

# **Rule 901.e Sensitive Area Determination**

**LINN Operating Inc.  
O-29 Centralized E&P Waste  
Management Facility**

**OA Project No. 014-1565**

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## **SENSITIVE AREA DETERMINATION**

### **O-29 WATER IMPOUNDMENT FACILITY**

**LINN OPERATING, INC.**

**OPERATOR NUMBER 10516**

**LOCATION ID 335836**

**FACILITY ID 290544**

**SWSE Section 29, T5S, R96W, 6th PM, Garfield County, Colorado**

The geologic and hydrologic data indicates that the O-29 Water Impoundment Facility (Facility) potentially is in a sensitive area. The Facility is located on a point between two tributaries of Little Creek. The distance to the surface water feature to the north is approximately 475 feet. The distance to Little Creek to the east is approximately 485 feet. Figure H-2 shows the proximity to surface water features within two miles of the Facility site.

Figure PW-1 shows the permitted water wells within one mile of the Facility. These are all monitoring wells for natural gas facilities. Shallow groundwater does not appear to be present in the vicinity of the facility based on a review of information from the Colorado Division of Water Resources (DWR) for permitted water wells in the area. Several monitoring holes permitted by Encana Oil and Gas are shown to the north of the site. The total depths of these wells are listed at between 24 feet and 34 feet below ground surface (bgs), but static water levels were not listed for these wells and the indication in the boring logs is that these wells were dry.

Marathon Oil Company has several monitoring holes permitted in Section 32, with total depths that range from 191 feet to 239 feet bgs. The static water levels in these wells are listed at between 171 feet and 233 feet bgs. The elevations of these wells range from 8,333.2 feet to 8,364.1 feet. Bargath LLC has three canceled well permits for wells located just outside the one mile radius to the southeast. The depths of these wells were reported at between 14 feet and 20.5 feet bgs, and static water levels reported at between 4.5 feet and 11 feet bgs.

Shallow groundwater is expected to follow topography and flow to the northeast. A potentiometric surface map cannot be created since there are no monitoring wells in the immediate vicinity of the site. Since groundwater in the bedrock is fracture controlled, it is also likely that the water levels would be influenced by the presence of fractures and impermeable layers and would be expected to discharge at locations where these layers crop out in the sides of the canyons. Many such springs are known to occur in the area along the main drainages.

O-29 Water Tank Treatment Facility  
Pit Facility ID: 427606  
Location ID: 421047

The soil types in the Facility area are Northwater-Adel complex, 5 to 50 percent slopes; Parachute-Irigul complex, 5 to 30 percent slopes; and Parachute-Irigul-Rhone association, 25 to 50 percent slopes. These soil types are described as well drained with water erosion potential low to moderate. Further details of soil qualities and characteristics can be found in the Geologic Hazard Report for the Berry Petroleum Company 29-17 Produced Water Injection Well Facility.

The Facility is not within a 317B notification area. There will be no construction within any Waters of the US or any drainage, so no Army Corp 404 permit is required. The facility is not located in a riparian area.

Copies of the figures used to help evaluate the Sensitive Area determination are included at the end of this document.

