PAVILLION FIELD
PIT REVIEW

WYOMING OIL AND GAS
CONSERVATION COMMISSION

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ACRONYMS

API	American Petroleum Institute
AOR	Area of Review
BLM	Bureau of Land Management
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
DRO	Diesel-Range Organics
E&P	Exploration and Production
EC	Electrical Conductivity
EPA	Environmental Protection Agency
GRO	Gasoline-Range Organics
KCl	Potassium Chloride
LSND	Low Solids Non-Dispersed
NRCS	Natural Resources Conservation Service
OBM	Oil-Based Mud
OCSRRS	Oil Contaminated Soils Remediation Ranking System
RCRA	Resource Conservation and Recovery Act
SEO	State Engineers Office
SVOC	Semi-Volatile Organic Compound
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
USCS	Unified Soil Classification System
USGS	United States Geological Survey
VOC	Volatile Organic Compound
VRP	Voluntary Remediation Program
WBM	Water-Based Mud
WDEQ	Wyoming Department of Environmental Quality
WOGCC	Wyoming Oil and Gas Conservation Commission

1.0 EXECUTIVE SUMMARY

The Wyoming Oil and Gas Conservation Commission has prepared this report as a technical and regulatory analysis of pits associated with gas wells located within the Pavillion Field, Fremont County, Wyoming. This report addresses the adequacy of Pavillion Field pit site investigations and reclamation in protecting water quality in all water wells within a 1,320 foot radius (1/4 mile) of each pit location.

Current WOGCC regulations include specific permitting, operation, and closure requirements intended to protect human health and the environment by avoiding contamination of the soils and underground and surface waters at drilling or production locations. Prior to April 26, 1984, pit construction and closure requirements did not include the same considerations for protection of human health and the environment as current regulations contain. The Oil Contaminated Soils Remediation Ranking System implemented to guide the pit closure and reclamation process at these historical pit locations utilizes a risk based closure method. Evaluation of the nine characteristics incorporated in the ranking system in the context of the Pavillion Field area illustrates the importance of site-specific investigation for scoring for all environmental variables.

Detailed water well and hydrogeologic information is needed to determine the adequacy of site investigations and pit remediation in the Pavillion Field in protecting water wells near pit locations. Further work should be conducted to attempt to obtain reliable domestic water well data, and a comprehensive geologic and hydrologic study of the Pavillion Field area should be undertaken.

Of the 169 Pavillion Field wells, 92 are associated with pits. The following determinations were made, with recommendations for additional investigation and remediation contingent upon determination of a potential pathway from shallow deposits to water well completion zones:

- No further investigation for 31 pits associated with water-based mud systems
- No further investigation for three pits on the periphery of the Pavillion Field for which pit type and/or mud type is unknown

- Investigation at one of 9 KCl cuttings pits to determine the need for additional KCl pit investigations
- For 18 reserve and reserve/production pits used to contain oil-based mud for which no investigations have been conducted, conduct investigations at the seven locations proximal to potential groundwater use pending determination of the presence of water wells at these locations. No investigation is recommended for the remaining 11 pits.
- For 31 reserve and reserve/production pits used to contain oil-based mud for which investigations have been conducted, investigations and remediation are adequate for eight locations and no further work is recommended. Further site investigation is recommended at twelve of the previously investigated locations to define the location and extent of the pit contents, collect samples of the pit contents and groundwater, and conduct soil remediation if necessary. Recommendations are pending review of further information for seven additional previously investigated pit locations. Four pits are currently enrolled in the WDEQ Voluntary Remediation Program and no assessments of remediation status or recommendations for further investigation are provided for these four pits.

Soil and groundwater analyses results from the Pavillion Field sites provide some indication of the utility of using 1,000 mg/kg total TPH in soils as an indicator of concentrations of other constituents of concern in soils. The assessment of the adequacy of use of soil TPH alone, rather than specific soil constituents of concern, to guide pit closure and remediation based on analytical data for soil and groundwater samples that were collected from the same borehole in the Pavillion Field area is inconclusive. Future pit investigation work in the Pavillion Field should include analysis for specific soil constituents of concern, such as BTEX, TPH-GRO, TPH-DRO, and naphthalene.

2.0 INTRODUCTION AND SCOPE OF WORK

The Wyoming Oil and Gas Conservation Commission (WOGCC) has prepared this report as a technical and regulatory analysis of pits associated with gas wells located within the Pavillion Field, Fremont County, Wyoming. Detailed use, status, closure, and reclamation information is provided for all known pits in the Pavillion Field. The Wyoming Department of Environmental Quality (WDEQ) has identified fourteen domestic wells within the Pavillion Field as having quality and palatability issues. Pits located within one-quarter mile of these wells are noted and evaluated for potential to contribute to water quality issues at the wells. This report also addresses the adequacy of Pavillion Field site investigations and pit reclamation in protecting water quality in all water wells within a 1,320 foot radius (1/4 mile) of each pit location. Recommendations are presented for additional site investigation, remediation, or other work which may be necessary to be protective of the water wells. The report references 10 maps and 17 tables provided in appendix format following the text presentation.

Principal contributors to the preparation and review of the report are:

Tom Kropatsch, P.G.	WOGCC Deputy Oil and Gas Supervisor
Cheryl A. Naus, P.G.	EDE Consultants, Hydrogeologist
Russell W. Hamilton, P.E.	EDE Consultants, Environmental Engineer/Hydrologist
Bruce N. Nelson, P.E.	EDE Consultants, Sr. Engineer/Principal

2.1 OBJECTIVES

Specific objectives of this report include the following:

- Summarize current regulations concerning pit permitting, usage, and closure.
- Compile information pertaining to all gas wells and pits in the Pavillion Field to determine historic pit locations and pit types, uses, and contents.
- Review domestic water well data and summarize in the context of the pits investigation.
- Summarize the currently employed risk assessment system and compile information relevant to risk assessment for the Pavillion Field.

- Review soil and groundwater investigations, remediation and reclamation completed at pit locations.
- Determine whether site investigations and/or reclamation were sufficient to protect water supply wells within 1,320 ft. of the pit locations.
- Identify data gaps and/or data issues that preclude conclusive assessment of site closure adequacy.
- Identify locations requiring additional site investigations and/or reclamation.

2.2 METHODS AND DATA SOURCES

To complete the evaluation of all known pits, current and historic, within the Pavillion Field, the WOGCC completed the following work:

- Compiled domestic water well and gas well information[1] based on review of records on file with the WOGCC, Wyoming State Engineers Office (SEO) records, and previous related reports.
- Determined historic pit locations, types, uses, and contents based on compilation and review of all available information (WOGCC records, previous related reports, information supplied by local residents).
- Compiled data from WOGCC records, investigation reports, and other previous reports to facilitate review and analysis of soil and groundwater investigations, remediation, and reclamation completed at pit locations.
- Compiled information and data for risk assessment analyses from:
  - Wyoming SEO
  - Wyoming Wind/Bighorn River Basin Plan

[1] A detailed summary of domestic water well and gas well locations, mineral ownership, drilling techniques, and completion techniques is presented in the Pavillion Field Well Integrity Review (WOGCC, 2014). from which data used within this report, in part, was obtained.

    - University of Wyoming Water Resources Data System
    - U. S. Geological Survey
    - Natural Resources Conservation Service.
- Constructed a GIS database for geospatial analyses based upon key characteristics of the pits and risk assessment criteria.

Spatial data analyses presented in this report utilize gas well, water well, and pit locations compiled from several sources:

- Coordinates for the 14 WDEQ Area of Review domestic wells are from the U.S. Environmental Protection Agency (EPA) report: "Investigation of Ground Water Contamination near Pavillion, Wyoming" (EPA, 2011).
- Coordinates for all other SEO-permitted wells are from the SEO e-permit database (some point locations were estimated using quarter-quarter section information) or from Wyoming well permit GIS data available from the SEO website (SEO, 2014).
- Gas well coordinates are from records on file with the WOGCC.
- Locations of pits associated with gas wells were estimated using site investigation maps (for pits that have been the subject of site investigations; see Section 8.1) and aerial photography.

The evaluation of the proximity of pits to water wells at some locations may contain error because some pit and water well locations appear to be estimates (center of quarter/quarter sections) and not all early pit investigation reports provide enough detail to confidently locate the pits. Additional potential uncertainties in spatial data could result from errors in source data.

3.0 PAVILLION FIELD GENERAL DESCRIPTION

The Pavillion Field is located on the western flank of the Wind River Basin, east of the town of Pavillion in Fremont County, Wyoming (Map 1). The town of Pavillion, population 231 (2010 census), is located at the southwestern extent of the well field. The primary industries in the area surrounding

Pavillion and within the Pavillion Field are natural gas production and agriculture. Development of the natural gas resources in this area began in 1960 and continued through 2006. Of the 169 gas wells in the Pavillion Field, currently 98 are in active production, 40 are shut-in, and 31 have been plugged.

Surface and mineral ownership in the Pavillion Field area are shown on Maps 2 and 3. Current land ownership in the Pavillion Field includes private, Federal, and Tribal. Surface ownership and Mineral Rights ownership in the Pavillion area are often separate, resulting in a split estate. The Bureau of Land Management (BLM) administers surface operating standards for oil and gas exploration and development on Federal lands and Tribal lands and/or leases (Map 3). Among the 169 wells in the Pavillion Field, 99 are regulated by the BLM.

Detailed descriptions of the Pavillion field geology, soils, groundwater resources, surface water resources, irrigation, and climate are provided in Section 7.

4.0 REGULATORY REQUIREMENTS

State and Federal regulations pertaining to oil and gas exploration and production wastes are applicable to the Pavillion Field. Regulatory review is presented in this section specifically in the context of oil and gas exploration and production waste containment in pits, and does not address a wide variety of regulations applicable to the oil and gas exploration and production industry.

In general, regulatory requirements governing oil and gas production in the State of Wyoming are administered by the WOGCC as required by Wyoming Statute Title 30, Chapter 5, Articles 1through 5. The WOGCC rules and regulations developed to fulfill that legislative mandate are discussed in Section 4.2. With respect to oil and gas well field pits and waste materials contained by pits, the WOGCC has primary regulatory authority for permitting the location, construction, operation, and closure/reclamation of non-commercial pits within a lease, unit, or communitized area.

In implementing the role of a principal regulatory agency, the WOGCC has executed cooperative agreements with other enforcement agencies, both State and Federal, where overlapping authorities exist. These agreements include:

- Bureau of Land Management, Memorandum of Understanding – Federal public lands management and oil development. The BLM/WOGCC memorandum of understanding includes the agreement to cooperate, to exchange information, and to share responsibilities.
- U.S. Environmental Protection Agency, Memorandum of Agreement – Underground Injection Control and Safe Drinking Water Act.
- Wyoming Department of Environmental Quality, Memorandum of Agreement – Defines primary agency where overlapping authority exists. The WDEQ has principal authority over commercial pits and other oil field waste disposal facilities not falling within the jurisdiction of the WOGCC. The Wyoming Department of Environmental Quality also has principal authority when groundwater contamination due to oil and gas activities is identified.
- Wyoming State Engineer Office, Memorandum of Agreement – Water rights and beneficial use protection.

4.1 Waste Classification

The EPA classifies wastes uniquely associated with oil and gas exploration and production (E&P) as *"special wastes"* lower in toxicity than other wastes regulated under the Resource Conservation and Recovery Act (RCRA). The agency published criteria to determine whether E&P wastes are exempt or non-exempt from RCRA Subtitle C (hazardous waste management program) regulations (EPA, 2002). In general, the waste is likely considered exempted from Subtitle C of RCRA if the waste has:

1) Come from downhole (i.e. brought to the surface during oil and gas exploration or production operations), or
2) Been generated by contact with the oil and gas production stream during the removal of produced water or other contaminants from the product.

The EPA identifies 28 specific exempt wastes and 22 non-exempt wastes. Mixing exempt and non-exempt wastes presents additional considerations outlined in the 2002 EPA document. Specific wastes that are exempted and are most relevant to the Pavillion Field pits evaluation include:

- Produced water (fresh or saline) and constituents removed from produced water before it is injected or otherwise disposed.
- Drilling fluids (water-based or oil-based).
- Drill cuttings.
- Well completion, treatment, and stimulation fluids.
- Pit sludges and contaminated bottoms from storage or disposal of exempt wastes.
- Light organics volatilized from exempt wastes in reserve pits, impoundments, or production equipment.
- Well work-over wastes.
- Hydrocarbon-bearing soil.

4.2 WOGCC Regulations

The WOGCC has primary regulatory authority over RCRA exempted E&P wastes and other E&P waste contained by pits. With respect to waste classification and regulatory authority, WOGCC regulations in Ch. 4 Section 1 (x) state:

> *"Operation: Pits shall not receive, collect, store, or dispose of any wastes that are listed or defined as hazardous wastes and regulated under Subtitle C of RCRA, except in accordance with state and federal hazardous waste laws and regulations. The pit permit or approval is automatically canceled if these provisions are not met."*

In general, pits are regulated under Chapter 4, Section 1 of the current WOGCC regulations. The regulations identify specific requirements applicable to pits for initial siting, construction, operation, and closure practices depending upon the type, contents, and longevity of the pit and the location of the pits relative to key site characteristics. Prior to constructing a pit or pits (field wide/area wide), the operator must obtain a pit permit (Chapter 4, Section 1(d)). This is achieved by filing with the WOGCC:

- Form 14A *"Application for Permit to Construct and Use Earthen Pit for Retention of Produced Water"*, or
- Form 14B *"Application for Permit to Construct and Use Earthen Pit for Temporary Use, or Reserve Pit"*, and (optionally),
- Form 18 *"Soil and Groundwater Information"*.

One exception is the construction of a temporary Emergency Pit, which requires that the operator advise the WOGCC Supervisor within 24 hours after the pit construction.

Under current WOGCC regulations, lined pits are required for:

- Pits constructed in fill material,
- Sites with sandy soils,
- Sites with shallow groundwater,
- Sites in areas of groundwater recharge,
- Sites immediately adjacent to sensitive environments,
- Pits used to retain oil-based drilling muds,
- Pits used to retain high-density brines,
- Pits used to retain completion or treating fluids,
- Pits used to retain water containing > 10,000 mg/L Total Dissolved Solids (TDS), and
- Pits as required by the WOGCC upon review of permit application materials.

In addition to pit closure regulations in Chapter 4, Section 1, the WOGCC drafted guidelines to assist producers in the closure of pits and other aspects of drill site environmental management, many of which apply to pit closure activities. These include:

- *"Guideline for Closure of Unlined Production Pits"* (December 2002), which provides suggested methods and procedures for closing unlined pits. The guideline also identifies

what the WOGCC considers to be an appropriate level of investigation to assure protection of public health and the environment.

- *"Guideline for Reclamation of Surface Areas Disturbed by Oil and Gas Drilling or Production Operations"*.
- *"Wyoming Oil and Gas Conservation Commission Soil and Sludge Sample Guide"*.
- *"Wyoming Oil and Gas Conservation Commission Guideline for Spill Cleanup"*.
- *"Wyoming Oil and Gas Conservation Commission Water Sample Guide"*.
- *"Oil Contaminated Soil Composting Basics"*.

Upon determining that a pit accompanying an oil or gas development site is no longer needed, the operator is required to close the pit within one year in accordance with specific closure requirements of Chapter 4 Section 1 WOGCC regulations. Pit closure requires the operator file a Form 4 *"Sundry Notice"* delineating the closure process for approval by the WOGCC. Upon approval the operator must allow at least a 24-hour notice before closure begins to provide WOGCC staff opportunity to observe pit soil sampling for testing prior to closure operations. The requirement to conduct testing and the closure standards to be met are determined by the WOGCC Supervisor based on site specific conditions. Current closure requirements also vary depending upon:

- Location of the pits relative to key site characteristics
- Type of pit
- Contents of the pit
- Construction of the pit
- Governmental Agency involvement/oversight
- Evidence of soils contamination
- Evidence of groundwater contamination

The two main contaminants addressed by WOGCC Chapter 4 regulations and guidelines are salts and oil. Chapter 4, Section 1 (iv) requires that pits with high concentrations of salts must be removed, disposed of in a permanent facility, encapsulated chemically, or mechanically treated thereby achieving cleanup standards of an exchangeable sodium percentage of 15 and a sodium absorption ratio of less than 12.

Chapter 4, Section 1 (v) requires oil-based mud solids to be removed and disposed in a permitted facility; solidified using a Commission approved method; or bioremediated in accordance with Commission or Wyoming Department of Environmental Quality rules. Burial after encapsulation or solidification is permissible if the stabilized mixture contains less than ten milligrams per liter (10 mg/L) leachable oil and less than five thousand milligrams per liter (5,000 mg/L) leachable dissolved solids using the Wyoming Leachate Test defined in Chapter 4, Section 1(ff), *"Testing"*.

If oil contaminated soils are present in the pit or immediate area, WOGCC guidance suggests the operator's closure plan employ elements of the Oil Contaminated Soil Remediation Ranking System (OCSRRS) or other rigorous detailed site and health/environmental assessment. The OCSRRS procedure uses site specific information to assess the sensitivity of the site to contaminant migration and applies specific numeric standards for Total Petroleum Hydrocarbons (TPH) in soils which must be met. Section 7 of this report provides a detailed discussion of the OCSRRS process and risk assessment.

The WOGCC OCSRRS process is for oil contaminated soils only and does not apply to situations where groundwater or surface water has been contaminated. If water contamination occurs, WDEQ regulations are primary. The WDEQ Voluntary Remediation Program (VRP) includes very specific individual constituent concentration limits that must be met. The WDEQ has developed guidance documents, policies, and other materials necessary to implement the VRP and assist Volunteers wishing to invoke this site cleanup alternative (http://deq.state.wy.us/volremedi/).

The structure of current WOGCC regulations requires preconstruction permit studies and closure studies with the intent of assuring that a pit is sited, constructed, operated, and closed without causing damage to human health and the environment. However, it is important to recognize that pit closure

requirements have changed over time. Current regulatory requirements and guidelines are not the same as during other periods in the past. Prior to April 26, 1984, pit construction and closure requirements did not include the same considerations for protection of human health and the environment as current regulations contain. Specifically, the regulations did not include the siting and closure requirements or filings for permits to construct under Forms 14A and 14B, the required removal and haulage of oil-based mud (OBM) cuttings or treatment prior to burial, or prohibition of the use of reserve pits as production pits. Pits constructed or closed prior to the implementation of these rules may be of higher potential risk of impacts to soils and groundwater.

5.0 GAS WELL AND PIT REVIEW

The information presented in this section is based on an intensive search and review of Applications for Permit to Drill, pit permits, well drilling and completion reports, sundries documenting waste disposal methods, and various other files (such as interviews with landowners) submitted to the WOGCC or other agencies (BLM, EPA, WDEQ) for determination of pit locations, contents, and closure methods for the Pavillion Field wells.

5.1 History of Pavillion Field

In 1953, Gulf Oil Company drilled the Mae H. Rhodes 1 well to a depth of 11,000 feet to the basal Mesaverde Formation but the well was plugged and abandoned. In 1960, Shell Oil Company (Shell) drilled the Well No. 14-12 (Ora Wells 14-12) to a total depth of 6,505 feet in the Fort Union Formation. The Ora Wells 14-12 is commonly considered the discovery well for the Pavillion Field and is currently a shut in producer.

Shell continued to develop the field and in 1963 received approval for 640-acre well spacing. Shell drilled a total of 36 wells through 1980 and operated the field until June 1986 when it was acquired by Tom Brown, Inc. Between 1963 and 1983, 18 additional wells were drilled in the field by various other companies (Atlantic Refining Corp, Hickerson Oil Company, Samedan Oil Corp, Palmer Oil and Gas, Kerr McGee, Damson Oil Corp, Tenneco Oil Company, Impel Energy, Gulf Energy Corp, Hallador

Petroleum, Elf Aquitaine Oil and Gas, and Exxon Corp), with most of these wells subsequently being plugged and abandoned.

Between 1993 and 2004, Tom Brown, Inc. drilled 77 wells in the Pavillion Field. In 2004, Tom Brown was acquired by Encana Oil and Gas (USA), Inc. which subsequently drilled an additional 36 wells between 2004 and 2006. One additional well was drilled in the field by Devon Energy Corp. in 2007. The locations of all gas wells in the Pavillion Field are on Map 1.

5.2 Well and Pit Review

Table 1 includes mineral ownership, location, completion, and status information for all Pavillion Field wells and information regarding pits associated with those wells. Of the 169 Pavillion Field wells, 92 are associated with pits (Map 4). Drilling, completion, and waste handling techniques used in the Pavillion Field varied over time, by operator, and by regulations in effect. A significant change in WOGCC regulations applicable to pits occurred in 1984. Fifty five of the Pavillion Field wells were drilled between 1953 and 1983 by Shell Oil Company and other operators. The remaining 114 wells were drilled between 1993 and 2007 by Tom Bown, Inc., Encana Oil and Gas, and Devon Energy Corp.

Shell drilled 36 wells between 1960 and 1980. These wells were drilled with invert (diesel based/ OBM) mud system circulated to unlined reserve pits at the drill site. The drill cuttings were subsequently buried in the reserve pits. As described in Section 4.2 of this report, regulatory requirements between 1960 and 1980 did not require treatment of the cuttings prior to burial in a reserve pit, which was standard industry practice. Although records on file with the WOGCC do not definitively indicate the process followed by Shell, it is expected that these reserve pits and drill cuttings were closed following standard industry practice and buried without treatment.

Evidence in the WOGCC files, operator knowledge, and site imagery indicate that reserve pits were typically partially buried and subsequently used as production pits (for Shell wells that were drilled, completed, and produced gas). Encana personnel verbally reported that many of these production pits were in use until Tom Brown, Inc. purchased the field in 1986. Records indicate that some of these pre-

existing production pits continued to be used by Tom Brown, Inc. until approximately the mid-1990's when the systematic replacement of legacy pits with tanks was completed by the operator. Detailed descriptions of the gas wells drilled by Shell and associated pits are provided in Appendix A.

Nineteen wells in the Pavillion Field were drilled between 1953 and 1983 by various other companies. As indicated in Table 1, the type of mud used and types of pits used varied with each operator, but most of the wells were drilled using invert mud and reserve pits. Available information pertaining to well drilling and associated pit usage for these wells are provided in Appendix A.

The 114 wells drilled by Tom Brown, Encana, and Devon between 1993 and 2007 were drilled using low solids, non-dispersed (LSND) water-based mud systems or water-based potassium chloride (KCl) polymer systems circulated to steel tanks (closed system) without the use of earthen reserve pits for drilling. Lined cuttings pits are associated with 37 of these 114 wells.

Fifty of the 169 Pavillion Field wells are located within approximately one-quarter mile[2] of the 14 domestic water wells that were evaluated for this report. The 50 gas wells (Area of Review gas wells) are located in Sections 2-4 and 9-13, Township 3 North, Range 2 East, Fremont County, Wyoming (Map 5). Mineral ownership, location, completion, and production information for these wells are summarized in Table 2. Table 3 summarizes the data pertaining to pits associated with 26 of the 50 wells. The remaining 24 Area of Review gas wells were drilled using a closed system with no associated pits.

Of the 50 Area of Review gas wells, 12 were drilled between 1953 and 1981. Reserve pits are associated with all 12 of these wells, and 11 of the 12 pits were used to contain OBM. Lined cuttings pits are associated with 14 of the 38 wells drilled by Tom Brown and Encana Oil & Gas between 1993 and 2005.

6.0 WATER WELL REVIEW

There are 14 private water supply wells identified by the WDEQ as having quality and palatability issues. Domestic water well identification numbers are referenced from Appendix A, Table

[2] Includes three wells located at a slightly greater distance (+100 feet).

1A of the EPA Draft Report "Investigation of Ground Water Contamination near Pavillion, Wyoming" (EPA, 2011). Water well ownership, location, depth, and SEO permit status are summarized in Table 4. Information included in Table 4 was compiled from the EPA (EPA, 2011), the SEO, and WDEQ records. The distances from each domestic well to the gas wells located within one-quarter mile are included on Table 3 and well locations (from EPA, 2011) are shown on Map 5.

A detailed review of the domestic wells, including available permitting information on file with the SEO for the seven water wells permitted, is included in the WOGCC wellbore integrity review report (WOGCC, 2014). This information was supplemented with additional information for this report as summarized in Table 5. The detailed discussion in the wellbore integrity review report and the information compiled in Tables 4 and 5 illustrate that information is lacking or unverified regarding construction details of the domestic water wells. Seven wells have no water well permit filed with the SEO and two water wells were drilled many years prior to the filing of the well permit. Records available from the SEO give little or no data relating to water well completion techniques. Missing or unverified data for many wells includes information concerning date drilled, total depth, water zone(s) penetrated, casing size and type, well completion procedures, producing depth, pump setting depth, and other information that might prove to be beneficial in determining possible relationships to, and impacts from, surrounding pits.

As stated in Section 2.0, this report addresses the adequacy of the site investigations and pit reclamations in protecting water wells within a 1/4 mile of all Pavillion Field well locations. A complete tabulation of all SEO permits issued for locations within 1/4 mile of each of the 169 Pavillion Field wells is included in Appendix B. Table 6 summarizes information from the SEO e-permit database for the 61 water wells included in Appendix B. A discussion of the proximity of the water wells to Pavillion Field pits is included in Section 7.5.

7.0 RISK ASSESSMENT SYSTEM

Chapter 4, Section 1, (a) of the WOGCC regulations provides that *"These rules are intended to protect human health and the environment by avoiding contamination of the soils and underground and surface waters at drilling or production locations."* With respect to pits, the construction, operation, and closure rules, regulations, and guidelines require pit permitting that involves preconstruction site characterization, specific pit construction standards, operational parameters, and pit closure sampling, planning, and contaminant limitations. If the pit is unlined and has contained oil-based drilling fluids, treating or completion fluids, or other petroleum product from drilling or exploration, a risk based closure method is preferred by the WOGCC. The Oil Contaminated Soils Remediation Ranking System process for contaminated soils uses an environmental characteristics matrix where characteristics of a pit site are numerically ranked according to a pre-determined scale of factors that could expose the environment or humans to harmful contaminants. The OCSRRS is described in detail in the WOGCC guidelines *"Guideline for Closure of Unlined Production Pits"*, and *"Guideline for Spill Cleanup"*. A ranking system for salt contaminated cleanup levels has not been developed.

Within the OCSRRS method, environmental and contaminant variables that affect potential contaminant migration and possible exposure affecting human health and the environment are assigned numeric values. A higher value is assigned when the characteristic could contribute to greater risk of environmental impacts. The OCSRRS employs a strategy of the higher the risk, the lower the cleanup standard. Table 7 presents the OCSRRS site characteristics, criteria, and rank points. The rankings include nine site and waste characteristics each assigned various point values from 0 to 20 depending on the risk that the characteristic poses to human health and the environment.

The soil cleanup level for oil contamination under the OCSRRS method is based on Total Petroleum Hydrocarbon (TPH) concentration. TPH is a measure of the mixture of many hydrocarbons (potentially several hundred compounds) derived from crude oil. TPH is useful as a measure of the presence of these compounds when it is not practical to measure each one separately. Table 8 presents

the WOGCC soil cleanup TPH standards based upon the total rank score of the pit site resulting from evaluation of each of the nine ranking characteristics.

The WOGCC *"Guideline for Closure of Unlined Production Pits"* indicates that a notice of intent to sample or close a pit should be provided to the Commission via Sundry Notice (Form 4). Suggested information to submit with the sundry includes:

- Topographic map depicting the locations of the pit, surface water features, water wells, springs, residences, and other environmentally sensitive features
- Soil and geology description
- Diagram of pit and drill site equipment and earthwork
- Duration of pit use and extent of contamination statement
- Disclosure of fluids placed in the pit and disposal method
- Chemical analysis of pit contents including oil and salt content[3]
- Soil analyses to determine the TPH and TDS concentration in soils left in the pit after excavation
- Excavated soil analyses before and after cleanup/treatment
- A completed OCSRRS worksheet and supporting evidence as requested ty the Commission staff
- Photographs to demonstrate the condition of the pit, soil below the pit, and vegetation in and around the pit

Successful implementation of the OCSRRS requires specific and accurate knowledge of each of the nine characteristics incorporated in the ranking system. A conceptual representation of the physical relations addressed by several of the ranking factors is presented as a schematic in Figure 1. Sections 7.1 through 7.9 present information for the Pavillion Field that directly relates to risk evaluation using the OCSRRS.

[3] The WOGCC may require further testing of wastes and additional disposal requirements prior to closure of a pit if there is reason to believe exempt oilfield wastes have been commingled with hazardous wastes and / or if there is extensive subsurface contamination or groundwater contamination. The rules provide the WOOGCC with the authority to require whatever testing is deemed appropriate.

7.1 Hydrogeology and Groundwater Resources

The hydrogeologic and groundwater resource description provided here is not intended to be a comprehensive hydrogeologic description, rather an applied/functional description to determine the proximity of the pits or contamination to the nearest aquifer(s) that:

1) Could directly receive pit contamination, and
2) Constitute the completion zones/aquifers of the domestic wells in or near the Pavillion Field.

In the Pavillion Field, there are two aquifers with the potential to be impacted by pit contaminants: the Wind River aquifer and the water bearing zones of the Quaternary unconsolidated deposits (Qa; Love and Christiansen, 1985). Map 6 depicts the surficial geology and the distribution of these units relative to the pits and the 14 domestic water wells in the WDEQ Area of Review.

The Eocene-age Wind River Formation, which composes the Wind River aquifer, is the principal surficial geologic outcrop in the Wind River Basin and is exposed over most of the central portion of the basin. The Formation varies in thickness from less than 100 feet at the basin margins to approximately 5,000 feet in the central portion of the basin (Daddow, 1996). In general, the Wind River Formation is described as interbedded sequences of sandstone, conglomerate, claystone, siltstone, and shale. The sandstone and conglomerate beds are lenticular and of variable texture, geometry, and thickness (Morris et al., 1959; McGreevy et al., 1969; Plafcan et al., 1995).

The Qa deposits are the prevalent surficial geology in the Pavillion Field area. These deposits consist of unconsolidated sediments present in flood plains, fans, terraces, and slopes. In the Wind River Basin in general, the Qa deposits are composed primarily of sand and gravel interbedded with finer-grained sediments such as silt and clay, with coarser deposits occurring in some locales (Morris et al., 1959; McGreevy et al., 1969; Daddow, 1996). Alluvium of upper Fivemile Creek contains a large proportion of gravel as thick as 10 ft., whereas in the central Wind River Basin along Fivemile Creek the alluvial deposits are generally fine-grained (Morris et al., 1959; McGreevy et al., 1969). The approximate maximum thickness of most types of Qa deposits (slope wash, alluvium, terraces, and pediments) is 80 ft.

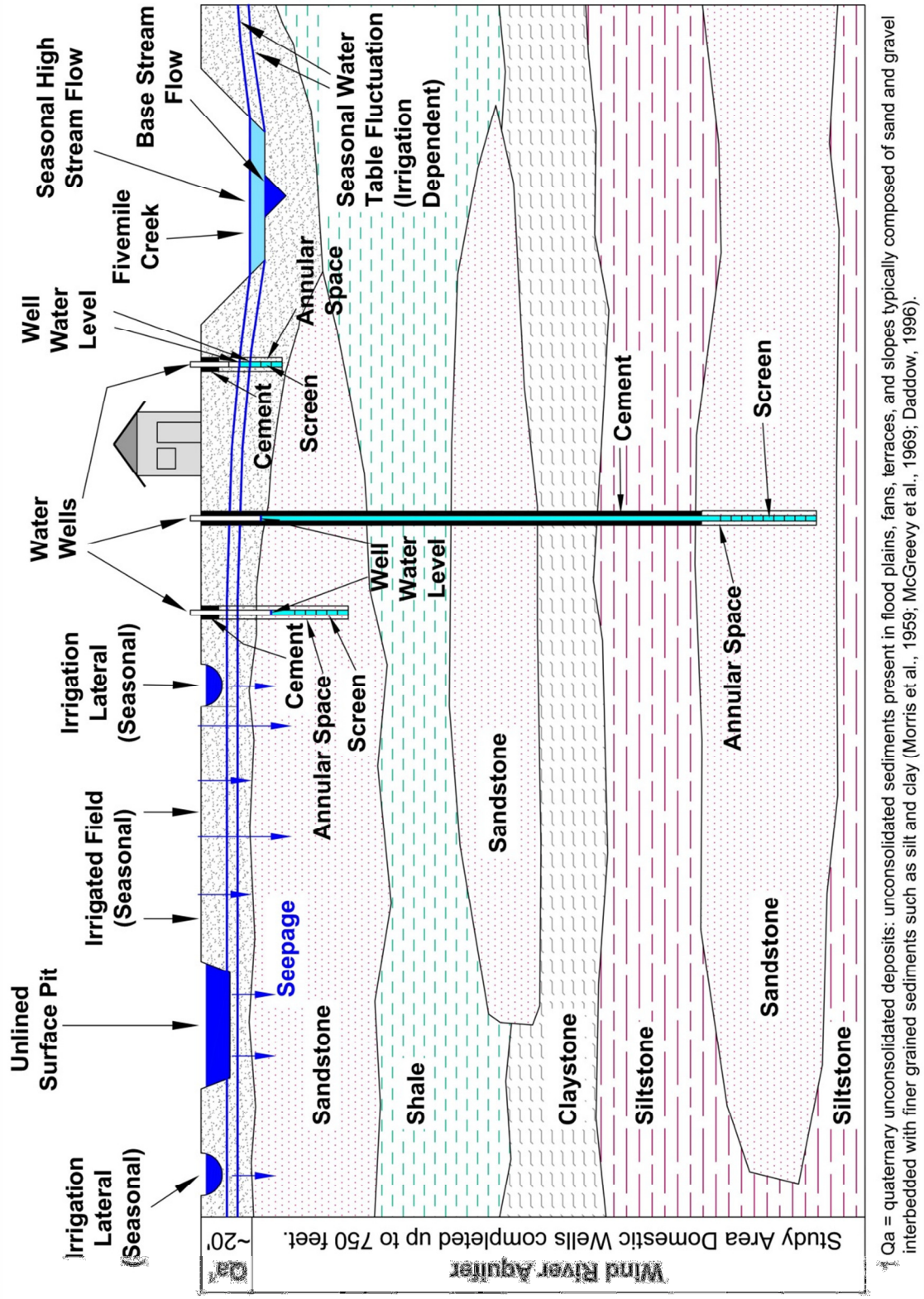

Figure 1 - Pavillion Area Conceptual Hydrologic Regime

(McGreevy et al., 1969). Morris et al. (1959) report that in most places the undifferentiated alluvial/colluvial deposits that mantle the Wind River Formation between terraces are generally 5 to 10 feet thick, but locally, such as in the North Pavillion area (T4N, R2E), thicknesses greater than 20 feet have been reported. The average thickness of Fivemile Creek alluvium is approximately 40 ft. (Morris et al., 1959).

Where exposed at the surface, recharge to both the Wind River aquifer and the Qa deposits occurs from direct infiltration of precipitation, streamflow losses, infiltration from unlined (or leaking) irrigation distribution networks, and infiltration of irrigation water applied to fields (Morris et al., 1959; McGreevy et al., 1969). Infiltrating irrigation waters and streamflow losses likely provide most recharge to the Wind River aquifer (Morris et al., 1959). Depending on hydraulic gradient and hydraulic connection, Qa aquifers may receive discharge from underlying aquifers or, conversely, recharge from Qa deposits to the Wind River aquifer may also occur (Morris et al., 1959; McGreevy et al., 1969).

Regionally, the Wind River aquifer wells obtain water primarily from the lenticular beds of sandstone in the Wind River Formation. The sandstone beds are discontinuous and hydraulically isolated to varying degrees by interbedded fine-grained confining units. Aquifer tests conducted in the Wind River aquifer in the Riverton area indicate that the sandstone lenses are interconnected at that location, and it is surmised that this is by fractures in the impermeable materials separating them (Morris et al. 1959). According to McGreevy et al. (1969), "Some water-bearing beds of the formation are hydraulically connected, but others, perhaps most, are only remotely connected; some are completely separated." In the upper, highly weathered part of the formation, some groundwater occurs under water-table conditions (Morris et al., 1959). At depth, the sandstone units are generally under confining pressure and most wells in the Wind River aquifer tap confined units (McGreevy et al. 1969; Daddow, 1996).

The occurrence of groundwater in Quaternary unconsolidated deposits is dependent on local geomorphology. Morris et al. (1959) and McGreevy et al. (1969) provide considerable detail pertaining to the hydrogeology of the different types of Qa deposits. The Qa aquifers are generally small in area and

often occur in either alluvial/colluvial deposits or terrace deposits along streams and rivers. Groundwater in the Qa aquifers typically is unconfined (water-table conditions). According to Morris et al. (1959), the alluvium of Fivemile Creek contained some groundwater before irrigation occurred along the creek. Irrigation added considerable water to storage, which contributed to a rise of the water table and water logging in small areas along the middle and lower reaches of Fivemile Creek.

Using data from 1950, Morris et al. (1959) developed a water table map (Plate 3) which shows depth to water ranging from 0.7 ft. to 31 ft. below land surface in the Pavillion Field area. Generally speaking, the depth to water in unconfined aquifers in the Pavillion Field as depicted by this map is approximately 4 ft. to 15 ft. The flow direction shown is generally down-valley from northwest to southeast, with localized variations somewhat paralleling the topography.

McGreevy et al. (1969) state: "The Wind River Formation consists of numerous separate aquifers. At a single location, aquifers at different depths will have very different water levels. Differences in depth to water of as much as 140 feet were measured in adjacent wells." This illustrates the limitations with respect to compilation of a Wind River aquifer potentiometric surface. The hydraulic gradient with respect to the overlying unconsolidated deposits is, however, an important consideration. Some deep wells completed in the Wind River Formation were at one time flowing at the land surface (Morris et al., 1959; McGreevy et al., 1969; Daddow, 1996), and localized data indicate that in some areas the head in the deeper Wind River sandstones was equivalent to the water table (McGreevy et al., 1969).

Water level data for the Pavillion Field area were downloaded from the USGS online database and other sources (Section 2.2). Upon review of the quantity and spatial and temporal distribution of water level data, it was concluded that the data are insufficient for a detailed hydrogeologic analysis, particularly in the context of the complexity of piezometric head in the Wind River aquifer water well production zones.

To adequately assess the Pavillion Field pits as potential groundwater contaminant sources to water wells, it is important to understand if potential pathways exist for pit contaminants to reach the production zone of the domestic water wells. In general this pathway would be from a pit to the shallow

alluvial/colluvial aquifer, then to the deeper Wind River aquifer where the majority of wells examined were completed. This pathway assessment involved identifying aquifer lithology, well completion, and water level data (Appendix C) which were compiled from available SEO records for water wells located in the central part of the Pavillion Field. The initial database query yielded 441 well filings in the four-Township area (T4N R2E, T4N R3E, T3N R2E, T3N R3E) including water right descriptions of cancelled, abandoned, fully adjudicated, and incomplete as well as filings with no water right description. Of these 441 records, 113 permitted wells closest to the Pavillion Field were selected for detailed review. This includes seven of the 14 domestic wells identified by the WDEQ for detailed water quality investigation (WDEQ AOR wells). The remaining seven WDEQ AOR wells have no SEO permit on file (see Tables 4 and 5). Within the 113 permitted wells examined in detail, only 53 contained lithology information. These well statistics point out the high degree of uncertainty regarding the number of wells at risk, their completion, and their relationship to the pits.

Descriptions of cuttings from Pavillion area water wells indicate that the Wind River strata in the well perforation zones include blue or blue-green shale and sandy shale, fine-grained sandstone, and water-bearing fine to coarse grained sand/sandstone. The Qa deposits were most often described as sand or sandy topsoil with lesser amounts of finer grained materials. Interpretation of the 53 drilling logs and completion reports indicates that 51 wells are completed in the Wind River aquifer and two may be completed in the unconsolidated alluvium/colluvium.

The Statement of Completion reports filed with the SEO for water wells in the review area (Appendix C) show that cementing was typically conducted during well construction to seal the well annulus at the surface and to seal certain water bearing zones from hydraulic communication with the desired production zones. Of the 53 well completions reviewed, cement was used up to a depth of 20 feet in 21 wells and to greater depths in 21 additional wells. The remaining 11 completion reports do not indicate whether cement seals were constructed. Figure 1 illustrates that where shallow cement seals are installed, the annular space from the screened interval up to the seal could function as a conduit for migration of shallow contaminants. Figure 1 also illustrates that water wells completed in upper Wind

River sandstones may be directly connected to shallow groundwater in the alluvium/colluvium. Regardless of well construction, if there are no confining layers isolating the production zone of the well a contaminant pathway exists between the alluvial/colluvial aquifer that underlies some pits. Deeper wells with production zones completed within confined strata of the Wind River aquifer and cemented from the screened interval to land surface are isolated from shallow groundwater and potential influence by pit related contaminants, so long as well construction integrity is intact (Figure 1). This analysis illustrates the importance of having detailed knowledge of the domestic water well construction and local hydraulic gradients when determining whether gas well pit contaminants may affect domestic well water quality.

The SEO log data summary in Appendix C indicates that the depth to water in wells completed in the Qa is approximately 10 to 15 ft. It has been documented in the past (Morris et al., 1959; McGreevy et al., 1969) that in some areas along Fivemile Creek soils water logging has occurred due to shallow groundwater table and irrigation. In such areas, depth to groundwater is functionally zero. In the Wind River aquifer, reported depths to water in SEO wells in the Pavillion area range from less than 10 to 265 ft. Interpretation of log data indicates that the majority of the Wind River water wells produce from confined units. Because of the confined conditions, water rises in wells to the potentiometric surface elevation and the measurement of the depth to groundwater in Wind River aquifer wells is not necessarily a measure of the depth to the saturated zone where the water physically resides below the confining layer(s).

Distance to an aquifer in the OCSRRS includes four categories of vertical separation distance that extends from the bottom of the contamination to the highest seasonal average elevation (Table 7). A test boring is of course the most definitive way to determine depth to water. However, because the majority of the pits in the Pavillion Field area overly Qa deposits, much of which receive irrigation seepage (Section 7.4), it is likely that the ranking points for groundwater would be 20 points in the majority of the area even with relatively shallow contaminant penetration. In areas where the Qa deposits are not present or do not hold water and the Wind River aquifer is the first water bearing unit in the profile, the physical depth to water as a ranking parameter in the OCSRRS should be based on the observed occurrence of

water-bearing deposits (from test bores or well logs) rather than potentiometric surface elevation due to probable confined conditions.

7.2 Aquifer Water Quality

Aquifer water quality, specifically the shallowest aquifer's potential use as a source of drinking water or its use for livestock, wildlife, or agriculture, is a criterion in the OCSRRS. This section includes a discussion of the quality of water in the two aquifers in the Pavillion Field area.

The water quality of the Wind River Formation is known to be highly variable (Daddow, 1996; Gores & Associates, 2011). In the Pavillion area, water produced from the Wind River aquifer is generally high in total dissolved solids (TDS) and dominated by sodium sulfate. Sulfate often exceeds EPA's secondary drinking water standard. Based on mapping and spatial analysis of water quality data in the October 2011 "Pavillion Area Water Supply Level 1 Study" (Gores & Associates, 2011), the authors concluded that there is "no identifiable spatial trend" and that the TDS can vary from 500 mg/L to 1,000 mg/L in a very small area. In groundwater samples from shallow wells (< 220 ft.), the TDS ranged from over 4,000 mg/L to 511 mg/L. In samples from medium depth wells (220 ft. to 600 ft.), the TDS concentration ranged from 4,180 mg/L to 375 mg/L. A search of the Wyoming Water Resources Data System for the Pavillion Area yielded data for 43 wells which indicate a range from 280 mg/L to 6,080 mg/L TDS (average 2,280 mg/L) in samples collected between 1972 and 1979. As discussed in Section 7.1 above, the variable water levels/pressures in wells in the Wind River aquifer indicates that the water bearing sandstone units are isolated by confining layers and are in most cases not hydraulically connected. The vertical and lateral variability of water quality from Wind River wells further supports this description.

The water in the alluvium of Fivemile Creek, and in the Qa in general, is unsatisfactory for domestic use due to high dissolved solids content (Morris et al., 1959). Water quality from field measurements provided with many of the investigations reports of pits conducted by AECOM (see Section 8.1 for further information) did not analyze for TDS. Field measurements of electrical

conductivity (EC), collected for the purpose of dissolved solids assessment, generally ranged from approximately 4,000 uS/cm to 6,000 uS/cm for shallow groundwater. Technically, there is no one conversion factor to estimate TDS from EC; however, a conversion factor range of 0.50 to 0.70 is recognized to provide a gross indication. Using a conversion factor of 0.5, the field EC measurements equate to TDS estimates of 2,000 to 3,000 mg/L for shallow groundwater. Converting the same EC measurement data with the higher factor of 0.7, results in TDS concentration estimates of 2,800 mg/L to 4,200 mg/L for shallow groundwater.

