

RMOTC
ANNUAL SITE ENVIRONMENTAL REPORT
(ASER)

CY-2011



**Rocky Mountain
Oilfield Testing**

C E N T E R

**U.S. Department of Energy
Rocky Mountain Oil field Testing Center
907 N. Poplar, Suite 150
Casper, Wyoming 82601**

September 20, 2012

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Acronyms and Abbreviations

| | |
|------------------|---|
| bbl | Barrel (42 US Gallons) |
| CAA | Clean Air Act |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CESQG | Conditionally Exempt Small Quantity Generator |
| CFR | Code of Federal Regulations |
| COD | Chemical Oxygen Demand |
| CWA | Clean Water Act |
| CY | Calendar Year |
| DMR | Discharge Monitoring Report |
| DOE | Department of Energy |
| EA | Environmental Assessment |
| EPA | Environmental Protection Agency |
| EPCRA | Emergency Planning and Community Right-To-Know Act |
| ESA | Endangered Species Act |
| ESS&H | Environment, Safety, Security, and Health |
| FE ES&H | Office of Fossil Energy Environment, Safety and Health |
| FIFRA | Federal Insecticide, Fungicide, Rodenticides Act |
| H ₂ S | Hydrogen Sulfide |
| ISMS | Integrated Safety Management System |
| LTS | Low Temperature Separation |
| NEPA | National Environmental Policy Act |
| NHPA | National Historical Preservation Act |
| NORM | Naturally Occurring Radioactive Material |
| NPOSR-CUW | Naval Petroleum and Oil Shale Reserves in Colorado, Utah, and Wyoming |
| NPR-3 | Naval Petroleum Reserve Number 3 |
| NRHP | National Registry of Historic Places |
| P&A | Plug and Abandon |
| PCB | Polychlorinated Biphenyls |
| ppm | Parts per Million |
| PR | Permit Renewal |
| RCRA | Resource Conservation and Recovery Act |
| RMOTC | Rocky Mountain Oil field Testing Center |
| RQ | Reportable Quantity |
| SAR | Semi-Annual Report |
| SARA | Superfund Amendments Reauthorization Act |
| SDWA | Safe Drinking Water Act |
| SHPO | State Historic Preservation Office |
| SPCC | Spill Prevention Control and Countermeasure |

| | |
|--------|--|
| TCLP | Toxicity Characteristic Leaching Procedure |
| TOX | Total Organic Halogens |
| TRI | Toxic Release Inventory |
| TSCA | Toxic Substances Control Act |
| UIC | Underground Injection Control |
| USC | United States Code |
| USDW | Underground Source of Drinking Water |
| UST | Underground Storage Tank |
| WDF | Water Disposal Facility |
| WOGCC | Wyoming Oil and Gas Conservation Commission |
| WYDEQ | Wyoming Department of Environmental Quality |
| WYPDES | Wyoming Pollutant Discharge Elimination System |

I. EXECUTIVE SUMMARY

This Calendar Year (CY) 2011 Site Environmental Report and Compliance Summary discusses environmental compliance activity for the Rocky Mountain Oilfield Testing Center (RMOTC) Naval Petroleum Reserve Number 3 (NPR-3) for the time frame from January 2011 through December 2011.

RMOTC / NPR-3 maintained its status as a Small Quantity Generator (SQG) throughout the 2011 calendar year.

In 2011, an average of 48 contractor and DOE personnel were employed in the field and an additional 20 in the Casper office.

No radionuclide activities were conducted at RMOTC / NPR-3 during CY-2011.

Hydrogen sulfide (H₂S) monitoring around tank batteries and at well sites was performed at 102 locations in 2009. Readings were 0 at all but 19 sites; 8 sites averaged <20 ppm, 10 sites ranged between 20 ppm and 61 ppm, and one site averaged 132 ppm (H₂S). Monitoring is conducted at all active sites. Hydrogen Sulfide (H₂S) procedures and results for RMOTC / NPR-3 are described in a report dated Oct 15, 2009 and prepared by Pat Toft. Since the report was published there have been efforts to monitor all wells in the field for H₂S. An updated report with more current sampling data is expected in 2013.

