



March 7, 2024

Mr. Blair Rollins
Caerus Operating, LLC
143 Diamond Avenue
Parachute, CO 81635

via email

**Subject: Railsback Water Facility Release
Pathway to Groundwater Investigation
CECMC Facility ID: 486170
CECMC Release ID: 486172
Garfield County, Colorado**

Mr. Rollins,

Entrada Consulting Group, Inc. (Entrada) was contracted by Caerus Operating, LLC (Caerus) to conduct field screening and soil sampling in response to a release from the tank battery at the Railsback produced water offload facility (Site).

The Railsback produced water offload facility (AKA: Railsback Water Facility, RBWTF) is located in the Mamm Creek unit of Caerus' Piceance operations area in the northeast quarter of the northwest quarter of section 32 of township 6 south and range 92 west of the 6th principal meridian in Garfield County, Colorado. The tank battery at the Site is identified in the Colorado Energy and Carbon Management Commission (CECMC) database by Facility ID 486170. The release is documented in the CECMC database by Release ID 486172.

BACKGROUND AND OBSERVATIONS

On March 1, 2024, Caerus' operations control center received a low liquid level alarm from the tank battery at the Railsback produced water offload facility. Inspection revealed that a release of produced water and paraffin had occurred adjacent to the tank battery.

Based on field observations of Entrada personnel, the release surfaced approximately four (4) feet north of the secondary containment. Some fluid flowed back into the tank containment while the remainder travelled over the ground surface to the west and north where it was contained by the facility's stormwater management ditch. The fluid followed the stormwater management ditch down-gradient to the east where it flowed into the ditch along the west side of County Road 315 (CR 315). The fluid flowed within the roadside ditch down-gradient to the north, and the northernmost extent of visible impact within the ditch was approximately 500 feet from the Site.

The east side of the road was thoroughly inspected, and no evidence was found to indicate the release crossed over or beneath the pavement.

PATHWAY TO GROUNDWATER INVESTIGATION

The Site lies at an elevation of 5,690 feet above mean sea level (ft-amsl) on the west side of CR 315, approximately 1000 feet west of Mamm Creek. The United States Department of Agriculture (USDA) National Resources Conservation Service (NRCS) records soil at the Site as Arvada loam, 1 to 6 percent slopes. The United States Geological Survey (USGS) reports bedrock at the Site as Wasatch Formation, comprised mainly of low-permeability claystone, mudstone, and shale with occasional lenses of sandstone and conglomerate.

The nearest groundwater wells actively permitted with the Colorado Division of Water Resources (DWR) are permit numbers 283209, 275860, and 194520.

The location of water well 283209 recorded in the DWR database was found to be inaccurate. With the landowner's assistance, an Entrada representative recorded the correct GPS location at latitude 39.48931833, longitude -107.69348300, approximately 360 feet northwest of the location in the DWR database. DWR records and field investigation show that it is a gallery well, constructed at the site of a surface spring at an elevation of 5,760 ft-amsl on the eastern flank of Hunter Mesa. Field observations and local geologic data indicate that the spring is fed by perched water in an aquifer zone above an impermeable layer within the Wasatch Formation near the top of Hunter Mesa. DWR records for water well permit numbers 25471 and 87658, located on Hunter Mesa approximately 1 mile to the southwest, also demonstrate the presence of a shallow perched aquifer.

Water wells 275860 and 194520 are located within the Mamm Creek valley east of Hunter Mesa. Drilling log records for these wells show that water was first encountered at depths significantly greater than the static water level recorded after completion, indicating the presence of a confining layer at depth. Water well 194520 is located approximately 0.4 miles north of the Site at an elevation of 5,694 ft-amsl*. This well first encountered water during drilling at 130 feet below ground surface (ft-bgs) or 5,664 ft-amsl* (126 feet below the Site elevation). Water well 275860 is located approximately 0.4 miles south of the Site at an elevation of 5,713 ft-amsl. During drilling of this well, water was first encountered at 65 ft-bgs, or 5,682 ft-amsl* (42 feet below the Site elevation). From these two groundwater elevation reference points, the elevation of the confining layer at the Site can be estimated to be 5,606 ft-amsl, or approximately 80 ft-bgs.

The relevant drilling and construction details for the water wells discussed above are summarized in **Table A**.

DWR Permit	Date Constructed	Distance (mi)	Direction	Elevation (ft-amsl)*	TopWater (ft-bgs)	TopWater (ft-amsl)**	TopWater Relative to Site (ft)
194520	1998-04-17	0.43	N	5694	130	5564	-126
283209	2012-04-01	0.19	NW	5760	0	5760	70
275860	2008-04-08	0.36	S	5713	65	5648	-42

87658	1977-05-15	1.08	SW	5950	39	5911	221
25471	1965-10-01	1.09	SW	5962	20	5942	252

Table A - Summary of DWR water well data.

**Based on elevation data obtained from Google Earth.*

CONCLUSIONS

Based on field observations and geologic and groundwater reference data presented herein, Entrada asserts that:

- Water well 283209 is sourced by a perched aquifer located at least 100 feet higher in elevation than the Railsback Water Facility and cannot be affected by the release.
- Groundwater is estimated to be 80 feet below the Site, separated from the release by one or more confining layers within the Wasatch Formation. Therefore, there is no clear direct pathway to groundwater at the Site.

Entrada recommends that Caerus request approval for all release cleanup soil samples to be evaluated against CECMC Table 915-1 Residential Soil Screening Level (RSSL) concentrations.

We appreciate the opportunity to assist Caerus Oil and Gas, LLC. Please contact us at (970) 270-2986 if you have any questions.

Sincerely,

ENTRADA CONSULTING GROUP



Christopher Mace
Senior Geologist



Tim Dobransky
Principal Scientist