In the context of OCSRRS ranking addressing shallow groundwater quality in the Pavillion Field, it appears that generally a 5 point rank would be representative. Although the OCSRRS ranking for water quality provides for greater protection to higher quality water, as this may be linked to the probability that the water may be used for human consumption, it is recognized that by law, contamination of groundwater is not acceptable under any of the ranges of TDS used in the ranking system.

7.3 Soil Medium

Soil medium is included in the OCSRRS to assess the capacity of the subsurface materials to both transport and attenuate potential contaminants. Site specific assessment at each individual pit site is an important component of a risk-based closure assessment. Legacy pits were generally constructed of local soils and the nature of these soils may be a determining factor as to the leakage rate from these soils. The soils also define the current and future potential use of the land in the case of buried pits that may be subject to re-disturbance.

Soils information is available through the Natural Resources Conservation Service (NRCS). Alternatively soil texture may be determined through on site soil sampling and laboratory analysis. In the context of the evaluation of pit locations for siting and for incorporation into Form 14a or 14b, the soil type as defined by the Unified Soil Classification System (USCS) is specified. This is also true for risk assessment under OCSRRS closure. Under the USCS, the soil texture as a determining factor of

permeability is the focus with respect to pit siting or cleanup/closure. Table 9 summarizes the OCSRRS USCS soils permeability scoring.

Map 7 shows the most commonly occurring or most representative USCS classification for soils in the Pavillion Field area (NRCS, 2014). The locations of Pavillion Field pits with respect to the USCS soil types as determined from the NRCS data is summarized as follows:

USCS Soil Classification	Soil Description	Number of Pits
CH	Clay of High Plasticity	2
CL	Clay of Low Plasticity	47
CL-ML	Mixture: Clay of Low Plasticity / Silt	1
SC	Clayey Sand	5
SC-SM	Mixture: Clayey Sand / Silty Sand	5
SM	Silty Sand	31
Unclassified (wet alluvial land)		1

In addition to using the information from maps, actual soil permeability test data may be used in place of the calculations delineated in the guidelines or regulations. Comparison of soil type data in the Pavillion area investigations reports (see Section 7.9) indicates that site-specific measured data is preferred over use of NRCS maps because the USCS soil type indicated by NRCS mapping is often not representative of the soil types reported, particularly for the CH and CL soil types (NRCS surveys may not be at a suitable scale or level of detail for site-specific analysis). Additionally, the use of soils maps may not reflect the permeability of the material where the pit resides because the site may have undergone topsoil salvage or fill operations prior to pit construction.

7.4 Surface Water and Irrigated Crop Lands

The proximity of the Pavillion Field pits to surface water and the presence of irrigated crop lands are both OCSRRS criteria (Table 7). Irrigation is an important factor because of the potential for increased mobilization of contaminants. Two potential mechanisms may contribute if contaminants are present in a pit: 1) Irrigation may alter the groundwater elevation (decrease the depth to groundwater) and the resulting seasonally high water table could contact contaminants, and 2) if the pit is in/near a

flood irrigated field or near an unlined irrigation canal or lateral, contamination may be conveyed in irrigation return flow to surface waters or as irrigation conveyance seepage loss to groundwater.

Perennial flowing surface water in the Pavillion Field vicinity occurs in Fivemile Creek, which essentially bisects the field from the northwest to the southeast. The entire Pavillion Field is within the 418 sq. mi. Fivemile Creek watershed. Other surface water features in the Pavillion Field area include irrigation canals, laterals, and ditches. The Pavillion area is heavily irrigated and much of the Pavillion Field is within or adjacent to irrigated lands. The irrigation season generally commences in April and ends in September.

Map 8 shows the locations of Pavillion Field pits with respect to surface water features and irrigated lands[4]. The point rank in the OCSRRS score for distance to perennial rivers, streams, creeks, irrigation canals, ditches, lakes, and ponds ranges from 20 points if less than 300 ft. to 0 points if greater than 1,320 ft. (Table 7). Spatial analysis using data used to construct Map 8 indicates that 16 pits were/are located within 1,320 feet of Fivemile Creek and 65 pits were/are located within 1,320 of the Midvale irrigation distribution network. For irrigated crop lands, the OCSRRS scoring is 0 for "no" (not present) and 20 for "yes" (present). Based upon the data used in Map 8, 40 pits were/are located in irrigated areas. In practice, field verification is employed in the ranking system (as opposed to map-based scoring) and 20 points could be assigned for areas that were historically irrigated.

7.5 Distance to Water Wells

The distance of pits to water wells (municipal, domestic, livestock, agricultural) is a factor in the pit siting/permitting requirements of Chapter 4 under Forms 14a and 14b and in closure under Chapter 4 and within the OCSRRS ranking. The OCSRRS uses four distance categories to weight the risk of the pit contamination to separation distance from a water well (Table 7) with the ranking score ranging from 15 for water wells less than 300 ft. from a pit to 0 for water wells farther than 1,320 ft. Map 9 illustrates the proximity of pits to the 14 domestic water wells which are the focus of contamination investigations and

[4] Irrigation distribution network data from WWDC, 2007; GIS files provided by the Wyoming Water Development Office. Irrigated lands data from Wind/Bighorn Basin Plan (2010).

to other SEO-permitted water wells in the surrounding area. A complete tabulation of all SEO permits issued for locations within approximately 1/4 mile of each of the 169 Pavillion Field wells is included in Appendix B. Summary data for the 61 SEO-permitted water wells included in Appendix B is included in Table 6. Of these water wells, 56 are within approximately 1/4 mile of pits associated with 60 of the gas wells.

Evaluating the proximity of pits to water wells using the OCSRRS criteria yielded the following summary:

Separation Distance	**Number of Pits**
>1320 ft.	32
1320 ft. to 500 ft.[5]	43
500 ft. to 300 ft.	10
<300 ft.	7

7.6 Distance to Populated Areas

The distance from a pit to populated areas including residences, schools, hospitals, parks, and recreation areas is an OCSRRS risk factor intended to account for potential impact to human health. This risk factor is ranked with the same four distance intervals as the distance to water wells and surface water (Table 7). The rank points range from 0 when greater than 1320 ft. to 15 points for less than 300 ft. This risk factor was not mapped for this report. Generally the proximity of pits within the Pavillion Field to schools, hospitals, parks, and recreation areas is easily identified and related principally to the town of Pavillion or several State recreation locations near the well field, most of which are much farther than a quarter mile from the pit locations. Determining the proximity of all Pavillion Field pits to all residences requires a detailed evaluation of the status of the many residences within the Pavillion Field which has not been undertaken in this report. It is assumed that the scoring conducted for the site assessments discussed in Section 8.1 utilized the correct distances to populated areas.

[5] Includes pits located between 500 and 1,475 ft. from SEO water well permit locations to account for potential inaccuracies in distance determinations (historical use of center of quarter-quarter for location).

7.7 Annual Precipitation

The annual precipitation in a specific area may be an important factor in the fate and transport of contaminants due to the potential for rainfall/snowmelt to transport contaminants as a component of groundwater recharge. The climate in the vicinity of the Pavillion Field is semi-arid. Average monthly maximum temperatures have been recorded to be as high as 92°F in July (1901) and average monthly minimum temperatures recorded to be as low as -15°F in January (1979) based on the 118-year record available using the Water Resources Data System PRISM Climate Data Server (WRDS, 2012).

Annual precipitation at the Pavillion Field is approximately 8 inches per year (WRDS, 2012; NOAA, 2013). The maximum and minimum yearly rainfall recorded within the 118-year period of record was 16.19 inches and 3.21 inches, respectively. Based on available information (WCA, 2004; WRCC, 2005), the free water surface evaporation for the Pavillion area is estimated to be approximately 40 inches per year.

The climatic effect as a risk factor for the closure of pits is addressed in the OCSRRS as annual precipitation amount. The average annual precipitation of 8 inches in the Pavillion area scores zero points. This point assignment applies to all pits under OCSRRS assessment.

7.8 Oil API Gravity

The WOGCC uses API gravity as an indicator of the presence of light hydrocarbons such as benzene and some polycyclic aromatic hydrocarbons. API gravity is a specific gravity scale developed by the American Petroleum Institute (API) for measuring the relative density of various petroleum liquids. API gravity is gradated in degrees on a hydrometer instrument and was designed so that most values would fall between 10° and 70° API gravity. The arbitrary formula used to obtain this effect is: API gravity = (141.5/SG at 60°F) - 131.5, where SG is the specific gravity of the fluid. Thus a high API gravity is indicative of a larger percentage of light hydrocarbons and the OCSRRS ranking scale (Table 7) assigns more points to higher API gravity values. As an applied risk factor, the use of API gravity and TPH is a surrogate to direct constituent analysis.

Pits in the Pavillion Field are associated with natural gas production wells. The primary soil contaminant for production pits would therefore be anticipated to be natural gas condensate. For reserve pits, contaminants may also be associated with the historical use of OBM.

OBM typically includes diesel fuel as a component ranging from 5% to 95%. Diesel fuel has a potential range of API gravity of 25 to 40 degrees (Nelson, 1958). Diesel fuel is specifically listed in some OBM Safety Data Sheets along with other unspecified petroleum distillates. Determination of the actual API gravity of a mixture of the petroleum product in OBM would require laboratory testing on only the petroleum components of an OBM mixture.

The WOGCC maintains a database of API gravity information submitted by operators. There are no API gravity data for condensate produced in the Pavillion Field. If there are no API gravity data on file, WOGCC recommends the conservative approach of using the highest score of 20 for the OCSRRS evaluation. API gravity for condensate produced for sale at the nearby Muddy Ridge Field ranges from approximately 51 to 60. Although Pavillion is typically a dry gas, by analogy to Muddy Ridge if there were any liquids or condensate present in the legacy pits in the Pavillion Field the OCSRRS score for API gravity should be the high end of the scale (20 points, Table 7).

7.9 Risk Assessment Summary

The OCSRRS numerically ranks a contamination site with nine site and materials variables. To demonstrate and evaluate the practical application of the OCSRRS, scores and corresponding TPH clean up levels (Table 10) were generated for the 11 reserve / production pits in the Pavillion Field that contained OBM and are located within 1,320 feet of the WDEQ domestic water wells. Criteria to assist with establishing the rank points for five of the variables were generated from spatial analysis using the data discussed in this Section: 1) underlying surficial geology unit as a proxy for distance from the bottom of the contamination to the aquifer, 2) USCS soil classification from NRCS mapping and investigation reports, 3) presence or absence of irrigation, 4) distance to surface water, and 5) distance to

water wells. Table 11 summarizes the data for these five OCSRRS variables for the 92 pits in the Pavillion Field area.

For the 11 sites evaluated, the OCSRRS scores for groundwater quality (5 points), annual precipitation (0 points), and API gravity (20 points) were held constant as being representative for the Pavillion Field area as described previously. The conservative score of 20 points for distance to groundwater was chosen for all sites despite geologic mapping which indicates that one of the pits evaluated (Unit 44-10) is underlain by the Wind River formation. The scores for distance to surface water and distance to water well(s) were based on GIS analysis (Table 11 data) using the Midvale irrigation district distribution network and streams shown on Map 8. Scores for irrigated crop lands were initially based on GIS data, but the presence or absence of irrigation was verified using 2013 imagery and in several cases the scores in Table 10 reflect change to an irrigated condition from what is presented in Table 11 and based on the spatial data sets. Scores for soil medium were assigned using the soil type reported in investigation reports and, as previously mentioned, comparison to the NRCS data in Table 11 illustrates the need for site-specific soil type determination. The variables for distance to public areas, residences, and recreational facilities were derived from review of 2013 imagery and represent best assumptions from that information.

The resulting OCSRRS scores presented in Table 10 range from 62 to 120 for these sites within 1,320 feet of domestic water wells. As previously mentioned these OCSRRS scores are for demonstration and evaluation of the application of the OCSRRS and are not WOGCC-imposed cleanup standards for these locations. The scoring indicates that the most conservative TPH cleanup limit of 1,000 mg/kg would apply for 8 of the 11 sites. In all but one instance the TPH limits agree with the operator-reported cleanup limits, where applicable. Actual scoring and limits should be verified using site visits and field review.

8.0 ASSESSMENT OF CURRENT REMEDIATION STATUS

As discussed in Section 7.1, detailed knowledge of the domestic water well construction and local hydraulic gradients is necessary in order to determine whether gas well pit contaminants may affect domestic well water quality. In the Pavillion Field area, information is lacking or unverified regarding construction details of the domestic water wells. Missing or unverified data includes information concerning date drilled, total depth, water zone(s) penetrated, casing size and type, well completion procedures, producing depth, pump setting depth, and any other information that might prove to be beneficial in determining possible relations between the water well completion zones and the shallow groundwater that could potentially be impacted by pit contaminants.

Data and information reviewed for this report (Section 7.1) indicate that most water wells in the Pavillion Field area produce from the Wind River formation and that it is quite likely that relatively deep sandstone lenses in the Wind River aquifer are not in hydraulic connection with the shallow alluvial / colluvial (Qa) deposits and shallow Wind River deposits in which the pits are located. However, available data are insufficient to determine groundwater flow patterns and gradients and possible hydraulic connection between the shallow aquifers and the Wind River aquifer in the vicinity of the water wells.

Given the lack of knowledge pertaining to water well construction and local hydrogeologic conditions, it is very difficult to assess the adequacy of investigations and remediation work associated with Pavillion Field pits with respect to protection of water wells. Therefore, the recommendations for future work provided in this Section are contingent upon demonstration of a pathway from potential pit contaminants to water well completion zones. Additionally, for any pits located on Tribal minerals any recommendations provided are for consideration by the BLM.

8.1 Pavillion Field Pit Review and Recommendations

Of the 169 Pavillion Field wells, 92 are associated with pits. Types of pits in the Pavillion Field and information pertaining to investigation and remediation in the Area of Review (AOR) are shown on

Map 10, pit summary data are provided in Tables 1 and 10, and Table 12 summarizes selected information pertaining to the investigations and remediation. Of the 92 pits, 31 are associated with gas wells drilled using water-based mud systems. Three of these pits were reserve pits constructed prior to assumption of operatorship by Tom Brown, Inc. (pre-1984) and the remaining 28 were cuttings pits associated with wells drilled between 1993 and 2007 using low solids, non-dispersed (LSND) water-based mud systems circulated to steel tanks (closed system) without the use of earthen reserve pits for drilling. Of the 31 pits associated with wells drilled with water-based mud, 11 are within 1,320 of WDEQ-identified domestic water wells (located within the WDEQ AOR). One soil investigation was conducted at Pavillion Fee 31-9, a cuttings/LSND pit, in September 2011. No groundwater was present (maximum investigation depth of 15 ft.) and TPH-gasoline range organics (GRO), TPH-diesel range organics (DRO), and other semi-volatile organic compounds were not detected in any of the soil samples collected. Additionally, Encana provided analytical data for drill cuttings for 40 wells in the Pavillion field that were drilled between 2001 and 2006. The cuttings were collected from depths similar to depths of gas wells associated with cuttings pits. All samples were analyzed for TPH and chloride concentrations were determined in two samples. The highest detection of TPH was 645 mg/kg and the chloride concentrations were 115 mg/kg and 215 mg/kg. No further investigation of LSND or WBM reserve or cuttings pits is recommended.

There are three pits in the Pavillion Field, but not within the WDEQ AOR, for which the pit type and/or mud type is unknown (Map 4; Table 1). For two wells, neither pit type nor mud type is known. One was converted to a water well and the other is not within 1,475 ft. of any SEO groundwater permit; no investigation is recommended at these locations. One pit was a reserve pit but the type of drilling fluid is unknown. This pit is not within 1,475 ft. of any SEO groundwater permit, stream, or irrigation canal and it is not located in an irrigated area. No investigation is recommended.

Nine Pavillion Field pits were cuttings pits associated with wells drilled using KCl polymer systems. Four of these pits are located within the WDEQ AOR and two additional pits are located within 1,475 of SEO groundwater permit locations (Table 13). Although these pits were not used to contain the

drilling fluid and pits were reportedly lined, there is potential for impacts to shallow groundwater, particularly for pits located in irrigated areas, if residual high chloride concentrations occur in cuttings left on-site. If it is demonstrated that there is potential for contaminant transport from shallow groundwater to water well completion zones, it is recommended that soil/cuttings and groundwater samples be obtained at one of these pit locations. The greatest potential for impacts to water wells, based on available information, appears to be at Tribal Pavillion 43-10 which is located less than 100 ft. from water well PGDW23, also known as Miller #3, reportedly drilled to a depth of 175 ft. (based on SEO data; Table 5).

The remaining 49 Pavillion Field pits were reserve pits or reserve and production pits used to contain OBM. These pits are associated with wells drilled by various operators between 1960 and 1983. No investigations or remedial work was conducted at 18 of these pit locations. Eleven of the uninvestigated pit locations are not within the WDEQ AOR and are not located within 1,475 ft. of any SEO groundwater permit location; no investigation is recommended. The remaining seven pits are within 1,475 ft. of SEO groundwater permit locations and one (Maxson 32-9) is in the WDEQ AOR (Table 13). It is recommended that investigations be conducted at these locations, pending (1) determination of the presence of water wells at these locations and (2) determination of a potential pathway from shallow deposits to water well completion zones. The seven pits are associated with the following gas wells: Govt 44-20 (API No. 1306273), Gov't 23-7 (API No. 1306359), Runner Herefords 44-17 (API No. 1308017), Maxson 32-9 (API No. 1320084), Unit TR1-22 (API No. 1320581), Finlayson 1-17 (API No. 1321086), and Runner Herefords 1 (API No. 1321157).

The current oil and gas operator in the Pavillion field, Encana Oil and Gas (USA) Inc., has been conducting site investigations at the remaining 31 reserve and reserve/production OBM pits to determine the presence of residual soil contamination and/or groundwater contamination. The pits were constructed and used (prior to Encana's involvement) by other oil and gas production companies in the Pavillion Field. Table 12 summarizes selected information pertaining to the investigations at these locations. More detailed descriptions of individual site assessments are included in Appendix A, and information regarding availability of pit investigation reports is provided in Appendix D.

Among the 31 investigated pits, 26 had been accepted in the WDEQ VRP program in September 2005. Encana subsequently requested, and was granted, approval to remove 22 pits from the VRP because investigations were to be conducted under WOGCC direction. Four sites remain in the VRP and the investigations, monitoring, and remediation at these sites have been, and are being, conducted based on the guidelines of the VRP. No assessment of remediation status or recommendations for further investigation are provided for these four pits. Investigations at the remaining 27 of the 31 pits were conducted using the OCSRRS guidelines, with the exception of one investigation that used the WDEQ soil cleanup levels (Unit 41X-10). Among these 27 locations, an initial phase of pit investigations between 2006 and 2008 was followed by more rigorous investigations at eight locations during 2010-2013.

The 2006-2008 site assessments consisted, in general, of geoprobe borehole drilling around the periphery of the estimated pit location and trenching at the center of the estimated pit location to obtain field photoionization detector (PID) readings as an indicator of the presence of hydrocarbons. The PID data were reportedly used to determine the location (highest PID reading) from which to collect at least one composite "confirmation sample" for laboratory analysis to determine the highest hydrocarbon concentration in soil. Most 2006-2008 site investigations included determination of salinity (EC) and metals in the PID confirmation sample. For pit locations that were subsequently remediated (by excavation), post-remediation sampling of soils remaining in at least two walls and the floor of the excavated area was conducted to determine whether the post-excavation TPH concentration in soils met or exceeded the OCSRRS-determined soil cleanup goal.

The scope of investigation varied somewhat for the more detailed 2010-2013 investigations (see Appendix A for details), but in general the investigations included installation of multiple boreholes from which soil samples were collected for TPH-GRO, TPH-DRO, and benzene, toluene, ethylbenzene, and xylenes (BTEX) laboratory analysis. Occasionally concentrations of other volatile and semi-volatile organic compounds (VOCs/SVOCs) were determined. Where shallow groundwater was present at the depth of investigation, groundwater samples were collected from the boreholes and/or from temporary

groundwater monitoring wells. Groundwater sample analyses included determination of TPH-GRO, TPH-DRO, and BTEX concentrations and occasionally concentrations of other VOCs/SVOCs were determined. Laboratory data associated with these investigations were compiled, along with data for the pits enrolled in the VRP program (Table 14). These data were used in the evaluations discussed in Section 8.2.

Table 12 includes the assessment of the adequacy of site investigations and/or reclamation and recommendations for future investigation for each of the previously investigated sites[6]. As previously mentioned, assessments of remediation adequacy and recommendations for further investigation are not provided for the four pits enrolled in the VRP.

No further work is recommended for eight of the previously investigated reserve/OBM pits. For pits within 1,475 ft. of water supply wells (see Table 15 for SEO data for water wells), this assessment was based on soil excavation and concurrent / subsequent soil and groundwater sampling that demonstrated the extent of the pit was defined, contaminated soil was removed, and no impact to groundwater occurred. The four pits located within 1,475 ft. of water supply wells for which no further investigation is recommended are W.E. Lloyd 1 (API No. 1320298), Ora Wells 14-12 (API No. 1306357), Tribal 21-9 (API No. 1321130), and Unit 31X-3 (API No. 1320457). For pits not located within 1,475 ft. of water wells, soil excavation and subsequent soil sampling to demonstrate that soil met cleanup standards was considered to be sufficient. This includes pits at the following gas well locations: 21-05 (API No. 1306413), Unit 21-11 (API No. 1320854), Tribal Pavillion 41X-2 (API No. 1320454), and Unit 42X-12 (API No. 1320443).

Further site investigation and remediation is recommended at twelve of the previously investigated reserve/OBM locations to define the location and extent of the pit contents, collect samples of the pit contents and groundwater, and conduct soil remediation if necessary. The twelve pits are associated with the following gas wells: Tribal Unit 238 11-14 (API No. 1320857), Tribal Pavillion 12-13 (API No. 1320855), Unit 13-13 (API No. 1306341), Tribal Pavillion 14-1 (API No. 1306389), Tribal

[6] Pavillion Fee 31-9, the cuttings/LSND pit investigated in 2011, is also included in Table 12.

14-2 (API No. 1321128), USA Tribal 22-10 (API No. 1320876), Tribal Pavillion 23-02 (API No. 1306395), Unit 24-14 (API No. 1306336), Govt Tribal 33X-10 (API No. 1306363), USA Tribal 41-9 (API No. 1320875), Unit 44-10 (API No. 1320879), and Doles Unit 44-15 (API No. 1320764).

Recommendations are pending review of further information (data to supplement incomplete reports, clarify of information, etc.) or verification of the existence of water wells within 1,475 ft. of the pit for seven additional previously investigated reserve/OBM pit locations. Unit 12-3 (API No. 1321129), Tribal-Pav 14-6 (API No. 1306392), USA Tribal 258 21-15 (API No.), Unit 22-12 (API No. 1320878), Tribal-Pav 31-15 (API No. 1320062), Unit 31X-14 (API No. 1320456), and Unit 41X-10 (API No. 1320414).

For pits for which further site investigation and remediation is recommended, investigation methods must demonstrate that the pit has been located and the full extent has been defined. Soils must be investigated to sufficient depth to delineate the contacts between impacted and clean soil. Review of previous investigations indicates that direct-push drilling is not capable of investigating to adequate depths in some parts of the Pavillion Field and alternate drilling techniques, such as augering, may be necessary. Cleanup levels should be determined using the OCSRRS with consideration of the recommendations discussed in Section 7.0 of this report and with field-based determination of scores for all applicable criteria. At certain locations it may be beneficial to consider the use of geophysical methods to locate the legacy pits prior to installation of boreholes, trenching, and PID screening. One option may be ground penetrating radar, which has been successful for mapping hydrocarbons in the vadose zone and detecting hydrocarbon pools floating on the water table in some locations (Daniels et al., 1995; Subba and Chandrashekhar, 2014).

8.2 Assessment of Cleanup Level Determination

As discussed previously, the OCSRRS procedure uses site specific information to assess the sensitivity of the site to contaminant migration and applies specific numeric standards for TPH in soils which must be met. Soil and groundwater analyses results (Table 14) from the Pavillion Field sites which

have undergone investigation were evaluated in an effort to assess whether the 1,000 mg/kg TPH standard for soils in high risk sites provides adequate protection from soil and groundwater contamination.

Table 16 summarizes the analytical data for the 185 soil samples for which TPH was determined by comparing the highest concentrations of TPH, BTEX, and naphthalene in soil samples at each pit location for two populations of samples: 148 soil samples in which the total TPH (sum of TPH-GRO and TPH-DRO) concentration was determined to be less than 1,000 mg/kg, and 37 soil samples in which the total TPH concentration was greater than 1,000 mg/kg. For the TPH < 1,000 mg/kg sample population, there were no benzene detections. The maximum toluene, total xylenes, and naphthalene concentrations were below the WDEQ migration to groundwater cleanup level, and the maximum ethylbenzene detection was slightly above the WDEQ migration to groundwater cleanup level. In the TPH > 1,000 mg/kg sample population, the maximum concentration of all constituents except toluene exceeded the WDEQ residential soil cleanup level at one or more pit location. These data provide some indication of the utility of using 1,000 mg/kg total TPH in soils as an indicator of concentrations of other constituents of concern in soils.

Table 17 includes analytical data for soil and groundwater samples that were collected from the same borehole. These data were used to create scatter plots to assess the relation between concentrations of constituents of concern in soil and groundwater (Figure 2). In the plots in Figure 2, TPH-GRO and TPH-DRO non-detects are plotted as one-half of the value of the detection limit, which can vary for a given constituent in soil samples. Because total TPH is calculated as the sum of TPH-GRO and TPH-DRO, a detection limit is not applicable and non-detects were not included in the plot in Figure 2.

The plots in Figure 2 illustrate that for the site-specific conditions described in this report, relatively high concentrations of TPH in groundwater can occur in association with relatively low soil TPH concentrations. Conversely, low TPH concentrations in groundwater can be associated with relatively high soil TPH concentrations. These data cannot be used to conclusively assess the use of soil TPH alone, rather than specific soil constituents of concern, to guide pit closure and remediation because

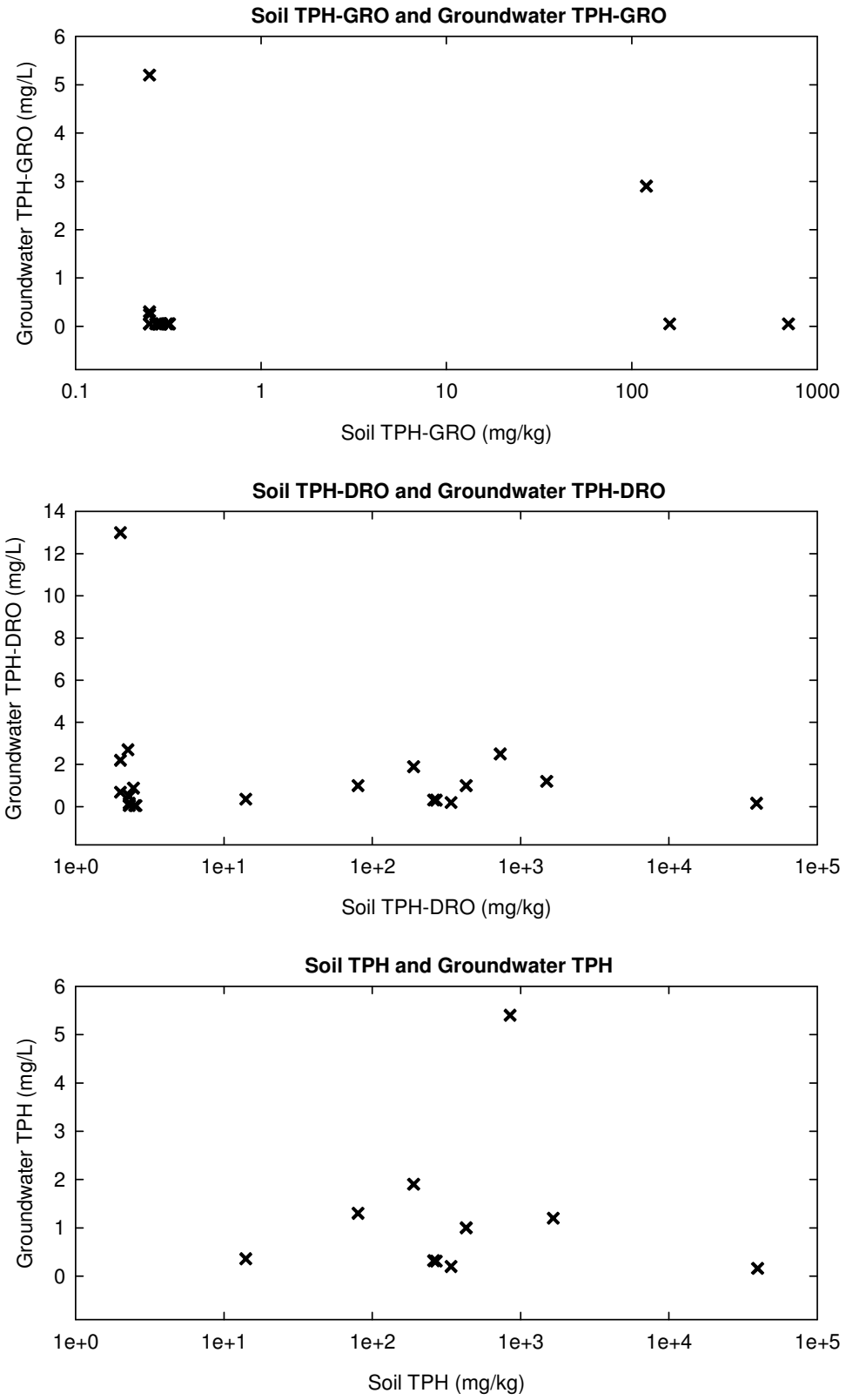

Figure 2. TPH Concentrations in Pavillion Field Soil and Groundwater Samples

it is not known with certainty whether the groundwater that was sampled had been in contact with the sampled soil. Future work in the Pavillion area may provide additional data that could be used to further assess the relation between soil TPH concentrations and concentrations of constituents of concern that occur in association with the specific hydrologic conditions in the Pavillion Field area.

9.0 SUMMARY

Current WOGCC regulations include specific permitting, operation, and closure requirements intended to protect human health and the environment by avoiding contamination of the soils and underground and surface waters at drilling or production locations. The regulations identify specific requirements applicable to pits for initial siting, construction, operation, and closure practices depending upon the type, contents, and longevity of the pit and the location of the pits relative to key site characteristics. Prior to constructing a pit or pits (field wide/area wide), the operator must obtain a pit permit. The regulations require construction of lined pits in environmentally sensitive areas, and lined pits are required regardless of location if pits are to contain potentially harmful materials such as oil-based drilling muds, high-density brines, completion or treating fluids, or water containing greater than 10,000 mg/L Total Dissolved Solids.

Prior to April 26, 1984, pit construction and closure requirements did not include the same considerations for protection of human health and the environment as current regulations contain. Specifically, the regulations did not include the siting and closure requirements or filings for permits to construct under Forms 14A and 14B, the required removal and haulage of oil-based mud (OBM) cuttings or treatment prior to burial, or prohibition of the use of reserve pits as production pits. Thus historical, or legacy, pits exist which are commonly unlined and which may have contained oil-based drilling fluids, treating or completion fluids, or other petroleum product from drilling or exploration. In these instances a risk based closure method known as the Oil Contaminated Soils Remediation Ranking System (OCSRRS) may be implemented to guide the pit closure and reclamation process. The OCSRRS utilizes an environmental characteristics matrix in which characteristics of a pit site are numerically ranked

according to a pre-determined scale of factors that could expose the environment or humans to harmful contaminants.

To demonstrate and evaluate the practical application of the OCSRRS, scores and corresponding Total Petroleum Hydrocarbon (TPH) clean up levels were generated for the 11 reserve / production pits in the Pavillion Field that contained Oil-Based Mud and are located within 1,320 feet of the domestic water wells within the WDEQ area of review (AOR). In all but one instance the TPH limits agree with the operator-reported cleanup limits, where applicable, for previous Pavillion Field area investigation and remediation work. Evaluation of each characteristic in the context of the Pavillion Field area illustrates the importance of site-specific investigation for scoring for all environmental variables.

With respect to determination of the adequacy of site investigations and pit remediation in the Pavillion Field in protecting water wells near pit locations, it is clear that detailed water well and hydrogeologic information is needed. Knowledge of the domestic water well construction and local hydraulic gradients is necessary in order to determine whether gas well pit contaminants may affect domestic well water quality. In the Pavillion Field area, information is lacking or unverified regarding construction details of the domestic water wells. Further work should be conducted to attempt to obtain current, reliable domestic water well data, including date drilled, total depth, water zone(s) penetrated, casing size and type, well completion procedures, producing depth, pump setting depth, and any other information that might prove to be beneficial in determining possible relationships to, and impacts from, surrounding gas wells and associated pits. This information should be obtained through direct measurement or from written well records when possible. Direct measurement could include the use of geophysical logs (gamma-gamma, caliper, density) to provide additional information pertaining to water well completion.

Data and information reviewed for this report indicate that most water wells in the Pavillion Field area produce from the Wind River formation and that it is quite likely that relatively deep sandstone lenses in the Wind River aquifer are not in hydraulic connection with the shallow alluvial / colluvial deposits and shallow Wind River deposits in which the pits are located. However, available data are

insufficient to determine groundwater flow patterns and gradients and possible hydraulic connection between the shallow aquifers and the Wind River aquifer in the vicinity of the water wells. A comprehensive geologic and hydrologic study of the Pavillion Field area should be undertaken using all available well logs / cores and a synoptic set of recent water level data, as well as other pertinent information, in order to better understand the relation between the shallow aquifers and the aquifers in which water wells are completed.

Of the 169 Pavillion Field wells, 92 are associated with pits. Of the 92 pits, 31 are associated with gas wells drilled using water-based mud systems and no further investigation is recommended. There are three pits in the Pavillion Field for which the pit type and/or mud type is unknown. One was converted to a water well and the other two are not within 1,475 ft. of any known groundwater well; no investigations are recommended for these three locations.

Nine Pavillion Field pits were cuttings pits associated with wells drilled using KCl polymer systems. If it is demonstrated that there is potential for contaminant transport from shallow groundwater to water well completion zones, it is recommended that soil/cuttings and groundwater samples be obtained at one of these pit locations and the results be used to determine the need for additional work at KCl pit locations.

The remaining 49 Pavillion Field pits were reserve pits or reserve and production pits used to contain OBM. These pits are associated with wells drilled by various operators between 1960 and 1983. No investigations or remedial work was conducted at 18 of these pit locations. Eleven of the uninvestigated pit locations are not within the WDEQ AOR and are not located within 1,475 ft. of any SEO groundwater permit location; no investigation is recommended. The remaining seven pits are within 1,475 ft. of SEO groundwater permit locations and one is in the WDEQ AOR. It is recommended that investigations be conducted at these seven locations, pending (1) the determination of the presence of water wells at these locations and (2) determination of a potential pathway from shallow deposits to water well completion zones.

Investigations have been conducted at 31 of the legacy OBM pits. Four of these sites are currently enrolled in the WDEQ Voluntary Remediation Program and no assessments of remediation status or recommendations for further investigation are provided for these four pits. For eight additional previously investigated reserve/OBM pits, the existing site assessment and remediation is adequate and no further work is recommended.

Further site investigation and remediation is recommended at twelve of the previously investigated reserve/OBM locations to define the location and extent of the pit contents, collect samples of the pit contents and groundwater, and conduct soil remediation if necessary. Recommendations are pending review of further information (data to supplement incomplete reports, clarify of information, etc.) or verification of the existence of water wells within 1,475 ft. of the pit for seven additional previously investigated reserve/OBM pit locations.

Soil and groundwater analyses results from the Pavillion Field sites which have undergone investigation were evaluated in an effort to assess whether the 1,000 mg/kg TPH standard for soils in high risk sites provides adequate protection from soil and groundwater contamination. TPH, BTEX, and naphthalene concentrations in soil samples for two populations of samples (148 soil samples in which the total TPH concentration was determined to be less than 1,000 mg/kg, and 37 soil samples in which the total TPH concentration was greater than 1,000 mg/kg) provide some indication of the utility of using 1,000 mg/kg total TPH in soils as an indicator of concentrations of other constituents of concern in soils.

Analytical data for soil and groundwater samples that were collected from the same borehole were used to create scatter plots to assess the relation between concentrations of constituents of concern in soil and groundwater. For the site-specific conditions described in this report, relatively high concentrations of TPH in groundwater can occur in association with relatively low soil TPH concentrations. Conversely, low TPH concentrations in groundwater can be associated with relatively high soil TPH concentrations. Future work in the Pavillion area may provide additional data that could be used to further assess the relation between soil TPH concentrations and concentrations of constituents of concern that may occur in groundwater in association with the specific hydrologic conditions in the

Pavillion Field area. Future pit investigation work in the Pavillion Field area should include analysis for specific soil constituents of concern.

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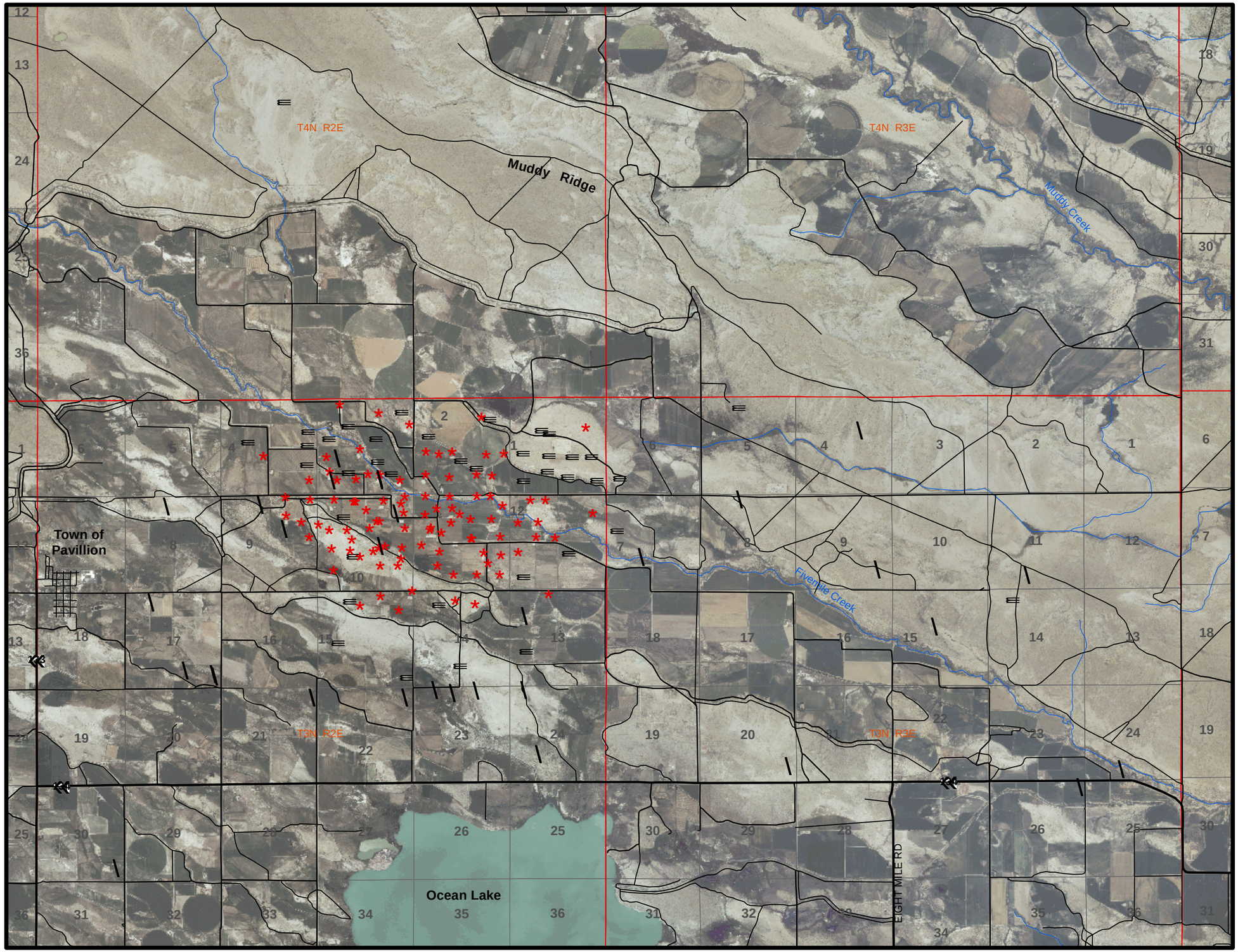
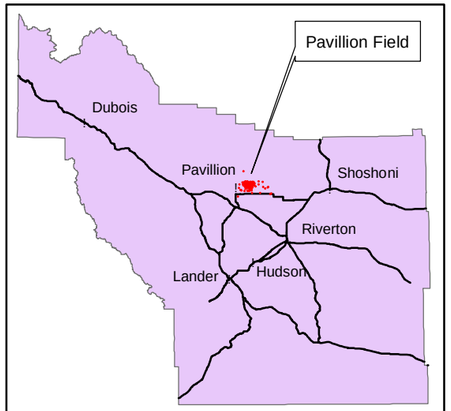