### **Sensitive Area Mitigation**

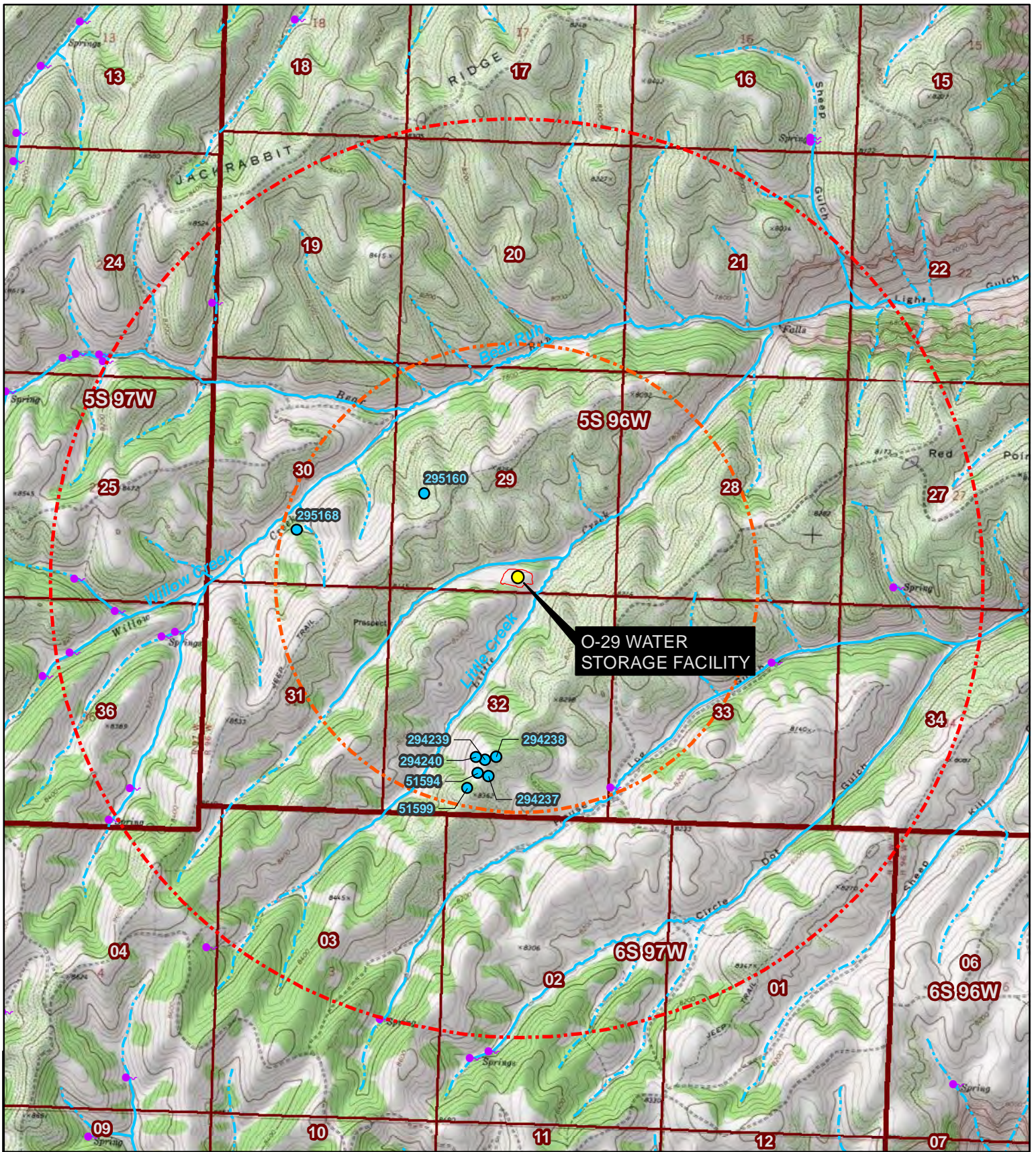
LINN proposes to mitigate any potential impacts through the use of engineering controls such as SWMP BMPs around the facility site and access road, SPCC lined containment of the tanks, and dual pit liners of 60 mil and 40 mil thicknesses, with leak detection for the impoundment.

In order to protect the surface water, secondary containment has been provided for the entire capacity of the largest single container plus sufficient freeboard to contain precipitation. One hundred year 24-hour precipitation event data indicate a worst-case precipitation rate of 2.8 inches per day for this region. LINN is willing to provide training for the Grand Valley Fire Protection District in spill and emergency response at their facilities.

The access road was constructed to prevent any sediment from migrating from the access road to nearby surface water or drainages leading to surface water. This was done through the use of stormwater BMPs where appropriate. Inspections have been conducted in accordance with LINN's Stormwater Permit to confirm that applicable BMPs are in place, maintained, and functioning properly.

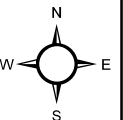
The monitoring wells will be sampled twice a year per LINN's Groundwater Monitoring Plan for the 29-17 Injection Well Site. Copies of all test results will be provided to the COGCC within three months of collecting the samples. Results of the monitoring program will be included in LINN's annual 900 Series facility report to the Director. Water samples from the monitoring wells will be tested for Table 910-1 contaminants and concentrations.





**Legend**

● Water Wells Within 1 Mile    
 ● Spring/Seep    
 ● O-29 WATER STORAGE FACILITY  
  1 Mile Buffer    
— Perennial Stream    
  O-29 Water Storage Facility Boundary  
  2 Mile Buffer    
- - - Intermittent Stream



PROJECT NO:	014-1565	HYDROGRAPHY MAP  LINN ENERGY O-29 WATER STORAGE FACILITY GARFIELD COUNTY, COLORADO		760 HORIZON DR., SUITE 102 GRAND JUNCTION, CO 81506 TEL 970.263.7800 FAX 970.263.7456	FIGURE
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DATE:	11/11/2014				



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# LEGEND:

