that IPSC has identified and mitigated the source of the groundwater impacts. EPW-27 will be reclassified as an observation well and monitored semi-annually to assess natural attenuation as a means of continued ground water mitigation. The construction of the new Evaporation Ponds will prevent IPSC from installing a new compliance monitoring well immediately downgradient from EPW-27. Therefore, EMW-3 will serve as a new compliance monitoring well and will be monitored semi-annually to evaluate any potential future impacts to ground water quality from the current Evaporation Ponds as well as the new Evaporation Ponds once they are operational.

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