Fremont County, Wyoming

Legend

- Major Road or Highway
- Minor Road
- Streams

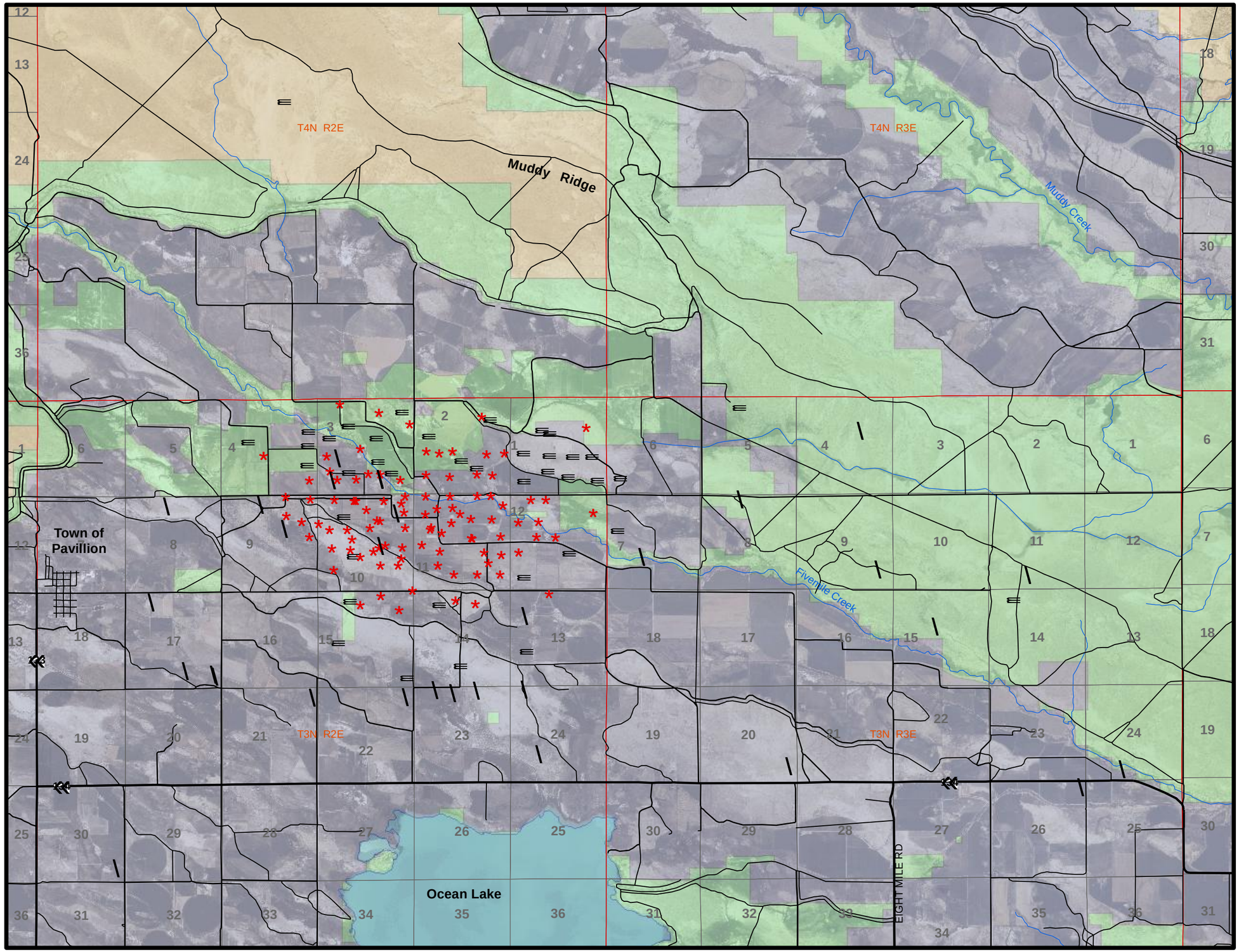
Pavillion Field Wells

- Active
- Plugged
- Shut In

0 0.5 1 2 Miles

1 in = 1 mile

Map 1
Pavillion Field General Location



Legend

- Major Road or Highway
- Minor Road
- Streams

Pavillion Field Wells

- Active
- Plugged
- Shut In

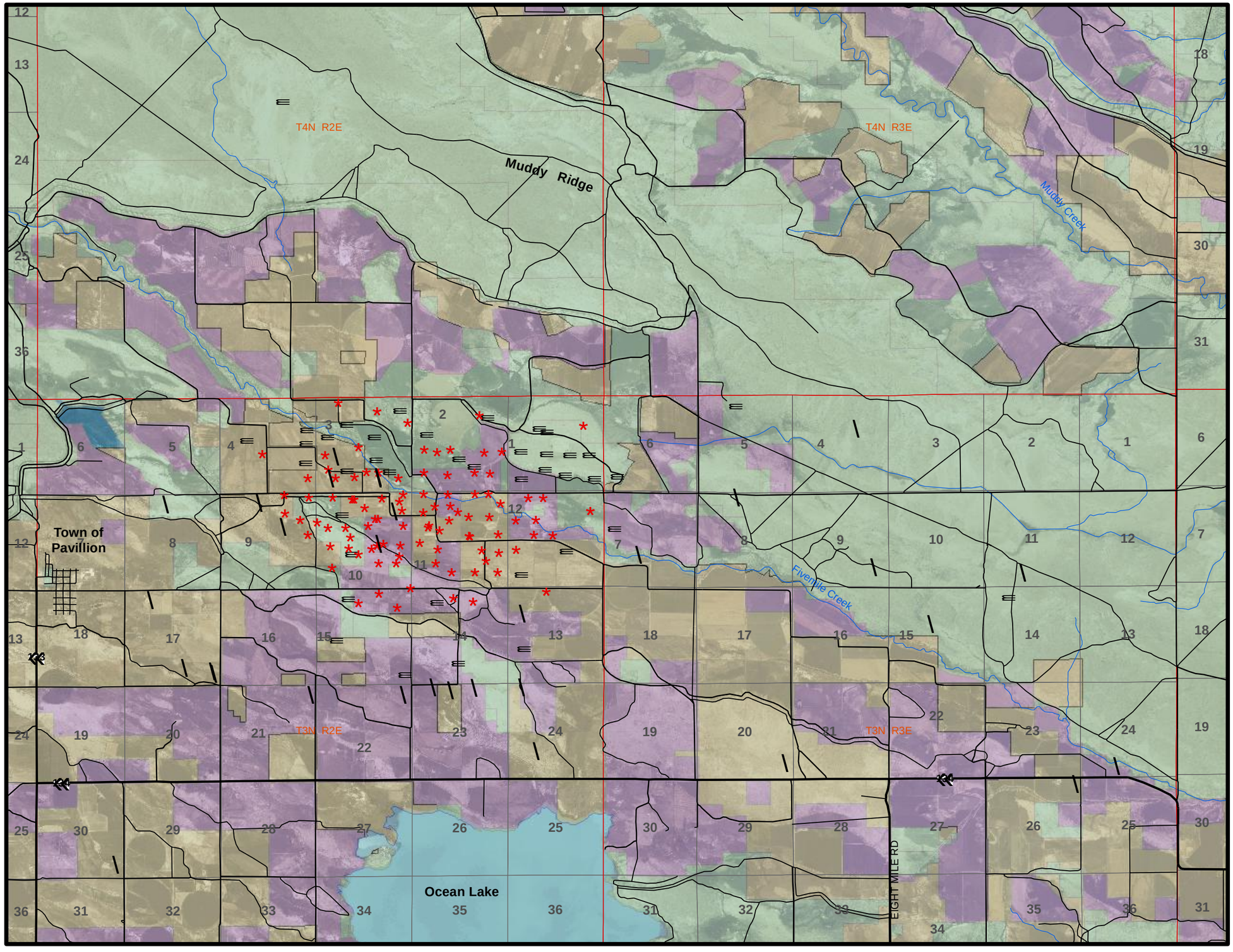
Surface Ownership

- Bureau of Indian Affairs
- Bureau of Reclamation
- Private
- Water

0 0.5 1 2 Miles

1 in = 1 mile

Map 2
Surface Ownership



Legend

- Major Road or Highway
- Minor Road
- Streams

Pavillion Field Wells

- Active
- Plugged
- Shut In

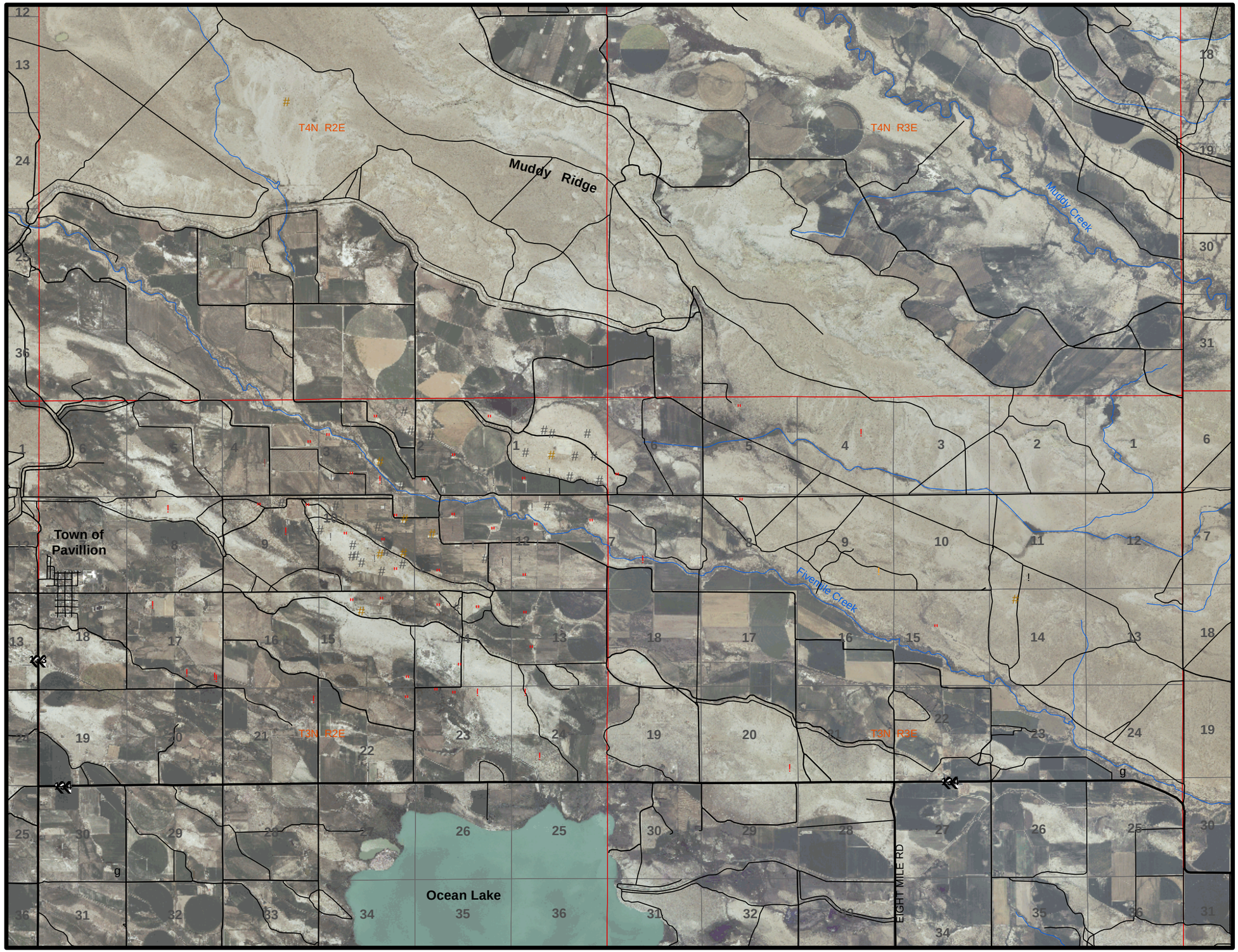
Mineral Ownership

- Tribal - All
- Tribal - Oil & Gas
- Tribal - Other
- Fee (Private)
- Water

0 0.5 1 2 Miles

1 in = 1 mile

Map 3
Mineral Ownership



Legend

- Major Road or Highway
- Minor Road
- Streams

Pit Type and Status

- " Reserve & Production Pit / OBM
- ! Reserve Pit / OBM
- ! Reserve Pit / LSND
- ! Reserve Pit / Unknown
- ! Reserve Pit / WBM
- # Cuttings Pit / KCl
- # Cuttings Pit / LSND
- ! No Pits
- g Unknown / Unknown

0 0.5 1 2 Miles

1 in = 1 mile

Map 4

Pavillion Field Wells - Pit Type and Status

Legend

- k — Area of Review Domestic Wells
- Domestic Wells 1/4 Mile Buffer
- Minor Road
- Streams

Pit Type and Status

- " — Reserve & Production Pit / OBM
- ! — Reserve Pit / OBM
- ! — Reserve Pit / WBM
- # — Cuttings Pit / KCl
- # — Cuttings Pit / LSND
- ! — No Pits

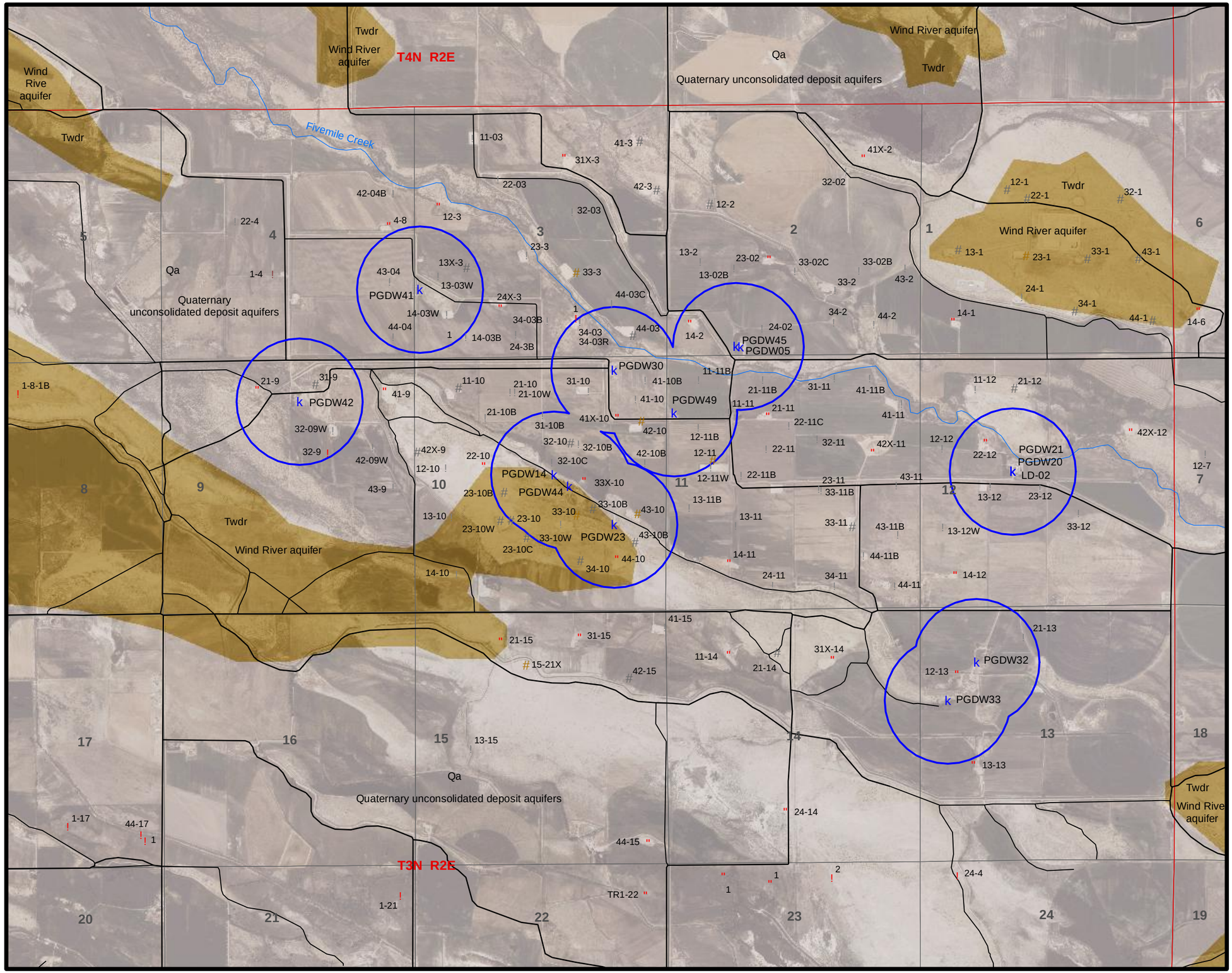
®

0 1,000 2,000 Feet

1 in = 1,994 feet

Map 5

Area of Review Wells - Pit Type and Status



Legend

- k — Area of Review Domestic Wells
- Domestic Wells 1/4 Mile Buffer
- Minor Road
- Streams

Pit Type and Status

- " — Reserve & Production Pit / OBM
- ! — Reserve Pit / OBM
- ! — Reserve Pit / WBM
- # — Cuttings Pit / KCl
- # — Cuttings Pit / LSND
- ! — No Pits

Surficial Geology

- Qa - Alluvium and colluvium
- Twdr - Wind River Formation

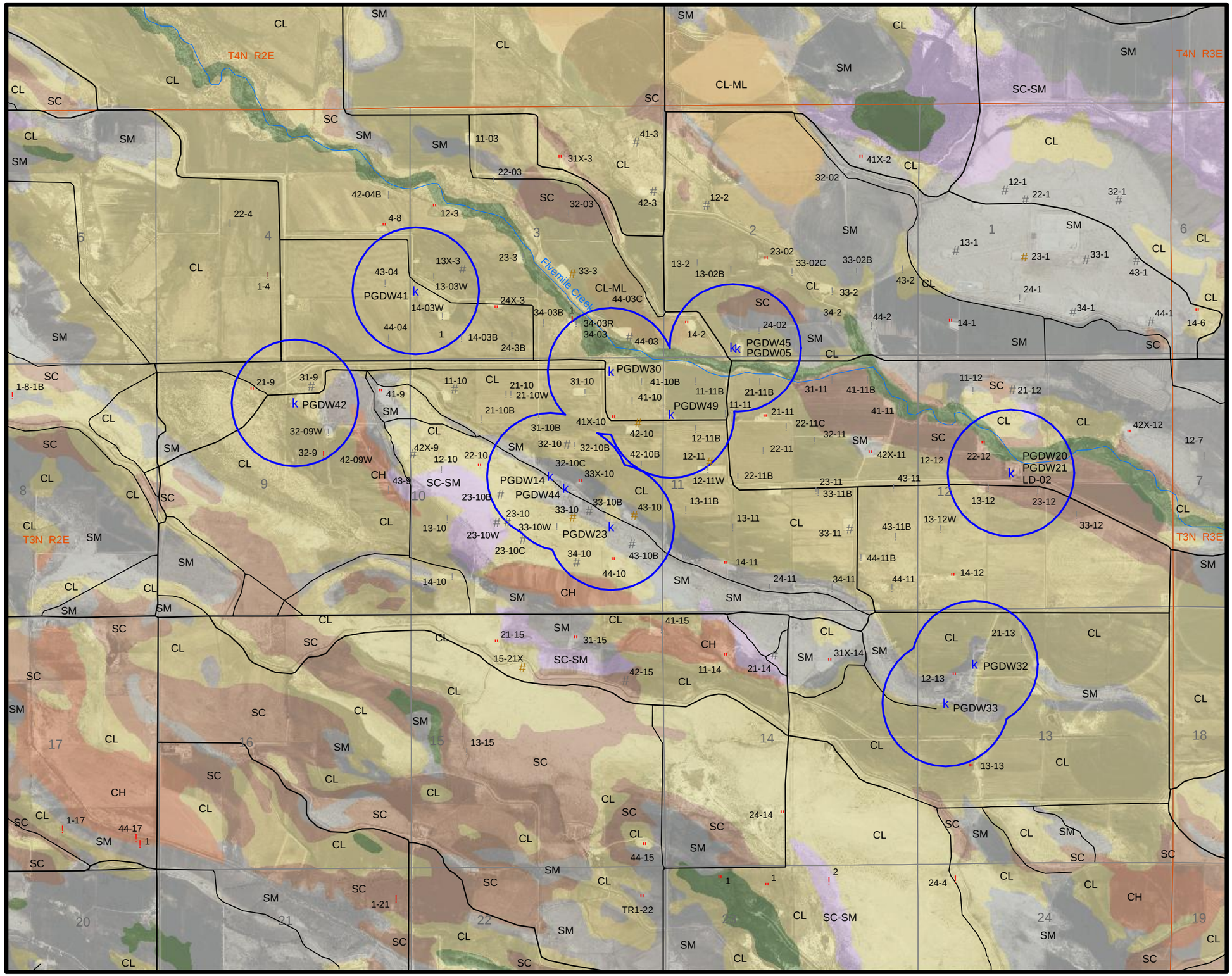
®

0 1,000 2,000 Feet

1 in = 2,000 feet

Map 6

Surficial Geology of the Pavillion Field Area



Legend

- k Area of Review Domestic Wells
- Domestic Wells 1/4 Mile Buffer
- Minor Road
- Streams

Pit Type and Status

- " Reserve & Production Pit / OBM
- ! Reserve Pit / OBM
- ! Reserve Pit / WBM
- # Cuttings Pit / KCl
- # Cuttings Pit / LSND
- ! No Pits

Soils Classifications

- CH - Clay of High Plasticity
- CL - Clay of Low Plasticity
- CL-ML - Mixture: Clay of Low Plasticity / Silt
- SC - Clayey Sand
- SC-SM - Mixture: Clayey Sand / Silty Sand
- SM - Silty Sand
- Unclassified, Usually water or wetlands

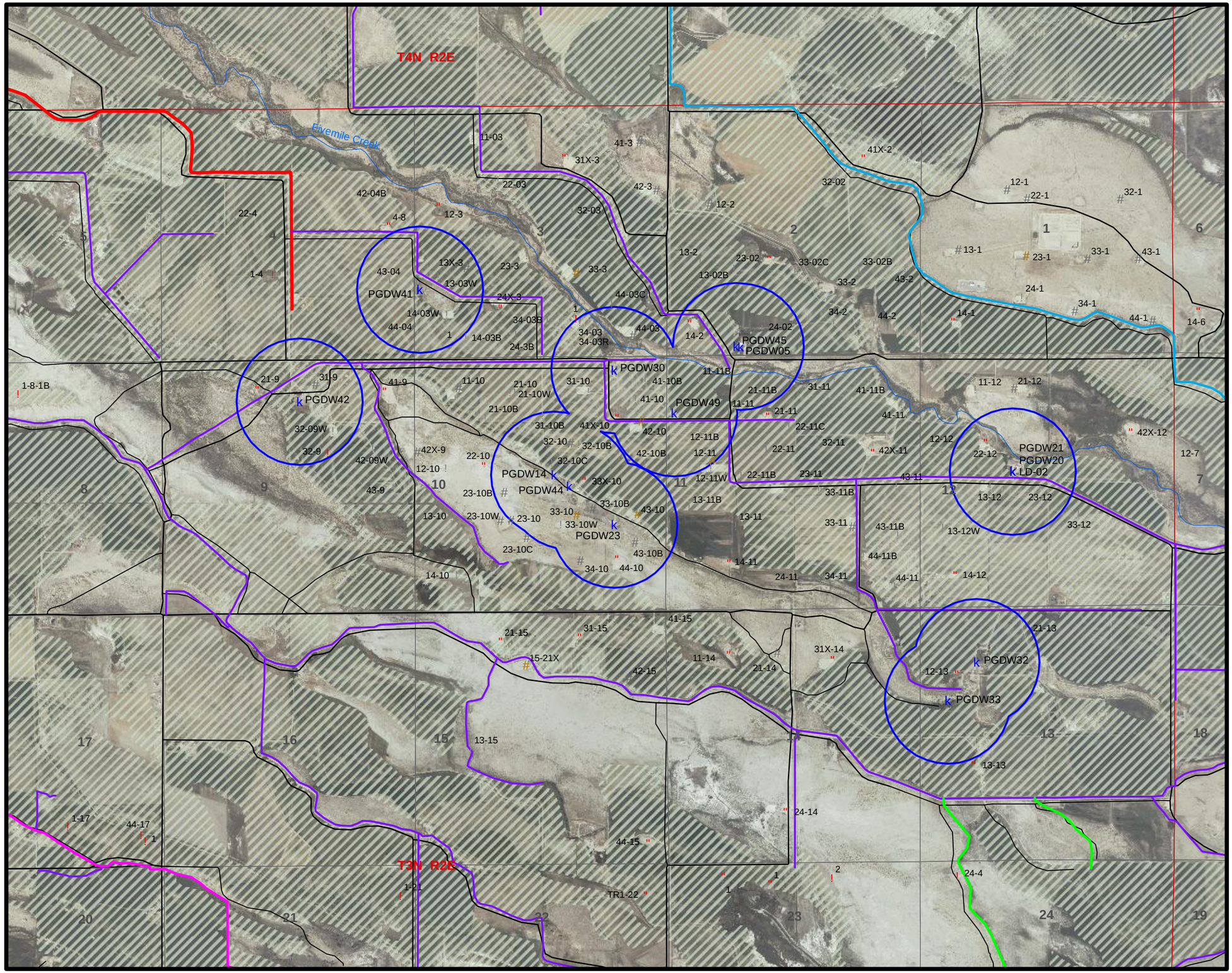
®

0 1,000 2,000 Feet

1 in = 2,000 feet

Map 7

Soils in the Pavillion Field Area



Legend

- k — Area of Review Domestic Wells
- Domestic Wells 1/4 Mile Buffer
- Minor Road
- Streams
- Irrigated Land

Pit Type and Status

- " — Reserve & Production Pit / OBM
- ! — Reserve Pit / OBM
- ! — Reserve Pit / WBM
- # — Cuttings Pit / KCl
- # — Cuttings Pit / LSND
- ! — No Pits

Irrigation Ditch Location & Seepage Rate

- 0.0 - 5.0 Percent
- 5.1 - 10.0 Percent
- 10.1 - 20.0 percent
- 20.1 - 30.0 Percent
- 30.1 - 40.0 percent
- 40.1 - 50.0 Percent
- 50.1 - 60.0 Percent

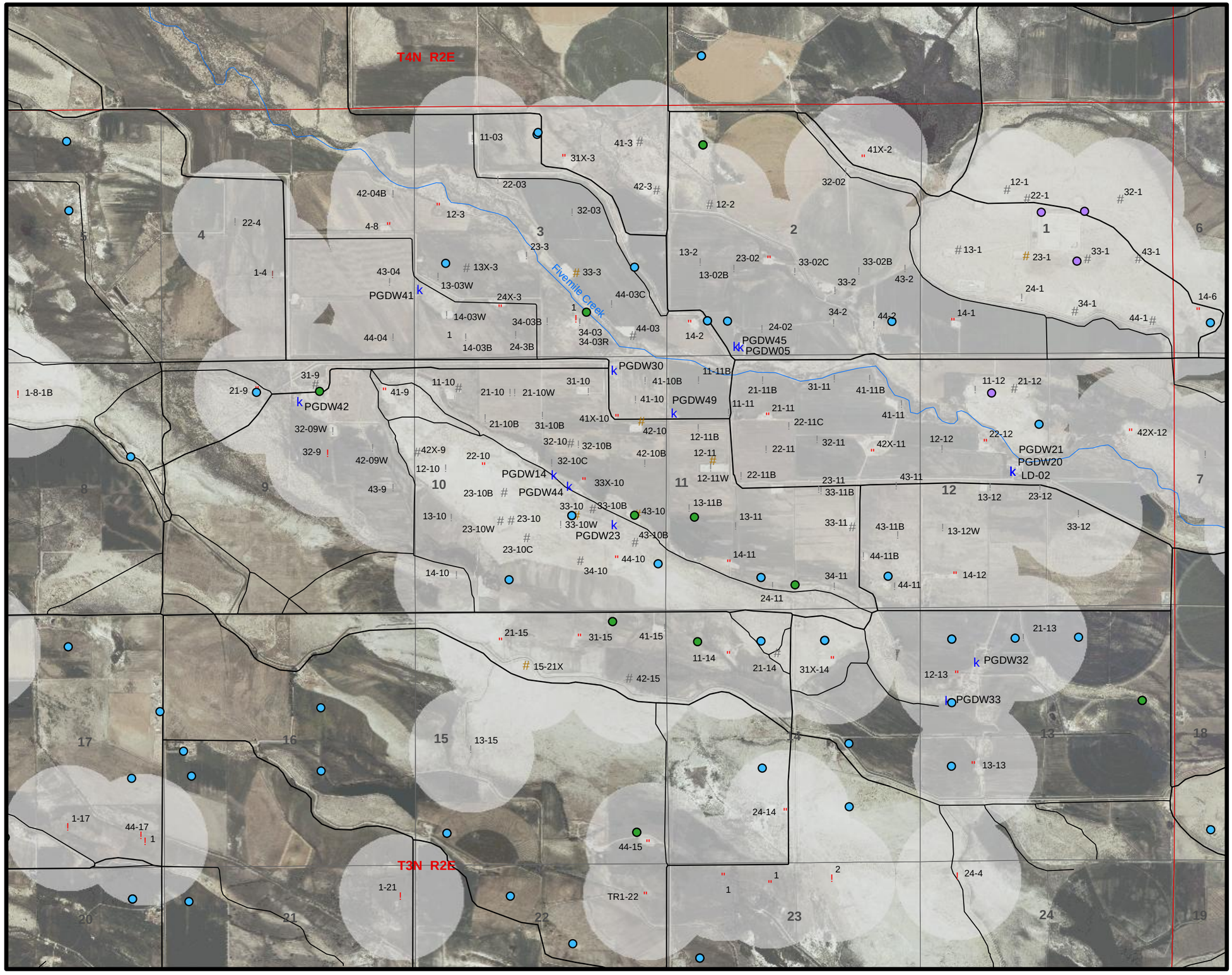
®

0 1,000 2,000 Feet

1 in = 2,000 feet

Map 8

Surface Water Resources in the Pavillion Field Area



Legend

- k — Area of Review Domestic Wells
- Minor Road
- Streams
- Gas Wells 1/4 Mile Buffer

Pit Type and Status

- " — Reserve & Production Pit / OBM
- ! — Reserve Pit / OBM
- ! — Reserve Pit / WBM
- # — Cuttings Pit / KCl
- # — Cuttings Pit / LSND
- ! — No Pits

SEO Permitted Water Wells

- Domestic
- Monitoring
- Stock

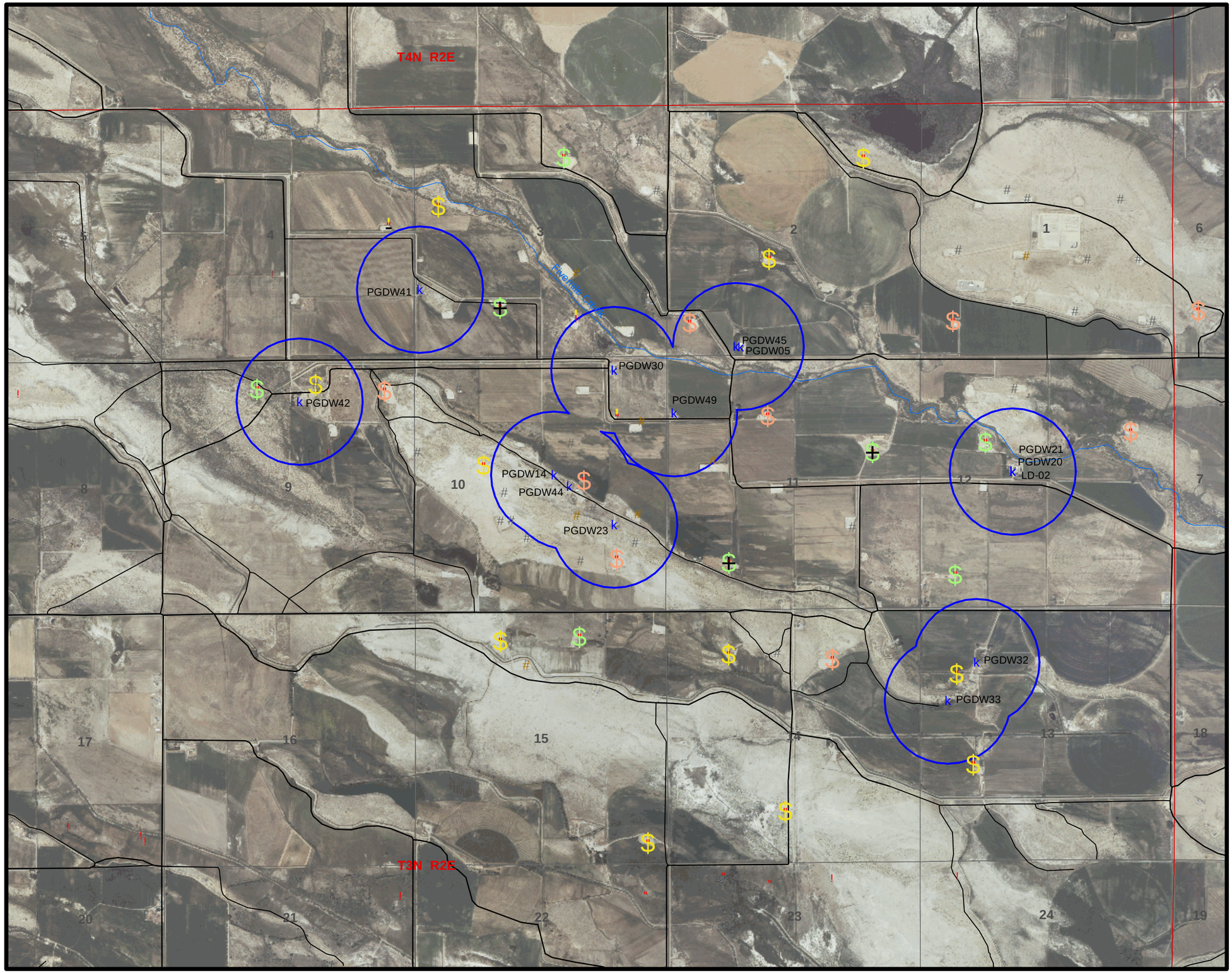
®

0 1,000 2,000 Feet

1 in = 2,000 feet

Map 9

SEO Permitted Water Wells in the Pavillion Field Area



Legend

- k — Area of Review Domestic Wells
- Domestic Wells 1/4 Mile Buffer
- Minor Road
- Streams

Pit Type and Status

- " — Reserve & Production Pit / OBM
- ! — Reserve Pit / OBM
- ! — Reserve Pit / WBM
- # — Cuttings Pit / KCl
- # — Cuttings Pit / LSND

Pit Investigation Type

- $ — Soil
- $ — Soil (Excavation)
- $ — Soil (Excavation) and Groundwater
- $ — Soil (Excavation) and Groundwater (VRP)
- ! — Soil and Groundwater
- ! — Soil and Groundwater (VRP)

®

0 1,000 2,000 Feet

1 in = 2,000 feet

Map 10

Pavillion Field Pits-
Investigation Summary

TABLE 1
All Pavillion Field Gas Well Locations
Summary Pits Information

API #	Well Name	Spud Date	Mineral Ownership	Location						Completion			Well Status	Pits				
				Qtr/Qtr	Footage Location	Latitude	Longitude	Ground Elev., ft.	KB-GL, ft.[1]	Operator	Date	Total Depth[2]		Reserve / Cuttings	Production	Drill Cutting Type / Disposition	Investigation Completed	Within 1,320' of WDEQ AOR
Section 1 T3N R2E																		
1306389	Tribal Pavillion 14-1	1/30/1963	Tribal	SWSW	660' FSL, 660' FWL	43.2602	-108.5954	5,351	12	Shell Oil Co.	6/18/63	4,115	Shut In	Reserve	Y	Invert	Y	N
1321697	Tribal Pavillion 23-1	7/10/1994	Tribal	NESW	2111' FSL, 2063' FWL	43.2640	-108.5902	5,419	14	Tom Brown, Inc.	11/11/94	5,306	Shut In	Cuttings	N	KCL Polymer, Cuttings Used Onsite	N	N
1322026	Tribal Pavillion 32-1	1/28/2001	Tribal	SWNE	1980' FNL, 1980' FEL	43.2672	-108.5828	5,422	12	Tom Brown, Inc.	3/23/01	3,380	Active	Cuttings	N	LSND	N	N
1322027	Tribal Pavillion 44-1	1/15/2001	Tribal	SESE	785' FSL, 660' FEL	43.2603	-108.5803	5,374	12	Tom Brown, Inc.	3/31/01	3,500	Shut In	Cuttings	N	LSND	N	N
1322101	Tribal Pavillion 24-1	2/15/2001	Tribal	SESW	1194' FSL, 2033' FWL	43.2617	-108.5906	5,370	12	Tom Brown, Inc.	3/23/01	3,400	Shut In	None	N	LSND	N	N
1322128	Tribal Pavillion 13-1	6/3/2001	Tribal	NWSW	2176' FSL, 612' FWL	43.2643	-108.5955	5,421	10	Tom Brown, Inc.	6/28/01	3,514	Shut In	Cuttings	N	LSND	N	N
1322144	Tribal Pavillion 33-1	6/18/2001	Tribal	NWSE	1980' FSL, 1980' FEL	43.2638	-108.5854	5,403	10	Tom Brown, Inc.	9/6/01	3,475	Shut In	Cuttings	N	LSND	N	N
1322145	Tribal Pavillion 43-1	6/26/2001	Tribal	NESE	1980' FSL, 710' FEL	43.2638	-108.5814	5,409	10	Tom Brown, Inc.	9/1/01	3,400	Shut In	Cuttings	N	LSND	N	N
1322146	Tribal Pavillion 34-1	9/11/2001	Tribal	SWSE	909' FSL, 2123' FEL	43.2608	-108.5864	5,380	10	Tom Brown, Inc.	10/13/01	3,345	Shut In	Cuttings	N	LSND	N	N
1322180	Tribal Pavillion 22-1	9/30/2001	Tribal	SENW	1997' FNL, 2238' FWL	43.2673	-108.5901	5,437	11	Tom Brown, Inc.	11/21/01	3,510	Shut In	Cuttings	N	LSND	N	N
1322181	Tribal Pavillion 12-1	9/16/2001	Tribal	SWNW	2113' FNL, 1181' FWL	43.2678	-108.5917	5,387	11	Tom Brown, Inc.	11/10/01	3,505	Shut In	Cuttings	N	LSND	N	N
Section 2 T3N R2E																		
1306395	Tribal Pavillion 23-02	6/15/1962	Tribal	NESW	1980' FSL, 1991' FWL	43.2637	-108.6104	5,354	12	Shell Oil Co.	12/3/62	5,200	Active	Reserve	Y	Invert	Y	N
1320454	Tribal Pavillion 41X-2	9/7/1973	Tribal	NENE	1200' FNL, 1200' FEL	43.2694	-108.6024	5,381	11	Shell Oil Co.	11/29/73	5,006	Shut in	Reserve	Y	Invert	Y	N
1321128	Tribal 14-2	11/3/1980	Tribal	SWSW	682' FSL, 552' FWL	43.2602	-108.6158	5,368	15	Shell Oil Co.	5/28/81	5,175	Active	Reserve	Y	Invert	Y	Y
1321693	Tribal Pavillion 33-2	6/17/1994	Tribal	NWSE	1434' FSL, 1944' FEL	43.2621	-108.6052	5,353	15	Tom Brown, Inc.	7/4/94	5,498	Shut in	None	N	Cuttings Used Onsite	N	N
1322068	Tribal Pavillion 43-2	1/28/2001	Tribal	NESE	1875' FSL, 504' FEL	43.2633	-108.5997	5,362	12	Tom Brown, Inc.	3/1/01	3,400	Active	None	N	Tank Berms	N	N
1322070	Tribal Pavillion 13-2	2/4/2001	Tribal	NWSW	1980' FSL, 660' FWL	43.2637	-108.6158	5,372	8	Tom Brown, Inc.	2/23/01	3,400	Active	None	N	Tank Berms	N	N
1322072	Tribal Pavillion 34-2	2/8/2001	Tribal	SWSE	666' FSL, 1980' FEL	43.2602	-108.6053	5,355	12	Tom Brown, Inc.	3/24/01	3,400	Active	None	N	Tank Berms	N	N
1322147	Tribal Pavillion 44-2	6/30/2001	Tribal	SESE	660' FSL, 960' FEL	43.2601	-108.6022	5,362	10	Tom Brown, Inc.	9/22/01	4,100	Active	None	N	Unknown	N	N
1322182	Tribal Pavillion 12-2	10/30/2001	Tribal	SWNW	2078' FNL, 880' FWL	43.2669	-108.6151	5,361	10	Tom Brown, Inc.	12/1/01	4,070	Shut in	Cuttings	N	LSND	N	N
1322236	Tribal Pavillion 24-2	10/9/2004	Tribal	SESW	592' FSL, 1980' FWL	43.2599	-108.6110	5,368	10	Tom Brown, Inc.	11/4/04	3,942	Active	None	N	Hauled to Offsite Pit	N	Y
1322245	Tribal Pavillion 32-02	2/24/2006	Tribal	SWNE	1980' FNL, 1980' FEL	43.2689	-108.6044	5,381	10	Encana O&G (USA) Inc.	3/30/06	5,280	Active	None	N	Hauled to Offsite Pit	N	N
1322617	Tribal Pavillion 33-02C	2/10/2005	Tribal	NESW	1787' FSL, 2620' FEL	43.2632	-108.6084	5,355	9	Encana O&G (USA) Inc.	3/22/05	3,710	Shut in	None	N	Hauled to Offsite Cuttings Facility	N	N
1322625	Tribal Pavillion 33-02B	2/26/2005	Tribal	NESE	1800' FSL, 1275' FEL	43.2632	-108.6033	5,358	9	Encana O&G (USA) Inc.	4/5/05	3,705	Active	None	N	Hauled to Offsite Cuttings Facility	N	N
1322627	Tribal Pavillion 13-02B	3/5/2005	Tribal	NESW	1850' FSL, 1390' FWL	43.2633	-108.6132	5,360	9	Encana O&G (USA) Inc.	3/29/05	3,970	Active	None	N	Hauled to Offsite Cuttings Facility	N	N
Section 3 T3N R2E																		
1306387	Pavillion 24X-3	10/27/1965	Fee	SESW	1170' FSL, 1600' FWL	43.2615	-108.6316	5,386	12	Shell Oil Co.	11/30/65	4,896	Shut in	Reserve	Y	Invert	Y (VRP)	N
1322246	Pavillion Fee 13-03W	4/3/2005	Fee	NWSW	1735' FSL, 472' FWL	43.2629	-108.6364	5,398	10	Encana O&G (USA) Inc.	4/23/05	4,602	Active	None	N	Hauled Cuttings to Landfill	N	Y
1321904	Pavillion Fee 13X-3	1/8/1999	Fee	NWSW	1934' FSL, 152' FWL	43.2633	-108.6342	5,350	13	Tom Brown, Inc.	10/21/99	6,044	Plugged	Cuttings	N	LSND	N	Y
1322623	Pavillion Fee 14-03B	3/20/2005	Fee	SWSW	466' FSL, 1050' FWL	43.2594	-108.6343	5,389	10	Encana O&G (USA) Inc.	4/5/05	3,934	Active	None	N	Hauled Cuttings to Landfill	N	Y
1322219	Pavillion Fee 14-03W	3/19/2002	Fee	SWSW	931' FSL, 654' FWL	43.2607	-108.6358	5,396	10	Tom Brown, Inc.	4/13/02	5,700	Active	None	N	Hauled Cuttings to Landfill	N	Y
1322087	Pavillion Fee 34-03R	12/28/2000	Fee	SWSE	725' FSL, 1954' FEL	43.2603	-108.6253	5,376	12	Tom Brown, Inc.	5/4/01	3,400	Active	None	N	Tank Berms	N	Y
1321906	Tribal Pavillion 44-3	1/25/1999	Tribal	SESE	550' FSL, 850' FEL	43.2594	-108.6211	5,377	13	Tom Brown, Inc.	6/21/99	6,009	Active	Cuttings	N	LSND	N	Y
1320298	W.E. Lloyd 1	11/9/1970	Fee	SWSE	660' FSL, 1980' FEL	43.2601	-108.6253	5,378	13	Hickerson Oil Co.	6/14/71	15,575	Plugged	Reserve	N	Invert	Y	Y
1306388	Mae H. Rhodes 1	8/10/1953	Fee	SWSW	660' FSL, 660' FWL	43.2601	-108.6352	5,387	12	Gulf Oil Corp.	12/31/53	11,000	Plugged	Reserve	N	Water Based Mud	N	Y
1320457	Unit 31X-3	9/30/1973	Tribal	NWNE	1132' FNL, 2040' FEL	43.2695	-108.6256	5,394	11	Shell Oil Co.	12/27/73	5,148	Active	Reserve	Y	Invert	Y	N
1321129	Unit 12-3	10/13/1980	Tribal	SWNW	2160' FNL, 504' FWL	43.2666	-108.6357	5,397	NA	Shell Oil Co.	10/30/80	5,216	Shut in	Reserve	Y	Invert	Y	N
1321907	Tribal Pavillion 33-3	2/27/1999	Tribal	NWSE	1819' FSL, 2128' FEL	43.2631	-108.6256	5,387	13	Tom Brown, Inc.	5/25/99	3,903	Shut in	Cuttings	N	KCL Polymer	N	N
1322005	Pavillion Fee 34-03	12/9/2000	Fee	SWSE	750' FSL, 1954' FEL	43.2603	-108.6253	5,377	NA	Tom Brown, Inc.	12/14/00	192	Plugged	None	N	LSND	N	Y
1322153	Tribal Pavillion 41-3	10/22/2001	Tribal	NENE	761' FNL, 764' FEL	43.2706	-108.6206	5,393	10	Tom Brown, Inc.	12/7/01	4,030	Shut in	Cuttings	N	LSND	N	N
1322191	Tribal Pavillion 42-3	10/17/2001	Tribal	SENE	1745' FNL, 465' FEL	43.2678	-108.6192	5,384	10	Tom Brown, Inc.	11/16/01	4,025	Active	Cuttings	N	LSND	N	N
1322207	Pavillion Fee 23-3	11/7/2001	Fee	NESW	2125' FSL, 2175' FWL	43.2641	-108.6294	5,395	10	Tom Brown, Inc.	2/27/02	5,575	Active	None	N	Offsite to unknown	N	N
1322212	Pavillion Fee 11-03	11/14/2001	Fee	NWNW	640' FNL, 1200' FWL	43.2708	-108.6337	5,406	10	Tom Brown, Inc.	1/9/02	3,991	Active	None	N	Hauled Cuttings to Landfill	N	N
1322229	Pavillion Fee 24-3B	1/12/2002	Fee	SESW	465' FSL, 1950' FWL	43.2596	-108.6303	5,386	9	Tom Brown, Inc.	2/8/02	5,680	Active	None	N	Offsite to unknown	N	N
1322258	Tribal Pavillion 22-03	5/23/2005	Tribal	SENW	1507' FNL, 1733' FWL	43.2684	-108.6317	5,400	10	Tom Brown, Inc.	7/16/05	5,500	Shut in	None	N	Hauled Cuttings to Landfill	N	N
1322259	Tribal Pavillion 32-03	5/4/2005	Tribal	SWNE	2200' FNL, 2000' FEL	43.2666	-108.6259	5,392	10	Tom Brown, Inc.	6/12/05	5,458	Shut in	None	N	Hauled Cuttings to Landfill	N	N
1322270	Pavillion Fee 34-03B	10/18/2004	Fee	SWSE	465' FSL, 2510' FEL	43.2603	-108.6278	5,381	12	Tom Brown, Inc.	10/24/04	5,580	Active	None	N	Hauled Cuttings to Landfill	N	N
1322721	Tribal Pavillion 44-03C	5/15/2005	Tribal	SESE	1153' FSL, 1169' FEL	43.2614	-108.6228	5,383	10	Tom Brown, Inc.	5/25/05	3,903	Shut in	None	N	Hauled Cuttings to Landfill	N	N

