



December 5, 2011

**RE: SENSITIVE AREA DETERMINATION  
FEDERAL NO. 2-10-84 WELL PAD  
GARFIELD COUNTY, CO**

This Sensitive Area Determination is intended to accompany the *Colorado Oil and Gas Conservation Commission Site Investigation and Remediation Work Plan* (COGCC Form 27) for the National Fuel Corporation Federal No. 2-10-84 well site.

The site is located approximately 12 miles north-northwest of Mack, Colorado in Section 10, Township 8 South, Range 104 West in Garfield County. This Sensitive Area Determination was performed following the guidelines set forth by the COGCC 900 Series Exploration and Production Waste Management rules. A desktop review of available information pertaining to the ground water, surface water, geology, and soils of the site and surrounding area was performed.

#### **GROUNDWATER AND WATER WELLS**

The nearest recorded water well is a monitoring well approximately 3,350 feet north-northwest of the site. The State of Colorado permit records for this well have no groundwater depth information. The driller's notes in the 1982 geological report for the Federal No. 2-10-84 gas well indicates that "sulfur water" was encountered at a depth of 316 feet below ground surface (bgs).

#### **SURFACE WATER**

Generally, a well pad location within a 0.25 mile radius to a perennial drainage is required to be classified as within a sensitive area. The site is located approximately 0.36 miles from West Salt Creek, but lies in proximity (approximately 500 feet in the down gradient direction) to an intermittent drainage that is a tributary to West Salt Creek. Although neither the intermittent tributary, nor West Salt Creek contain surface water most of the year, these water courses provide a potential conveyance of any material released from the well site.

#### **OTHER HYDROLOGIC CONSIDERATIONS**

The site is not located in a Wellhead Protection Area. The site is not in close proximity to a domestic or Public Water Supply well. It is not underlain by a designated groundwater basin and is not within a Surface Water Supply Area.

#### **GEOLOGY**

The surface geology at the site is the Mancos Formation. The Mancos formation consists of several thousand feet of predominantly dark gray shales with interbedded sands and shales. The formation is generally considered to have low permeability.

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### **SOIL**

A review of the National Resource Conservation Service (NRCS) soil report for the site indicates that Billings silty clay loam is the predominant soil type at the well site and in the surrounding area. Billings silty clay loam is alluvium derived from shale that tends to be well drained with a semi-pervious relative permeability.

### **DETERMINATION**

A review of the geologic and hydrologic information indicates that groundwater at the site is relatively deep. However, the site is constructed in alluvium and therefore exhibits a potential for the infiltration of liquids to groundwater and nearby surface water. In addition, the intermittent drainage adjacent to the site provides a potential conveyance for any material spilled to the site surface.

Based on this information, it is determined that the site is constructed in a sensitive area.

***Olsson Associates***



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