● Oil and Gas Well Location

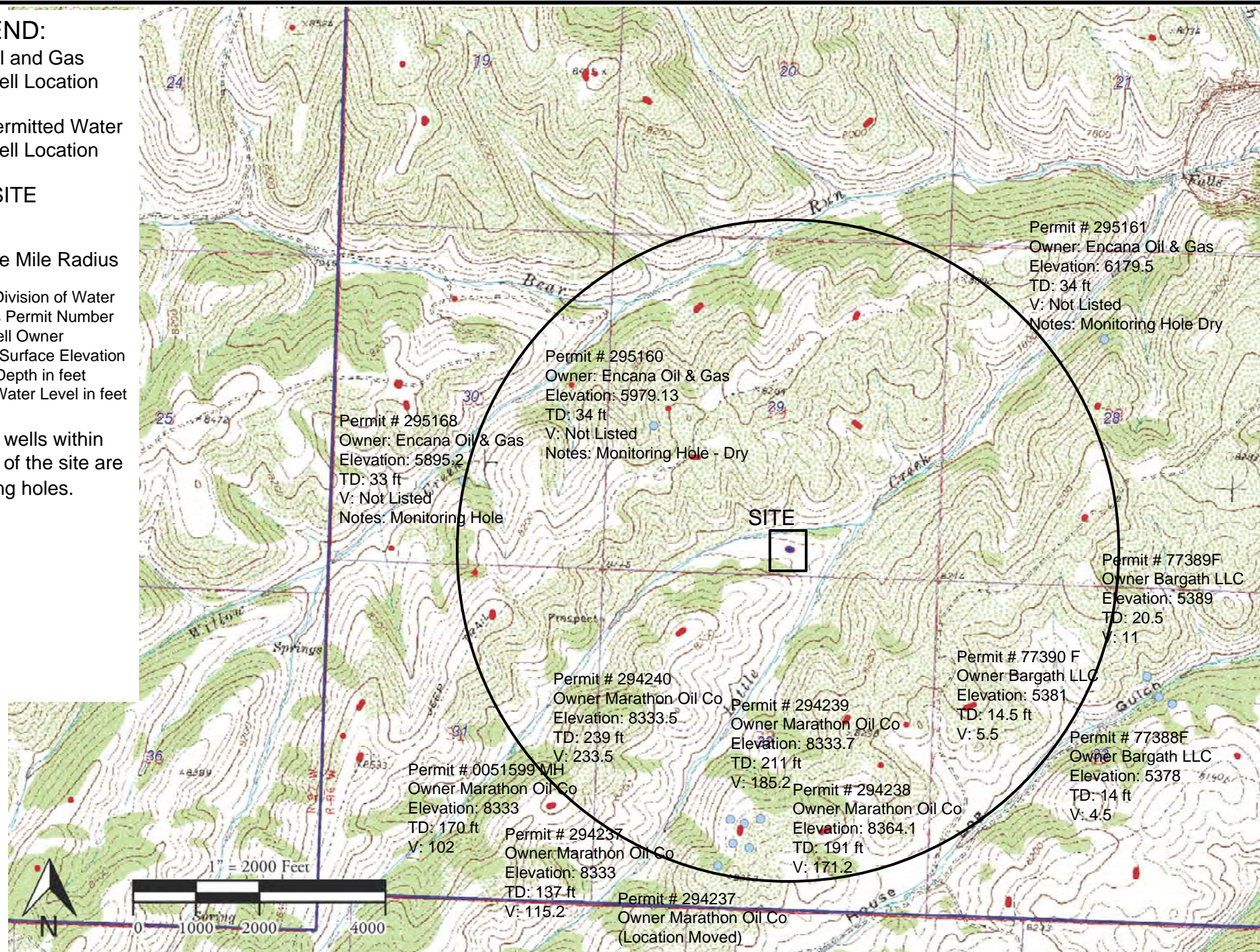
● Permitted Water Well Location

□ SITE

One Mile Radius

Permit # Division of Water Resources Permit Number  
Owner: Well Owner  
Elevation: Surface Elevation  
TD: Total Depth in feet  
V: Static Water Level in feet

Note: All wells within one mile of the site are monitoring holes.



PROJECT NO: 014-1565

DRAWN BY: JWH

DATE: 11/4/2014

## PERMITTED WATER WELLS MAP

Linn O-29 Centralized E&P Waste Management Facility  
SW ¼ SE ¼ 29 T5S R96W - Garfield County, Colorado

**OLSSON**  
ASSOCIATES

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FIGURE

PW-1



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