TABLE 1
All Pavillion Field Gas Well Locations
Summary Pits Information

					Location						Completion				Pits				
API #	Well Name	Spud Date	Mineral Ownership	Qtr/Qtr	Footage Location	Latitude	Longitude	Ground Elev., ft.	KB-GL, ft.[1]	Operator	Date	Total Depth[2]	Well Status	Reserve / Cuttings	Production	Drill Cutting Type / Disposition	Investigation Completed	Within 1,320' of WDEQ AOR
Section 4 T3N R2E																		
1321087	John K. Coolidge 1-4	2/22/1982	Fee	NWSW	1780' FSL, 2178' FWL	43.2631	-108.6494	5,406	UNK	Tenneco Oil Company	5/20/82	3,750	Active	Reserve	N	Water Based Mud	N	N
1322633	Pavillion Fee 43-04	3/1/2005	Fee	NESE	1630' FSL, 541' FEL	43.2626	-108.6402	5,399	10	Encana O&G (USA) Inc.	4/2/05	4,744	Shut in	None	N	Hauled Cuttings to Landfill	N	Y
1322634	Pavillion Fee 44-04	2/6/2005	Fee	SESE	470' FSL, 470' FEL	43.2594	-108.6399	5,394	10	Encana O&G (USA) Inc.	3/15/05	5,700	Active	None	N	Hauled Cuttings to Landfill	N	Y
1322635	Pavillion Fee 42-04B	3/13/2005	Fee	SENE	1790' FNL, 465' FEL	43.2676	-108.6399	5,411	9	Encana O&G (USA) Inc.	4/16/05	3,968	Shut in	None	N	Hauled Cuttings to Landfill	N	N
1322825	Pavillion Fee 22-4	11/13/2006	Fee	SENW	2350' FNL, 1500' FWL	43.2661	-108.6524	5,417	UNK	Encana O&G (USA) Inc.	4/3/07	5,491	Shut in	None	N	Hauled Cuttings to Landfill	N	N
1320668	Blankenship 4-8	1/31/1977	Fee	SENE	2525' FNL, 660' FEL	43.2656	-108.6401	5,404	11	Palmer Oil & Gas	3/25/77	5,204	Shut in	Reserve	Y	Invert	Y (VRP)	Y
Section 7 T3N R2E																		
1322126	Tribal Pavillion 12-7	6/8/2001	Tribal	SWNW	2100' FNL, 465' FWL	43.2527	-108.5761	5,320	10	Tom Brown, Inc.	9/8/01	3,350	Shut in	None	N	LSND Cuttings Used for Tank Berms	N	N
Section 8 T3N R2E																		
1321088	West Pavillion 1-8-1B	5/30/1981	Tribal	NENW	660' FNL, 2100' FWL	43.2562	-108.6694	5,484	UNK	Gulf Energy Corporation	6/19/81	5,207	Plugged	Reserve	N	Invert	N	N
Section 9 T3N R2E																		
1320875	USA Tribal 41-9	5/15/1979	Tribal	NENE	660' FNL, 560' FEL	43.2565	-108.6398	5,385	UNK	Shell Oil Co.	8/24/79	5,281	Active	Reserve	Y	Invert	Y	N
1321130	Tribal 21-9	11/21/1980	Tribal	NENW	660' FNL, 1979' FWL	43.2564	-108.6501	5,390	15	Shell Oil Co.	6/24/81	5,304	Plugged	Reserve	Y	Invert	Y	Y
1321905	Pavillion Fee 42X-9	11/29/1998	Fee	SENE	1868' FNL, 122' FEL	43.2528	-108.6381	5,404	13	Tom Brown, Inc.	2/11/99	5,969	Active	Cuttings	N	LSND	N	N
1322171	Pavillion Fee 43-9	4/24/2005	Fee	NESE	2599' FSL, 465' FEL	43.2508	-108.6400	5,387	10	Encana O&G (USA) Inc.	6/16/05	5,668	Active	None	N	Hauled offsite to Unknown	N	N
1322172	Pavillion Fee 31-9	9/25/2001	Fee	NWNE	465' FNL, 1975' FEL	43.2569	-108.6449	5,399	10	Tom Brown, Inc.	11/8/01	3,445	Active	Cuttings	N	LSND	Y	Y
1320084	Maxson 32-9	5/16/1968	Fee	SWNE	1980' FNL, 1980' FEL	43.2528	-108.6451	5,390	11	Shell Oil Co.	5/27/68	3,511	Plugged	Reserve	N	Invert	N	Y
1322227	Pavillion Fee 32-09W	3/4/2002	Fee	SWNE	1468' FNL, 1737' FEL	43.2541	-108.6447	5,398	10	Tom Brown, Inc.	3/22/02	3,460	Active	None	N	Hauled Cuttings to Landfill	N	Y
1322228	Pavillion Fee 42-09W	3/9/2002	Fee	SENE	1850' FNL, 900' FEL	43.2531	-108.6416	5,390	10	Tom Brown, Inc.	3/21/02	3,420	Active	None	N	LSND	N	N
Section 10 T3N R2E																		
1321676	Pavillion 11-10	8/23/1993	Tribal	NWNW	750' FNL, 750' FWL	43.2565	-108.6348	5,387	UNK	Tom Brown, Inc.	12/29/93	8,082	Active	Cuttings	N	LSND	N	N
1322243	Pavillion Fee 13-10	11/18/2004	Fee	NWSW	1980' FSL, 748' FWL	43.2491	-108.6354	5,389	11	Tom Brown, Inc.	2/3/05	5,705	Active	None	N	Hauled Cuttings to Landfill	N	N
1322099	Tribal Pavillion 14-10	1/20/2001	Tribal	SWSW	800' FSL, 660, FWL	43.2458	-108.6350	5,383	12	Tom Brown, Inc.	4/13/01	3,500	Active	None	N	LSND Cuttings Used for Tank Berms or Hauled Offsite	N	N
1322125	Pavillion Fee 21-10	7/10/2001	Fee	NENW	710' FNL, 1980' FWL	43.2563	-108.6308	5,384	10	Tom Brown, Inc.	8/10/01	5,930	Active	None	N	LSND Cuttings Used for Tank Berms	N	N
1322269	Pavillion Fee 21-10B	12/24/2004	Fee	NENW	1229' FNL, 1461' FWL	43.2548	-108.6327	5,382	10	Tom Brown, Inc.	2/3/05	5,625	Shut in	None	N	Hauled to 34-10 Cuttings Pit	N	N
1322188	Pavillion Fee 21-10W	8/31/2001	Fee	NENW	711' FNL, 2080' FWL	43.2563	-108.6304	5,382	10	Tom Brown, Inc.	9/15/01	4,400	Active	None	N	Hauled to 34-10 Cuttings Pit	N	N
1322141	Tribal Pavillion 12-10	7/24/2001	Tribal	SWNW	2318' FNL, 470' FWL	43.2519	-108.6358	5,397	10	Tom Brown, Inc.	11/7/01	4,908	Active	None	N	LSND Cuttings Used for Tank Berms	N	N
1320876	USA Tribal 22-10	6/26/1979	Tribal	SENW	2305' FNL, 1444' FWL	43.2519	-108.6322	5,408	14	Shell Oil Co.	10/13/79	5,152	Active	Reserve	Y	Invert	Y	Y
1321692	Tribal Pavillion 23-10	5/28/1994	Tribal	NESW	1879' FSL, 1863' FWL	43.2489	-108.6307	5,406	15	Tom Brown, Inc.	7/14/94	6,000	Shut in	Cuttings	N	LSND	N	Y
1322417	Tribal Pavillion 23-10B	9/28/2004	Tribal	NESW	2474' FSL, 1866' FWL	43.2505	-108.6312	5,410	10	Tom Brown, Inc.	11/5/04	5,646	Active	Cuttings	N	LSND	N	Y
1322418	Tribal Pavillion 23-10C	9/19/2004	Tribal	NESW	1528' FSL, 2326' FWL	43.2479	-108.6295	5,433	10	Tom Brown, Inc.	10/13/04	5,730	Active	Cuttings	N	LSND	N	Y
1322217	Tribal Pavillion 23-10W	3/13/2002	Tribal	NESW	1883' FSL, 1780' FWL	43.2489	-108.6315	5,408	10	Tom Brown, Inc.	12/19/02	4,590	Active	Cuttings	N	LSND	N	N
1321691	Pavillion Fee 31-10	3/16/1994	Fee	NWNE	660' FNL, 1786' FEL	43.2563	-108.6246	5,372	15	Tom Brown, Inc.	6/25/94	5,972	Active	None	N	Tank Berms	N	Y
1322268	Pavillion Fee 31-10B	12/10/2004	Fee	NWNE	1185' FNL, 2605' FEL	43.2549	-108.6282	5,378	10	Encana O&G (USA) Inc.	1/23/05	5,555	Active	None	N	Hauled to Lozier	N	Y
1321968	Tribal Pavillion 32-10	2/27/2000	Tribal	SENW	1788' FNL, 2166' FWL	43.2533	-108.6260	5,387	13	Tom Brown, Inc.	5/10/00	5,593	Active	Cuttings	N	LSND	N	Y
1322224	Tribal Pavillion 32-10B	2/23/2002	Tribal	SWNE	1890' FNL, 1739' FEL	43.2533	-108.6254	5,374	10	Tom Brown, Inc.	3/28/02	5,850	Active	None	N	Hauled to Lozier	N	Y
1322419	Tribal Pavillion 32-10C	1/27/2005	Tribal	SWNE	2179' FNL, 2412' FEL	43.2522	-108.6275	5,381	10	Encana O&G (USA) Inc.	2/18/05	4,020	Active	None	N	Hauled to Lozier	N	Y
1321862	Tribal Pavillion 33-10	2/13/1999	Tribal	NWSE	1888' FSL, 2135' FEL	43.2492	-108.6256	5,470	13	Tom Brown, Inc.	5/6/99	5,970	Active	Cuttings	N	KCL Polymer	N	Y
1322274	Tribal Pavillion 33-10B	11/7/2004	Tribal	NWSE	2120' FSL, 1549' FEL	43.2495	-108.6243	5,395	10	Tom Brown, Inc.	12/14/04	5,610	Active	Cuttings	N	LSND	N	Y
1322195	Tribal Pavillion 33-10W	10/9/2001	Tribal	NWSE	1819' FSL, 2225' FEL	43.2487	-108.6268	5,473	10	Tom Brown, Inc.	12/6/01	5,070	Active	None	N	Cuttings Hauled Offsite to Unknown	N	Y
1306363	Govt Tribal 33X-10	5/21/1963	Tribal	NWSE	2380' FSL, 1986' FEL	43.2502	-108.6253	5,391	24	Shell Oil Co.	5/11/65	19,235	Plugged	Reserve	Y	Invert	Y	Y

TABLE 1
All Pavillion Field Gas Well Locations
Summary Pits Information

API #	Well Name	Spud Date	Mineral Ownership	Location						Completion			Well Status	Pits				
				Qtr/Qtr	Footage Location	Latitude	Longitude	Ground Elev., ft.	KB-GL, ft.[1]	Operator	Date	Total Depth[2]		Reserve / Cuttings	Production	Drill Cutting Type / Disposition	Investigation Completed	Within 1,320' of WDEQ AOR
1322149	Tribal Pavillion 34-10	7/31/2001	Tribal	SWSE	1050' FSL, 1980' FEL	43.2466	-108.6253	5,402	10	Tom Brown, Inc.	10/6/01	5,732	Active	Cuttings	N	Cuttings from several nearby wells buried in cuttings pit just west of this site called Lozier Cuttings Facility	N	Y
1322198	Pavillion Fee 41-10	1/7/2002	Fee	NENE	860' FNL, 660' FEL	43.2559	-108.6209	5,372	10	Tom Brown, Inc.	1/23/02	3,180	Active	None	N	Hauled to Lozier	N	Y
1322624	Pavillion Fee 41-10B	4/12/2005	Fee	NENE	465' FNL, 465' FEL	43.2569	-108.6202	5,371	10	Encana O&G (USA) Inc.	5/7/05	3,841	Active	None	N	Hauled Cuttings to Landfill	N	Y
1320414	Unit 41X-10	10/27/1972	Tribal	NENE	1140' FNL, 1085' FEL	43.2551	-108.6220	5,366	10	Shell Oil Co.	1/29/73	5,047	Plugged	Reserve	Y	Invert	Y	Y
1321696	Tribal 42-10	5/2/1994	Tribal	SENE	2100' FNL, 662' FEL	43.2545	-108.6204	5,368	15	Tom Brown, Inc.	6/15/94	5,995	Active	Cuttings	N	KCL Polymer	N	Y
1322324	Tribal Pavillion 42-10B	1/7/2005	Tribal	SENE	2172' FNL, 465' FEL	43.2522	-108.6202	5,366	10	Encana O&G (USA) Inc.	2/16/05	5,605	Active	None	N	Hauled to Lozier	N	Y
1321704	Tribal Pavillion 43-10	8/16/1994	Tribal	NESE	1996' FSL, 761' FEL	43.2493	-108.6208	5,378	15	Tom Brown, Inc.	9/21/94	5,956	Active	Cuttings	N	KCL Polymer	N	Y
1322420	Tribal Pavillion 43-10B	10/28/2004	Tribal	NESE	1410' FSL, 663' FEL	43.2476	-108.6209	5,439	10	Encana O&G (USA) Inc.	1/20/05	5,760	Active	Cuttings	N	LSND	N	Y
1320879	Unit 44-10	6/3/1979	Tribal	SESE	1000' FSL, 1000' FEL	43.2465	-108.6216	5,389	14	Shell Oil Co.	12/17/79	5,200	Active	Reserve	Y	Invert	Y	Y
Section 11 T3N R2E																		
1322059	Pavillion Fee 11-11	12/7/2000	Fee	NWNW	1136' FNL, 1274' FWL	43.2551	-108.6136	5,355	11	Tom Brown, Inc.	5/17/01	5,846	Active	None	N	Tank Berms (LSND)	N	Y
1322220	Pavillion Fee 11-11B	1/22/2002	Fee	NWNW	465' FNL, 665' FWL	43.2570	-108.6159	5,365	10	Tom Brown, Inc.	2/16/02	4,780	Active	None	N	Cuttings hauled to Landfill	N	Y
1321669	Pavillion Unit 12-11	6/17/1993	Fee	SWNW	2300' FNL, 750' FWL	43.2523	-108.6148	5,357	15	Tom Brown, Inc.	10/19/93	6,482	Active	Cuttings	N	KCL Polymer	N	Y
1322272	Pavillion Fee 12-11B	12/16/2004	Fee	SWNW	1457' FNL, 656' FWL	43.2542	-108.6160	5,362	9	Encana O&G (USA) Inc.	1/15/05	3,860	Active	None	N	Cuttings hauled to Landfill	N	Y
1322102	Pavillion Fee 12-11W	4/15/2001	Fee	SWNW	2292' FNL, 1014' FWL	43.2519	-108.6150	5,356	12	Tom Brown, Inc.	5/3/01	3,250	Active	None	N	LSND/Unknown Disposition	N	Y
1322058	Pavillion Fee 13-11	12/27/2000	Fee	NWSW	1758' FSL, 1280' FWL	43.2486	-108.6131	5,348	12	Tom Brown, Inc.	2/23/01	5,800	Active	None	N	Tank Berms	N	N
1322240	Pavillion Fee 13-11B	2/13/2002	Fee	NWSW	2135' FSL, 465' FWL	43.2496	-108.6167	5,359	UNK	Tom Brown, Inc.	4/9/02	5,660	Active	None	N	Cuttings hauled to Landfill	N	N
1306355	14-11	11/9/1965	Tribal	SWSW	1020' FSL, 1190' FWL	43.2465	-108.6134	5,358	UNK	Shell Oil Co.	12/10/65	4,930	Active	Reserve	Y	Invert	Y (VRP)	N
1320854	Unit 21-11	11/26/1978	Tribal	NENW	1138' FNL, 2000' FWL	43.2552	-108.6104	5,355	11	Shell Oil Co.	3/14/79	5,103	Active	Reserve	Y	Invert	Y	N
1322586	Tribal Pavillion 21-11B	3/28/2005	Tribal	NENW	481' FNL, 2000' FWL	43.2569	-108.6109	5,355	10	Encana O&G (USA) Inc.	4/19/05	3,875	Active	None	N	Cuttings hauled to Landfill	N	Y
1322215	Pavillion Fee 22-11	11/23/2001	Fee	SENW	1980' FNL, 1911' FWL	43.2530	-108.6107	5,355	10	Tom Brown, Inc.	12/15/01	3,190	Active	None	N	Cuttings hauled to Landfill	N	N
1322271	Pavillion Fee 22-11B	1/21/2005	Fee	SENW	2471' FNL, 1551' FWL	43.2515	-108.6126	5,356	9	Encana O&G (USA) Inc.	2/16/05	4,500	Active	None	N	Cuttings hauled to Landfill	N	N
1322314	Pavillion Fee 22-11C	2/1/2005	Fee	SENW	1445' FNL, 2554' FWL	43.2543	-108.6089	5,353	9	Encana O&G (USA) Inc.	2/23/05	3,850	Active	None	N	Cuttings hauled to Landfill	N	N
1321806	Tribal Pavillion 23-11	10/19/1997	Tribal	NESW	2540' FSL, 2300' FWL	43.2507	-108.6065	5,351	15	Tom Brown, Inc.	2/9/98	5,540	Active	None	N	LSND	N	N
1322222	Tribal Pavillion 24-11	11/28/2004	Tribal	SESW	515' FSL, 2200' FWL	43.2452	-108.6102	5,350	9	Tom Brown, Inc.	1/20/05	3,926	Active	None	N	Hauled to 34-10 Cuttings Pit	N	N
1322106	Pavillion Fee 31-11	1/29/2002	Fee	NWNE	487' FNL, 1980' FEL	43.2570	-108.6053	5,346	10	Tom Brown, Inc.	2/22/02	3,960	Active	None	N	Tank Berms	N	N
1322223	Pavillion Fee 32-11	2/3/2002	Fee	SWNE	1720' FNL, 2150' FEL	43.2536	-108.6066	5,350	10	Tom Brown, Inc.	3/2/02	4,000	Active	None	N	Cuttings hauled to Landfill	N	N
1321670	Pavillion Fee 33-11	5/27/1993	Fee	NWSE	1780' FSL, 1500' FEL	43.2485	-108.6039	5,340	15	Tom Brown, Inc.	9/15/93	5,050	Active	Cuttings	N	LSND	N	N
1322313	Pavillion Fee 33-11B	12/25/2004	Fee	NWSE	2500' FSL, 2075' FEL	43.2506	-108.6064	5,347	9	Encana O&G (USA) Inc.	1/24/05	3,975	Active	None	N	Cuttings Hauled Offsite to Unknown	N	N
1322103	Pavillion Fee 34-11	5/23/2001	Fee	SWSE	465' FSL, 1980' FEL	43.2451	-108.6053	5,343	10	Tom Brown, Inc.	6/13/01	3,360	Active	None	N	Tank Berms	N	N
1321866	Pavillion Fee 41-11	12/14/1998	Fee	NENE	978' FNL, 648' FEL	43.2556	-108.6000	5,339	13	Tom Brown, Inc.	2/12/99	5,100	Active	None	N	LSND	N	N
1322601	Pavillion Fee 41-11B	3/22/2005	Fee	NENE	465' FNL, 1052' FEL	43.2570	-108.6025	5,343	9	Encana O&G (USA) Inc.	4/14/05	3,900	Active	None	N	Cuttings Hauled Offsite to Unknown	N	N
1320442	W.H. Paul Patent 42X-11	8/6/1973	Fee	SENE	1770' FNL, 1169' FEL	43.2535	-108.6023	5,341	11	Shell Oil Co.	12/27/73	5,028	Active	Reserve	Y	Invert	Y (VRP)	N
1322200	Pavillion Fee 43-11	12/1/2001	Fee	NESE	2583' FSL, 500' FEL	43.2509	-108.6004	5,338	10	Tom Brown, Inc.	12/22/01	4,000	Active	None	N	Cuttings hauled to Landfill	N	N
1322199	Pavillion Fee 44-11	2/8/2002	Fee	SESE	503' FSL, 700' FEL	43.2451	-108.6006	5,338	10	Tom Brown, Inc.	3/6/02	4,070	Active	None	N	Cuttings hauled to Landfill	N	N
1322599	Pavillion Fee 44-11B	1/5/2005	Fee	SESE	1118' FSL, 1185' FEL	43.2469	-108.6030	5,340	9	Encana O&G (USA) Inc.	1/26/05	3,948	Active	None	N	Cuttings hauled to Landfill	N	N
1322600	Pavillion Fee 43-11B	1/14/2005	Fee	NESE	1550' FSL, 470' FEL	43.2481	-108.6003	5,335	9	Encana O&G (USA) Inc.	2/11/05	3,948	Active	None	N	Cuttings hauled to Landfill	N	N
Section 12 T3N R2E																		
1322105	Tribal Pavillion 11-12	6/14/2001	Tribal	NWNW	726' FNL, 1063' FWL	43.2564	-108.5942	5,337	10	Tom Brown, Inc.	8/3/01	3,184	Active	None	N	Tank Battery	N	N
1322255	Tribal Pavillion 12-12	2/18/2005	Tribal	SWNW	1936' FNL, 460' FWL	43.2530	-108.5968	5,334	9	Tom Brown, Inc.	3/17/05	3,955	Active	None	N	Cuttings hauled to Landfill	N	N
1322060	Pavillion Fee 13-12	11/23/2000	Fee	NWSW	2459' FSL, 1301' FWL	43.2508	-108.5931	5,323	12	Tom Brown, Inc.	6/1/01	3,275	Active	None	N	Tank Battery	N	Y
1322214	Pavillion Fee 13-12W	12/8/2001	Fee	NWSW	1700' FSL, 470' FWL	43.2485	-108.5968	5,329	10	Tom Brown, Inc.	1/26/02	4,025	Active	None	N	Cuttings hauled to Landfill	N	N
1306357	Ora Wells 14-12	6/25/1960	Fee	SWSW	690' FSL, 661' FWL	43.2457	-108.5955	5,323	14	Shell Oil Co.	8/7/60	6,505	Shut in	Reserve	Y	Invert	Y	N
1322150	Tribal Pavillion 21-12	9/29/2001	Tribal	NENW	684' FNL, 2087' FWL	43.2564	-108.5911	5,345	10	Tom Brown, Inc.	10/30/01	3,227	Active	Cuttings	N	LSND	N	N
1320878	Unit 22-12	8/15/1979	Tribal	SENW	1906' FNL, 1393' FWL	43.2531	-108.5927	5,324	14	Shell Oil Co.	1/17/80	5,200	Active	Reserve	Y	Invert	Y	Y
1322186	Pavillion Fee 23-12	7/20/2001	Fee	NESW	2494' FSL, 2502' FWL	43.2507	-108.5892	5,323	10	Tom Brown, Inc.	9/19/01	3,260	Active	None	N	Tank Berm	N	Y
1322824	Pavillion Fee 33-12	2/3/2006	Fee	NWSE	1980' FSL, 1980' FEL	43.2493	-108.5861	5,315	10	Encana O&G (USA) Inc.	4/1/06	5,520	Shut in	None	N	Cuttings hauled to Landfill	N	N
1320443	Unit 42X-12	8/26/1973	Tribal	SENE	1460' FNL, 960' FEL	43.2544	-108.5814	5,325	11	Shell Oil Co.	1/4/74	4,950	Active	Reserve	Y	Invert	Y	N

TABLE 1
All Pavillion Field Gas Well Locations
Summary Pits Information

					Location						Completion				Pits				
API #	Well Name		Spud Date	Mineral Ownership	Qtr/Qtr	Footage Location	Latitude	Longitude	Ground Elev., ft.	KB-GL, ft.[1]	Operator	Date	Total Depth[2]	Well Status	Reserve / Cuttings	Production	Drill Cutting Type / Disposition	Investigation Completed	Within 1,320' of WDEQ AOR
Section 13 T3N R2E																			
1320855	Tribal Pavillion	12-13	12/27/1978	Tribal	SWNW	1530' FNL, 660' FWL	43.2396	-108.5956	5,328	10	Shell Oil Co.	5/12/79	5,400	Plugged	Reserve	Y	Invert	Y	Y
1306341	Unit	13-13	6/21/1963	Tribal	NWSW	1859' FSL, 832' FWL	43.2345	-108.5950	5,310	10	Shell Oil Co.	7/16/63	4,639	Shut in	Reserve	Y	Invert	Y	N
1322057	Pavillion Fee	21-13	1/10/2001	Fee	NENW	660' FNL, 1980' FWL	43.2422	-108.5905	5,315	12	Tom Brown, Inc.	2/23/01	3,500	Flowing	None	N	Tank Battery	N	Y
Section 14 T3N R2E																			
1306336	Unit	24-14	11/5/1963	Tribal	SESW	1120' FSL, 2438' FWL	43.2323	-108.6086	5,305	12	Shell Oil Co.	11/22/63	3,803	Shut in	Reserve	Y	Invert	Y	N
1320456	Unit	31X-14	9/8/1973	Tribal	NWNE	1109' FNL, 2053' FEL	43.2407	-108.6057	5,345	11	Shell Oil Co.	12/27/73	5,000	Active	Reserve	Y	Invert	Y	N
1320857	Tribal Unit 238	11-14	7/28/1979	Tribal	NWNW	800' FNL, 1292' FWL	43.2415	-108.6130	5,343	UNK	Shell Oil Co.	2/11/80	5,250	Shut in	Reserve	Y	Invert	Y	N
1322216	Tribal Pavillion	21-14	11/30/2004	Tribal	NENW	907' FNL, 2290' FWL	43.2413	-108.6098	5,355	11	Encana O&G (USA) Inc.	1/28/05	5,600	Active	Cuttings	N	LSND	N	N
Section 15 T3N R2E																			
1320062	Tribal-Pav	31-15	1/26/1968	Tribal	NWNE	660' FNL, 1980' FEL	43.2419	-108.6252	5,355	9	Shell Oil Co.	2/26/68	3,445	Active	Reserve	Y	Invert	Y	N
1320764	Doles Unit	44-15	2/26/1978	Tribal	SESE	520' FSL, 510' FEL	43.2306	-108.6196	5,346	12	Shell Oil Co.	6/2/78	5,375	Shut in	Reserve	Y	Invert	Y	N
1320889	USA Tribal 258	21-15	7/13/1979	Tribal	NENW	561' FNL, 1650' FWL	43.2421	-108.6314	5,357	UNK	Shell Oil Co.	12/6/79	5,200	Shut in	Reserve	Y	Invert	Y	N
1321695	Tribal-Pav	41-15	7/28/1994	Tribal	NENE	660' FNL, 663' FEL	43.2428	-108.6187	5,348	15	Tom Brown, Inc.	11/23/94	6,526	Active	None	N	Spread on Location	N	N
1321840	Tribal-Pav	15-21X	4/21/1998	Tribal	NENW	1160' FNL, 2225' FWL	43.2406	-108.6295	5,370	18	Tom Brown, Inc.	7/2/99	16,140	Active	Cuttings	N	KCL Polymer	N	N
1322100	Tribal Pavillion	42-15	11/26/2006	Tribal	SENE	1434' FNL, 816' FEL	43.2398	-108.6214	5,363	10	Encana O&G (USA) Inc.	1/19/07	5,497	Active	Cuttings	N	LSND	N	N
1322104	Pavillion Fee	13-15	4/10/2001	Fee	NWSW	2408' FSL, 945' FWL	43.2358	-108.6339	5,355	12	Tom Brown, Inc.	4/14/01	3,650	Shut in	None	N	Tank Battery	N	N
Section 17 T3N R2E																			
1308017	Runner Herefords	44-17	5/18/1964	Fee	SESE	660' FSL, 661' FEL	43.2309	-108.6598	5,354	UNK	Shell Oil Co.	5/22/64	4,240	Plugged	Reserve	N	Invert	N	N
1320965	Garrett	1	10/13/1979	Fee	NWNW	660' FNL, 1270' FWL	43.2417	-108.6726	5,394	UNK	Tenneco Oil Company	10/30/79	5,494	Plugged	Reserve	N	Invert	N	N
1321086	Finlayson	1-17	8/19/1980	Fee	SWSE	856' FSL, 2196' FEL	43.2314	-108.6656	5,397	14	Impel Energy Corp.	9/14/80	5,610	Plugged	Reserve	N	Invert	N	N
1321157	Runner Herefords	1	9/17/1981	Fee	SESE	560' FSL, 560' FEL	43.2306	-108.6595	5,357	UNK	Hallador Petroleum	10/7/81	4,006	Plugged	Reserve	N	Inver	N	N
Section 21 T3N R2E																			
1320586	Tribal	1-21	3/5/1976	Tribal	NENE	665' FNL, 458' FEL	43.2274	-108.6394	5,338	11	Palmer Oil & Gas	3/17/76	3,966	Plugged	Reserve	N	Invert	N	N
Section 22 T3N R2E																			
1320581	Unit	TR1-22	12/15/1975	Tribal	NENE	660' FNL, 660' FEL	43.2274	-108.6202	5,324	11	Palmer Oil & Gas	2/7/76	4,200	Plugged	Reserve	Y	Invert	N	N
Section 23 T3N R2E																			
1308274	Tribal-Unit	2	6/13/1979	Tribal	NWNE	330' FNL, 1980' FEL	43.2284	-108.6056	5,287	UNK	Kerr-McGee	6/24/79	4,296	Plugged	Reserve?	N	Invert	N	N
1320598	Taylor Patented	1	4/22/1976	Fee	NENW	460' FNL, 1950' FWL	43.2281	-108.6104	5,282	11	Palmer Oil & Gas	5/14/76	4,010	Plugged	Reserve	Y	Invert	N	N
1320654	Tribal Unit	1	10/15/1976	Tribal	NWNW	250' FNL, 980' FWL	43.2285	-108.6141	5,293	12	Kerr-McGee	11/3/76	3,670	Plugged	Reserve	Y	Invert	N	N
Section 24 T3N R2E																			
1306281	Woodring	23X-24	4/17/1964	Fee	NESW	1420' FSL, 1418' FWL	43.2188	-108.5927	5,243	9	Shell Oil Co.	4/25/64	5,252	Plugged	Reserve	N	Invert	N	N
1320775	Tribal	24-4	5/12/1978	Tribal	NWNW	330' FNL, 660' FWL	43.2285	-108.5957	5,322	UNK	Palmer Oil & Gas	5/22/78	3,990	Plugged	Reserve	N	Invert	N	N
Section 30 T3N R2E																			
1320491	Clair C Day	1	4/20/1974	Tribal	SESE	660' FSL, 660' FEL	43.2017	-108.6799	5,364	UNK	Samedan Oil Corp	5/15/74	8,021	Plugged	Unk	N	Unk	N	N
Section 4 T3N R3E																			
1306402	Govt	32-4	7/10/1963	Tribal	SWNE	1972' FNL, 1980' FEL	43.2674	-108.5263	5,338	UNK	Shell Oil Co.	7/18/63	5,000' (?)	Plugged	Reserve	N	Invert	N	N
Section 5 T3N R3E																			
1306413		21-05	2/24/1963	Tribal	NENW	653' FNL, 1980' FWL	43.2711	-108.5510	5,337	12	Shell Oil Co.	7/13/63	5,000	Shut in	Reserve	Y	Invert	Y	N
Section 6 T3N R3E																			
1306392	Tribal-Pav	14-6	6/9/1963	Tribal	SWSW	760' FSL, 584' FWL	43.2606	-108.5756	5,392	13	Shell Oil Co.	7/16/63	4,000	Shut in	Reserve	Y	Invert	Y	N
Section 7 T3N R3E																			
1306359	Gov't	23-7	3/3/1961	Tribal	NESW	1611' FSL, 1711' FWL	43.2484	-108.5714	5,294	12	Shell Oil Co.	5/11/61	8,038	Plugged	Reserve	N	Invert	N	N
Section 8 T3N R3E																			
1306376	Govt	21-8	3/19/1963	Tribal	NENW	410' FNL, 1960' FWL	43.2571	-108.5511	5,383	12	Shell Oil Co.	7/11/63	4,500	Plugged	Reserve	Y	Invert	N	N
Section 9 T3N R3E																			
1306358	Govt-Ocean Lake	1	5/11/1963	Tribal	SESE	989' FSL, 1020' FEL	43.2465	-108.5227	5,241	UNK	Atlantic Refining Company	5/27/63	6,000	Plugged	Reserve	N	Unk	N	N
Section 11 T3N R3E																			
1320748	Shoshone-Arapahoe	24-11	12/11/1977	Fee	SESW	660' FSL, 1965' FWL	43.2456	-108.4918	5,265	15	Damson Oil Corp	5/12/78	14,975	Plugged	Reserve	N	LSND	N	N
Section 14 T3N R3E																			
1322819	Haymaker	14-21	11/23/2005	Tribal	NENW	653 FNL AND 1425 FWL	43.2421	-108.4945	5,285	16	Encana O&G (USA) Inc.	5/16/06	11,164	Shut in	Cuttings	N	KCL	N	N

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Section 15 T3N R3E																		
1321312	Ocean Lake Tribal 1-15	11/1/1982	Tribal	SENW	3207' FSL, 3152' FEL	43.2379	-108.5109	5,195	UNK	Exxon Corp.	7/27/83	15,770	Plugged	Reserve	Y	Invert	N	N
Section 20 T3N R3E																		
1306273	Govt 44-20	3/9/1963	Tribal	SESE	760' FSL, 660' FEL	43.2169	-108.5412	5,382	UNK	Shell Oil Co.	3/16/63	5,000	Plugged	Reserve	N	Invert	N	N
Section 24 T3N R3E																		
1321302	Tribal 14-24	7/22/1982	Tribal	SESW	530' FSL, 1803' FWL	43.2163	-108.4725	5,140	UNK	Elf Aquitaine Oil and Gas	8/24/82	8,850	Plugged	Unk	N	Unk	N	N
Section 26 T3N R3E																		
1323068	Leonhardt 41-26	5/20/2007	Fee	NENE	470 FNL AND 470 FEL	43.2136	-108.4810	5,108	10	Devon Energy	6/5/07	5,100	Plugged	None	N	Water/Gel	N	N
Section 16 T4N R2E																		
1321682	Shoshone-Arapahoe 16-34	10/14/1995	Tribal	SWSE	1222' FSL, 1981' FEL	43.3173	-108.6449	5,353	14	Tom Brown, Inc.	4/13/01	7,007	Shut in	Cuttings	N	KCL	N	N

[1] Height of Kelly Bushing (KB) of the drilling rig above ground level (GL)

[2] Depths measured from KB

TABLE 2

Pavillion Field Gas Well Location, Completion, and Production

Wells within WDEQ Areas of Review

API #	Well Name	Mineral Ownership	Location						Completion			Cumulative Production[1]		
			Qtr/Qtr	Footage Location	Latitude	Longitude	Ground Elev., ft.	KB-GL, ft.[2]	Operator	Date	Total Depth[3]	Well Status	BO	MCF	BW
Section 2 T3N R2E															
1321128	Tribal 14-2	Tribal	SWSW	682' FSL, 552' FWL	43.260210	-108.615830	5,368	15	Shell Oil Co.	5/28/81	5,175	Active	0	3,327,283	44
1322236	Tribal Pavillion 24-2	Tribal	SESW	592' FSL, 1980' FWL	43.259890	-108.610972	5,368	10	Tom Brown, Inc.	11/4/04	3,942	Active	0	475,693	174
Section 3 T3N R2E															
1322246	Pavillion Fee 13-3W	Fee	NWSW	1735' FSL, 472' FWL	43.262920	-108.636417	5,398	10	Encana O&G (USA) Inc.	4/23/05	4,602	Active	3	243,427	1,340
1321904	Pavillion Fee 13X-3	Fee	NWSW	1934' FSL, 152' FWL	43.263330	-108.634170	5,350	13	Tom Brown, Inc.	10/21/99	6,044	Plugged	0	0	0
1322623	Pavillion Fee 14-3B	Fee	SWSW	466' FSL, 1050' FWL	43.259440	-108.634250	5,389	10	Encana O&G (USA) Inc.	4/5/05	3,934	Active	5	1,129,901	1,901
1322219	Pavillion Fee 14-3W	Fee	SWSW	931' FSL, 654' FWL	43.260720	-108.635750	5,396	10	Tom Brown, Inc.	4/13/02	5,700	Active	3	3,532,722	5,687
1322087	Pavillion Fee 34-3R	Fee	SWSE	725' FSL, 1954' FEL	43.260280	-108.625278	5,376	12	Tom Brown, Inc.	5/4/01	3,400	Active	2	855,616	1,153
1321906	Tribal Pavillion 44-3	Tribal	SESE	550' FSL, 850' FEL	43.259440	-108.621110	5,377	13	Tom Brown, Inc.	6/21/99	6,009	Active	1	1,506,355	1,663
1320298	W.E. Lloyd 1	Fee	SWSE	660' FSL, 1980' FEL	43.260110	-108.625280	5,378	13	Hickerson Oil Co.	6/14/71	15,575	Plugged	0	0	0
1306388	Mae H. Rhodes 1	Fee	SWSW	660' FSL, 660' FWL	43.260090	-108.635190	5,387	12	Gulf Oil Corp.	12/31/53	11,000	Plugged	0	0	0
Section 4 T3N R2E															
1322633	Pavillion Fee 43-4	Fee	NESE	1630' FSL, 541' FEL	43.262610	-108.640222	5,399	10	Encana O&G (USA) Inc.	4/2/05	4,744	Shut in	44	389,582	19,681
1322634	Pavillion Fee 44-4	Fee	SESE	470' FSL, 470' FEL	43.259440	-108.639944	5,394	10	Encana O&G (USA) Inc.	3/15/05	5,700	Active	1,265	173,288	26,707
1320668	Blankenship 4-8	Fee	SENE	2525' FNL, 660' FEL	43.265560	-108.640090	5,404	11	Palmer Oil & Gas	3/25/77	5,204	Shut in	365	6,966,244	65,784
Section 9 T3N R2E															
1321130	Tribal 21-9	Tribal	NENW	660' FNL, 1979' FWL	43.256390	-108.650110	5,390	15	Shell Oil Co.	6/24/81	5,304	Plugged	0	271,143	11
1322172	Pavillion Fee 31-9	Fee	NWNE	465' FNL, 1975' FEL	43.256860	-108.644861	5,399	10	Tom Brown, Inc.	11/8/01	3,445	Active	2	426,670	1,346
1320084	Maxson 32-9	Fee	SWNE	1980' FNL, 1980' FEL	43.252780	-108.645110	5,390	11	Shell Oil Co.	5/27/68	3,511	Plugged	0	0	0
1322227	Pavillion Fee 32-9W	Fee	SWNE	1468' FNL, 1737' FEL	43.254080	-108.644722	5,398	10	Tom Brown, Inc.	3/22/02	3,460	Active	2	495,104	1,380
Section 10 T3N R2E															
1320876	USA Tribal 22-10	Tribal	SENW	2305' FNL, 1444' FWL	43.251940	-108.632220	5,408	14	Shell Oil Co.	10/13/79	5,152	Active	2	6,341,009	1,363
1321692	Tribal Pavillion 23-10	Tribal	NESW	1879' FSL, 1863' FWL	43.248890	-108.630680	5,406	15	Tom Brown, Inc.	7/14/94	6,000	Shut in	7	1,939,835	112,463
1322417	Tribal Pavillion 23-10B	Tribal	NESW	2474' FSL, 1866' FWL	43.250470	-108.631222	5,410	10	Tom Brown, Inc.	11/5/04	5,646	Active	6	1,692,683	4,620
1322418	Tribal Pavillion 23-10C	Tribal	NESW	1528' FSL, 2326' FWL	43.247890	-108.629472	5,433	10	Tom Brown, Inc.	10/13/04	5,730	Active	6	764,919	4,549
1321691	Pavillion Fee 31-10	Fee	NWNE	660' FNL, 1786' FEL	43.256330	-108.624600	5,372	15	Tom Brown, Inc.	6/25/94	5,972	Active	1,412	4,269,156	15,504
1322268	Pavillion Fee 31-10B	Fee	NWNE	1185' FNL, 2605' FEL	43.254940	-108.628222	5,378	10	Encana O&G (USA) Inc.	1/23/05	5,555	Active	2,570	243,516	14,008
1321968	Tribal Pavillion 32-10	Tribal	SENW	1788' FNL, 2166' FWL	43.253300	-108.626000	5,387	13	Tom Brown, Inc.	5/10/00	5,593	Active	29	4,707,951	2,200
1322224	Tribal Pavillion 32-10B	Tribal	SWNE	1890' FNL, 1739' FEL	43.253280	-108.625389	5,374	10	Tom Brown, Inc.	3/28/02	5,850	Active	14	4,501,617	4,727
1322419	Tribal Pavillion 32-10C	Tribal	SWNE	2179' FNL, 2412' FEL	43.252220	-108.627500	5,381	10	Encana O&G (USA) Inc.	2/18/05	4,020	Active	8	315,995	7,099
1321862	Tribal Pavillion 33-10	Tribal	NWSE	1888' FSL, 2135' FEL	43.249170	-108.625560	5,470	13	Tom Brown, Inc.	5/6/99	5,970	Active	2	5,163,904	2,546
1322274	Tribal Pavillion 33-10B	Tribal	NWSE	2120' FSL, 1549' FEL	43.249530	-108.624278	5,395	10	Tom Brown, Inc.	12/14/04	5,610	Active	2	1,100,556	2,219
1322195	Tribal Pavillion 33-10W	Tribal	NWSE	1819' FSL, 2225' FEL	43.248690	-108.626806	5,473	10	Tom Brown, Inc.	12/6/01	5,070	Active	2	930,223	8,228
1306363	Govt Tribal 33X-10	Tribal	NWSE	2380' FSL, 1986' FEL	43.250190	-108.625280	5,391	24	Shell Oil Co.	5/11/65	19,235	Plugged	0	14,697,897	0
1322149	Tribal Pavillion 34-10	Tribal	SWSE	1050' FSL, 1980' FEL	43.246580	-108.625260	5,402	10	Tom Brown, Inc.	10/6/01	5,732	Active	5	3,092,923	4,816
1322198	Pavillion Fee 41-10	Fee	NENE	860' FNL, 660' FEL	43.255860	-108.620917	5,372	10	Tom Brown, Inc.	1/23/02	3,180	Active	0	939,858	157

TABLE 2

Pavillion Field Gas Well Location, Completion, and Production

Wells within WDEQ Areas of Review

API #	Well Name		Mineral Ownership	Location						Completion			Cumulative Production[1]			
				Qtr/Qtr	Footage Location	Latitude	Longitude	Ground Elev., ft.	KB-GL, ft.[2]	Operator	Date	Total Depth[3]	Well Status	BO	MCF	BW
1322624	Pavillion Fee	41-10B	Fee	NENE	465' FNL, 465' FEL	43.256940	-108.620167	5,371	10	Encana O&G (USA) Inc.	5/7/05	3,841	Active	0	284,408	293
1320414	Unit	41X-10	Tribal	NENE	1140' FNL, 1085' FEL	43.255110	-108.622010	5,366	10	Shell Oil Co.	1/29/73	5,047	Plugged	0	0	0
Section 10 T3N R2E (continued)																
1321696	Tribal	42-10	Tribal	SENE	2100' FNL, 662' FEL	43.254540	-108.620440	5,368	15	Tom Brown, Inc.	6/15/94	5,995	Active	595	3,326,769	14,503
1322324	Tribal Pavillion	42-10B	Tribal	SENE	2172' FNL, 465' FEL	43.252190	-108.620194	5,366	10	Encana O&G (USA) Inc.	2/16/05	5,605	Active	0	957,773	2,882
1321704	Tribal Pavillion	43-10	Tribal	NESE	1996' FSL, 761' FEL	43.249250	-108.620760	5,378	15	Tom Brown, Inc.	9/21/94	5,956	Active	604	6,830,178	28,467
1322420	Tribal Pavillion	43-10B	Tribal	NESE	1410' FSL, 663' FEL	43.247610	-108.620944	5,439	10	Encana O&G (USA) Inc.	1/20/05	5,760	Active	2	524,410	2,606
1320879	Unit	44-10	Tribal	SESE	1000' FSL, 1000' FEL	43.246490	-108.621610	5,389	14	Shell Oil Co.	12/17/79	5,200	Active	2	4,515,619	1,751
Section 11 T3N R2E																
1322059	Pavillion Fee	11-11	Fee	NWNW	1136' FNL, 1274' FWL	43.255109	-108.613611	5,355	11	Tom Brown, Inc.	5/17/01	5,846	Active	0	820,286	9,051
1322220	Pavillion Fee	11-11B	Fee	NWNW	465' FNL, 665' FWL	43.256970	-108.615944	5,365	10	Tom Brown, Inc.	2/16/02	4,780	Active	4	775,677	13,056
1321669	Pavillion Unit	12-11	Fee	SWNW	2300' FNL, 750' FWL	43.252270	-108.614830	5,357	15	Tom Brown, Inc.	10/19/93	6,482	Active	229	5,706,151	8,451
1322272	Pavillion Fee	12-11B	Fee	SWNW	1457' FNL, 656' FWL	43.254220	-108.615972	5,362	9	Encana O&G (USA) Inc.	1/15/05	3,860	Active	0	354,281	731
1322102	Pavillion Fee	12-11W	Fee	SWNW	2292' FNL, 1014' FWL	43.251940	-108.615000	5,356	12	Tom Brown, Inc.	5/3/01	3,250	Active	0	851,732	460
1322586	Tribal Pavillion	21-11B	Tribal	NENW	481' FNL, 2000' FWL	43.256940	-108.610917	5,355	10	Encana O&G (USA) Inc.	4/19/05	3,875	Active	18	625,953	1,560
Section 12 T3N R2E																
1322060	Pavillion Fee	13-12	Fee	NWSW	2459' FSL, 1301' FWL	43.250830	-108.593056	5,323	12	Tom Brown, Inc.	6/1/01	3,275	Active	0	658,223	221
1320878	Unit	22-12	Tribal	SENW	1906' FNL, 1393' FWL	43.253060	-108.592690	5,324	14	Shell Oil Co.	1/17/80	5,200	Active	0	3,639,997	288
1322186	Pavillion Fee	23-12	Fee	NESW	2494' FSL, 2502' FWL	43.250720	-108.589167	5,323	10	Tom Brown, Inc.	9/19/01	3,260	Active	0	422,041	138
Section 13 T3N R2E																
1320855	Tribal Pavillion	12-13	Tribal	SWNW	1530' FNL, 660' FWL	43.239590	-108.595560	5,328	10	Shell Oil Co.	5/12/79	5,400	Plugged	0	1,043,834	18
1322057	Pavillion Fee	21-13	Fee	NENW	660' FNL, 1980' FWL	43.242179	-108.590496	5,315	12	Tom Brown, Inc.	2/23/01	3,500	Flowing	2	160,665	1,422

[1] Production reported through April 2014; BO = barrels oil, MCF = million cubic feet gas; BW = barrels water

[2] Height of Kelly Bushing (KB) of the drilling rig above ground level (GL)

[3] Depths measured from KB

TABLE 3
Gas Well Pit Information
Wells within WDEQ Areas of Review

Gas Wells								Domestic Water Wells Within 1/4 Mile				
Well Name	**Latitude**	**Longitude**	**Pit Type**	**Drilling Mud Type**	**Water Production (bbls)**	**Pit Contents / Cuttings Disposition**	**Pit Investigation Summary**	**Well ID**	**Latitude**	**Longitude**	**Reported Depth, ft.**	**Distance From Gas to Water Well**
Section 2 T3N R2E												
Tribal 14-2	43.26021	-108.61583	Reserve/Production	Invert	44	Invert Drill Mud/Cuttings and Produced Water	Site Assessment Completed in Nov. 2006, OCSRRS Goal = 1,000 ppm, Excavation = ~50 cu yds, Post-remediation sample max = 861 ppm	PGDW05	43.25885	-108.61265	210	980
								PGDW45	43.25888062	-108.6130142	100	891
Tribal Pavillion 24-02	43.25972	-108.61083	No Pit	LSND	174	Closed Loop Drilling, Cuttings Hauled Offsite to a Cuttings Pit at TP 43-1	N/A	PGDW05	43.25885	-108.61265	210	585
								PGDW45	43.25888062	-108.6130142	100	655
Section 3 T3N R2E												
Pavillion Fee 13-3W	43.26292	-108.63642	No Pit	LSND	1,340	Closed Loop Drilling, Cuttings Disposed at Landfill	N/A	PGDW41	43.262146	-108.6378479	100	473
Pavillion Fee 13X-3	43.26333	-108.63417	Cuttings Pit	LSND	0	Closed Loop Drilling, Cuttings Buried Onsite	N/A	PGDW41	43.262146	-108.6378479	100	1,068
Pavillion Fee 14-3B	43.25944	-108.63425	No Pit	LSND	1,901	Closed Loop Drilling, Cuttings Disposed at Landfill	N/A	PGDW41	43.262146	-108.6378479	100	1,373
Pavillion Fee 14-3W	43.26072	-108.63575	No Pit	LSND	5,687	Closed Loop Drilling, Cuttings Disposed at Landfill	N/A	PGDW41	43.262146	-108.6378479	100	762
Pavillion Fee 34-03R	43.26028	-108.62528	No Pit	LSND	1,153	Closed System Cuttings Used in Construction of Tank Berms	N/A	PGDW30	43.25753	-108.62258	260	1,232
Tribal Pavillion 44-03	43.25944	-108.62111	Cuttings Pit	LSND	1,663	Closed Loop Drilling, Cuttings Buried Onsite	N/A	PGDW30	43.25753	-108.62258	260	797
W.E. Lloyd 1	43.26011	-108.62528	Reserve/Production	Invert	0	Invert Drill Mud/Cuttings and Produced Water	Site Assessment Completed in August 2011, OCSRRS Goal = 1,000 ppm, Soil TPH below OCSRRS Goal, No remediation	PGDW30	43.25753	-108.62258	260	1,183
Mae H. Rhodes 1	43.26009	-108.63519	Reserve	Water	0	Water Based Mud/Cuttings	N/A	PGDW41	43.262146	-108.6378479	100	1,029
Section 4 T3N R2E												
Pavillion Fee 43-4	43.26261	-108.64022	No Pit	LSND	19,681	Closed Loop Drilling, Cuttings Disposed at Landfill	N/A	PGDW41	43.262146	-108.6378479	100	653
Pavillion Fee 44-4	43.25944	-108.63994	No Pit	LSND	26,707	Closed Loop Drilling, Cuttings Disposed at Landfill	N/A	PGDW41	43.262146	-108.6378479	100	1,133
Blankenship 4-8	43.26556	-108.64009	Reserve/Production	Invert	63,110	Invert Drill Mud/Cuttings and Produced Water	Site Assessment Completed in September 2011, Soil Samples All Below 1,000 ppm, but GW Detected at 2.5 feet bgs, Benzene, TPH-GRO Detected Above WDEQ Cleanup Levels, Site Entered in VRP	PGDW41	43.262146	-108.6378479	100	1,380
Section 9 T3N R2E												
Tribal 21-9	43.25639	-108.65011	Reserve/Production	Invert	11	Invert Drill Mud/Cuttings and Produced Water	Site Assessments Completed in August 2011, October 2012, and November 2012, TPH in Groundwater detected below WDEQ Cleanup Levels, Remediation (excavation) Conducted October-November 2013, Excavation and confirmation sampling until TPH soil goals met, Total Excavated ~ 8,522 cu yds, Closure using Treated/tested Fill Material	PGDW42	43.25574493	-108.647316	200	778
Pavillion Fee 31-9	43.25686	-108.64486	Cuttings Pit	LSND	1,346	Closed Loop Drilling, Cuttings Buried Onsite	Site Assessment Completed in August 2011, No Remediation Required - No Detections of SVOCs, TPH-DRO, TPH-GRO	PGDW42	43.25574493	-108.647316	200	768
Maxson 32-9	43.25278	-108.64511	Reserve	Invert	0 (dry hole)	Invert Drill Mud/Cuttings	N/A	PGDW42	43.25574493	-108.647316	200	1,229
Pavillion Fee 32-9W	43.25408	-108.64472	No Pit	LSND	1,380	Closed System, Cuttings Disposed at Landfill	N/A	PGDW42	43.25574493	-108.647316	200	918
Section 10 T3N R2E												
USA Tribal 22-10	43.25194	-108.63222	Reserve/Production	Invert	1,363	Invert Drill Mud/Cuttings and Produced Water	Site Assessment Completed in April 2007, OCSRRS Goal = 7,000 ppm, No Remediation Required, Max Soil Sample = 201 ppm	PGDW14	43.25154027	-108.6273311	190	1,306
Tribal Pavillion 23-10	43.24889	-108.63068	Cuttings Pit	LSND	112,463	Closed Loop Drilling, Cuttings Buried Onsite	N/A	PGDW14	43.25154027	-108.6273311	190	1,313
								PGDW44	43.25086975	-108.6261292	750	1,408
Tribal Pavillion 23-10B	43.25047	-108.63122	Cuttings Pit	LSND	4,620	Closed Loop Drilling, Cuttings Buried Onsite	N/A	PGDW14	43.25154027	-108.6273311	190	1,104
								PGDW44	43.25086975	-108.6261292	750	1,360
Tribal Pavillion 23-10C	43.24789	-108.62947	Cuttings Pit	LSND	4,549	Closed Loop Drilling, Cuttings Buried Onsite	N/A	PGDW44	43.25086975	-108.6261292	750	1,403
Pavillion Fee 31-10	43.25633	-108.62460	No Pit	LSND	15,504	Closed Loop Drilling Cuttings Used in Construction of Tank Berms	N/A	PGDW30	43.25753	-108.62258	260	707
Pavillion Fee 31-10B	43.25494	-108.62822	No Pit	LSND	14,008	Closed Loop Drilling, Cuttings Hauled Offsite to Lozier Cuttings Facility	N/A	PGDW14	43.25154027	-108.6273311	190	1,262
Tribal Pavillion 32-10	43.25330	-108.62600	Cuttings Pit	LSND	2,200	Closed Loop Drilling, Cuttings Buried Onsite	N/A	PGDW14	43.25154027	-108.6273311	190	732
								PGDW44	43.25086975	-108.6261292	750	887
Tribal Pavillion 32-10B	43.25328	-108.62539	No Pit	LSND	4,727	Closed Loop Drilling, Cuttings Hauled Offsite to Lozier Cuttings Facility	N/A	PGDW14	43.25154027	-108.6273311	190	817
								PGDW44	43.25086975	-108.6261292	750	900
Tribal Pavillion 32-10C	43.25222	-108.62750	No Pit	LSND	7,099	Closed System, Cuttings Hauled Offsite to Lozier Cuttings Facility	N/A	PGDW14	43.25154027	-108.6273311	190	252
								PGDW44	43.25086975	-108.6261292	750	612
Tribal Pavillion 33-10	43.24917	-108.62556	Cuttings Pit	KCL Polymer	2,546	Closed System, Cuttings Buried Onsite	N/A	PGDW14	43.25154027	-108.6273311	190	984
								PGDW23	43.24866472	-108.6225943	500	809
								PGDW44	43.25086975	-108.6261292	750	638
Tribal Pavillion 33-10B	43.24953	-108.62428	Cuttings Pit	LSND	2,219	Closed System, Cuttings Buried Onsite	N/A	PGDW14	43.25154027	-108.6273311	190	1,093
								PGDW23	43.24866472	-108.6225943	500	547
								PGDW44	43.25086975	-108.6261292	750	693
Tribal Pavillion 33-10W	43.24869	-108.62681	No Pit	LSND	8,228	Closed System, Cuttings Hauled Offsite	N/A	PGDW14	43.25154027	-108.6273311	190	1,048
								PGDW23	43.24866472	-108.6225943	500	1,118
								PGDW44	43.25086975	-108.6261292	750	815

TABLE 3
Gas Well Pit Information
Wells within WDEQ Areas of Review

Gas Wells								Domestic Water Wells Within 1/4 Mile				
Well Name	**Latitude**	**Longitude**	**Pit Type**	**Drilling Mud Type**	**Water Production (bbls)**	**Pit Contents / Cuttings Disposition**	**Pit Investigation Summary**	**Well ID**	**Latitude**	**Longitude**	**Reported Depth, ft.**	**Distance From Gas to Water Well**
Govt Tribal 33X-10	43.25019	-108.62528	Reserve/Production	Invert	0	Invert Drill Mud/Cuttings and Produced Water	Site Assessment Completed in December 2007, OCSRRS Goal = 1,000 ppm, Remediation (Excavation) Required, Excavated 560 cu yds, Post-Excavation Samples Max TPH = 1,000 ppm	PGDW14	43.25154027	-108.6273311	190	734
								PGDW23	43.24866472	-108.6225943	500	904
								PGDW44	43.25086975	-108.6261292	750	335
Tribal Pavillion 34-10	43.24658	-108.62526	No Pit	LSND	4,816	Closed System, Cuttings Hauled Offsite	N/A	PGDW23	43.24866472	-108.6225943	500	1,039
Pavillion Fee 41-10	43.25586	-108.62092	No Pit	LSND	157	Closed Loop Drilling, Cuttings Hauled Offsite to Lozier Cuttings Facility	N/A	PGDW30	43.25753	-108.62258	260	752
								PGDW49	43.25506	-108.61787	50	860
Pavillion Fee 41-10B	43.25694	-108.62017	No Pit	LSND	293	Closed System, Cuttings Disposed at Landfill	N/A	PGDW30	43.25753	-108.62258	260	675
								PGDW49	43.25506	-108.61787	50	917
Unit (C.A. Fike) 41X-10	43.25511	-108.62201	Reserve/Production	Invert	0	Invert Drill Mud/Cuttings and Produced Water	Site Assessment Conducted in December 2007, Seven Trenches Dug at North, South, and East Ends of Site, Soil was Reportedly Indicative of Native Non-Impacted Soils	PGDW30	43.25753	-108.62258	260	896
								PGDW49	43.25506	-108.61787	50	1,098
Tribal 42-10	43.25454	-108.62044	Cuttings Pit	KCL Polymer	14,503	Closed System, Cuttings Buried Onsite	N/A	PGDW30	43.25753	-108.62258	260	1,229
								PGDW49	43.25506	-108.61787	50	707
Tribal Pavillion 42-10B	43.25219	-108.62019	No Pits	LSND	2,882	Closed Loop Drilling, Cuttings Hauled Offsite to Lozier Cuttings Facility	N/A	PGDW49	43.25506	-108.61787	50	1,214
Tribal Pavillion 43-10	43.24925	-108.62076	Cuttings Pit	KCL Polymer	28,467	Closed System, Cuttings Buried Onsite	N/A	PGDW23	43.24866472	-108.6225943	500	532
Tribal Pavillion 43-10B	43.24761	-108.62094	Cuttings Pit	LSND	2,606	Closed System, Cuttings Buried Onsite	N/A	PGDW23	43.24866472	-108.6225943	500	583
Unit 44-10	43.24649	-108.62161	Reserve/Production	Invert	1,751	Invert Drill Mud/Cuttings and Produced Water	Site Assessment Conducted in May 2007, OCSRRS Goal = 5,500 ppm, Approximately 60 cu yds Excavated, Post-Excavation Sample Max = 2,920 ppm	PGDW23	43.24866472	-108.6225943	500	835
Section 11 T3N R2E												
Pavillion Fee 11-11	43.25511	-108.61361	No Pits	LSND	9,051	Closed System Cuttings Used in Construction of Tank Berms	N/A	PGDW05	43.25885	-108.61265	210	1,386
								PGDW45	43.25888062	-108.6130142	100	1,384
								PGDW49	43.25506	-108.61787	50	1,132
Pavillion Fee 11-11B	43.25697	-108.61594	No Pits	LSND	13,056	Closed System, Cuttings Disposed at Landfill	N/A	PGDW05	43.25885	-108.61265	210	1,111
								PGDW45	43.25888062	-108.6130142	100	1,044
								PGDW49	43.25506	-108.61787	50	865
Pavillion Unit 12-11	43.25227	-108.61483	Cuttings Pit	KCL Polymer	8,451	Closed System, Cuttings Buried Onsite	N/A	PGDW49	43.25506	-108.61787	50	1,299
Pavillion Fee 12-11B	43.25422	-108.61597	No Pits	LSND	731	Closed System, Cuttings Disposed at Landfill	N/A	PGDW49	43.25506	-108.61787	50	590
Pavillion Fee 12-11W	43.25194	-108.61500	No Pits	LSND	460	No pits, unknown cuttings disposition	N/A	PGDW49	43.25506	-108.61787	50	1,369
Tribal Pavillion 21-11B	43.25694	-108.61092	No Pits	LSND	1,560	Closed System, Cuttings Disposed at Landfill	N/A	PGDW05	43.25885	-108.61265	210	833
								PGDW45	43.25888062	-108.6130142	100	900
Section 12 T3N R2E												
Pavillion Fee 13-12	43.25083	-108.59306	No Pits	LSND	221	Closed System Cuttings Used in Construction of Tank Battery Facility	N/A	PGDW20	43.25167	-108.60151	460	563
								PGDW21	43.25167	-108.60151	460	563
								LD02	43.25167	-108.60151	610	563
Unit 22-12	43.25306	-108.59269	Reserve/Production	Invert	288	Invert Drill Mud/Cuttings and Produced Water	Site Assessment Conducted December 2006, Excavation of 40-60 cu yds Completed March 2008, Second Site Assessment Conducted August 2011, Soil and GW samples Below Cleanup Concentrations, Additional Monitoring Wells installed in October 2012, Low (below WDEQ standards) BTEX Concentrations in Sample from One Well	PGDW20	43.25167	-108.60151	460	631
								PGDW21	43.25167	-108.60151	460	630
								LD02	43.25167	-108.60151	610	630
Pavillion Fee 23-12	43.25072	-108.58917	No Pits	LSND	138	Closed System, Tank Berm	N/A	PGDW20	43.25167	-108.60151	460	685
								PGDW21	43.25167	-108.60151	460	659
								LD02	43.25167	-108.60151	610	659
Section 13 T3N R2E												
Tribal Pavillion 12-13	43.23959	-108.59556	Reserve/Production	Invert	18	Invert Drill Mud/Cuttings and Produced Water	Site Assessment Conducted in September 2011 Based on Reports From Residents of Potential Pit Location, No Evidence of Pit Found	PGDW32	43.24075256	-108.5941561	674	565
								PGDW33	43.23855522	-108.5964146	30	440
Pavillion Fee 21-13	43.24218	-108.59050	No Pits	LSND	1,422	Closed System Cuttings Used in Construction of Tank Battery Facility	N/A	PGDW32	43.24075256	-108.5941561	674	514

TABLE 4
Pavillion Field Domestic Water Wells
Identified By Wyoming Department of Environmental Quality
Township 3N, Range 2E
Fremont County, Wyoming

Well ID[1]	Owner	LOCATION					Depth[1]	SEO Permit[3]			
		Qtr/Qtr	Sec	Latitude[1]	Longitude[1]	Approximate Footage[2]		U.W.	Depth	File Date	Year Completed
PGDW05	Louis Meeks	SWSW	2	43.25884666	-108.6126481	226 ' FSL 1,509 ' FWL	210'	32161	210'	1/22/1976	1973
PGDW14	Marvin Griffin	SWNE	10	43.25154027	-108.6273311	2,414 ' FNL 2,368 ' FEL	190'	No permit on file			
PGDW20	Jeff Locker	SENW	12	43.25166961	-108.5912756	2,142 ' FNL 1,810 ' FWL	460'	No permit on file			
PGDW21	Jeff Locker	SENW	12	43.25167095	-108.5912762	2,384 ' FNL 1,916 ' FWL	460'	No permit on file			
LD-02[4]	Jeff Locker	SENW	12	43.25167095	-108.5912762	2,384 ' FNL 1,916 ' FEL	610'	No permit on file			
PGDW23	John Fenton	NESE	10	43.24866472	-108.6225943	1,810 ' FSL 1,101 ' FEL	500'	24508	175'	8/31/1973	1964
PGDW30	Brian Randall	NENE	10	43.25753218	-108.6225755	302 ' FNL 1,147 ' FEL	260'	No permit on file			
PGDW32	Joe Dennis	NWNW	13	43.24075256	-108.5941561	1,011 ' FNL 1,267 ' FWL	674'	64110	675'	9/2/1983	1983
PGDW33	Joe Dennis	SWNW	13	43.23855522	-108.5964146	1,901 ' FNL 558 ' FWL	30'	22662	30'	12/28/1972	1934
PGDW41	Fans/Capps	NWSW	3	43.262146	-108.6378479	1,448 ' FSL 91 ' FWL	376'	66345	70'	6/30/1984	1984
PGDW42	Dale Steele	NWNE	9	43.25574493	-108.647316	784 ' FNL 2,429 ' FEL	200'	41517	200'	2/21/1981	1981
PGDW44	Marvin Griffin	NWSE	10	43.25086975	-108.6261292	2,625 ' FSL 2,052 ' FEL	750'	24506	750'	8/31/1973	1932
PGDW45	Louis Meeks	SWSW	2	43.25888062	-108.6130142	256 ' FSL 1,403 ' FWL	100'[5]	No permit on file			
PGDW49	Louis Meeks	NWNW	11	43.25505829	-108.6178741	1,116 ' FNL 151 ' FWL	50'[5]	No permit on file			

[1] From EPA December 2011 Draft Report, Investigation of Ground Water Contamination near Pavillion, Wyoming

[2] Estimated from mapping

[3] Wyoming State Engineer's Office

[4] Location reported the same as PGDW21

[5] From WDEQ

TABLE 5
Pavillion Field Domestic Water Wells
Supplemental Water Well Information
Township 3N, Range 2E
Fremont County, Wyoming

EPA Well ID	LOCATION		SEO Data				Completion			
	Qtr/Qtr	Sec	Permit Number	Priority Date	Facility Name	Status	Well Depth (ft.)	Screened / Perforated Interval Depth (ft.)	Pump Depth (ft.)	Source[5]
PGDW45	SWSW	2					100	unknown	unknown	WDEQ
--	SWSW	2	P170310.0W	10/19/2005	MEEKS #2	Incomplete	700[1]	520-540[1]	unknown	UW5 / EPA
--	SWSW	2	P190920.0W	07/07/2009	MEEKS #1	Cancelled	60[2]	unknown	unknown	UW5
PGDW05	SWSW	2	P32161.0W	02/02/1976	K & J HUELLE #1	Fully Adjudicated	210/210	unknown	189	UW6
PGDW41	NWSW	3	P66345.0W	1/31/1984	Garland #1	Fully Adjudicated	70/376[3]	53-68	60	UW6/EPA
PGDW42	NWNE	9	P41517.0W	11/29/1977	Newkirk #2	Fully Adjudicated	200/200	180-200	180	UW6/EPA
PGDW14	SWNE	10					190	unknown	unknown	EPA
PGDW30	NENE	10					260	unknown	unknown	EPA
PGDW44	NWSE	10	P24506.0P	12/31/1932	Miller #1	Fully Adjudicated	750/750	unknown	unknown	UW7/EPA
	NWSE	10	P24507.0P	12/31/1942	Miller #2	Fully Adjudicated	750	unknown	unknown	UW7
PGDW23	NESE	10	P24508.0P	12/31/1964	Miller #3	Fully Adjudicated	175/500[3]	90	unknown	UW5 / EPA
PGDW49	NWNW	11					50	unknown	unknown	WDEQ
PGDW20	SENW	12					460			EPA
PGDW21	SENW	12					460			EPA
LD-02	SENW	12					610	unknown	unknown	EPA
	SENW	12	P97501.0W	10/11/1994	Locker #2	Cancelled	640[2]	unknown	unknown	UW5
	NWNW	13	P22660.0P	9/30/1938	Hunt #1	Fully Adjudicated	175	unknown	unknown	UW7
PGDW32	NWNW	13	P64110.0W	5/24/1983	Dennis #1	Fully Adjudicated	675/674[3]	550	384	UW5 / EPA
PGDW33	SWNW	13	P22662.0P	12/31/1934	Hippe #1	Fully Adjudicated	30/30	unknown	unknown	UW7/EPA

[1] See WOGCC (2014) for additional information regarding the completion and status of this well

[2] Permit application estimated depth

[3] SEO reported depth / EPA reported depth

[4] Location reported the same as PGDW21

[5] UW-5 = SEO Application for Permit, UW-6 & UW-7 = SEO Statement of Completion

TABLE 6
Wyoming State Engineer's Office Well Permits Within One Quarter Mile of Pavillion Field Gas Wells

WR Number	Priority Date	Summary WR Status	Permittee	Facility Name	Uses	Twn	Rng	Sec	Qtr-Qtr	Appro-priation (gpm)	Total depth (ft)	Static Water Level (ft)	Chemical Analysis	Latitude	Longitude
CR UW09/250	8/19/1977		BETTY COUNTRYMAN	ED CHOPPING CHEVROLET #2	MIS	003N	003E	7		10				43.25114	-108.56899
P106827.0W	7/22/1997	Cancelled	D. G. FINLAYSON	FINLAYSON #2	DOM_GW; STK	003N	002E	20	NE1/4NE1/4	25				43.22725	-108.66048
P108128.0W	11/5/1997	Complete	RAY FOXWORTHY	CROWN HEART #1	DOM_GW; STK	003N	002E	15	SE1/4SE1/4	2	379	60	N	43.23104	-108.62085
P111834.0W [1]	9/16/1998	Cancelled	STEPHEN H/DANA R HUGUS	Hugus #1	DOM_GW; STK	003N	002E	2	NW1/4NW1/4	25				43.27042	-108.61556
P120203.0W	11/8/1999	Complete	D. G. FINLAYSON	Finlayson #3	DOM_GW; STK	003N	002E	20	NE1/4NE1/4	25	450	100	N	43.22725	-108.66048
P123043.0W [1]	2/14/2000	Cancelled	Stephen/Dana Hugus	Hugus #1	DOM_GW; STK	003N	002E	2	NW1/4NW1/4	25				43.27042	-108.61556
P123668.0W [1]	3/6/2000	Complete	Louis A Meeks, Sr.	Meeks #1 Stock	STK	003N	002E	2	NW1/4NW1/4	25	60	12	N	43.27042	-108.61556
P124049.0W	3/6/2000	Complete	Robert E Lozier	Lozier Well #1	DOM_GW; STK	003N	002E	10	SE1/4SW1/4	25	484	246	N	43.24552	-108.63087
P139588.0W	10/5/2001	Cancelled		MW 0229	MON	003N	002E	12	NE1/4NW1/4	0				43.25617	-108.59293
P146856.0W	9/5/2002	Complete	RAY FOXWORTHY	CROWN HEART # 2	STK	003N	002E	15	SE1/4SE1/4	5	380	89	N	43.23104	-108.62085
P164192.0W [2]	12/6/2004	Complete		PLF #3	MON	003N	002E	1	NW1/4SE1/4	0	80	60.4	N	43.26372	-108.5862
P164193.0W [2]	12/6/2004	Complete		PLF #2	MON	003N	002E	1	SW1/4NE1/4	0	100	82	N	43.26653	-108.589
P164194.0W [2]	12/6/2004	Complete		PLF #1	MON	003N	002E	1	SE1/4NW1/4	0	102.5	81	N	43.26658	-108.5856
P166480.0W [1]	4/7/2005		JONATHAN Q. & LYNN D. MIDDELSTADT	MIDD-2	STK	003N	002E	11	NW1/4SW1/4	25				43.24909	-108.6163
P166481.0W	4/7/2005	Complete	JACK ROBINSON	ROBINSON #1	STK	003N	002E	11	SW1/4SE1/4	10	200	50	N	43.2452	-108.6084
P170310.0W [1]	10/19/2005	Incomplete	LOUIS A. & DONNA J. MEEKS	MEEKS #2	DOM_GW	003N	002E	2	SW1/4SW1/4	25				43.26034	-108.61525
P172899.0W [1]	1/27/2006	Complete	H. DOUGLAS TUCK	TUCK 1	DOM_GW	003N	002E	2	SE1/4SE1/4	12	100	30	N	43.26029	-108.60075
P183041.0W	8/1/2007	Complete	AARON AND LANA SORENSEN	SORENSEN #1	DOM_GW; STK	003N	003E	25	NW1/4NW1/4	20	240	80	N	43.21207	-108.47977
P187102.0W	6/9/2008	Cancelled	JOSEPH HALL	HALL'S #1	DOM_GW	003N	002E	17	NE1/4SE1/4	10				43.23417	-108.66054
P190920.0W	7/7/2009	Cancelled	LOUIS MEEKS	MEEKS #1	DOM_GW	003N	002E	2	SW1/4SW1/4	25				43.26032	-108.61366
P197335.0W	1/27/2012	Incomplete	VINCENT DOLBOW	HILL FARM NEW PENS 1	DOM_GW; STK	003N	002E	3	NE1/4NW1/4	25				43.27103	-108.62861
P197336.0W	1/27/2012	Incomplete	VINCENT DOLBOW	HILL FARM NEW PENS 2	DOM_GW; STK	003N	002E	3	NE1/4NW1/4	25				43.27115	-108.62854
P200885.0W	8/16/2013	Incomplete	CARL RAY PACE	ROOSTER KEY #1	DOM_GW;STK	003N	002E	10	SE1/4SE1/4	25				43.24642	-108.61915
P22660.0P	9/30/1938	Fully Adjudicated	JOSEPH B. DENNIS	HUNT #1	STK	003N	002E	13	NW1/4NW1/4	25	175	12	N	43.24208	-108.59609
P22661.0P	8/31/1947	Fully Adjudicated	JOSEPH B. DAVIS	HUNT #2	DOM_GW	003N	002E	13	NE1/4NW1/4	25	48	10	N	43.24212	-108.5911
P22662.0P	12/31/1934	Fully Adjudicated	JOSEPH DENNIS	HIPPE #1	DOM_GW	003N	002E	13	SW1/4NW1/4	25	30	10	N	43.23844	-108.59611
P23056.0P	1/4/1960	Fully Adjudicated	D. G. FINLAYSON	FINLAYSON #2	DOM_GW; STK	003N	002E	20	NE1/4NE1/4	25	65	5	Y	43.22725	-108.66048
P24502.0P	12/31/1942	Fully Adjudicated	MARVIN GRIFFIN	SAM BLACK #185	DOM_GW; STK	003N	002E	14	SW1/4SE1/4	-1	180	35	N	43.23248	-108.60418
P24506.0P	12/31/1932	Fully Adjudicated	MARVIN & EVELYN GRIFFIN	MILLER #1	DOM_GW; STK	003N	002E	10	NW1/4SE1/4	5	750	90	N	43.24918	-108.62593
P24507.0P	12/31/1942	Fully Adjudicated	MARVIN & EVELYN GRIFFIN	MILLER #2	DOM_GW; STK	003N	002E	10	NW1/4SE1/4	7	750	80	N	43.24918	-108.62593
P24508.0P	12/31/1964	Fully Adjudicated	MARVIN & EVELYN GRIFFIN	MILLER #3	STK	003N	002E	10	NE1/4SE1/4	25	175	80	N	43.2492	-108.62099
P29496.0P	3/31/1975	Fully Adjudicated	JAMES E. & BARBARA J. HENRY	HENRY #1	DOM_GW; STK	003N	002E	14	NE1/4NW1/4	20	130	20	N	43.24198	-108.61107
P30217.0W	6/18/1975	Fully Adjudicated	THE BORUSHKO FAMILY TRUST	MORTENSEN #1	DOM_GW	003N	002E	15	NE1/4NE1/4	12	350	40	N	43.24311	-108.62275
P31805.0W	1/20/1976	Fully Adjudicated		FIKE #3	DOM_GW; STK	003N	002E	11	SE1/4SW1/4	5	100	50	N	43.24562	-108.61107
P32161.0W [1]	2/2/1976	Fully Adjudicated	KEITH & JOANNE HUELLE	K & J HUELLE #1	DOM_GW	003N	002E	2	SW1/4SW1/4	10	210	190	Y	43.26034	-108.61525

TABLE 6
Wyoming State Engineer's Office Well Permits Within One Quarter Mile of Pavillion Field Gas Wells

WR Number	Priority Date	Summary WR Status	Permittee	Facility Name	Uses	Twn	Rng	Sec	Qtr-Qtr	Appro-priation (gpm)	Total depth (ft)	Static Water Level (ft)	Chemical Analysis	Latitude	Longitude
P34936.0W	9/14/1976	Fully Adjudicated	THE BORUSHKO FAMILY TRUST	ENL MORTENSEN #1	STK	003N	002E	15	NE1/4NE1/4	0	350	40	N	43.24311	-108.62275
P41320.0W	12/19/1977	Fully Adjudicated	GLEN L. HUGHES	#1	DOM_GW	003N	002E	14	NW1/4NE1/4	12	100	40	N	43.24201	-108.60608
P41517.0W	11/29/1977	Fully Adjudicated		NEWKIRK #2	DOM_GW; STK	003N	002E	9	NE1/4NW1/4	25	200	50	N	43.25628	-108.6507
P44255.0W	7/18/1978	Fully Adjudicated	GLEN L. HUGHES	ENL #1	DOM_GW	003N	002E	14	NW1/4NE1/4	12	225	60	N	43.24201	-108.60608
P50375.0W	10/15/1979	Fully Adjudicated	MICHAEL D. & OR PATTY A. KLINKER	KLINKER #1	DOM_GW	003N	002E	13	NW1/4NE1/4	22	100	12	N	43.24216	-108.58612
P51810.0W	4/17/1980	Cancelled	DALE H. & KEBBIE WEMPEN	KEBBIE	DOM_GW	003N	002E	11	SE1/4SE1/4	25				43.24568	-108.60108
P53932.0W	9/19/1980	Cancelled		HOLSTEIN #1	STK	003N	003E	25	NW1/4NW1/4	25				43.21309	-108.47748
P59499.0W	2/3/1982	Fully Adjudicated	JOE & DELORES M. ZUBER	ZUBER #3	DOM_GW; STK	003N	002E	14	NE1/4SW1/4	15	110	60	N	43.23471	-108.611
P60032.0W	3/23/1982	Fully Adjudicated	DEAN L. NOLTING	NOLTING #1	DOM_GW; STK	003N	002E	13	NW1/4SW1/4	15	86	18	N	43.2348	-108.59614
P64110.0W	5/24/1983	Fully Adjudicated	JOE B. DENNIS	DENNIS #1	DOM_GW; STK	003N	002E	13	NW1/4NW1/4	20	675	235	Y	43.24208	-108.59609
P65111.0W [3]	8/3/1983	Fully Adjudicated	BERT OR DEBBIE JELLISON	JELLISION #1	DOM_GW	003N	002E	17	SE1/4SW1/4	13	90	45	N	43.23078	-108.67048
P66345.0W	1/31/1984	Fully Adjudicated		GARLAND #1	DOM_GW; STK	003N	002E	3	NW1/4SW1/4	7	70	7	N	43.26365	-108.6358
P69549.0W	2/25/1985	Complete	JAMES D. & BEVERLY D. SCHUERMAN	SCHUERMAN #1	DOM_GW; STK	003N	002E	11	SE1/4SW1/4	15	100	45	N	43.24562	-108.61107
P82257.0W	4/20/1990	Incomplete	MIDVALE FIRE DEPARTMENT CO.	FIRE 1	MIS	003N	003E	23	SE1/4SE1/4	8	300	120	N	43.21668	-108.48244
P89840.0W [1]	9/17/1992	Complete	BILL/ADA HANCOCK	HILL #1	DOM_GW; STK	003N	002E	3	NE1/4SE1/4	6	215	20	Y	43.26343	-108.62097
P91293.0W	4/5/1993	Complete	DAN BISBEE	PONDEROSA #1	STK	003N	002E	14	NW1/4NW1/4	1.5	10	-4	N	43.24195	-108.61606
P9334.0P [3]	12/31/1935	Fully Adjudicated	LLOYD BASHORE	BASHORE #2	DOM_GW; STK	003N	003E	29	NW1/4NE1/4	8	20	-1	N	43.21429	-108.54506
P93498.0W	11/15/1993	Complete		LEONHARDT #1	DOM_GW; STK	003N	003E	23	SE1/4SE1/4	15	228	112	N	43.21668	-108.48244
P9441.0P	1/1/1944	Fully Adjudicated	CLAIR C. DAY	HILLCREST #1	DOM_GW; STK	003N	002E	30	SE1/4SE1/4	17.5	582	72	N	43.20178	-108.68044
P94540.0W	2/9/1994	Cancelled	D. G. FINLAYSON	FINLAYSON #2	DOM_GW; STK	003N	002E	20	NE1/4NE1/4	25				43.22725	-108.66048
P95171.0W [3]	5/9/1994	Complete	WESLEY/THELMA CHILDERS	CHILDERS #2	STK	003N	002E	17	SE1/4SW1/4	3	85	12	N	43.23078	-108.67048
P97501.0W	10/11/1994	Cancelled	JEFF LOCKER	LOCKER #2	DOM_GW; STK	003N	002E	12	SE1/4NW1/4	12				43.25437	-108.58919
P98083.0W	1/3/1995	Cancelled	FIVE MILE RANCH, L.L.C.	INDIAN RIDGE #2	STK	003N	002E	9	NW1/4NE1/4	20				43.25633	-108.64573
P98084.0W [1]	1/3/1995	Cancelled	FIVE MILE RANCH, L.L.C.	POWERLINE #2	STK	003N	002E	3	SE1/4SE1/4	20				43.26084	-108.62474
P98491.0W [1]	3/7/1995	Cancelled		BECK #1	DOM_GW	003N	003E	6	SW1/4SW1/4	25				43.26018	-108.57571
P99671.0W	6/28/1995	Complete	JERRY J. & SANDRA J. MYERS	DUSTIN #1	DOM_GW; STK	003N	002E	14	NW1/4NE1/4	5	55	28	N	43.24201	-108.60608

[1] Well location estimated from quarter-quarter section information.

[2] Well location from SEO shapefile (SEO, 2014).

[3] Distance from gas well between 1,320 ft. and 1,475 ft.; all others are 1,320 ft. or less.

TABLE 7

Oil Contaminated Soil Remediation Ranking System (OCSRRS) Ranking Table

Variable Site Characteristic	Criteria	Rank Points
Distance from the bottom of the contamination to the Aquifer	>100 ft.	0
	99 ft. To 75 ft.	2
	74 ft. to 50 ft.	6
	49 ft. to 20 ft.	10
	<20 ft.	20
	Recharge Area	20
Aquifer water quality	>5000 TDS mg/L	0
	5000-2000 mg/L	5
	<2000 mg/L	10
Soil medium (texture type)	Clays and shales	0
	Sandy loams	10
	Sand, gravel, limestone	20
Distance to surface water	>1320 ft.	0
	1320-500 ft.	5
	500-300 ft.	10
	<300 ft.	20
Distance to water well	>1320 ft.	0
	1320-500 ft.	5
	500-300 ft.	10
	<300 ft.	15
Distance to public areas, residences, and recreation facilities	>1320 ft.	0
	1320-500 ft.	2
	500-300 ft.	5
	<300 ft.	10
Annual Precipitation	<10 inches	0
	10-15 inches	5
	15-20 inches	10
	>20 Inches	20
Irrigated Crop Lands	no	0
	yes	20
Oil API Gravity	<15	0
	15-20	2
	21-30	5
	31-42	15
	>42	20

TABLE 8

Total Rank Score and TPH Site Specific Limit

Point Total	TPH Limit (mg/kg)
30	10,000
40	8,500
50	7,000
60	5,500
70	4,000
80	2,500
90+	1,000

Table 9
USCS Soils Classification Summary

Permeability	Soil Medium	Unified Soil Classification System Symbols	Rank Points
Low	Clays and Shales	Pt, OH, CH, MH, OL CL, ML	0
Medium	Sandy Loams, Silty Sands, Poorly Sorted Mixtures	SC, SM	10
High	Sand, Gravel, Fractured Rock	SM, SP, SW, GC, GM, GP, GW	20

TABLE 10
Calculated OCSRRS Scores: Pits within WDEQ Areas of Review

API #	1306363	1320084	1320298	1320414	1320668	1320855	1320876	1320878	1320879	1321128	1321130
Well Name	Govt Tribal 33X-10	Maxson 32-9	W.E. Lloyd 1	Unit 41X-10	Blankenship 4-8	Tribal Pavillion 12-13	USA Tribal 22-10	Unit 22-12	Unit 44-10	Tribal 14-2	Tribal 21-9
OCSRRS Variable											
Distance from the bottom of the contamination to the Aquifer	20	20	20	20	20	20	20	20	20	20	20
Aquifer water quality	5	5	5	5	5	5	5	5	5	5	5
Soil medium (texture type)	10	0	0	0	0	20	10	10	10	10	10
Distance to surface water	0	5	20	20	20	20	5	10	0	20	20
Distance to water well	5	5	15	5	5	5	5	5	5	10	15
Distance to public areas, residences, and recreation facilities	10	2	2	2	0	10	0	2	2	2	2
Annual Precipitation	0	0	0	0	0	0	0	0	0	0	0
Irrigated Crop Lands	20	20	20	20	20	20	0	20	0	20	0
Oil API Gravity	20	20	20	20	20	20	20	20	20	20	20
Total OCSRRS Score	90	77	102	92	90	120	65	92	62	107	92
TPH Site Specific Limit (mg/kg)	1,000	2,500	1,000	1,000	1,000	1,000	4,000	1,000	5,500	1,000	1,000
Operator Reported TPH Site Specific Limit (mg/kg)	1,000	none	1,000	WDEQ	1,000	1,000	7,000	1,000	5,500	1,000	1,000

TABLE 11
Pits Summary Data with OCSRRS Criteria Information

Api	TRS	Qtr-Qtr	Well Name	Pit Type	Within 1,320 ft. of WDEQ PGDW	Surficial Geology	USCS Soil Classification	Stream Proximity (feet)	Midvale Ditch Proximity (feet)	Irrigated Land?	SEO Well Proximity (feet)
1306273	Section 20 T3N R3E	SESE	Govt 44-20	Reserve Pit / OBM	N	Twdr	CL	>1475	>1475		1320-1475
1306281	Section 24 T3N R2E	NESW	Woodring 23X-24	Reserve Pit / OBM	N	Qa	CL	>1475	500-1320	Y	>1475
1306336	Section 14 T3N R2E	SESW	Unit 24-14	Reserve & Production Pit / OBM	N	Qa	CL	>1475	<300		500-1320
1306341	Section 13 T3N R2E	NWSW	Unit 13-13	Reserve & Production Pit / OBM	N	Qa	CL	>1475	500-1320	Y	300-500
1306355	Section 11 T3N R2E	SWSW	14-11	Reserve & Production Pit / OBM	N	Qa	SM	>1475	>1475		500-1320
1306357	Section 12 T3N R2E	SWSW	Ora Wells 14-12	Reserve & Production Pit / OBM	N	Qa	CL	>1475	500-1320	Y	1320-1475
1306358	Section 9 T3N R3E	SESE	Govt-Ocean Lake 1	Reserve Pit / Unknown	N	Qa	SM	>1475	>1475		>1475
1306359	Section 7 T3N R2E	NESW	Gov't 23-7	Reserve Pit / OBM	N	Qa	SM	<300	300-500		500-1320
1306363	Section 10 T3N R2E	NWSE	Govt Tribal 33X-10	Reserve & Production Pit / OBM	Y	Qa	SM	>1475	1320-1475	Y	500-1320
1306376	Section 8 T3N R3E	NENW	Govt 21-8	Reserve & Production Pit / OBM	N	Qa	SM	>1475	>1475		>1475
1306387	Section 3 T3N R2E	SESW	Pavillion 24X-3	Reserve & Production Pit / OBM	N	Qa	CL	500-1320	<300		1320-1475
1306388	Section 3 T3N R2E	SWSW	Mae H. Rhodes 1	Reserve Pit / WBM	Y	Qa	CL	>1475	500-1320	Y	500-1320
1306389	Section 1 T3N R2E	SWSW	Tribal Pavillion 14-1	Reserve & Production Pit / OBM	N	Qa	SM	>1475	500-1320	Y	500-1320
1306392	Section 6 T3N R2E	SWSW	Tribal-Pav 14-6	Reserve & Production Pit / OBM	N	Qa	SM	>1475	500-1320		300-500
1306395	Section 2 T3N R2E	NESW	Tribal Pavillion 23-02	Reserve & Production Pit / OBM	N	Qa	CL	>1475	>1475	Y	>1475
1306402	Section 4 T3N R3E	SWNE	Govt 32-4	Reserve Pit / OBM	N	Qa	SM	>1475	>1475		>1475
1306413	Section 5 T3N R3E	NENW	21-05	Reserve & Production Pit / OBM	N	Qa	CL	>1475	>1475	Y	>1475
1308017	Section 17 T3N R2E	SESE	Runner Herefords 44-17	Reserve Pit / OBM	N	Qa	CH	>1475	500-1320	Y	500-1320
1308274	Section 23 T3N R2E	NWNE	Tribal-Unit 2	Reserve Pit / OBM	N	Qa	SC-SM	>1475	500-1320		>1475
1320062	Section 15 T3N R2E	NWNE	Tribal-Pav 31-15	Reserve & Production Pit / OBM	N	Qa	SM	>1475	500-1320	Y	500-1320
1320084	Section 9 T3N R2E	SWNE	Maxson 32-9	Reserve Pit / OBM	Y	Qa	CL	>1475	500-1320	Y	500-1320
1320298	Section 3 T3N R2E	SWSE	W.E. Lloyd 1	Reserve & Production Pit / OBM	Y	Qa	CL	<300	500-1320	Y	<300
1320414	Section 10 T3N R2E	NENE	Unit 41X-10	Reserve & Production Pit / OBM	Y	Qa	CL	>1475	<300	Y	>1475
1320442	Section 11 T3N R2E	SENE	W.H. Paul Patent 42X-11	Reserve & Production Pit / OBM	N	Qa	SM	500-1320	500-1320		>1475
1320443	Section 12 T3N R2E	SENE	Unit 42X-12	Reserve & Production Pit / OBM	N	Qa	SM	300-500	1320-1475		>1475
1320454	Section 2 T3N R2E	NENE	Tribal Pavillion 41X-2	Reserve & Production Pit / OBM	N	Qa	SM	>1475	<300	Y	>1475
1320456	Section 14 T3N R2E	NWNE	Unit 31X-14	Reserve & Production Pit / OBM	N	Qa	SM	>1475	500-1320	Y	300-500
1320457	Section 3 T3N R2E	NWNE	Unit 31X-3	Reserve & Production Pit / OBM	N	Qa	CL	>1475	<300		500-1320
1320491	Section 30 T3N R2E	SESE	Clair C Day 1	Unknown / Unknown	N	Qa	SC	>1475	>1475	Y	<300
1320581	Section 22 T3N R2E	NENE	Unit TR1-22	Reserve Pit / OBM	N	Qa	CL	>1475	>1475	Y	1320-1475
1320586	Section 21 T3N R2E	NENE	Tribal 1-21	Reserve Pit / OBM	N	Qa	SC	>1475	300-500	Y	>1475
1320598	Section 23 T3N R2E	NENW	Taylor Patented 1	Reserve & Production Pit / OBM	N	Qa	CL	>1475	500-1320	Y	>1475
1320654	Section 23 T3N R2E	NWNW	Tribal Unit 1	Reserve Pit / OBM	N	Qa	Wet Alluvium	>1475	>1475	Y	>1475
1320668	Section 4 T3N R2E	SENE	Blankenship 4-8	Reserve & Production Pit / OBM	Y	Qa	CL	500-1320	<300	Y	1320-1475
1320748	Section 11 T3N R3E	SESW	Shoshone-Arapahoe 24-11	Reserve Pit / LSND	N	Twdr	SM	>1475	>1475		>1475
1320764	Section 15 T3N R2E	SESE	Doles Unit 44-15	Reserve & Production Pit / OBM	N	Qa	SM	>1475	>1475	Y	300-500
1320775	Section 24 T3N R2E	NWNW	Tribal 24-4	Reserve & Production Pit / OBM	N	Qa	CL	>1475	<300		>1475
1320854	Section 11 T3N R2E	NENW	Unit 21-11	Reserve & Production Pit / OBM	N	Qa	CL	500-1320	<300		>1475
1320855	Section 13 T3N R2E	SWNW	Tribal Pavillion 12-13	Reserve & Production Pit / OBM	Y	Qa	SM	>1475	<300		500-1320
1320857	Section 14 T3N R2E	NWNW	Tribal Unit 238 11-14	Reserve & Production Pit / OBM	N	Qa	CH	>1475	500-1320		500-1320
1320875	Section 9 T3N R2E	NENE	USA Tribal 41-9	Reserve & Production Pit / OBM	N	Qa	SM	>1475	<300		1320-1475
1320876	Section 10 T3N R2E	SENW	USA Tribal 22-10	Reserve & Production Pit / OBM	Y	Qa	CL	>1475	500-1320		>1475
1320878	Section 12 T3N R2E	SENW	Unit 22-12	Reserve & Production Pit / OBM	Y	Qa	SC	300-500	500-1320		500-1320
1320879	Section 10 T3N R2E	SESE	Unit 44-10	Reserve & Production Pit / OBM	Y	Twdr	CL	>1475	>1475		500-1320

TABLE 11
Pits Summary Data with OCSRRS Criteria Information

Api	TRS	Qtr-Qtr	Well Name	Pit Type	Within 1,320 ft. of WDEQ PGDW	Surficial Geology	USCS Soil Classification	Stream Proximity (feet)	Midvale Ditch Proximity (feet)	Irrigated Land?	SEO Well Proximity (feet)
1320889	Section 15 T3N R2E	NENW	USA Tribal 258 21-15	Reserve & Production Pit / OBM	N	Twdr	CL	>1475	300-500	Y	500-1320
1320965	Section 17 T3N R2E	NWNW	Garrett 1	Reserve Pit / OBM	N	Qa	CL	>1475	>1475	Y	>1475
1321086	Section 17 T3N R2E	SWSE	Finlayson 1-17	Reserve Pit / OBM	N	Qa	CL	>1475	300-500	Y	1320-1475
1321087	Section 4 T3N R2E	NWSW	John K. Coolidge 1-4	Reserve Pit / WBM	N	Qa	CL	>1475	300-500		>1475
1321088	Section 8 T3N R2E	NENW	West Pavillion 1-8-1B	Reserve Pit / OBM	N	Twdr	SM	>1475	500-1320	Y	>1475
1321128	Section 2 T3N R2E	SWSW	Tribal 14-2	Reserve & Production Pit / OBM	Y	Qa	CL-ML	500-1320	<300		300-500
1321129	Section 3 T3N R2E	SWNW	Unit 12-3	Reserve & Production Pit / OBM	N	Qa	CL	<300	500-1320		500-1320
1321130	Section 9 T3N R2E	NENW	Tribal 21-9	Reserve & Production Pit / OBM	Y	Qa	CL	>1475	<300		<300
1321157	Section 17 T3N R2E	SESE	Runner Herefords 1	Reserve Pit / OBM	N	Qa	SM	>1475	500-1320	Y	500-1320
1321302	Section 24 T3N R3E	SESW	Tribal 14-24	Unknown / Unknown	N	Twdr	CL	300-500	500-1320		>1475
1321312	Section 15 T3N R3E	SENW	Ocean Lake Tribal 1-15	Reserve Pit / OBM	N	Qa	CL	500-1320	>1475		>1475
1321669	Section 11 T3N R2E	SWNW	Pavillion Unit 12-11	Cuttings Pit / KCl	Y	Qa	CL	>1475	300-500	Y	500-1320
1321670	Section 11 T3N R2E	NWSE	Pavillion Fee 33-11	Cuttings Pit / LSND	N	Qa	CL	>1475	<300	Y	500-1320
1321676	Section 10 T3N R2E	NWNW	Pavillion 11-10	Cuttings Pit / LSND	N	Qa	CL	>1475	500-1320	Y	>1475
1321682	Section 16 T4N R3E	SWSE	Shoshone-Arapahoe 16-34	Cuttings Pit / KCl	N	Qa	SC-SM	>1475	>1475	Y	>1475
1321692	Section 10 T3N R2E	NESW	Tribal Pavillion 23-10	Cuttings Pit / LSND	Y	Twdr	SC-SM	>1475	500-1320		500-1320
1321696	Section 10 T3N R2E	SENE	Tribal 42-10	Cuttings Pit / KCl	Y	Qa	CL	1320-1475	<300	Y	>1475
1321697	Section 1 T3N R2E	NESW	Tribal Pavillion 23-1	Cuttings Pit / KCl	N	Twdr	SM	>1475	500-1320		500-1320
1321704	Section 10 T3N R2E	NESE	Tribal Pavillion 43-10	Cuttings Pit / KCl	Y	Qa	SM	>1475	>1475	Y	<300
1321840	Section 15 T3N R2E	NENW	Tribal-Pav 15-21X	Cuttings Pit / KCl	N	Qa	CL	>1475	<300		>1475
1321862	Section 10 T3N R2E	NWSE	Tribal Pavillion 33-10	Cuttings Pit / KCl	Y	Twdr	CL	>1475	>1475		<300
1321904	Section 3 T3N R2E	NWSW	Pavillion Fee 13X-3	Cuttings Pit / LSND	Y	Qa	CL	500-1320	500-1320	Y	300-500
1321905	Section 9 T3N R2E	SENE	Pavillion Fee 42X-9	Cuttings Pit / LSND	N	Qa	CL	>1475	300-500		>1475
1321906	Section 3 T3N R2E	SESE	Tribal Pavillion 44-03	Cuttings Pit / LSND	Y	Qa	CL	<300	300-500	Y	500-1320
1321907	Section 3 T3N R2E	NWSE	Tribal Pavillion 33-3	Cuttings Pit / KCl	N	Qa	CL	300-500	500-1320	Y	500-1320
1321968	Section 10 T3N R2E	SENW	Tribal Pavillion 32-10	Cuttings Pit / LSND	Y	Qa	CL	>1475	500-1320	Y	>1475
1322026	Section 1 T3N R2E	SWNE	Tribal Pavillion 32-1	Cuttings Pit / LSND	N	Twdr	SM	>1475	>1475		500-1320
1322027	Section 1 T3N R2E	SESE	Tribal Pavillion 44-1	Cuttings Pit / LSND	N	Twdr	SM	>1475	<300		500-1320
1322100	Section 15 T3N R2E	SENE	Tribal Pavillion 42-15	Cuttings Pit / LSND	N	Qa	SC	>1475	<300	Y	500-1320
1322128	Section 1 T3N R2E	NWSW	Tribal Pavillion 13-1	Cuttings Pit / LSND	N	Twdr	SM	>1475	500-1320		>1475
1322144	Section 1 T3N R2E	NWSE	Tribal Pavillion 33-1	Cuttings Pit / LSND	N	Twdr	SM	>1475	500-1320		<300
1322145	Section 1 T3N R2E	NESE	Tribal Pavillion 43-1	Cuttings Pit / LSND	N	Twdr	SM	>1475	500-1320		500-1320
1322146	Section 1 T3N R2E	SWSE	Tribal Pavillion 34-1	Cuttings Pit / LSND	N	Qa	SM	>1475	<300		500-1320
1322149	Section 10 T3N R2E	SWSE	Tribal Pavillion 34-10	Cuttings Pit / LSND	Y	Twdr	CL	>1475	>1475		500-1320
1322150	Section 12 T3N R2E	NENW	Tribal Pavillion 21-12	Cuttings Pit / LSND	N	Qa	SC	500-1320	>1475		300-500
1322153	Section 3 T3N R2E	NENE	Tribal Pavillion 41-3	Cuttings Pit / LSND	N	Qa	CL	>1475	500-1320		1320-1475
1322172	Section 9 T3N R2E	NWNE	Pavillion Fee 31-9	Cuttings Pit / LSND	Y	Qa	CL	>1475	300-500	Y	<300
1322180	Section 1 T3N R2E	SENW	Tribal Pavillion 22-1	Cuttings Pit / LSND	N	Twdr	SM	>1475	>1475		300-500
1322181	Section 1 T3N R2E	SWNW	Tribal Pavillion 12-1	Cuttings Pit / LSND	N	Twdr	SM	>1475	>1475		500-1320
1322182	Section 2 T3N R2E	SWNW	Tribal Pavillion 12-2	Cuttings Pit / LSND	N	Qa	CL	>1475	>1475	Y	500-1320
1322191	Section 3 T3N R2E	SENE	Tribal Pavillion 42-3	Cuttings Pit / LSND	N	Qa	CL	>1475	500-1320		1320-1475
1322216	Section 14 T3N R2E	NENW	Tribal Pavillion 21-14	Cuttings Pit / LSND	N	Qa	SC-SM	>1475	500-1320		300-500
1322217	Section 10 T3N R2E	NESW	Tribal Pavillion 23-10W	Cuttings Pit / LSND	N	Twdr	SC-SM	>1475	500-1320		500-1320
1322274	Section 10 T3N R2E	NWSE	Tribal Pavillion 33-10B	Cuttings Pit / LSND	Y	Twdr	SM	>1475	>1475		300-500

TABLE 11
Pits Summary Data with OCSRRS Criteria Information

Api	TRS	Qtr-Qtr	Well Name	Pit Type	Within 1,320 ft. of WDEQ PGDW	Surficial Geology	USCS Soil Classification	Stream Proximity (feet)	Midvale Ditch Proximity (feet)	Irrigated Land?	SEO Well Proximity (feet)
1322417	Section 10 T3N R2E	NESW	Tribal Pavillion 23-10B	Cuttings Pit / LSND	Y	Twdr	CL	>1475	500-1320		>1475
1322418	Section 10 T3N R2E	NESW	Tribal Pavillion 23-10C	Cuttings Pit / LSND	Y	Twdr	CL	>1475	500-1320		500-1320
1322420	Section 10 T3N R2E	NESE	Tribal Pavillion 43-10B	Cuttings Pit / LSND	Y	Qa	SM	>1475	>1475		500-1320
1322819	Section 14 T3N R3E	NENW	Haymaker 14-21	Cuttings Pit / KCl	N	Twdr	CL	>1475	>1475		>1475

TABLE 12
Pit Investigation Summary Information

API #	Well Name	Investigation Date	Within 1,320' of WDEQ PGDW	No. of SEO Permits within 1,475 ft.	Clean Up Goal TPH (mg/kg)	Pre-Remediation			Cu. Yards Soil Removed	Max Post-Excavation Soil TPH (mg/kg)	Soil Sample		Groundwater		GW Sample?	Pit Investigation Summary	Assessment	Recommendations	Mineral Ownership
						PID min. (ppm)	PID max. (ppm)	Max. TPH (mg/kg)			Min.[1]	Max.	Min.	Max.					
1320298	W.E. Lloyd 1	Aug-11	Y	2	1,000	0	30.3	390	n/a	n/a	0	12	10.5	11.5	Y	Site assessment in August 2011. Soil TPH-DRO below cleanup level, soil TPH-GRO non-detect, naphthalene detected in one soil sample < current standards. TPH-DRO in one GW sample < cleanup level.	Site Assessment Adequate, No remediation required		Fee
1320668	Blankenship 4-8	Sept-11[2]	Y	1	1,000	0	4,000	32	n/a	n/a	2	12	0.5	6.79	Y	Site assessment in September 2011. Soil TPH-DRO below cleanup level, soil TPH-GRO non-detect, naphthalene > soil and GW cleanup levels. Benzene and TPH-DRO > WDEQ Cleanup Levels in one GW sample, VRP reinstated.	Pit is in VRP		Fee
1320857	Tribal Unit 238 11-14	Nov-06	N	2	4,000	0	10	16	n/a	n/a	6	16	>16	>16	N	Site assessment in November 2006. Soil TPH GRO/DRO < cleanup level; no GW reported.	Site Assessment Not Adequate: shallow stock well may exist near pit; entire pit extent likely not defined	Additional Investigation and Remediation Necessary: define pit extents and follow with soil and, if applicable, groundwater sampling and soil excavation as necessary.	Tribal
1321129	Unit 12-3	May-07	N	1	5,500	0	0	161	n/a	n/a	6	20+	>20+?	>20+?	N	Site assessment in May 2007. Soil TPH GRO/DRO < cleanup level; incorrect site photo and borehole logs in report thus no soil type, depth, or GW occurrence verification.	Site Assessment Potentially Not Adequate: errors in report	Provide replacement report to resolve discrepancies in sketch vs. photos vs. tank location and provide correct borehole logs. Additional recommendations pending review of data.	Tribal
1320855	Tribal Pavillion 12-13	Sept-11	Y	3	1,000	0	0	ND (<4.5)	n/a	n/a	6	10.5	7	9.5	N	Site assessment in September 2011. Soil TPH-GRO, TPH-DRO, BTEX, and SVOC were non-detect. Investigation location based on reports from residents of potential pit location, no evidence of pit found.. Subsequently obtained imagery may show pit location.	Site Assessment Not Adequate: no evidence of pit being located	Additional Investigation and Remediation Necessary: define pit location and extents and follow with soil and, if applicable, groundwater sampling and soil excavation as necessary.	Tribal
1306341	Unit 13-13	Nov-06	N	1	1,000	0	6	16	n/a	n/a	4	7	>7	>7	N	Site assessment in November 2006. Soil TPH GRO/DRO < cleanup level; no GW reported.	Site Assessment Not Adequate: relatively shallow domestic well may exist near pit; entire pit extent likely not defined	Additional Investigation and Remediation Necessary: define pit extents and follow with soil and, if applicable, groundwater sampling and soil excavation as necessary.	Tribal
1306389	Tribal Pavillion 14-1	May-06	N	1	2,500 / 4,000	0	850	unk	1,400	4,890 / 3,790	9	20+	>20+?	>20+?	N	Site assessment in May 2006. Soil excavated, clean up goal stated in report varies 2,500 in pre-remediation table but 4,000 in post-remediation table. Post-excavation soil TPH exceeded 2,500 and 4,000.	Site Assessment and Remediation Not Adequate: WOGCC preliminary re-score indicates TPH cleanup level = 1,000 mg/kg	Additional Investigation and Remediation Necessary: define extent of pit at previously excavated location and follow with soil and, if applicable, groundwater sampling and soil excavation as necessary.	Tribal
1306355	14-11	2006, 2008	N	4	1,000	0	2,000+	unk	940	10,270	unk	unk	unk	unk	Y	Site investigations in 2006 indicated GW impacts, site entered in VRP. Soil removed in 2008, TPH still showed exceedance. Supplemental Site characterization was conducted in August and September 2011 along with quarterly (seasonal) groundwater monitoring from August 2011 through May 2012. Several GW exceedances.	Pit is in VRP		Tribal
		Aug/Sep-11		4	1,000	1.3	2,573	15,200	unk	unk	4	10	5.5	13.02	Y				

TABLE 12
Pit Investigation Summary Information

API #	Well Name	Investigation Date	Within 1,320' of WDEQ PGDW	No. of SEO Permits within 1,475 ft.	Clean Up Goal TPH (mg/kg)	Pre-Remediation			Cu. Yards Soil Removed	Max Post-Excavation Soil TPH (mg/kg)	Soil Sample		Groundwater		GW Sample?	Pit Investigation Summary	Assessment	Recommendations	Mineral Ownership
						PID min. (ppm)	PID max. (ppm)	Max. TPH (mg/kg)			Min.[1]	Max.	Min.	Max.					
1306357	Ora Wells 14-12	Jun-06	N	1	4,000	unk	unk	unk	200	>1,000 and <4,000	unk	unk	unk	unk	unk	Site assessment in June 2006. Excavation of 200 cu yds completed March 2008, second site assessment conducted August 2011, soil samples above cleanup concentration in one boring, GW sample TPH-DRO detections but < standards. October 2012 MW installation confirmed GW concentrations < standards; soil samples from MW boreholes < TPH goal indicating containment of contamination to 2011 investigation area. December 2013 excavation in area of high 2011 TPH, subsequent excavation and confirmation sampling until TPH soil goals met. Closure using treated/tested fill material.	Site Assessment and Remediation Adequate		Fee
		Aug-11		1	1,000	3	2,730	1,740	n/a	n/a	4	12	8	10.5	Y				
		Oct-12 / Dec-13		1	1,000	2	1,303	4,560	1,106	19	6	10	8	9.8	Y				
1321128	Tribal 14-2	Nov-06	Y	4	1,000 / 4,000	0.3	42	unk	50	861	4	12	>12?	>12?	N	Site assessment in November 2006. Soil excavation ~50 cu yds, clean up goal stated in report varies 1,000 in pre-remediation table but 4,000 in post-remediation table, post-excavation soil TPH < cleanup standards.	Site Assessment and Remediation Not Adequate: upgradient of PGDWs; entire pit extent likely not defined	Additional Investigation and Remediation Necessary: define pit extents and follow with soil and, if applicable, groundwater sampling and soil excavation as necessary.	Tribal
1306392	Tribal-Pav 14-6	Dec-06	N	1	2,500	0	0	ND (<14)	120	1,298	5	8	>8?	>8?	N	Site assessment in December 2006. Soil excavation ~ 120 cu yds in April 2007, post-excavation soil TPH < cleanup standards.	Site Assessment and Remediation Adequate contingent upon confirmation of no nearby water well	SEO data indicates permit for domestic well was cancelled (P98491.0W); confirm. Additional recommendations pending.	Tribal
1306413	21-05	Nov-06	N	0	7,000	0	3.2	275	60	327	6	17	>17	>17	N	Site assessment in November 2006. Soil excavation ~ 60 cu yds in April 2007, post-excavation soil TPH < cleanup standards.	Site Assessment and Remediation Adequate		Tribal
1320854	Unit 21-11	Dec-06	N	0	1,000	0	280	757	100	ND (<12)	12	16	12	12	N	Site assessment in December 2006. Soil excavation ~ 100 cu yds in March 2008, post-excavation soil TPH < cleanup standards.	Site Assessment and Remediation Adequate		Tribal
1320889	USA Tribal 258 21-15	Apr-07	N	1	8,500	0	0.8	401	n/a	n/a	3	8	>8?	>8?	N	Site assessment in April 2007. Soil TPH GRO/DRO < cleanup level.	Site Assessment Potentially Not Adequate: domestic well may exist near pit; entire pit extent likely not defined	Confirm presence of domestic well; if exists conduct additional investigation to define pit extents follow with soil and, if applicable, groundwater sampling and soil excavation as necessary.	Tribal
1321130	Tribal 21-9	Aug-11	Y	2	1,000	0.1	299	18,004	n/a	n/a	4	15	15	15	N	Site assessments completed in August 2011, October 2012, and November 2012. GW samples TPH < standards. Soil excavation ~ 8,522 cu yds in October-November 2013. Excavation and confirmation sampling until TPH soil goals met. Closure using treated/tested fill material.	Site Assessment and Remediation Adequate		Tribal
		Oct/Nov-12		2	1,000	0	309	39,700	n/a	n/a	2	20	13	19	Y				
		Oct/Nov-13		2	1,000	no data	no data	1,900	8,522	760	5	18?	no data	no data					
1320876	USA Tribal 22-10	Apr-07	Y	1	7,000	0	0	201	n/a	n/a	1	7	>7	>7	N	Site assessment in April 2007. Soil TPH < cleanup goals.	Site Assessment Not Adequate: Lack of PID confirmation sample and shallow investigation indicates full extent of pit not delineated	Additional Investigation and Remediation Necessary: define pit extent follow with soil and, if applicable, groundwater sampling and soil excavation as necessary.	Tribal

TABLE 12
Pit Investigation Summary Information

API #	Well Name	Investigation Date	Within 1,320' of WDEQ PGDW	No. of SEO Permits within 1,475 ft.	Clean Up Goal TPH (mg/kg)	Pre-Remediation			Cu. Yards Soil Removed	Max Post-Excavation Soil TPH (mg/kg)	Soil Sample		Groundwater		GW Sample?	Pit Investigation Summary	Assessment	Recommendations	Mineral Ownership
						PID min. (ppm)	PID max. (ppm)	Max. TPH (mg/kg)			Min.[1]	Max.	Min.	Max.					
1320878	Unit 22-12	Dec-06	Y	2	2,500	unk	unk	unk	40-60	unk	unk	unk	unk	unk	unk	Site assessment in December 2006. Excavation of 40-60 cu yds in March 2008, second site assessment conducted August 2011, soil and GW samples below cleanup concentrations. Three additional monitoring wells installed in October 2012, sample from one indicated low BTEX concentrations (< standards).	Site Assessment and Remediation Potentially Adequate	Recommendation to conduct follow up groundwater monitoring to confirm continued low BTEX concentrations pending results of WDEQ sampling.	Tribal
		Sept-11		2	1,000	2.6	20.6	41	n/a	n/a	7	13	11	12.5	Y				
		Oct-12		2	1,000	0.5	5.4	850	n/a	n/a	4	17	12.3	15.9	Y				
1306395	Tribal Pavillion 23-02	Nov-06	N	0	1,000	0	1.3	ND (<14)	n/a	n/a	4	16	9.5	10	N	Site assessment in November 2006. Soil TPH < cleanup goals.	Site Assessment Not Adequate: potentially upgradient of PGDW; entire pit extent likely not defined	Additional Investigation and Remediation Necessary: define pit extent follow with soil and, if applicable, groundwater sampling and soil excavation as necessary.	Tribal
1306336	Unit 24-14	Mar-07	N	2	4,000	0	18	3,910	n/a	n/a	2	5	>5?	>5?	N	Site assessment in November 2006. Soil TPH < cleanup goals.	Site Assessment Not Adequate: Two fully adjudicated groundwater rights near; WOGCC preliminary re-score indicates lower cleanup level	Additional Investigation and Remediation Necessary: define pit extent follow with soil and, if applicable, groundwater sampling and soil excavation as necessary.	Tribal
1306387	Pavillion 24X-3	2006-2009	N	1	1,000	0	2,000+	unk	1,000	3,170	wall	floor	7	10	Y	Site assessment in 2006. Excavation of 1000 cu yds in 2008, second site assessment conducted August 2011, soil and GW samples > cleanup concentrations.	Pit is in VRP		Fee
		Sep-11		1	1,000	0	9,999+	unk	5,600	12,000	4	20	6	8	Y				
1320062	Tribal-Pav 31-15	Jun-07	N	2	5,500	0	2,000+	ND (<14)	1,500	70	4	7	>7?	>7?	N	Site assessment in June 2007. Soil excavation ~1,500 cu yds, post-excavation soil TPH < cleanup goal.	Site Assessment and Remediation Potentially Not Adequate: No pre-remediation sample for locale with highest PID; unclear which was excavated & reported as post-remediation	Provide replacement report to define area excavated relative to high PID locations. Additional recommendations pending review of data.	Tribal
1322172	Pavillion Fee 31-9[3]	Sept-11	Y	2	1,000	2.5	6.6	ND (<4.5)	n/a	n/a	0	15	>15	>15	N	Site assessment in August 2011. TPH-GRO, TPH-DRO, and SVOCs were not detected in any of the soil samples collected.	Site Assessment Adequate, No Remediation Required		Fee
1320456	Unit 31X-14	Feb/May-07	N	3	2,500	0	2,000+	unk	260	ND (<14)	4	20+	>20+	>20+	N	Site assessment in February and May 2007. Soil excavation ~ 260 cu ds, post-excavation soil TPH < cleanup goal.	Site Assessment and Remediation Potentially Not Adequate: No Pre-remediation analytical data included in report, not stated in report	Provide all analytical data and any other information pertaining to previous investigation. Further investigation recommended pending review of pre-excavation data.	Tribal
1320457	Unit 31X-3	May-07	N	2	2,500	0	600	4,980?	200	1,505	8	12	>12?	>12?	N	Site assessment in November 2006. Soil excavation ~ 200 cu yds in May 2007. Second site assessment in August 2011, soil TPH > cleanup goal of 1,000, GW TPH < standards and BTEX non-detect. October 2012 MW installation confirmed GW concentrations < standards; soil samples from MW boreholes < TPH goal indicating containment of contamination to 2011 investigation area. December 2013 excavation in area of high 2011 TPH, subsequent excavation and confirmation sampling until TPH soil goals met. Closure using treated/tested fill material.	Site Assessment and Remediation Adequate		Tribal
		Aug-Sep-11		2	1,000	0.4	5,973	1,505	n/a	1,234	8	16	11	14	Y				
		Oct-12 / Nov - 13		2	1,000	1.9	369	1,234	4,192	64	5	19	9	13	Y (Oct-12)				

TABLE 12
Pit Investigation Summary Information

API #	Well Name	Investigation Date	Within 1,320' of WDEQ PGDW	No. of SEO Permits within 1,475 ft.	Clean Up Goal TPH (mg/kg)	Pre-Remediation			Cu. Yards Soil Removed	Max Post-Excavation Soil TPH (mg/kg)	Soil Sample		Groundwater		GW Sample?	Pit Investigation Summary	Assessment	Recommendations	Mineral Ownership
						PID min. (ppm)	PID max. (ppm)	Max. TPH (mg/kg)			Min.[1]	Max.	Min.	Max.					
1306363	Govt Tribal 33X-10	Dec-07	Y	4	1,000	ND	5,780	5,730	560	1,000	4	14	>14?	>14?	N	Site assessment in December 2007. Soil excavation ~560 cu yds, post-excavation TPH met cleanup goal.	Site Assessment and Remediation Not Adequate: Several potential water well impacts	Additional Investigation and Remediation Necessary: define pit extents and follow with soil and, if applicable, groundwater sampling and soil excavation as necessary.	Tribal
1320875	USA Tribal 41-9	May-07	N	1	4,000	0	4	unk	1,200	3,700	0	15	>15?	>15?	N	Site assessment in May 2007. Soil excavation ~ 1,200 cu yds; post-excavation soil TPH < cleanup goal.	Site Assessment and Remediation Not Adequate: Preliminary re-score TPH cleanup level = 2500; close proximity to and probably upgradient of many domestic wells	Additional Investigation and Remediation Necessary: define pit extents and follow with soil and, if applicable, groundwater sampling and soil excavation as necessary.	Tribal
1320414	Unit 41X-10	Dec-07	Y	2	WDEQ	ND	ND	ND	n/a	n/a	0	10	>10?	>10?	domestic	Site assessment in December 2007. Soil TPH < cleanup goal. Domestic GW well sample TPH and BTEX non-detect; sulfate, pH, and TDS concentrations exceed the EPA National Secondary Drinking Water Guidelines.	Site Assessment Not Adequate: No evidence of pit being located and near potential shallow PGDW source	Additional Investigation and Remediation Necessary: locate pit (consider geophysical methods), define pit extents and follow with soil and, if applicable, groundwater sampling and soil excavation as necessary.	Tribal
1320454	Tribal Pavillion 41X-2	Nov-06	N	0	2,500	0	24	1,190	n/a	n/a	4	16	>20	>20	N	Site assessment in November 2006. Soil TPH < cleanup goals.	Site Assessment Adequate, No remediation required		Tribal
1320442	W.H. Paul Patent 42X-11	2006-2008	N	0	1,000	unk	unk	unk	900	273	unk	unk	unk	unk	unk	Site assessment in December 2006. Excavation of ~900 cu yds in September 2008. Second site assessment in August 2011, soil TPH < cleanup goal, soil ethylbenzene > migration to GW standards. GW>standards. Additional GW monitoring wells installed in 2012; numerous VOC detections and exceedances.	Pit is in VRP		Fee
		May-12		0	1,000	0.2	9999+	1869?	900	960	2	20	4.01	14.75	Y				
1320443	Unit 42X-12	May-07	N	0	2,500	0	1,721	379	280	379	6	10	>10?	>10?	N	Site assessment in November 2006. Soil excavation ~280 cu yds in May 2007. Post-excavation soil TPH < cleanup goal. Second site assessment in August 2011, soil TPH < cleanup goal.	Site Assessment Adequate, No remediation required		Tribal
		Sept-11		0	2,500	0	5.3	379	n/a	1,100	4	8	>8	>8	N				
1320879	Unit 44-10	May-07	Y	4	5,500	0	0	ND	60	2,920	4	6	>6	>6	N	Site assessment in 2006-2007. Soil excavation ~60 cu yds, post-excavation soil TPH < cleanup goal.	Site Assessment and Remediation Not Adequate: shallow soil investigation, TPH in soil left in place, several potential groundwater rights near	Additional Investigation and Remediation Necessary: define pit extents and follow with soil and, if applicable, groundwater sampling and soil excavation as necessary.	Tribal
1320764	Doles Unit 44-15	Nov-06	N	2	5,500	0	0	486	n/a	n/a	2	6	>6	>6	N	Site assessment in 2006-2007. Soil TPH < cleanup goal.	Site Assessment Not Adequate: Surrounded by irrigation and close to two permitted SEO rights	Additional Investigation and Remediation Necessary: define pit extent follow with soil sampling to confirm very high TPH was lab error and, if applicable, groundwater sampling and soil excavation as necessary.	Tribal

[1] Soil sample depths may include PID field data
[2] More than one investigation has been conducted at this location
[3] Cuttings / LSND pit; all others Reserve & Production / OBM

TABLE 13

SEO Well Permit Data for Water Wells within 1,475 Feet of Uninvestigated Potassium Chloride and Oil-Based Mud Pits

Cuttings Pits Associated with Potassium Chloride Drilling Fluid

Api	Well Name	Area of Review	SEO Permit #	Review Well ID	Summary WR Status	Uses	Permittee	Priority Date	Facility Name	Total Depth (Ft)	Static Water Level (Ft)
1321669	Pavillion Unit 12-11	Y	No Permit on File	PGDW49	n/a	n/a					
1321669	Pavillion Unit 12-11	Y	P166480.0W			STK	JONATHAN Q. & LYNN D. MIDDELSTADT	4/7/2005	MIDD-2		
1321696	Tribal 42-10	Y	No Permit on File	PGDW30	n/a	n/a					
1321696	Tribal 42-10	Y	No Permit on File	PGDW49	n/a	n/a					
1321697	Tribal Pavillion 23-1	N	P164192.0W		Complete	MON		12/6/2004	PLF #3	80	60.4
1321697	Tribal Pavillion 23-1	N	P164193.0W		Complete	MON		12/6/2004	PLF #2	100	82
1321704	Tribal Pavillion 43-10	Y	P24507.0P		Fully Adjudicated	DOM_GW; STK	MARVIN & EVELYN GRIFFIN	12/31/1942	MILLER #2	750	80
1321704	Tribal Pavillion 43-10	Y	P166480.0W			STK	JONATHAN Q. & LYNN D. MIDDELSTADT	4/7/2005	MIDD-2		
1321704	Tribal Pavillion 43-10	Y	P24508.0P	PGDW23	Fully Adjudicated	STK	MARVIN & EVELYN GRIFFIN	12/31/1964	MILLER #3	175	80
1321704	Tribal Pavillion 43-10	Y	P200885.0W		Incomplete	DOM_GW;STK	CARL RAY PACE	8/16/2013	ROOSTER KEY #1		
1321862	Tribal Pavillion 33-10	Y	P24507.0P		Fully Adjudicated	DOM_GW; STK	MARVIN & EVELYN GRIFFIN	12/31/1942	MILLER #2	750	80
1321862	Tribal Pavillion 33-10	Y	P24506.0P	PGDW44	Fully Adjudicated	DOM_GW; STK	MARVIN & EVELYN GRIFFIN	12/31/1932	MILLER #1	750	90
1321862	Tribal Pavillion 33-10	Y	P24508.0P	PGDW23	Fully Adjudicated	STK	MARVIN & EVELYN GRIFFIN	12/31/1964	MILLER #3	175	80
1321862	Tribal Pavillion 33-10	Y	No Permit on File	PGDW14	n/a	n/a					
1321907	Tribal Pavillion 33-3	N	P98084.0W		Cancelled	STK	FIVE MILE RANCH, L.L.C.	1/3/1995	POWERLINE #2		
1321907	Tribal Pavillion 33-3	N	P89840.0W		Complete	DOM_GW; STK	BILL/ADA HANCOCK	9/17/1992	HILL #1	215	20

Reserve Pits Associated with Invert Drilling Fluid

Api	Well Name	Area of Review	SEO Permit #	Review Well ID	Summary WR Status	Uses	Permittee	Priority Date	Facility Name	Total Depth (Ft)	Static Water Level (Ft)
1306273	Govt 44-20	N	P9334.0P		Fully Adjudicated	DOM_GW; STK	LLOYD BASHORE	12/31/1935	BASHORE #2	20	-1
1306359	Gov't 23-7	N	CR UW09/250			MIS	BETTY COUNTRYMAN	8/19/1977	ED CHOPPING CHEVROLET #2		
1308017	Runner Herefords 44-17	N	P106827.0W		Cancelled	DOM_GW; STK	D. G. FINLAYSON	7/22/1997	FINLAYSON #2		
1308017	Runner Herefords 44-17	N	P120203.0W		Complete	DOM_GW; STK	D. G. FINLAYSON	11/8/1999	Finlayson #3	450	100
1308017	Runner Herefords 44-17	N	P187102.0W		Cancelled	DOM_GW	JOSEPH HALL	6/9/2008	HALL'S #1		
1308017	Runner Herefords 44-17	N	P23056.0P		Fully Adjudicated	DOM_GW; STK	D. G. FINLAYSON	1/4/1960	FINLAYSON #2	65	5
1308017	Runner Herefords 44-17	N	P94540.0W		Cancelled	DOM_GW; STK	D. G. FINLAYSON	2/9/1994	FINLAYSON #2		
1320084	Maxson 32-9	Y	P41517.0W	PGDW42	Fully Adjudicated	DOM_GW; STK		11/29/1977	NEWKIRK #2	200	50
1320084	Maxson 32-9	Y	P98083.0W		Cancelled	STK	FIVE MILE RANCH, L.L.C.	1/3/1995	INDIAN RIDGE #2		
1320581	Unit TR1-22	N	P108128.0W		Complete	DOM_GW; STK	RAY FOXWORTHY	11/5/1997	CROWN HEART #1	379	60
1320581	Unit TR1-22	N	P146856.0W		Complete	STK	RAY FOXWORTHY	9/5/2002	CROWN HEART # 2	380	89
1321086	Finlayson 1-17	N	P65111.0W		Fully Adjudicated	DOM_GW	BERT OR DEBBIE JELLISON	8/3/1983	JELLISION #1	90	45
1321086	Finlayson 1-17	N	P95171.0W		Complete	STK	WESLEY/THELMA CHILDERS	5/9/1994	CHILDERS #2	85	12
1321157	Runner Herefords 1	N	P106827.0W		Cancelled	DOM_GW; STK	D. G. FINLAYSON	7/22/1997	FINLAYSON #2		
1321157	Runner Herefords 1	N	P120203.0W		Complete	DOM_GW; STK	D. G. FINLAYSON	11/8/1999	Finlayson #3	450	100
1321157	Runner Herefords 1	N	P187102.0W		Cancelled	DOM_GW	JOSEPH HALL	6/9/2008	HALL'S #1		
1321157	Runner Herefords 1	N	P23056.0P		Fully Adjudicated	DOM_GW; STK	D. G. FINLAYSON	1/4/1960	FINLAYSON #2	65	5
1321157	Runner Herefords 1	N	P94540.0W		Cancelled	DOM_GW; STK	D. G. FINLAYSON	2/9/1994	FINLAYSON #2		

TABLE 14
Pit Investigation Soil and Groundwater Analytical TPH, BTEX, and Naphthalene Data

								Method	Calc.	8015	8015	8015	8260B	8260B	8260B	8260B	8270C
								WDEQ Residential Soil Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	site-specific	2300	n/a	1.1	5000	5.4	630	3.6
								WDEQ Migration to Groundwater Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	28	n/a	n/a	0.00139	0.406	0.414	6.01	1.61
								Water Cleanup Levels (mg/L)[1]	NA	7.3	1.1/10	n/a	0.005	1	0.7	10	0.729
Gas Well Name	**API #**	**Remediation Stage**	**WOGCC Soil TPH Standard (mg/kg)**	**Sample Name**	**Sample Depth (feet)**	**Sample Date**	**Sample Type**	**SAR**	**TPH GRO**	**TPH DRO**	**TPH**	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**Naphthalene**
Unit 31X-3	1320457	Intermediate	1000	SB-1-11	8-10	8/30/2011	Soils	--	**34**	**1200**	**1234**	--	--	--	--	--
Unit 31X-3	1320457	Intermediate	1000	SB-1-11	10-12	8/30/2011	Soils	--	**66**	**290**	**356**	<0.05	<0.25	<0.05	<0.15	**0.34**
Unit 31X-3	1320457	Intermediate	1000	SB-1-11	12-13	8/30/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Unit 31X-3	1320457	Intermediate	1000	SB-2-11	12-14	8/30/2011	Soils	--	<0.5	**80**	**80**	<0.005	<0.025	<0.005	<0.015	--
Unit 31X-3	1320457	Intermediate	1000	SB-2-11	15-16	8/30/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Unit 31X-3	1320457	Intermediate	1000	SB-3-11	10-12	8/30/2011	Soils	--	**0.63**	**340**	**340.63**	<0.005	<0.025	<0.005	<0.015	--
Unit 31X-3	1320457	Intermediate	1000	SB-3-11	12-13	8/30/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Unit 31X-3	1320457	Intermediate	1000	SB-4-11	12-13	8/30/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Unit 31X-3	1320457	Intermediate	1000	SB-5-11	10-11.5	8/30/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Unit 31X-3	1320457	Intermediate		SB-2-11		9/9/2011	Groundwater	--	**0.3**	**1**	**1.3**	<0.001	<0.005	**0.0024**	<0.003	<0.001
Unit 31X-3	1320457	Intermediate	1000	TMW-1	8-10	10/8/2012	Soils	--	<0.54	**190**	**190**	<0.0054	<0.027	<0.0054	<0.016	--
Unit 31X-3	1320457	Intermediate	1000	TMW-1	12-14	10/8/2012	Soils	--	<0.57	**16**	**16**	<0.0057	<0.028	<0.0057	<0.017	--
Unit 31X-3	1320457	Intermediate	1000	TMW-2	12-14	10/8/2012	Soils	--	<0.56	<4.5	ND	<0.0056	<0.028	<0.0056	<0.017	--
Unit 31X-3	1320457	Intermediate	1000	TMW-3	8-10	10/8/2012	Soils	--	<0.57	<4.6	ND	<0.0057	<0.029	<0.0057	<0.017	--
Unit 31X-3	1320457	Intermediate	1000	MW-1		10/13/2012	Groundwater	--	<0.1	**0.67**	**0.67**	<0.001	<0.005	<0.001	<0.003	--
Unit 31X-3	1320457	Intermediate	1000	TMW-1		10/14/2012	Groundwater	--	<0.1	**1.9**	**1.9**	<0.001	<0.005	<0.001	<0.003	--
Unit 31X-3	1320457	Intermediate	1000	TMW-2		10/13/2012	Groundwater	--	<0.1	**2.7**	**2.7**	<0.001	<0.005	<0.001	<0.003	--
Unit 31X-3	1320457	Intermediate	1000	TMW-3		10/13/2012	Groundwater	--	<0.1	**0.49**	**0.49**	<0.001	<0.005	<0.001	<0.003	--
Unit 31X-3	1320457	Post	1000	SS-C-1		11/15/2013	Soils	--	<0.5	<4	ND	<0.005	<0.025	<0.005	<0.015	--
Unit 31X-3	1320457	Post	1000	SS-C-2		11/13/2013	Soils	--	<5.5	<50	ND	<0.05	<0.1	<0.05	<0.1	--
Unit 31X-3	1320457	Post	1000	SS-C-3-1		11/18/2013	Soils	--	<0.5	**5.4**	**5.4**	<0.005	<0.025	<0.005	<0.015	--
Unit 31X-3	1320457	Post	1000	SS-C-3-2		11/20/2013	Soils	--	<0.5	<4	ND	<0.005	<0.025	<0.005	<0.015	--
Unit 31X-3	1320457	Post	1000	SS-C-3-3		11/20/2013	Soils	--	<0.5	<4	ND	<0.005	<0.025	<0.005	<0.015	--
Unit 31X-3	1320457	Post	1000	SS-C-4		11/13/2013	Soils	--	<5.5	<50	ND	<0.05	<0.1	<0.05	<0.1	--
Unit 31X-3	1320457	Post	1000	SS-C-4-1		11/20/2013	Soils	--	<0.5	<4	ND	<0.005	<0.025	<0.005	<0.015	--
Unit 31X-3	1320457	Post	1000	SS-C-5		11/14/2013	Soils	--	<5	<50	ND	<0.05	<0.1	<0.05	<0.1	--
Unit 31X-3	1320457	Post	1000	SS-C-0B		11/12/2013	Soils	--	<5.5	<50	ND	<0.05	<0.05	<0.05	<0.1	--
Unit 31X-3	1320457	Post	1000	SS-C-0B2		11/15/2013	Soils	--	<0.5	**64**	**64**	<0.005	<0.025	<0.005	<0.015	--
Unit 31X-3	1320457	Post	1000	DUP		11/13/2013	Soils	--	<5.5	<50	ND	<0.05	<0.1	<0.05	<0.1	--
Blankenship 4-8	1320668	Pre	1000	SB-1-11	2-4	9/8/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Blankenship 4-8	1320668	Pre	1000	SB-1-11	6-8	9/8/2011	Soils	--	--	--	--	--	--	--	--	**0.23**
Blankenship 4-8	1320668	Pre	1000	SB-2-11	2-3	9/8/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Blankenship 4-8	1320668	Pre	1000	SB-3-11	2-4	9/8/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Blankenship 4-8	1320668	Pre	1000	SB-3-111	8-10	9/8/2011	Soils	--	--	--	--	--	--	--	--	**5.3**
Blankenship 4-8	1320668	Pre	1000	SB-4-11	2-4	9/8/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Blankenship 4-8	1320668	Pre	1000	SB-5-11	0-1	9/8/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Blankenship 4-8	1320668	Pre	1000	SB-6-11	2-4	9/8/2011	Soils	--	<0.5	**32**	**32**	--	--	--	--	--
Blankenship 4-8	1320668	Pre	1000	SB-6-111	8-12	9/8/2011	Soils	--	--	--	--	--	--	--	--	**0.06**

TABLE 14
Pit Investigation Soil and Groundwater Analytical TPH, BTEX, and Naphthalene Data

								Method	Calc.	8015	8015	8015	8260B	8260B	8260B	8260B	8270C
								WDEQ Residential Soil Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	site-specific	2300	n/a	1.1	5000	5.4	630	3.6
								WDEQ Migration to Groundwater Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	28	n/a	n/a	0.00139	0.406	0.414	6.01	1.61
								Water Cleanup Levels (mg/L)[1]	NA	7.3	1.1/10	n/a	0.005	1	0.7	10	0.729
Gas Well Name	**API #**	**Remediation Stage**	**WOGCC Soil TPH Standard (mg/kg)**	**Sample Name**	**Sample Depth (feet)**	**Sample Date**	**Sample Type**	**SAR**	**TPH GRO**	**TPH DRO**	**TPH**	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**Naphthalene**
Blankenship 4-8	1320668	Pre		SB-1-11		9/8/2011	Groundwater	--	**0.24**	**0.69**	**0.93**	<0.001	<0.005	<0.001	<0.003	<0.001
Blankenship 4-8	1320668	Pre		SB-3-11		9/8/2011	Groundwater	--	**5.2**	**13**	**18.2**	**0.11**	**0.25**	**0.24**	**1.2**	**0.072**
Ora Wells 14-12	1306357	Intermediate	1000	SB-1-11	4-6	8/26/2011	Soils	--	<0.5	**14**	**14**	<0.005	<0.025	<0.005	<0.015	--
Ora Wells 14-12	1306357	Intermediate	1000	SB-2-11	7-8	8/29/2011	Soils	--	**12**	**10**	**22**	<0.005	<0.25	<0.005	<0.015	--
Ora Wells 14-12	1306357	Intermediate	1000	SB-3-11	7-8	8/29/2011	Soils	--	**160**	**1500**	**1660**	--	--	--	--	--
Ora Wells 14-12	1306357	Intermediate	1000	SB-3-11	9-11	8/29/2011	Soils	--	**340**	**1400**	**1740**	<0.1	<0.5	<0.1	<0.3	--
Ora Wells 14-12	1306357	Intermediate	1000	SB-4-11	10-12	8/29/2011	Soils	--	<0.5	<4	ND	<0.005	<0.025	<0.005	<0.015	--
Ora Wells 14-12	1306357	Intermediate	1000	SB-5-11	7.5-8	8/29/2011	Soils	--	<0.5	**46**	**46**	--	--	--	--	--
Ora Wells 14-12	1306357	Intermediate	1000	SB-6-11	4-6	8/26/2011	Soils	--	<0.5	**9.3**	**9.3**	--	--	--	--	--
Ora Wells 14-12	1306357	Intermediate		SB-1-11		9/9/2011	Groundwater	--	<0.1	**0.36**	**0.36**	<0.001	<0.005	<0.001	<0.003	--
Ora Wells 14-12	1306357	Intermediate		SB-3-11		9/9/2011	Groundwater	--	<0.1	**1.2**	**1.2**	<0.001	<0.005	<0.001	<0.003	--
Ora Wells 14-12	1306357	Intermediate	1000	W-3 6-8FT	6-8	10/9/2012	Soils	--	<0.61	**100**	**100**	<0.0061	<0.03	<0.0061	<0.018	--
Ora Wells 14-12	1306357	Intermediate	1000	V-3 8-10FT	8-10	10/9/2012	Soils	--	<0.64	**430**	**430**	<0.0064	<0.032	<0.0064	<0.019	--
Ora Wells 14-12	1306357	Intermediate	1000	W-4 6-8FT	6-8	10/9/2012	Soils	--	<0.58	**270**	**270**	<0.0058	<0.029	<0.0058	<0.017	--
Ora Wells 14-12	1306357	Intermediate	1000	W-5 6-8FT	6-8	10/9/2012	Soils	--	<0.58	<4.6	ND	<0.0058	<0.029	<0.0058	<0.017	--
Ora Wells 14-12	1306357	Intermediate	1000	MW-1		10/13/2012	Groundwater	--	<0.1	**0.68**	**0.68**	<0.001	<0.005	<0.001	<0.003	--
Ora Wells 14-12	1306357	Intermediate	1000	MW-2		10/14/2012	Groundwater	--	<0.1	**1.3**	**1.3**	<0.001	<0.005	<0.001	<0.003	--
Ora Wells 14-12	1306357	Intermediate	1000	TMW-3		10/13/2012	Groundwater	--	<0.1	**1**	**1**	<0.001	<0.005	<0.001	<0.003	--
Ora Wells 14-12	1306357	Intermediate	1000	TMW-4		10/13/2012	Groundwater	--	<0.1	**0.31**	**0.31**	<0.001	<0.005	<0.001	<0.003	--
Ora Wells 14-12	1306357	Intermediate	1000	TMW-5		10/13/2012	Groundwater	--	<0.1	**0.16**	**0.16**	<0.001	<0.005	<0.001	<0.003	--
Ora Wells 14-12	1306357	During Closure	1000	erburden-1	2-12	12/2/2013	Soils	--	<0.5	**26**	**26**	<0.005	<0.025	<0.005	<0.015	--
Ora Wells 14-12	1306357	During Closure	1000	Sidewall-1	2-12	12/3/2013	Soils	--	**7**	**17**	**24**	<0.005	<0.025	<0.005	<0.015	--
Ora Wells 14-12	1306357	During Closure	1000	DUP-1	2-12	12/3/2013	Soils	--	**89**	**43**	**132**	<0.025	<0.12	<0.025	<0.075	--
Ora Wells 14-12	1306357	During Closure	1000	Sidewall-2	2-12	12/3/2013	Soils	--	**260**	**4300**	**4560**	<0.025	<0.12	**0.066**	**0.085**	--
Ora Wells 14-12	1306357	During Closure	1000	Sidewall-3	2-12	12/3/2013	Soils	--	<0.5	<4	ND	<0.005	<0.025	<0.005	<0.015	--
Ora Wells 14-12	1306357	During Closure	1000	Sidewall-4	2-12	12/3/2013	Soils	--	**1.3**	**8.8**	**10.1**	<0.005	<0.025	<0.005	<0.015	--
Ora Wells 14-12	1306357	During Closure	1000	Bottom-1	2-12	12/3/2013	Soils	--	<0.5	<4	ND	<0.005	<0.025	<0.005	<0.015	--
Ora Wells 14-12	1306357	Post	1000	1 (121213)	12	12/12/2013	Soils	--	<0.5	<4	ND	<0.005	<0.025	<0.005	<0.015	--
Ora Wells 14-12	1306357	Post	1000	n-1-121713	2-12	12/17/2013	Soils	--	<0.5	<4	ND	<0.005	<0.025	<0.005	<0.015	--
Ora Wells 14-12	1306357	Post	1000	n-2-121713	2-12	12/17/2013	Soils	--	<0.5	**19**	**19**	<0.005	<0.025	<0.005	<0.015	--
Ora Wells 14-12	1306357	Post	1000	ast-121713	2-12	12/17/2013	Soils	--	<0.5	**8.8**	**8.8**	<0.005	<0.025	<0.005	<0.015	--
Ora Wells 14-12	1306357	Post	1000	t-1-121713	2-12	12/17/2013	Soils	--	<0.5	<4	ND	<0.005	<0.025	<0.005	<0.015	--
Pavillion Fee 31-9	1322172	Pre	1000	SB-1-11	0-1	8/29/2011	Soils	1.9	--	--	--	--	--	--	--	--
Pavillion Fee 31-9	1322172	Pre	1000	SB-1-11	14-15	8/29/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Pavillion Fee 31-9	1322172	Pre	1000	SB-2-11	0-1	8/29/2011	Soils	4.7	--	--	--	--	--	--	--	--
Pavillion Fee 31-9	1322172	Pre	1000	SB-2-11	6-8	8/29/2011	Soils	--	--	--	--	--	--	--	--	--
Pavillion Fee 31-9	1322172	Pre	1000	SB-2-11	14-15	8/29/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Pavillion Fee 31-9	1322172	Pre	1000	SB-3-11	0-1	8/29/2011	Soils	11	--	--	--	--	--	--	--	--

TABLE 14
Pit Investigation Soil and Groundwater Analytical TPH, BTEX, and Naphthalene Data

								Method	Calc.	8015	8015	8015	8260B	8260B	8260B	8260B	8270C
								WDEQ Residential Soil Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	site-specific	2300	n/a	1.1	5000	5.4	630	3.6
								WDEQ Migration to Groundwater Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	28	n/a	n/a	0.00139	0.406	0.414	6.01	1.61
								Water Cleanup Levels (mg/L)[1]	NA	7.3	1.1/10	n/a	0.005	1	0.7	10	0.729
Gas Well Name	**API #**	**Remediation Stage**	**WOGCC Soil TPH Standard (mg/kg)**	**Sample Name**	**Sample Depth (feet)**	**Sample Date**	**Sample Type**	**SAR**	**TPH GRO**	**TPH DRO**	**TPH**	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**Naphthalene**
Pavillion Fee 31-9	1322172	Pre	1000	SB-3-11	13-15	8/29/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Tribal Pavillion 12-13	1320855	Pre	1000	SB-1-111	6-8	8/31/2011	Soils	--	<0.5	<4	ND	<0.005	<0.025	<0.005	<0.015	--
Tribal Pavillion 12-13	1320855	Pre	1000	SB-2-11	7-8	8/31/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Tribal Pavillion 12-13	1320855	Pre	1000	SB-3-11	9-10	8/31/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Tribal Pavillion 12-13	1320855	Pre	1000	SB-4-11	9.5-10.5	8/31/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-1-11	0-1	8/25/2011	Soils	17	--	--	--	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-1-11	13-15	8/25/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-2-11	0-1	8/25/2011	Soils	18	--	--	--	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-2-11	13-15	8/25/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-3-11	0-1	8/26/2011	Soils	5.6	--	--	--	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-3-11	4-6	8/26/2011	Soils	--	**4**	**18000**	**18004**	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-3-111	6-8	8/26/2011	Soils	--	**18**	**11000**	**11018**	<0.05	<0.25	<0.05	<0.15	--
Tribal 21-9	1321130	Pre	1000	SB-3-11	13-15	8/26/2011	Soils	--	<0.5	**47**	**47**	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-4-11	0-1	8/26/2011	Soils	5.9	--	--	--	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-4-11	13-15	8/26/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-5-11	0-1	8/26/2011	Soils	3.4	--	--	--	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-5-11	13-15	8/26/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-6-11	0-1	8/26/2011	Soils	2.9	--	--	--	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-6-11	13-15	8/26/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-7-11	0-1	8/26/2011	Soils	7.7	--	--	--	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-7-11	13-15	8/26/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-8-11	0-1	8/26/2011	Soils	2.2	--	--	--	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-8-11	13-15	8/26/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-9-11	0-1	8/26/2011	Soils	12	--	--	--	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-9-11	13-15	8/26/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-10-11	0-1	8/26/2011	Soils	26	--	--	--	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-10-11	13-15	8/26/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-11-11	0-1	8/26/2011	Soils	21	--	--	--	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-11-11	13-15	8/26/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-12-11	0-1	8/26/2011	Soils	4.2	--	--	--	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-12-11	8-10	8/26/2011	Soils	--	**9.3**	**240**	**249.3**	<0.05	<0.25	<0.05	<0.15	--
Tribal 21-9	1321130	Pre	1000	SB-12-11	13-15	8/26/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-13-11	0-1	8/26/2011	Soils	3.8	--	--	--	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-13-11	13-15	8/26/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-14-11	0-1	8/26/2011	Soils	6.5	--	--	--	--	--	--	--	--
Tribal 21-9	1321130	Pre	1000	SB-14-11	13-15	8/26/2011	Soils	--	<0.5	**4.5**	**4.5**	--	--	--	--	--
Tribal 21-9	1321130	Intermediate	1000	TMW-1	2-6	10/12/2012	Soils	--	**55**	**4400**	**4455**	<0.056	<0.28	<0.056	<0.17	--
Tribal 21-9	1321130	Intermediate	1000	TMW-1R	2-6	10/12/2012	Soils	--	**700**	**39000**	**39700**	<0.3	<1.4	**2.4**	**20**	--

TABLE 14
Pit Investigation Soil and Groundwater Analytical TPH, BTEX, and Naphthalene Data

								Method	Calc.	8015	8015	8015	8260B	8260B	8260B	8260B	8270C
								WDEQ Residential Soil Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	site-specific	2300	n/a	1.1	5000	5.4	630	3.6
								WDEQ Migration to Groundwater Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	28	n/a	n/a	0.00139	0.406	0.414	6.01	1.61
								Water Cleanup Levels (mg/L)[1]	NA	7.3	1.1/10	n/a	0.005	1	0.7	10	0.729
Gas Well Name	**API #**	**Remediation Stage**	**WOGCC Soil TPH Standard (mg/kg)**	**Sample Name**	**Sample Depth (feet)**	**Sample Date**	**Sample Type**	**SAR**	**TPH GRO**	**TPH DRO**	**TPH**	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**Naphthalene**
Tribal 21-9	1321130	Intermediate	1000	TMW-2	16-18	10/12/2012	Soils	--	<0.64	<5.1	ND	<0.0064	<0.032	<0.0064	<0.019	--
Tribal 21-9	1321130	Intermediate	1000	TMW-3	16-18	10/12/2012	Soils	--	<0.63	<5	ND	<0.0063	<0.031	<0.0063	<0.019	--
Tribal 21-9	1321130	Intermediate	1000	TMW-4	18-20	10/12/2012	Soils	--	<0.62	<4.9	ND	<0.0062	<0.031	<0.0062	<0.018	--
Tribal 21-9	1321130	Intermediate	1000	TMW-2		10/13/2012	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	--
Tribal 21-9	1321130	Intermediate	1000	TMW-3		10/13/2012	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	--
Tribal 21-9	1321130	Intermediate	1000	TMW-4		10/14/2012	Groundwater	--	<0.1	**0.88**	**0.88**	<0.001	<0.001	<0.001	<0.003	--
Tribal 21-9	1321130	Intermediate	1000	TMW-1		11/18/2012	Groundwater	--	<0.1	**0.16**	**0.16**	<0.001	<0.005	<0.001	<0.003	--
Tribal 21-9	1321130	Intermediate	1000	SB-15-12	6-8	11/17/2012	Soils	--	<0.53	**4.8**	**4.27**	<0.0053	<0.026	<0.0053	<0.016	--
Tribal 21-9	1321130	Intermediate	1000	SB-15-12	8-10	11/17/2012	Soils	--	<0.57	**1600**	**1599.43**	<0.0057	<0.029	<0.0057	<0.017	--
Tribal 21-9	1321130	Intermediate	1000	SB-15-12	12-14	11/17/2012	Soils	--	<0.64	<5.1	ND	<0.0064	<0.032	<0.0064	<0.019	--
Tribal 21-9	1321130	Intermediate	1000	SB-15-12	20-21	11/17/2012	Soils	--	<0.64	<5.1	ND	<0.0064	<0.032	<0.0064	<0.019	--
Tribal 21-9	1321130	Intermediate	1000	SB-16-12	2-4	11/18/2012	Soils	--	<0.55	**140**	**139.45**	<0.0055	<0.028	<0.0055	<0.016	--
Tribal 21-9	1321130	Intermediate	1000	SB-16-12	4-6	11/18/2012	Soils	--	<0.55	**640**	**639.45**	<0.0055	<0.028	<0.0055	<0.016	--
Tribal 21-9	1321130	Intermediate	1000	SB-16-12	12-14	11/18/2012	Soils	--	<0.64	<5.1	ND	<0.0064	<0.032	<0.0064	<0.019	--
Tribal 21-9	1321130	Intermediate	1000	SB-16-12	16-18	11/18/2012	Soils	--	<0.64	<5.1	ND	<0.0064	<0.032	<0.0064	<0.019	--
Tribal 21-9	1321130	Intermediate	1000	SB-17-12	4-6	11/18/2012	Soils	--	<0.52	<4.1	ND	<0.0052	<0.026	<0.0052	<0.015	--
Tribal 21-9	1321130	Intermediate	1000	SB-17-12	6-8	11/18/2012	Soils	--	<0.56	<4.5	ND	<0.0056	<0.028	<0.0056	<0.017	--
Tribal 21-9	1321130	Intermediate	1000	SB-17-12	10-12	11/18/2012	Soils	--	<0.52	<4.2	ND	<0.0052	<0.026	<0.0052	<0.016	--
Tribal 21-9	1321130	Intermediate	1000	SB-17-12	16-18	11/18/2012	Soils	--	<0.64	<5.1	ND	<0.0064	<0.032	<0.0064	<0.019	--
Tribal 21-9	1321130	Intermediate	1000	SB-18-12	0-2	11/18/2012	Soils	--	--	--	--	<0.0052	<0.026	<0.0052	<0.016	--
Tribal 21-9	1321130	Intermediate	1000	SB-18-12	8-10	11/18/2012	Soils	--	**60**	**5800**	**5860**	<0.0063	<0.031	**0.009**	**0.042**	--
Tribal 21-9	1321130	Intermediate	1000	SB-18-12	10-12	11/18/2012	Soils	--	**180**	**3100**	**3280**	<0.06	<0.3	<0.06	**4**	--
Tribal 21-9	1321130	Intermediate	1000	SB-18-12	14-16	11/18/2012	Soils	--	**7.2**	**4800**	**4807.2**	<0.006	<0.03	<0.006	<0.018	--
Tribal 21-9	1321130	Intermediate	1000	SB-18-12	16-18	11/18/2012	Soils	--	<0.64	**13**	**12.36**	<0.0064	<0.032	<0.0064	<0.019	--
Tribal 21-9	1321130	Intermediate	1000	AUG-02	4-5	11/18/2012	Soils	--	**86**	**6000**	**6086**	--	--	--	<	--
Tribal 21-9	1321130	Intermediate	1000	AUG-03	4-5	11/18/2012	Soils	--	**60**	**21000**	**21060**	--	--	--	<	--
Tribal 21-9	1321130	Intermediate	1000	AUG-04	4-4.5	11/18/2012	Soils	--	**1.6**	**3200**	**3201.6**	--	--	--	<	--
Tribal 21-9	1321130	Intermediate	1000	SS-C-1		10/24/2013	Soils	--	<5.5	**52**	**52**	<0.05	<0.05	<0.05	--	--
Tribal 21-9	1321130	Intermediate	1000	SS-C-2		10/24/2013	Soils	--	**6.5**	**1700**	**1706.5**	<0.05	<0.05	<0.05	--	--
Tribal 21-9	1321130	Post	1000	SS-C-2-2		10/29/2013	Soils	--	**11**	<50	**11**	<0.05	**0.064**	<0.05	--	--
Tribal 21-9	1321130	Post	1000	SS-C-3		10/24/2013	Soils	--	<5.5	**90**	**90**	<0.05	<0.05	<0.05	ND	--
Tribal 21-9	1321130	Post	1000	SS-C-4		10/24/2013	Soils	--	**7.7**	**53**	**60.7**	<0.05	<0.05	<0.05	ND	--
Tribal 21-9	1321130	Post	1000	SS-C-5-1		11/1/2013	Soils	--	**6.1**	**160**	**166.1**	<0.05	**0.075**	<0.05	**0.11**	--
Tribal 21-9	1321130	Intermediate	1000	SS-C-5-2		11/1/2013	Soils	--	<5.5	**1900**	**1900**	<0.05	<0.05	<0.05	ND	--
Tribal 21-9	1321130	Post	1000	SS-C-5-2-2		11/5/2013	Soils	--	<5.5	**460**	**460**	<0.05	<0.05	<0.05	ND	--
Tribal 21-9	1321130	Post	1000	SS-C-5-3		11/4/2013	Soils	--	**7.3**	**750**	**757.3**	<0.05	**0.092**	<0.05	ND	--
Tribal 21-9	1321130	Post	1000	SS-C-5-4		11/2/2013	Soils	--	<5.5	<50	ND	<0.05	<0.05	<0.05	ND	--
Tribal 21-9	1321130	Post	1000	SS-C-6		10/25/2013	Soils	--	<5.5	<50	ND	<0.05	<0.05	<0.05	ND	--

TABLE 14
Pit Investigation Soil and Groundwater Analytical TPH, BTEX, and Naphthalene Data

							Method	Calc.	8015	8015	8015	8260B	8260B	8260B	8260B	8270C
							WDEQ Residential Soil Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	site-specific	2300	n/a	1.1	5000	5.4	630	3.6
							WDEQ Migration to Groundwater Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	28	n/a	n/a	0.00139	0.406	0.414	6.01	1.61
							Water Cleanup Levels (mg/L)[1]	NA	7.3	1.1/10	n/a	0.005	1	0.7	10	0.729
Gas Well Name	**API #**	**Remediation Stage**	**WOGCC Soil TPH Standard (mg/kg)**	**Sample Name**	**Sample Depth (feet)**	**Sample Date**	**Sample Type**	**SAR**	**TPH GRO**	**TPH DRO**	**TPH**	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**Naphthalene**
Tribal 21-9	1321130	Post	1000	SS-C-7		10/25/2013	Soils	--	<5.5	**51**	**51**	<0.05	<0.05	<0.05	ND	--
Tribal 21-9	1321130	Post	1000	SS-C-8		10/28/2013	Soils	--	**7.7**	**680**	**687.7**	<0.05	**0.085**	<0.05	ND	--
Tribal 21-9	1321130	Post	1000	SS-C-9		10/28/2013	Soils	--	**8.3**	<50	**8.3**	<0.05	**0.094**	<0.05	ND	--
Tribal 21-9	1321130	Post	1000	SS-C-10		10/30/2013	Soils	--	**8.7**	**110**	**118.7**	<0.05	**0.081**	<0.05	ND	--
Tribal 21-9	1321130	Post	1000	SS-C-11		10/28/2013	Soils	--	**7.9**	<50	**7.9**	<0.05	**0.085**	<0.05	ND	--
Tribal 21-9	1321130	Intermediate	1000	SS-C-12		10/31/2013	Soils	--	**5.8**	**1400**	**1405.8**	<0.05	**0.15**	<0.05	**0.14**	--
Tribal 21-9	1321130	Intermediate	1000	SS-C-12-2		11/4/2013	Soils	--	<5.5	**1200**	**1200**	<0.05	<0.05	<0.05	ND	--
Tribal 21-9	1321130	Post	1000	SS-C-12-3		11/6/2013	Soils	--	<5.5	**110**	**110**	<0.05	<0.1	<0.05	ND	--
Tribal 21-9	1321130	Post	1000	Overburden		11/4/2013	Soils	--	**6.7**	**58**	**64.7**	<0.05	**0.087**	<0.05	ND	--
Tribal 21-9	1321130	Post	1000	DMP-01		10/25/2013	Soils	--	<5.5	<50	ND	<0.05	<0.05	<0.05	ND	--
Unit 22-12	1320878	Post	1000	SB-1-11	7-8	8/29/2011	Soils	--	--	--	--	<0.05	<0.25	<0.05	<0.15	--
Unit 22-12	1320878	Post	1000	SB-1-11	10-12	8/29/2011	Soils	--	<0.5	**41**	**41**	--	--	--	--	--
Unit 22-12	1320878	Post	1000	SB-2-11	11-12	8/29/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Unit 22-12	1320878	Post	1000	SB-3-11	12-13	8/29/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Unit 22-12	1320878	Post	1000	SB-4-11	10-12	8/29/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Unit 22-12	1320878	Post	1000	SB-5-11	10-12	8/29/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Unit 22-12	1320878	Post	1000	TMW-1-12	4-6	10/11/2012	Soils	--	<0.55	**340**	**340**	--	--	--	--	--
Unit 22-12	1320878	Post	1000	TMW-1-12	10-12	10/11/2012	Soils	--	<0.6	**8.4**	**8.4**	--	--	--	--	--
Unit 22-12	1320878	Post	1000	TMW-2-12	10-12	10/11/2012	Soils	--	<0.53	<4.2	ND	--	--	--	--	--
Unit 22-12	1320878	Post	1000	TMW-2-12	16-17	10/11/2012	Soils	--	**120**	**730**	**850**	--	--	--	--	--
Unit 22-12	1320878	Post	1000	TMW-3-12	10-12	10/11/2012	Soils	--	<0.58	<4.6	ND	--	--	--	--	--
Unit 22-12	1320878	Post		SB-5-11		9/9/2011	Groundwater	--	<0.1	**2.2**	**2.2**	<0.001	<0.005	<0.001	<0.003	--
Unit 22-12	1320878	Post	1000	MW-1		10/14/2012	Groundwater	--	<0.1	**3.5**	**3.5**	<0.001	<0.005	<0.001	<0.003	--
Unit 22-12	1320878	Post	1000	TMW-1-12		10/14/2012	Groundwater	--	<0.1	**0.2**	**0.2**	<0.001	<0.005	<0.001	<0.003	--
Unit 22-12	1320878	Post	1000	TMW-2-12		10/13/2012	Groundwater	--	**2.9**	**2.5**	**5.4**	<0.001	<0.005	**0.12**	**0.61**	--
Unit 22-12	1320878	Post	1000	TMW-3-12		10/14/2012	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	--
Unit 42X-12	1320443	Post	2500	SB-1-11	7-8	8/31/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Unit 42X-12	1320443	Post	2500	SB-2-11	6-8	8/31/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Unit 42X-12	1320443	Post	2500	SB-3-11	6-7	8/31/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
Unit 42X-12	1320443	Post	2500	SB-4-111	4-5	8/31/2011	Soils	--	<0.5	**1100**	**1100**	<0.005	<0.025	<0.005	<0.015	--
Unit 42X-12	1320443	Post	2500	SB-5-11	4-6	8/31/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
W.E. Lloyd 1	1320298	Pre	1000	SB-1-11	0-1	8/30/2011	Soils	12	--	--	--	--	--	--	--	--
W.E. Lloyd 1	1320298	Pre	1000	SB-1-11	11-12	8/30/2011	Soils	--	<0.5	**40**	**40**	--	--	--	--	--
W.E. Lloyd 1	1320298	Pre	1000	SB-2-11	0-1	8/30/2011	Soils	2.6	--	--	--	--	--	--	--	--
W.E. Lloyd 1	1320298	Pre	1000	SB-2-11	11-12	8/30/2011	Soils	--	<0.5	**7.4**	**7.4**	--	--	--	--	--
W.E. Lloyd 1	1320298	Pre	1000	SB-3-11	0-1	8/30/2011	Soils	2	--	--	--	--	--	--	--	--
W.E. Lloyd 1	1320298	Pre	1000	SB-3-11	10-12	8/30/2011	Soils	--	<0.5	**57**	**57**	--	--	--	--	--
W.E. Lloyd 1	1320298	Pre	1000	SB-4-11	0-1	8/30/2011	Soils	1.2	--	--	--	--	--	--	--	--

TABLE 14
Pit Investigation Soil and Groundwater Analytical TPH, BTEX, and Naphthalene Data

							Method	Calc.	8015	8015	8015	8260B	8260B	8260B	8260B	8270C
							WDEQ Residential Soil Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	site-specific	2300	n/a	1.1	5000	5.4	630	3.6
							WDEQ Migration to Groundwater Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	28	n/a	n/a	0.00139	0.406	0.414	6.01	1.61
							Water Cleanup Levels (mg/L)[1]	NA	7.3	1.1/10	n/a	0.005	1	0.7	10	0.729
Gas Well Name	**API #**	**Remediation Stage**	**WOGCC Soil TPH Standard (mg/kg)**	**Sample Name**	**Sample Depth (feet)**	**Sample Date**	**Sample Type**	**SAR**	**TPH GRO**	**TPH DRO**	**TPH**	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**Naphthalene**
W.E. Lloyd 1	1320298	Pre	1000	SB-4-11	11-12	8/30/2011	Soils	--	<0.5	**260**	**260**	--	--	--	--	--
W.E. Lloyd 1	1320298	Pre	1000	SB-5-11	0-1	8/30/2011	Soils	1.3	--	--	--	--	--	--	--	--
W.E. Lloyd 1	1320298	Pre	1000	SB-5-11	11-12	8/30/2011	Soils	--	<0.5	**390**	**390**	--	--	--	--	**0.22**
W.E. Lloyd 1	1320298	Pre	1000	SB-6-11	0-1	8/30/2011	Soils	0.99	--	--	--	--	--	--	--	--
W.E. Lloyd 1	1320298	Pre	1000	SB-6-11	11.5-12	8/30/2011	Soils	--	<0.5	**190**	**190**	--	--	--	--	--
W.E. Lloyd 1	1320298	Pre	1000	SB-7-11	0-1	8/30/2011	Soils	1	--	--	--	--	--	--	--	--
W.E. Lloyd 1	1320298	Pre	1000	SB-7-11	11-12	8/30/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
W.E. Lloyd 1	1320298	Pre	1000	SB-8-11	0-1	8/30/2011	Soils	1	--	--	--	--	--	--	--	--
W.E. Lloyd 1	1320298	Pre	1000	SB-8-11	11-12	8/30/2011	Soils	--	<0.5	**7.1**	**7.1**	--	--	--	--	--
W.E. Lloyd 1	1320298	Pre		SB-4-11		9/8/2011	Groundwater	--	<0.1	**0.32**	**0.32**	<0.001	<0.005	<0.001	<0.003	<0.001
W.E. Lloyd 1	1320298	Pre		SB-5-11		9/8/2011	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	<0.001
Unit 41X-10	1320414	Pre	Trench 1 thru 7		composite	12/7/2007	Soils	--	<4	<10	ND	--	--	--	--	--
Unit 41X-10	1320414	Pre	Zoe Ann Randall - A			12/7/2007	Groundwater	--	<0.036	<1	ND	<0.005	<0.005	<0.005	ND	--
Unit 41X-10	1320414	Pre	Zoe Ann Randall - B			12/7/2007	Groundwater	--	<0.036	<1	ND	<0.005	<0.005	<0.005	ND	--
14-11	1306355	Intermediate/VRP	1000	SB-1-11	4-6	8/24/2011	Soils	--	**520**	**1100**	**1620**	<0.068	<1	**1.2**	**1.1**	**4.4**
14-11	1306355	Intermediate/VRP	1000	SB-2-11	4-6	8/24/2011	Soils	--	**7400**	**7800**	**15200**	<0.17	<2.5	**5.1**	**5.1**	**15**
14-11	1306355	Intermediate/VRP	1000	SB-3-11	4-6	8/24/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
14-11	1306355	Intermediate/VRP	1000	SB-4-11	4-6	8/24/2011	Soils	--	<0.5	**6**	**6**	--	--	--	--	--
14-11	1306355	Intermediate/VRP	1000	SB-5-11	7-9	9/7/2011	Soils	--	**1400**	**1600**	**3000**	<0.05	<0.25	**0.27**	<0.15	<1.6
14-11	1306355	Intermediate/VRP	1000	SB-5-11	9-10	9/7/2011	Soils	--	**3700**	**5000**	**8700**	<0.5	<2.5	**1.8**	**2**	**7**
14-11	1306355	Intermediate/VRP	1000	SB-6-11	4-6	8/24/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
14-11	1306355	Intermediate/VRP	1000	SB-7-11	4-6	8/24/2011	Soils	--	<0.5	**6.5**	**6.5**	--	--	--	--	--
14-11	1306355	Intermediate/VRP	1000	SB-8-11	4-6	8/24/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
14-11	1306355	Intermediate/VRP	1000	SB-9-11	4-6	8/24/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
14-11	1306355	Intermediate/VRP	1000	SB-10-11	4-6	8/25/2011	Soils	--	<0.5	<4	ND	--	--	--	--	--
14-11	1306355	Intermediate/VRP	1000	SB-11-11	2-4	8/24/2011	Soils	--	**38**	**7100**	**7138**	--	--	--	--	<1.6
14-11	1306355	Intermediate/VRP	1000	SB-12-11	4-6	8/24/2011	Soils	--	**2700**	**330**	**3030**	--	--	--	--	**4**
14-11	1306355	Intermediate/VRP		MW-1		7/17/2007	Groundwater	--	**0.672**	ND	**0.672**	<	<	<	<	ND
14-11	1306355	Intermediate/VRP		MW-1		5/7/2008	Groundwater	--	**0.415**	ND	**0.415**	<	<	**0.0098**	**0.002**	ND
14-11	1306355	Intermediate/VRP		MW-1		10/29/2008	Groundwater	--	**0.183**	ND	**0.183**	ND	ND	ND	ND	ND
14-11	1306355	Intermediate/VRP		MW-1		3/6/2009	Groundwater	--	**0.482**	<1.1	**0.482**	<0.002	<0.002	**0.015**	**0.0029**	<0.002
14-11	1306355	Intermediate/VRP		MW-1		11/1/2009	Groundwater	--	**0.2**	ND	**0.2**	ND	ND	**0.0011**	ND	--
14-11	1306355	Intermediate/VRP		MW-1		4/12/2010	Groundwater	--	**0.272**	**0.59**	**0.862**	**0.00058**	<0.001	**0.012**	**0.0033**	--
14-11	1306355	Intermediate/VRP		MW-1		10/8/2010	Groundwater	--	**0.047**	<0.3	**0.047**	<0.001	<0.001	<0.001	<0.001	--
14-11	1306355	Intermediate/VRP		MW-1		8/9/2011	Groundwater	--	<0.1	<0.1	ND	<0.005	<0.005	<0.001	<0.003	<0.005
14-11	1306355	Intermediate/VRP		MW-1		11/3/2011	Groundwater	--	<0.1	**0.46**	**0.46**	<0.001	<0.005	<0.001	<0.003	<0.005
14-11	1306355	Intermediate/VRP		MW-1		1/27/2012	Groundwater	--	**0.4**	**0.44**	**0.84**	<0.001	<0.005	**0.0089**	<0.003	<0.005
14-11	1306355	Intermediate/VRP		MW-1		5/9/2012	Groundwater	--	**0.19**	**0.21**	**0.4**	<0.001	<0.005	**0.0081**	<0.003	--

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								Method	Calc.	8015	8015	8015	8260B	8260B	8260B	8260B	8270C
								WDEQ Residential Soil Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	site-specific	2300	n/a	1.1	5000	5.4	630	3.6
								WDEQ Migration to Groundwater Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	28	n/a	n/a	0.00139	0.406	0.414	6.01	1.61
								Water Cleanup Levels (mg/L)[1]	NA	7.3	1.1/10	n/a	0.005	1	0.7	10	0.729
Gas Well Name	**API #**	**Remediation Stage**	**WOGCC Soil TPH Standard (mg/kg)**	**Sample Name**	**Sample Depth (feet)**	**Sample Date**	**Sample Type**	**SAR**	**TPH GRO**	**TPH DRO**	**TPH**	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**Naphthalene**
14-11	1306355	Intermediate/VRP		MW-2		7/17/2007	Groundwater	--	ND	ND	ND	<	<	<	<	--
14-11	1306355	Intermediate/VRP		MW-2		5/7/2008	Groundwater	--	ND	ND	ND	ND	ND	ND	ND	ND
14-11	1306355	Intermediate/VRP		MW-2		10/29/2008	Groundwater	--	ND	**0.0079**	**0.0079**	ND	ND	ND	ND	ND
14-11	1306355	Intermediate/VRP		MW-2		3/6/2009	Groundwater	--	<0.08	<1.1	ND	<0.002	<0.002	<0.002	<0.002	<0.002
14-11	1306355	Intermediate/VRP		MW-2		11/1/2009	Groundwater	--	ND	ND	ND	ND	ND	ND	ND	ND
14-11	1306355	Intermediate/VRP		MW-2		4/12/2010	Groundwater	--	-20	<0.3	ND	<0.001	<0.001	<0.001	<0.001	--
14-11	1306355	Intermediate/VRP		MW-2		10/8/2010	Groundwater	--	<0.02	<0.3	ND	<0.001	<0.001	<0.001	<0.001	--
14-11	1306355	Intermediate/VRP		MW-2		10/8/2010	Groundwater	--	<0.02	<0.3	ND	<0.001	<0.001	<0.001	<0.001	--
14-11	1306355	Intermediate/VRP		MW-2		8/9/2011	Groundwater	--	<0.1	<0.1	ND	<0.005	<0.005	<0.001	<0.003	<0.005
14-11	1306355	Intermediate/VRP		MW-2		11/3/2011	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	<0.005
14-11	1306355	Intermediate/VRP		MW-2		1/27/2012	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	<0.005
14-11	1306355	Intermediate/VRP		MW-2		5/9/2012	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	--
14-11	1306355	Intermediate/VRP		MW-3		7/17/2007	Groundwater	--	**2.38**	**25**	**27.38**	<	<	<	<	--
14-11	1306355	Intermediate/VRP		MW-3		5/7/2008	Groundwater	--	**1.92**	**70**	**71.92**	**0.115**	ND	ND	**0.013**	**0.213**
14-11	1306355	Intermediate/VRP		MW-3		10/29/2008	Groundwater	--	**0.446**	ND	**0.446**	**0.022**	ND	ND	ND	**0.069**
14-11	1306355	Intermediate/VRP		MW-3		3/6/2009	Groundwater	--	**1.88**	**25**	**26.88**	**0.222**	<0.002	**0.0044**	**0.036**	**0.194**
14-11	1306355	Intermediate/VRP		MW-3		11/1/2009	Groundwater	--	**0.53**	**7.3**	**7.83**	**0.047**	ND	**0.0062**	**0.0048**	--
14-11	1306355	Intermediate/VRP		MW-3		4/12/2010	Groundwater	--	**1.09**	**52**	**53.09**	**0.234**	**0.00037**	**0.039**	**0.028**	--
14-11	1306355	Intermediate/VRP		MW-3		10/8/2010	Groundwater	--	**1.39**	**60**	**61.39**	**0.267**	**0.00042**	**0.032**	**0.024**	--
14-11	1306355	Intermediate/VRP		MW-3		8/9/2011	Groundwater	--	**2.5**	**4.3**	**6.8**	**0.31**	<0.005	**0.042**	**0.028**	**0.11**
14-11	1306355	Intermediate/VRP		MW-3		11/3/2011	Groundwater	--	**2**	**40**	**42**	**0.25**	**0.015**	**0.06**	**0.068**	**0.19**
14-11	1306355	Intermediate/VRP		MW-3		1/27/2012	Groundwater	--	**2.6**	**31**	**33.6**	**0.3**	<0.025	**0.05**	**0.054**	**0.14**
14-11	1306355	Intermediate/VRP		MW-3		5/9/2012	Groundwater	--	**3.6**	**78**	**81.6**	**0.35**	**0.0095**	**0.056**	**0.065**	--
14-11	1306355	Intermediate/VRP		MW-4		5/7/2008	Groundwater	--	ND	ND	ND	ND	ND	ND	ND	ND
14-11	1306355	Intermediate/VRP		MW-4		10/29/2008	Groundwater	--	ND	ND	ND	ND	ND	ND	ND	ND
14-11	1306355	Intermediate/VRP		MW-4		3/6/2009	Groundwater	--	<0.08	<1.1	ND	<0.002	<0.002	<0.002	<0.002	<0.002
14-11	1306355	Intermediate/VRP		MW-4		11/1/2009	Groundwater	--	ND	ND	ND	ND	ND	ND	ND	--
14-11	1306355	Intermediate/VRP		MW-4		4/12/2010	Groundwater	--	-20	<0.3	ND	<0.001	<0.001	<0.001	<0.001	--
14-11	1306355	Intermediate/VRP		MW-4		10/7/2010	Groundwater	--	<0.02	<0.3	ND	<0.001	<0.001	<0.001	<0.001	--
14-11	1306355	Intermediate/VRP		MW-4		8/9/2011	Groundwater	--	<0.1	<0.1	ND	<0.005	<0.005	<0.001	<0.003	<0.005
14-11	1306355	Intermediate/VRP		MW-4		11/3/2011	Groundwater	--	<0.1	**0.26**	**0.26**	<0.001	<0.005	<0.001	<0.003	<0.005
14-11	1306355	Intermediate/VRP		MW-4		1/27/2012	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	<0.005
14-11	1306355	Intermediate/VRP		MW-4		5/9/2012	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	--
14-11	1306355	Intermediate/VRP		MW-5		5/7/2008	Groundwater	--	ND	ND	ND	ND	ND	ND	ND	ND
14-11	1306355	Intermediate/VRP		MW-5		10/29/2008	Groundwater	--	ND	ND	ND	ND	ND	ND	ND	ND
14-11	1306355	Intermediate/VRP		MW-5		3/6/2009	Groundwater	--	<0.08	<1.1	ND	<0.002	<0.002	<0.002	<0.002	<0.002
14-11	1306355	Intermediate/VRP		MW-5		11/1/2009	Groundwater	--	**0.033**	ND	**0.033**	ND	ND	ND	ND	--
14-11	1306355	Intermediate/VRP		MW-5		4/12/2010	Groundwater	--	-20	**0.38**	**0.38**	<0.001	<0.001	<0.001	<0.001	--

TABLE 14
Pit Investigation Soil and Groundwater Analytical TPH, BTEX, and Naphthalene Data

								Method	Calc.	8015	8015	8015	8260B	8260B	8260B	8260B	8270C
								WDEQ Residential Soil Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	site-specific	2300	n/a	1.1	5000	5.4	630	3.6
								WDEQ Migration to Groundwater Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	28	n/a	n/a	0.00139	0.406	0.414	6.01	1.61
								Water Cleanup Levels (mg/L)[1]	NA	7.3	1.1/10	n/a	0.005	1	0.7	10	0.729
Gas Well Name	**API #**	**Remediation Stage**	**WOGCC Soil TPH Standard (mg/kg)**	**Sample Name**	**Sample Depth (feet)**	**Sample Date**	**Sample Type**	**SAR**	**TPH GRO**	**TPH DRO**	**TPH**	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**Naphthalene**
14-11	1306355	Intermediate/VRP		MW-5		10/7/2010	Groundwater	--	**0.039**	**0.68**	**0.719**	<0.001	<0.001	<0.001	<0.001	--
14-11	1306355	Intermediate/VRP		MW-5		8/9/2011	Groundwater	--	<0.1	<0.1	ND	<0.005	<0.005	<0.001	<0.003	<0.005
14-11	1306355	Intermediate/VRP		MW-5		11/2/2011	Groundwater	--	<0.1	**0.2**	**0.2**	<0.001	<0.005	<0.001	<0.003	<0.005
14-11	1306355	Intermediate/VRP		MW-5		1/27/2012	Groundwater	--	**0.15**	**0.35**	**0.5**	<0.001	<0.005	<0.001	<0.003	<0.005
14-11	1306355	Intermediate/VRP		MW-5		5/9/2012	Groundwater	--	**0.16**	**0.63**	**0.79**	<0.001	<0.005	<0.001	<0.003	--
14-11	1306355	Intermediate/VRP		MW-6		10/29/2008	Groundwater	--	**14.3**	**36**	**50.3**	**0.472**	ND	**0.107**	ND	**0.313**
14-11	1306355	Intermediate/VRP		MW-6		3/6/2009	Groundwater	--	**8.6**	**41**	**49.6**	**0.363**	<0.002	**0.00322**	**0.022**	**0.486**
14-11	1306355	Intermediate/VRP		MW-6		11/1/2009	Groundwater	--	**6.2**	**4**	**10.2**	**0.5**	ND	**0.025**	ND	--
14-11	1306355	Intermediate/VRP		MW-6		4/12/2010	Groundwater	--	**1.9**	**4.3**	**6.2**	**0.44**	**0.00018**	**0.097**	**0.029**	--
14-11	1306355	Intermediate/VRP		MW-6		10/8/2010	Groundwater	--	**3.55**	**40**	**43.55**	**0.476**	**0.00056**	**0.138**	**0.046**	--
14-11	1306355	Intermediate/VRP		MW-6		8/9/2011	Groundwater	--	**91.1**	<0.1	**91.1**	**0.37**	<0.005	**0.093**	**0.02**	**0.15**
14-11	1306355	Intermediate/VRP		MW-6		11/2/2011	Groundwater	--	**2.1**	**16**	**18.1**	**0.58**	<0.005	**0.14**	**0.033**	**0.19**
14-11	1306355	Intermediate/VRP		MW-6		1/27/2012	Groundwater	--	**1.8**	**18**	**19.8**	**0.34**	<0.025	**0.11**	**0.026**	**0.15**
14-11	1306355	Intermediate/VRP		MW-6		5/9/2012	Groundwater	--	**2**	**32**	**34**	**0.28**	<0.025	**0.1**	**0.024**	--
14-11	1306355	Intermediate/VRP		MW-7		10/29/2008	Groundwater	--	**1.13**	**8.3**	**9.43**	ND	ND	ND	ND	**0.0053**
14-11	1306355	Intermediate/VRP		MW-7		3/6/2009	Groundwater	--	**1.63**	**6**	**7.63**	**0.063**	<0.002	**0.0023**	**0.0068**	**0.056**
14-11	1306355	Intermediate/VRP		MW-7		11/1/2009	Groundwater	--	**1.5**	**8.1**	**9.6**	**0.26**	ND	**0.12**	**0.053**	--
14-11	1306355	Intermediate/VRP		MW-7		4/12/2010	Groundwater	--	**0.507**	**11**	**11.507**	**0.156**	<0.001	**0.189**	**0.0097**	--
14-11	1306355	Intermediate/VRP		MW-7		10/7/2010	Groundwater	--	**1.96**	**18**	**19.96**	**0.164**	<0.001	**0.126**	**0.032**	--
14-11	1306355	Intermediate/VRP		MW-7		8/9/2011	Groundwater	--	**1.7**	**8.8**	**10.5**	**0.17**	<0.005	**0.13**	**0.018**	**0.053**
14-11	1306355	Intermediate/VRP		MW-7		11/3/2011	Groundwater	--	**1.1**	**18**	**19.1**	**0.12**	<0.005	**0.19**	**0.033**	**0.012**
14-11	1306355	Intermediate/VRP		MW-7		1/27/2012	Groundwater	--	**3.2**	**28**	**31.2**	**0.2**	<0.005	**0.016**	**0.032**	**0.019**
14-11	1306355	Intermediate/VRP		MW-7		5/9/2012	Groundwater	--	**1.2**	**16**	**17.2**	**0.064**	<0.005	**0.084**	**0.0088**	--
14-11	1306355	Intermediate/VRP		MW-8		3/5/2009	Groundwater	--	**0.311**	<1.1	**0.311**	<0.002	<0.002	<0.002	<0.002	<0.002
14-11	1306355	Intermediate/VRP		MW-8		4/12/2010	Groundwater	--	**0.068**	**1.1**	**1.168**	<0.001	<0.001	<0.001	<0.001	--
14-11	1306355	Intermediate/VRP		MW-8		10/8/2010	Groundwater	--	**0.044**	<0.3	**0.044**	<0.001	<0.001	<0.001	<0.001	--
14-11	1306355	Intermediate/VRP		MW-8		8/9/2011	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	<0.005
14-11	1306355	Intermediate/VRP		MW-8		11/2/2011	Groundwater	--	<0.1	**0.12**	**0.12**	<0.001	<0.005	<0.001	<0.003	<0.005
14-11	1306355	Intermediate/VRP		MW-8		1/27/2012	Groundwater	--	<0.1	**0.55**	**0.55**	<0.001	<0.005	<0.001	<0.003	<0.005
14-11	1306355	Intermediate/VRP		MW-8		5/9/2012	Groundwater	--	<0.1	**0.37**	**0.37**	<0.001	<0.005	<0.001	<0.003	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP	1000	SB-1-11	4-6	8/25/2011	Soils	--	<0.5	**99**	**99**	<0.005	<0.025	<0.005	<0.015	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP	1000	SB-2-11	2-4	8/25/2011	Soils	--	<0.5	<4	ND	<0.005	<0.025	<0.005	<0.015	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP	1000	SB-3-11	2-4	8/25/2011	Soils	--	<0.5	<4	ND	<0.005	<0.025	<0.005	<0.015	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP	1000	SB-4-11	2-4	8/25/2011	Soils	--	<0.5	**5.5**	**5.5**	<0.005	<0.025	<0.005	<0.015	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP	1000	SB-5-11	2-4	8/25/2011	Soils	--	<0.5	**15**	**15**	<0.005	<0.025	<0.005	<0.015	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP	1000	SB-5-11	4-6	9/6/2011	Soils	--	<0.5	<4	ND	<0.005	<0.025	<0.005	<0.015	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP	1000	SB-5-111	16-18	9/6/2011	Soils	--	**510**	**450**	**960**	<0.05	<0.25	**0.26**	**0.4**	**0.58**
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP	1000	SB-5-111	18-20	9/6/2011	Soils	--	**580**	**100**	**680**	<0.05	<0.25	**0.52**	**1.1**	**0.52**

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Gas Well Name	**API #**	**Remediation Stage**	**WOGCC Soil TPH Standard (mg/kg)**	**Sample Name**	**Sample Depth (feet)**	**Sample Date**	**Sample Type**	**SAR**	**TPH GRO**	**TPH DRO**	**TPH**	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**Naphthalene**
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP	1000	SB-6-11	2-4	8/25/2011	Soils	--	<0.5	**11**	**11**	<0.005	<0.025	<0.005	<0.015	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP	1000	MW-6	4-6	9/7/2011	Soils	--	<0.5	<4	ND	<0.005	<0.025	<0.005	<0.015	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP	1000	SB-7-11	4-6	8/25/2011	Soils	--	<0.5	**7.4**	**7.4**	<0.005	<0.025	<0.005	<0.015	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-1		7/17/2007	Groundwater	--	**0.672**	ND	**0.672**	--	--	--	--	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-1		5/7/2008	Groundwater	--	ND	ND	ND	ND	ND	ND	ND	ND
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-1		10/29/2008	Groundwater	--	ND	ND	ND	ND	ND	ND	ND	ND
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-1		3/6/2009	Groundwater	--	ND	ND	ND	ND	ND	ND	ND	ND
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-1		10/29/2009	Groundwater	--	ND	ND	ND	ND	ND	ND	ND	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-1		4/15/2010	Groundwater	--	<0.02	<0.3	ND	<0.001	<0.001	<0.001	<0.001	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-1		10/6/2010	Groundwater	--	<0.02	<0.3	ND	<0.001	<0.001	<0.001	<0.001	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-1		8/8/2011	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	<0.005
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-1		11/2/2011	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	<0.005
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-1		1/27/2012	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	<0.005
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-1		5/10/2012	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-2		7/17/2007	Groundwater	--	**2.3**	**5.4**	**7.7**	--	--	--	--	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-2		5/7/2008	Groundwater	--	**1.3**	**3.6**	**4.9**	**0.027**	ND	ND	**0.019**	**0.043**
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-2		10/29/2008	Groundwater	--	**0.438**	**11**	**11.438**	**0.013**	ND	ND	ND	**0.0021**
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-2		3/6/2009	Groundwater	--	**1.15**	**9.4**	**10.55**	**0.014**	ND	**0.076**	**0.054**	**0.013**
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-2		10/29/2009	Groundwater	--	**0.28**	**3.2**	**3.48**	**0.0079**	ND	**0.0052**	**0.032**	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-2		4/12/2010	Groundwater	--	**0.313**	**5.6**	**5.913**	**0.0042**	**0.00013**	**0.023**	**0.034**	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-2		8/8/2011	Groundwater	--	**0.3**	**2**	**2.3**	**0.011**	<0.005	**0.022**	**0.051**	<0.005
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-2		8/8/20113	Groundwater	--	**0.36**	**1**	**1.36**	**0.009**	**0**	**0.019**	**0.033**	<0.001
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-2		11/2/2011	Groundwater	--	**0.46**	**4.3**	**4.76**	**0.015**	<0.005	**0.026**	**0.065**	<0.005
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-2		11/2/20113	Groundwater	--	**0.46**	**5.2**	**5.66**	**0.017**	<0.005	**0.028**	**0.071**	**0.011**
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-2		1/27/2012	Groundwater	--	**0.79**	**9.1**	**9.89**	**0.0061**	<0.005	**0.026**	**0.027**	<0.005
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-2		5/10/2012	Groundwater	--	**0.4**	**5.1**	**5.5**	**0.0043**	<0.005	**0.0058**	**0.029**	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-3		5/10/20123	Groundwater	--	**0.41**	**9.4**	**9.81**	**0.0053**	<0.005	**0.011**	**0.042**	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-3		7/17/2007	Groundwater	--	ND	ND	ND	--	--	--	--	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-3		5/7/2008	Groundwater	--	ND	ND	ND	--	--	--	--	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-3		10/29/2008	Groundwater	--	ND	ND	ND	ND	ND	ND	ND	ND
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-3		3/6/2009	Groundwater	--	ND	ND	ND	ND	ND	ND	ND	ND
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-3		10/29/2009	Groundwater	--	ND	ND	ND	ND	ND	ND	ND	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-3		4/12/2010	Groundwater	--	<0.02	<0.3	ND	<0.001	<0.001	<0.001	<0.001	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-3		8/8/2011	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	<0.005
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-3		11/2/2011	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	<0.005
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-3		1/27/2012	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.025	<0.001	<0.003	<0.005
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-3		5/10/2012	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-4		10/29/2008	Groundwater	--	**4.91**	ND	**4.91**	**0.0021**	ND	ND	**0.032**	**0.0029**

TABLE 14
Pit Investigation Soil and Groundwater Analytical TPH, BTEX, and Naphthalene Data

								Method	Calc.	8015	8015	8015	8260B	8260B	8260B	8260B	8270C
								WDEQ Residential Soil Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	site-specific	2300	n/a	1.1	5000	5.4	630	3.6
								WDEQ Migration to Groundwater Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	28	n/a	n/a	0.00139	0.406	0.414	6.01	1.61
								Water Cleanup Levels (mg/L)[1]	NA	7.3	1.1/10	n/a	0.005	1	0.7	10	0.729
Gas Well Name	**API #**	**Remediation Stage**	**WOGCC Soil TPH Standard (mg/kg)**	**Sample Name**	**Sample Depth (feet)**	**Sample Date**	**Sample Type**	**SAR**	**TPH GRO**	**TPH DRO**	**TPH**	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**Naphthalene**
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-4		3/6/2009	Groundwater	--	**7.76**	**12**	**19.76**	**0.021**	ND	**0.19**	**0.505**	**0.236**
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-4		10/29/2009	Groundwater	--	**0.73**	**0.27**	**1**	**0.0013**	ND	**0.016**	**0.04**	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-4		4/12/2010	Groundwater	--	**2.83**	**13**	**15.83**	**0.011**	**0.00061**	**0.111**	**0.289**	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-4		8/8/2011	Groundwater	--	**0.27**	**0.12**	**0.39**	<0.001	<0.005	**0.034**	**0.01**	**0.0053**
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-4		11/2/2011	Groundwater	--	**0.26**	**0.41**	**0.67**	<0.001	<0.005	**0.016**	**0.039**	**0.016**
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-4		1/27/2012	Groundwater	--	**0.47**	**1.4**	**1.87**	**0.0015**	<0.001	**0.023**	**0.52**	**0.028**
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-4		5/10/2012	Groundwater	--	**0.23**	**1.5**	**1.73**	<0.001	<0.005	**0.0056**	**0.016**	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-5		3/6/2009	Groundwater	--	ND	ND	ND	ND	ND	ND	ND	ND
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-5		10/29/2009	Groundwater	--	ND	ND	ND	ND	ND	ND	ND	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-5		4/12/2010	Groundwater	--	<0.02	<0.3	ND	<0.001	<0.001	<0.001	<0.001	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-5		8/8/2011	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	<0.005
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-5		11/2/2011	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	<0.005
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-5		1/28/2012	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	<0.005
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-5		5/10/2012	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-6		9/9/2011	Groundwater	--	<0.1	**0.47**	**0.47**	<0.001	<0.005	<0.001	<0.003	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-6		11/2/2011	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	<0.005
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-6		1/27/2012	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.025	<0.001	<0.003	<0.005
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-6		5/10/2012	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-6		3/28/2013	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		MW-6		3/28/20133	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		WT-1-11		9/9/2011	Groundwater	--	**50**	**14**	**64**	**0.13**	<0.025	**0.18**	**0.46**	--
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		WT-1-11		11/2/2011	Groundwater	--	**7.4**	**14**	**21.4**	**0.16**	**0.016**	**0.15**	**0.41**	**0.11**
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		WT-1-11		1/28/2012	Groundwater	--	**7.7**	**31**	**38.7**	**0.22**	<0.05	**0.16**	**0.4**	**0.12**
W.H. Paul Patent 42X-11	1320442	Intermediate/VRP		WT-1-11		5/10/2012	Groundwater	--	**8.9**	**15**	**23.9**	**0.24**	**0.025**	**0.24**	**0.62**	--
Pavillion 24X-3	1306387	Intermediate	1000	SB-1-11	7-8	8/29/2011	Soils	--	**51**	**1400**	**1451**	<0.05	<0.25	<0.05	<0.15	--
Pavillion 24X-3	1306387	Intermediate	1000	SB-1-11	8-10	8/29/2011	Soils	--	**9200**	**1400**	**10600**	<5	<25	**110**	**750**	**6.6**
Pavillion 24X-3	1306387	Intermediate	1000	SB-2-11	4-6	8/29/2011	Soils	--	**1900**	**2200**	**4100**	<5	<25	**23**	**170**	**8.6**
Pavillion 24X-3	1306387	Intermediate	1000	SB-2-11	6-8	8/29/2011	Soils	--	**2400**	**1600**	**4000**	<0.5	<2.5	**13**	**110**	--
Pavillion 24X-3	1306387	Intermediate	1000	SB-3-11	7-8	8/29/2011	Soils	--	**750**	**540**	**1290**	<0.5	<2.5	**5.1**	**43**	**1.4**
Pavillion 24X-3	1306387	Intermediate	1000	SB-4-11	7-8	8/29/2011	Soils	--	**250**	**290**	**540**	<0.05	<0.25	<0.05	<0.15	**0.11**
Pavillion 24X-3	1306387	Intermediate	1000	SB-5-11	7-8	8/29/2011	Soils	--	**1900**	**1600**	**3500**	<0.05	<0.25	**0.68**	**8.5**	**2.6**
Pavillion 24X-3	1306387	Intermediate	1000	SB-6-11	6-8	8/29/2011	Soils	--	**440**	**220**	**660**	<0.05	<0.25	<0.05	**0.15**	**0.25**
Pavillion 24X-3	1306387	Intermediate	1000	3-DEEP-11	5-10	9/2/2011	Soils	--	**590**	**1700**	**2290**	<0.1	<0.5	**1.2**	**11**	**2.5**
Pavillion 24X-3	1306387	Intermediate	1000	3-DEEP-11	10-15	9/2/2011	Soils	--	**2000**	**700**	**2700**	**0.55**	<1.2	**11**	**70**	--
Pavillion 24X-3	1306387	Intermediate	1000	3-DEEP-11	15-20	9/2/2011	Soils	--	**23**	**410**	**433**	<0.05	<0.25	**0.072**	**0.48**	--
Pavillion 24X-3	1306387	Intermediate	1000	MW-10	5-7	12/6/2011	Soils	--	**3100**	**3300**	**6400**	<1	<5	**12**	**94**	**7**
Pavillion 24X-3	1306387	Intermediate	1000	MW-10	10-12	12/6/2011	Soils	--	**5800**	**730**	**6530**	<2.5	<12	**30**	**150**	**5.7**
Pavillion 24X-3	1306387	Intermediate	1000	MW-7R	5-7	12/6/2011	Soils	--	<0.5	<4	ND	<0.005	<0.025	<0.005	<0.015	<0.033

TABLE 14
Pit Investigation Soil and Groundwater Analytical TPH, BTEX, and Naphthalene Data

								Method	Calc.	8015	8015	8015	8260B	8260B	8260B	8260B	8270C
								WDEQ Residential Soil Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	site-specific	2300	n/a	1.1	5000	5.4	630	3.6
								WDEQ Migration to Groundwater Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	28	n/a	n/a	0.00139	0.406	0.414	6.01	1.61
								Water Cleanup Levels (mg/L)[1]	NA	7.3	1.1/10	n/a	0.005	1	0.7	10	0.729
Gas Well Name	**API #**	**Remediation Stage**	**WOGCC Soil TPH Standard (mg/kg)**	**Sample Name**	**Sample Depth (feet)**	**Sample Date**	**Sample Type**	**SAR**	**TPH GRO**	**TPH DRO**	**TPH**	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**Naphthalene**
Pavillion 24X-3	1306387	Intermediate	1000	MW-7R	10-12	12/6/2011	Soils	--	**8900**	**3100**	**12000**	**4.2**	<12	**49**	**260**	**7.6**
Pavillion 24X-3	1306387	Intermediate		MW-1		7/17/2007	Groundwater	--	**45.2**	**3.1**	**48.3**	--	--	--	--	--
Pavillion 24X-3	1306387	Intermediate		MW-1		5/7/2008	Groundwater	--	**5.1**	**2.3**	**7.4**	**0.383**	ND	**0.512**	**0.268**	**0.08**
Pavillion 24X-3	1306387	Intermediate		MW-1		10/29/2008	Groundwater	--	**13.9**	**5**	**18.9**	**1.5**	ND	**0.093**	**1.42**	**0.102**
Pavillion 24X-3	1306387	Intermediate		MW-1		3/6/2009	Groundwater	--	**11.8**	**21**	**32.8**	**1.96**	ND	**0.572**	**1.27**	**0.176**
Pavillion 24X-3	1306387	Intermediate		MW-1		10/21/2009	Groundwater	--	**6.6**	**0.73**	**7.33**	**1.7**	ND	**0.18**	**0.39**	--
Pavillion 24X-3	1306387	Intermediate		MW-1		4/12/2010	Groundwater	--	**3.23**	**3.2**	**6.43**	**0.064**	**0.00017**	**0.0057**	**0.038**	--
Pavillion 24X-3	1306387	Intermediate		MW-1		8/10/2011	Groundwater	--	**11**	**3.2**	**14.2**	**0.92**	<0.25	**0.51**	**2.5**	--
Pavillion 24X-3	1306387	Intermediate		MW-1		10/31/2011	Groundwater	--	**11**	**3.3**	**14.3**	**1.9**	<0.25	**0.56**	**2.9**	--
Pavillion 24X-3	1306387	Intermediate		MW-2		7/17/2007	Groundwater	--	**23.3**	**7.6**	**30.9**	--	--	--	--	--
Pavillion 24X-3	1306387	Intermediate		MW-2		5/7/2008	Groundwater	--	**1.8**	**11**	**12.8**	**0.036**	ND	ND	**0.0071**	**0.032**
Pavillion 24X-3	1306387	Intermediate		MW-2		12/30/2008	Groundwater	--	**5.9**	ND	**5.9**	**0.25**	ND	**0.061**	**0.069**	--
Pavillion 24X-3	1306387	Intermediate		MW-2		3/6/2009	Groundwater	--	**3.7**	**22**	**25.7**	**0.07**	ND	**0.069**	**0.107**	**0.046**
Pavillion 24X-3	1306387	Intermediate		MW-2		10/21/2009	Groundwater	--	**1.7**	**9.8**	**11.5**	**0.018**	ND	**0.013**	**0.027**	--
Pavillion 24X-3	1306387	Intermediate		MW-2		4/12/2010	Groundwater	--	**11.6**	**59**	**70.6**	**0.017**	ND	**0.031**	**0.094**	--
Pavillion 24X-3	1306387	Intermediate		MW-2		8/10/2011	Groundwater	--	**1.5**	**16**	**17.5**	**0.16**	<0.005	**0.035**	**0.12**	--
Pavillion 24X-3	1306387	Intermediate		MW-2		10/31/2011	Groundwater	--	**3.1**	**27**	**30.1**	**0.8**	<0.005	**0.13**	**1.2**	--
Pavillion 24X-3	1306387	Intermediate		MW-3		8/10/2011	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	--
Pavillion 24X-3	1306387	Intermediate		MW-3		10/31/2011	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	--
Pavillion 24X-3	1306387	Intermediate		MW-4		8/10/2011	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	--
Pavillion 24X-3	1306387	Intermediate		MW-4		10/31/2011	Groundwater	--	<0.1	**0.15**	**0.15**	<0.001	<0.005	<0.001	<0.003	--
Pavillion 24X-3	1306387	Intermediate		MW-5		10/29/2008	Groundwater	--	**10.3**	**3.9**	**14.2**	**0.02**	ND	**0.326**	**2.06**	**0.095**
Pavillion 24X-3	1306387	Intermediate		MW-5		3/6/2009	Groundwater	--	**10.2**	**6.3**	**16.5**	**0.016**	ND	**0.532**	**1.0945**	**0.1565**
Pavillion 24X-3	1306387	Intermediate		MW-5		10/21/2009	Groundwater	--	**3.7**	**0.8**	**4.5**	**0.008**	ND	**0.057**	**0.13**	--
Pavillion 24X-3	1306387	Intermediate		MW-5		4/12/2010	Groundwater	--	**1.7**	**2.6**	**4.3**	**0.015**	ND	**0.016**	**0.065**	--
Pavillion 24X-3	1306387	Intermediate		MW-5		8/10/2011	Groundwater	--	**8.2**	**2.4**	**10.6**	**0.32**	<0.12	**0.42**	**2.3**	--
Pavillion 24X-3	1306387	Intermediate		MW-5		10/31/2011	Groundwater	--	**3.6**	**6.1**	**9.7**	**0.23**	<0.12	**0.39**	**2.2**	--
Pavillion 24X-3	1306387	Intermediate		MW-6		8/10/2011	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	--
Pavillion 24X-3	1306387	Intermediate		MW-6		10/31/2011	Groundwater	--	<0.1	**0.38**	**0.38**	<0.001	<0.005	<0.001	<0.003	--
Pavillion 24X-3	1306387	Intermediate		MW-7		3/6/2009	Groundwater	--	**19.2**	**11**	**30.2**	**0.948**	ND	**0.916**	**3.9**	**0.267**
Pavillion 24X-3	1306387	Intermediate		MW-7		6/2/2009	Groundwater	--	**10**	**14**	**24**	**0.23**	ND	**0.045**	**1.73**	**0.14**
Pavillion 24X-3	1306387	Intermediate		MW-7		10/21/2009	Groundwater	--	**6.4**	**4.1**	**10.5**	**0.64**	ND	**0.42**	**0.97**	--
Pavillion 24X-3	1306387	Intermediate		MW-7		4/12/2010	Groundwater	--	**4.92**	**17**	**21.92**	**1.09**	ND	**0.51**	**1.04**	--
Pavillion 24X-3	1306387	Intermediate		MW-7R		12/7/2011	Groundwater	--	**9.8**	**7.8**	**17.6**	**1.3**	<0.005	**0.85**	**4.2**	--
Pavillion 24X-3	1306387	Intermediate		MW-8		8/10/2011	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	--
Pavillion 24X-3	1306387	Intermediate		MW-8		10/31/2011	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	--
Pavillion 24X-3	1306387	Intermediate		MW-9		8/10/2011	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	--
Pavillion 24X-3	1306387	Intermediate		MW-9		10/31/2011	Groundwater	--	<0.1	<0.1	ND	<0.001	<0.005	<0.001	<0.003	--

TABLE 14
Pit Investigation Soil and Groundwater Analytical TPH, BTEX, and Naphthalene Data

								Method	Calc.	8015	8015	8015	8260B	8260B	8260B	8260B	8270C
								WDEQ Residential Soil Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	site-specific	2300	n/a	1.1	5000	5.4	630	3.6
								WDEQ Migration to Groundwater Cleanup Levels (mg/kg) (effective December 2013)[1]	NA	28	n/a	n/a	0.00139	0.406	0.414	6.01	1.61
								Water Cleanup Levels (mg/L)[1]	NA	7.3	1.1/10	n/a	0.005	1	0.7	10	0.729
Gas Well Name	**API #**	**Remediation Stage**	**WOGCC Soil TPH Standard (mg/kg)**	**Sample Name**	**Sample Depth (feet)**	**Sample Date**	**Sample Type**	**SAR**	**TPH GRO**	**TPH DRO**	**TPH**	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**Naphthalene**
Pavillion 24X-3	1306387	Intermediate		MW-10		12/7/2011	Groundwater	--	**18**	**5**	**23**	**1**	<0.005	**0.95**	**4.2**	--

[1]WDEQ cleanup levels for GRO in soils are dependant upon site-specific depth to groundwater as well as site-specific exposure parameters; default value 28 mg/kg shown here.

WDEQ Migration to Groundwater cleanup levels use the conservative dilution attentuation factor of 1.

WDEQ cleanup levels for DRO in groundwater depend on concentrations of napthalene and/or 2-methlynaphthalene along with other chemicals of concern in groundwater and presence of free product on the groundwater table.

Bold font highlights detections.

Light grey shading for soil samples indicates exceedance of tabulated Migration to Groundwater cleanup level, which may not be applicable for WDEQ site-specific cleanup levels.
Dark grey shading for soil samples indicates exceedance of tabulated Residential Soil cleanup level, which may not be applicable for WDEQ site-specific cleanup levels.

Light grey shading for groundwater samples indicates exceedance of the lowest TPH-DRO cleanup level and dark grey shading indicates exceedance of the highest TPH-DRO level, which may not be applicable for WDEQ site-specific cleanup levels. Other groundwater exceedances indicated by dark grey shading.

ND = non-detect (no detection limit available or applicable)

TABLE 15
SEO Well Permit Data for Water Wells within 1,475 Feet of Investigated Oil-Based Mud Pits

Well Name	Area of Review	SEO Permit #	Review Well ID	Summary WR Status	Uses	Priority Date	Permittee	Facility Name	Total Depth (Ft)	Static Water Level (Ft)
W.E. Lloyd 1	Y	P98084.0W		Cancelled	STK	1/3/1995	FIVE MILE RANCH, L.L.C.	POWERLINE #2		
Blankenship 4-8	Y	P66345.0W	PGDW41	Fully Adjudicated	DOM_GW; STK	1/31/1984		GARLAND #1	70	7
Tribal Unit 238 11-14	N	P29496.0P		Fully Adjudicated	DOM_GW; STK	3/31/1975	JAMES E. & BARBARA J. HENRY	HENRY #1	130	20
Tribal Unit 238 11-14	N	P91293.0W		Complete	STK	4/5/1993	DAN BISBEE	PONDEROSA #1	10	-4
Unit 12-3	N	P66345.0W		Fully Adjudicated	DOM_GW; STK	1/31/1984		GARLAND #1	70	7
Tribal Pavillion 12-13	Y	P64110.0W	PGDW32	Fully Adjudicated	DOM_GW; STK	5/24/1983	JOE B. DENNIS	DENNIS #1	675	235
Tribal Pavillion 12-13	Y	P22660.0P		Fully Adjudicated	STK	9/30/1938	JOSEPH B. DENNIS	HUNT #1	175	12
Tribal Pavillion 12-13	Y	P22662.0P	PGDW33	Fully Adjudicated	DOM_GW	12/31/1934	JOSEPH DENNIS	HIPPE #1	30	10
Unit 13-13	N	P60032.0W		Fully Adjudicated	DOM_GW; STK	3/23/1982	DEAN L. NOLTING	NOLTING #1	86	18
Tribal Pavillion 14-1	N	P172899.0W		Complete	DOM_GW	1/27/2006	H. DOUGLAS TUCK	TUCK 1	100	30
14-11	N	P166481.0W		Complete	STK	4/7/2005	JACK ROBINSON	ROBINSON #1	200	50
14-11	N	P31805.0W		Fully Adjudicated	DOM_GW; STK	1/20/1976		FIKE #3	100	50
14-11	N	P69549.0W		Complete	DOM_GW; STK	2/25/1985	JAMES D. & BEVERLY D. SCHUERMAN	SCHUERMAN #1	100	45
14-11	N	P166480.0W			STK	4/7/2005	JONATHAN Q. & LYNN D. MIDDELSTADT	MIDD-2		
Ora Wells 14-12		P22660.0P		Fully Adjudicated	STK	9/30/1938	JOSEPH B. DENNIS	HUNT #1	175	12
Tribal 14-2	Y	P32161.0W	PGDW05	Fully Adjudicated	DOM_GW	2/2/1976	KEITH & JOANNE HUELLE	K & J HUELLE #1	210	190
Tribal 14-2	Y	P170310.0W		Incomplete	DOM_GW	10/19/2005	LOUIS A. & DONNA J. MEEKS	MEEKS #2		
Tribal 14-2	Y	P190920.0W		Cancelled	DOM_GW	7/7/2009	LOUIS MEEKS	MEEKS #1		
Tribal-Pav 14-6	N	P98491.0W		Cancelled	DOM_GW	3/7/1995		BECK #1		
USA Tribal 258 21-15	N	P124049.0W		Complete	DOM_GW; STK	3/6/2000	Robert E Lozier	Lozier Well #1	484	246
Tribal 21-9	Y	P41517.0W	PGDW42	Fully Adjudicated	DOM_GW; STK	11/29/1977		NEWKIRK #2	200	50
Tribal 21-9	Y	P98083.0W		Cancelled	STK	1/3/1995	FIVE MILE RANCH, L.L.C.	INDIAN RIDGE #2		
Unit 22-12	Y	P97501.0W	PGDW20, PGDW21, LD02	Cancelled	DOM_GW; STK	10/11/1994	JEFF LOCKER	LOCKER #2		
Unit 22-12	Y	P139588.0W		Cancelled	MON	10/5/2001		MW 0229		
Unit 24-14	N	P24502.0P		Fully Adjudicated	DOM_GW; STK	12/31/1942	MARVIN GRIFFIN	SAM BLACK #185	180	35
Unit 24-14	N	P59499.0W		Fully Adjudicated	DOM_GW; STK	2/3/1982	JOE & DELORES M. ZUBER	ZUBER #3	110	60
Pavillion 24X-3	N	P66345.0W	PGDW41	Fully Adjudicated	DOM_GW; STK	1/31/1984		GARLAND #1	70	7
Tribal-Pav 31-15	N	P34936.0W		Fully Adjudicated	STK	9/14/1976	THE BORUSHKO FAMILY TRUST	ENL MORTENSEN #1	350	40
Tribal-Pav 31-15	N	P30217.0W		Fully Adjudicated	DOM_GW	6/18/1975	THE BORUSHKO FAMILY TRUST	MORTENSEN #1	350	40
Pavillion Fee 31-9*	Y	P41517.0W	PGDW42	Fully Adjudicated	DOM_GW; STK	11/29/1977		NEWKIRK #2	200	50
Pavillion Fee 31-9*	Y	P98083.0W		Cancelled	STK	1/3/1995	FIVE MILE RANCH, L.L.C.	INDIAN RIDGE #2		
Unit 31X-14	N	P41320.0W		Fully Adjudicated	DOM_GW	12/19/1977	GLEN L. HUGHES	#1	100	40
Unit 31X-14	N	P44255.0W		Fully Adjudicated	DOM_GW	7/18/1978	GLEN L. HUGHES	ENL #1	225	60
Unit 31X-14	N	P99671.0W		Complete	DOM_GW; STK	6/28/1995	JERRY J. & SANDRA J. MYERS	DUSTIN #1	55	28
Unit 31X-3	N	P197336.0W		Incomplete	DOM_GW; STK	1/27/2012	VINCENT DOLBOW	HILL FARM NEW PENS 2		
Unit 31X-3	N	P197335.0W		Incomplete	DOM_GW; STK	1/27/2012	VINCENT DOLBOW	HILL FARM NEW PENS 1		
Govt Tribal 33X-10	Y	P24507.0P		Fully Adjudicated	DOM_GW; STK	12/31/1942	MARVIN & EVELYN GRIFFIN	MILLER #2	750	80
Govt Tribal 33X-10	Y	P24506.0P	PGDW44	Fully Adjudicated	DOM_GW; STK	12/31/1932	MARVIN & EVELYN GRIFFIN	MILLER #1	750	90
Govt Tribal 33X-10	Y	P24508.0P	PGDW23	Fully Adjudicated	STK	12/31/1964	MARVIN & EVELYN GRIFFIN	MILLER #3	175	80
USA Tribal 41-9	N	P98083.0W		Cancelled	STK	1/3/1995	FIVE MILE RANCH, L.L.C.	INDIAN RIDGE #2		
Unit 44-10	Y	P34936.0W		Fully Adjudicated	STK	9/14/1976	THE BORUSHKO FAMILY TRUST	ENL MORTENSEN #1	350	40
Unit 44-10	Y	P24508.0P	PGDW23	Fully Adjudicated	STK	12/31/1964	MARVIN & EVELYN GRIFFIN	MILLER #3	175	80
Unit 44-10	Y	P200885.0W		Incomplete	DOM_GW;STK	8/16/2013	CARL RAY PACE	ROOSTER KEY #1		
Unit 44-10	Y	P30217.0W		Fully Adjudicated	DOM_GW	6/18/1975	THE BORUSHKO FAMILY TRUST	MORTENSEN #1	350	40
Doles Unit 44-15	N	P146856.0W		Complete	STK	9/5/2002	RAY FOXWORTHY	CROWN HEART # 2	380	89
Doles Unit 44-15	N	P108128.0W		Complete	DOM_GW; STK	11/5/1997	RAY FOXWORTHY	CROWN HEART #1	379	60

TABLE 16
Pit Investigation Soil Analytical TPH, BTEX, and Naphthalene Data Summary

WDEQ Residential Soil Cleanup Levels (mg/kg) (effective December 2013)[1]	site-specific	2300	n/a	1.1	5000	5.4	630	3.6
WDEQ Migration to Groundwater Cleanup Levels (mg/kg) (effective December 2013)[1]	28	n/a	n/a	0.00139	0.406	0.414	6.01	1.61
Pavillion Field Soil Samples: TPH < 1,000 mg/kg								
Well Name	TPH GRO	TPH DRO	TPH	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene
14-11	<0.5	**6.5**	**6.5**	--	--	--	--	--
Blankenship 4-8	<0.5	**32**	**32**	--	--	--	--	--
Ora Wells 14-12	**89**	**430**	**430**	<0.005	<0.025	<0.005	<0.015	--
Pavillion 24X-3	**440**	**410**	**660**	<0.005	<0.025	**0.072**	**0.48**	**0.25**
Pavillion Fee 31-9	<0.5	<4	ND	--	--	--	--	--
Tribal 21-9	**11**	**750**	**757.3**	<0.0052	**0.094**	<0.0052	**0.11**	--
Tribal Pavillion 12-13	<0.5	<4	ND	<0.005	<0.025	<0.005	<0.015	--
Unit 22-12	**120**	**730**	**850**	--	--	--	--	--
Unit 31X-3	**66**	**340**	**356**	<0.005	<0.025	<0.005	<0.015	**0.34**
Unit 41X-10	<4	<10	ND	--	--	--	--	--
Unit 42X-12	<0.5	<4	ND	--	--	--	--	--
W.E. Lloyd 1	<0.5	**390**	**390**	--	--	--	--	**0.22**
W.H. Paul Patent 42X-11	**580**	**450**	**960**	<0.005	<0.025	**0.52**	**1.1**	**0.58**
Pavillion Field Soil Samples: TPH >= 1,000 mg/kg								
Well Name	TPH GRO	TPH DRO	TPH	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene
14-11	**7400**	**7800**	**15200**	<0.05	<0.25	**5.1**	**5.1**	**15**
Ora Wells 14-12	**340**	**4300**	**4560**	<0.025	<0.12	**0.066**	**0.085**	--
Pavillion 24X-3	**9200**	**3300**	**12000**	**4.2**	<0.25	**110**	**750**	**8.6**
Tribal 21-9	**700**	**39000**	**39700**	<0.0057	**0.15**	**2.4**	**20**	--
Unit 31X-3	**34**	**1200**	**1234**	--	--	--	--	--
Unit 42X-12	<0.5	**1100**	**1100**	<0.005	<0.025	<0.005	<0.015	--

[1]WDEQ cleanup levels for GRO in soils are dependant upon site-specific depth to groundwater as well as site-specific exposure parameters; default value 28 mg/kg shown here.

WDEQ cleanup levels for other soil constituents shown as Residential Soil value / Migration to Groundwater value, using the conservative dilution attentuation factor of 1.

WDEQ cleanup levels for DRO in groundwater depend on concentrations of napthalene and/or 2-methlynaphthalene along with other chemicals of concern in groundwater and presence of free product on the groundwater table.

Bold font highlights detections.

TABLE 17
Comparison of TPH, BTEX, and Naphthalene Concentrations in Soil and Groundwater Samples

			GW		SOIL			GW (mg/L)	SOIL (mg/kg)	GW (mg/L)	SOIL (mg/kg)	GW (mg/L)	SOIL (mg/kg)	GW (mg/L)	SOIL (mg/kg)	GW (mg/L)	SOIL (mg/kg)	GW (mg/L)	SOIL (mg/kg)	GW (mg/L)	SOIL (mg/kg)	GW (mg/L)	SOIL (mg/kg)
							Cleanup Level±	**7.3**	**28**	**1.1/10**	**2300**	**n/a**	**1000**	**0.005**	**1.1/0.00139**	**1**	**5000/0.406**	**0.7**	**5.4/0.414**	**10**	**630/6.01**	**0.729**	**3.6/1.61**
Well Name	**API #**	**Remediation**	**Sample Name**	**Sample Date**	**Sample Name**	**Sample Depth (feet)**	**Sample Date**	**TPH GRO**		**TPH DRO**		**TPH**		**Benzene**		**Toluene**		**Ethylbenzene**		**Total Xylenes**		**Naphthalene**	
Blankenship 4-8	1320668	Pre	SB-1-11	9/8/2011	SB-1-11	2-4	9/8/2011	0.24	0.25	0.69	2	0.93	ND	0.0005	--	0.0025	--	0.0005	--	0.0015	--	0.0005	--
Blankenship 4-8	1320668	Pre	SB-3-11	9/8/2011	SB-3-11	2-4	9/8/2011	5.2	0.25	**13**	2	18.2	ND	**0.11**	--	0.25	--	0.24	--	1.2	--	0.072	--
Ora Wells 14-12	1306357	Intermediate	SB-1-11	9/9/2011	SB-1-11	4-6	8/26/2011	0.05	0.25	0.36	14	0.36	14	0.0005	0.0025	0.0025	0.0125	0.0005	0.0025	0.0015	0.0075	--	--
Ora Wells 14-12	1306357	Intermediate	SB-3-11	9/9/2011	SB-3-11	7-8	8/29/2011	0.05	**160**	**1.2**	1500	1.2	**1660**	0.0005	--	0.0025	--	0.0005	--	0.0015	--	--	--
Ora Wells 14-12	1306357	Intermediate	TMW-3	10/13/2012	2 TMW-3 8-10FT	8-10	10/9/2012	0.05	0.32	1	430	1	430	0.0005	0.0032	0.0025	0.016	0.0005	0.0032	0.0015	0.0095	--	--
Ora Wells 14-12	1306357	Intermediate	TMW-4	10/13/2012	12 TMW-4 6-8FT	6-8	10/9/2012	0.05	0.29	0.31	270	0.31	**270**	0.0005	0.0029	0.0025	0.0145	0.0005	0.0029	0.0015	0.0085	--	--
Ora Wells 14-12	1306357	Intermediate	TMW-5	10/13/2012	12 TMW-5 6-8FT	6-8	10/9/2012	0.05	0.29	0.16	2.3	0.16	ND	0.0005	0.0029	0.0025	0.0145	0.0005	0.0029	0.0015	0.0085	--	--
Tribal 21-9	1321130	Intermediate	TMW-1*	11/18/2012	TMW-1R	2-6	10/12/2012	0.05	**700**	0.16	**39000**	0.16	**39700**	0.0005	0.15	0.0025	0.7	0.0005	**2.4**	0.0015	**20**	--	--
Tribal 21-9	1321130	Intermediate	TMW-1*	11/18/2012	TMW-1	2-6	10/12/2012	0.05	**55**	0.16	**4400**	0.16	**4455**	0.0005	0.028	0.0025	0.14	0.0005	0.028	0.0015	0.085	--	--
Tribal 21-9	1321130	Intermediate	TMW-2	10/13/2012	TMW-2	16-18	10/12/2012	0.05	0.32	0.05	2.55	ND	ND	0.0005	0.0032	0.0025	0.016	0.0005	0.0032	0.0015	0.0095	--	--
Tribal 21-9	1321130	Intermediate	TMW-3	10/13/2012	TMW-3	16-18	10/12/2012	0.05	0.315	0.05	2.5	ND	ND	0.0005	0.00315	0.0025	0.0155	0.0005	0.00315	0.0015	0.0095	--	--
Tribal 21-9	1321130	Intermediate	TMW-4	10/14/2012	TMW-4	18-20	10/12/2012	0.05	0.31	0.88	2.45	0.88	ND	0.0005	0.0031	0.0025	0.0155	0.0005	0.0031	0.0015	0.009	--	--
Unit 22-12	1320878	Post	SB-5-11	9/9/2011	SB-5-11	10-12	8/29/2011	0.05	0.25	**2.2**	2	2.2	ND	0.0005	--	0.0025	--	0.0005	--	0.0015	--	--	--
Unit 22-12	1320878	Post	TMW-1-12*	10/14/2012	TMW-1-12	4-6	10/11/2012	0.05	0.275	0.2	340	0.2	340	0.0005	--	0.0025	--	0.0005	--	0.0015	--	--	--
Unit 22-12	1320878	Post	TMW-1-12*	10/14/2012	TMW-1-12	10-12	10/11/2012	0.05	0.3	0.2	8.4	0.2	8.4	0.0005	--	0.0025	--	0.0005	--	0.0015	--	--	--
Unit 22-12	1320878	Post	TMW-2-12*	10/13/2012	TMW-2-12	16-17	10/11/2012	2.9	**120**	**2.5**	730	5.4	850	0.0005	--	0.0025	--	0.12	--	0.61	--	--	--
Unit 22-12	1320878	Post	TMW-2-12*	10/13/2012	TMW-2-12	10-12	10/11/2012	2.9	0.265	**2.5**	2.1	5.4	ND	0.0005	--	0.0025	--	0.12	--	0.61	--	--	--
Unit 22-12	1320878	Post	TMW-3-12*	10/14/2012	TMW-3-12	10-12	10/11/2012	0.05	0.29	0.05	2.3	ND	ND	0.0005	--	0.0025	--	0.0005	--	0.0015	--	--	--
Unit 31X-3	1320457	Intermediate	SB-2-11	9/9/2011	SB-2-11	12-14	8/30/2011	0.3	0.25	1	80	1.3	80	0.0005	0.0025	0.0025	0.0125	0.0024	0.0025	0.0015	0.0075	0.0005	--
Unit 31X-3	1320457	Intermediate	TMW-1*	10/14/2012	TMW-1	8-10	10/8/2012	0.05	0.27	**1.9**	190	1.9	190	0.0005	0.0027	0.0025	0.0135	0.0005	0.0027	0.0015	0.008	--	--
Unit 31X-3	1320457	Intermediate	TMW-1*	10/14/2012	TMW-1	12-14	10/8/2012	0.05	0.285	**1.9**	16	1.9	16	0.0005	0.00285	0.0025	0.014	0.0005	0.00285	0.0015	0.0085	--	--
Unit 31X-3	1320457	Intermediate	TMW-2	10/13/2012	TMW-2	12-14	10/8/2012	0.05	0.28	**2.7**	2.25	2.7	ND	0.0005	0.0028	0.0025	0.014	0.0005	0.0028	0.0015	0.0085	--	--
Unit 31X-3	1320457	Intermediate	TMW-3	10/13/2012	TMW-3	8-10	10/8/2012	0.05	0.285	0.49	2.3	0.49	ND	0.0005	0.00285	0.0025	0.0145	0.0005	0.00285	0.0015	0.0085	--	--
W.E. Lloyd 1	1320298	Pre	SB-4-11	9/8/2011	SB-4-11	11-12	8/30/2011	0.05	0.25	0.32	260	0.32	260	0.0005	--	0.0025	--	0.0005	--	0.0015	--	0.0005	--
W.E. Lloyd 1	1320298	Pre	SB-5-11	9/8/2011	SB-5-11	0-1	8/30/2011	0.05	--	0.05	--	ND	--	0.0005	--	0.0025	--	0.0005	--	0.0015	--	0.0005	--

± Cleanup Levels:
Groundwater (GW) cleanup levels from WDEQ VRP Clenup level Look-up Table, Effective December 2013
WDEQ cleanup levels for GRO in soils are dependant upon site-specific depth to groundwater as well as site-specific exposure parameters; default value 28 mg/kg shown here.
WDEQ cleanup levels for other soil constituents shown as Residential Soil value / Migration to Groundwater value, using the conservative dilution attentuation factor of 1.
WDEQ cleanup levels for DRO in groundwater depends on concentrations of napthalene and/or 2-methlynaphthalene along with other chemicals of concern in groundwater and presence of free product on the groundwater table.
Total soils TPH is compared to 1,000 mg/kg

* Single groundwater sample compared to two discrete soil samples from this borehole. Chart in Figure2 presents the comparison to the soil sample with higher concentrations.

Shaded cells indicate non-detect value converted to 1/2 detection limit for plotting (Figure 2); bold cells indicate exceedance of most conservative cleanup level, which may not be applicable for WDEQ site-specific cleanup levels

ND = no detection limit for TPH (sum of TPH-GRO and TPH-GRO)

-- = not analyzed