All underground vehicle-fuel storage tanks located at RMOTC / NPR-3 were removed and inspected in May 1998. They were replaced with aboveground, double-walled tanks with built-in, computerized, leak-detection systems. The above-ground storage tanks are inspected once per year. If leaks or damage is discovered, repairs are made prior to reintroducing the tanks into service. All tank inspections, berm requirements, and associated maintenance criteria as well as standard operating procedures (SOPs) for spill response at RMOTC are outlined in the site wide Spill Prevention Control and Countermeasures (SPCC) Plan. During CY-2011 the SPCC plan was

revised and amended to reflect current conditions at the site. There are no underground sources of drinking water (USDW) underlying RMOTC / NPR-3.

No Wyoming Pollutant Discharge Elimination System (WYPDES) wastewater samples collected at RMOTC / NPR-3 were out of compliance with Wyoming Department of Environmental Quality (WYDEQ) standards. Flow rates were recorded at the WYPDES outfall of Pit #4 using a weir, beginning November 11, 2009. Maximum flow was 44,555 bpd for the period reviewed in 2011. There were four spills / leaks reportable under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

In CY-2011, the Technical Assurance Department continued to develop and improve a site Environmental Management System (EMS) that is integrated into the existing site Integrated Safety Management System (ISMS).

II. INTRODUCTION

This document is the CY-2011 Site Environmental Report for the RMOTC / NPR-3 field, as required under the U.S. Department of Energy (DOE) Order 231.1B, Environment, Safety, and Health Reporting as well as DOE Order 458.1, Radiation Protection of the Public and Environment, and as further outlined in DOE Manual 231.1A, Chapter 1, Reporting Environmental Protection Information.

Specifically, this document is intended to follow the guidelines set forth in the DOE Manual, section 231.1-1A, for the Annual Site Environmental Report.

RMOTC / NPR-3, also known as Teapot Dome, is a 9,481 acre (38.4 km²) oil field that is located approximately 35 miles (56 km) north of Casper, Wyoming (see Figure 1). The geologic structure of RMOTC / NPR-3 is the southernmost of two adjacent oil-bearing domes lying in the same anticline. Eleven oil-bearing zones are known to exist within the geologic formations underlying RMOTC / NPR-3. The reserve extends approximately 7 miles (11 km) along a north-south axis and 2 miles (3 km) along an east-west axis. The elevation of RMOTC / NPR-3 is about 5,400 feet (1,646 m) above sea level, and the terrain is characterized by rolling plains interspersed with ridges and isolated bluffs. The surface consists of a prairie dotted with sagebrush, severely cut ravines, and sandstone bluffs.

RMOTC / NPR-3 is part of the Powder River drainage basin and is drained by two streams, Little Teapot Creek and Teapot Creek, which join and flow into Salt Creek just north of the Reserve. Before the production of oil and gas from the Reserve, the area was used for livestock grazing.

Annual precipitation is 9-12 inches (23 - 30 cm). Temperatures for the area can vary, from highs of 105°F (40.6° C) during the summer months, to lows of -40°F (-40°C) during the winter. The average date for the occurrence of the last frost is May 18, while the average date of the first freeze is September 25. RMOTC / NPR-3 soils are generally characterized as a sandy clay loam. Bentonite soils can be found in parts of the field.

Production facilities located at RMOTC / NPR-3 include:

- pumping units;

- treaters;
- tanks for storage of petroleum and produced water;
- low-temperature-separation gas plant (not in operation);
- water injection facilities (not in operation);
- wastewater disposal system; and
- flow lines.

There are numerous support facilities at RMOTC / NPR-3, including:

- Electric power distribution systems;
- Cathodic protection systems;
- Potable water and sewer systems;
- Roads and bridges;
- Fences; and
- Buildings for maintenance, production support, administration, safety, security, and environmental purposes.

Figure 2 shows the major facilities at RMOTC/NPR-3.

Water produced in conjunction with the operation of the field is discharged to local drainages in accordance with Wyoming Pollutant Discharge Elimination System (WYPDES) permits from the Wyoming Department of Environmental Quality (WYDEQ).

Permits are also in place for the disposal of wastewater into injection wells permitted by the Wyoming Oil and Gas Conservation Commission (WOGCC).

Potable water is hauled to RMOTC / NPR-3 by truck from the neighboring community of Midwest.

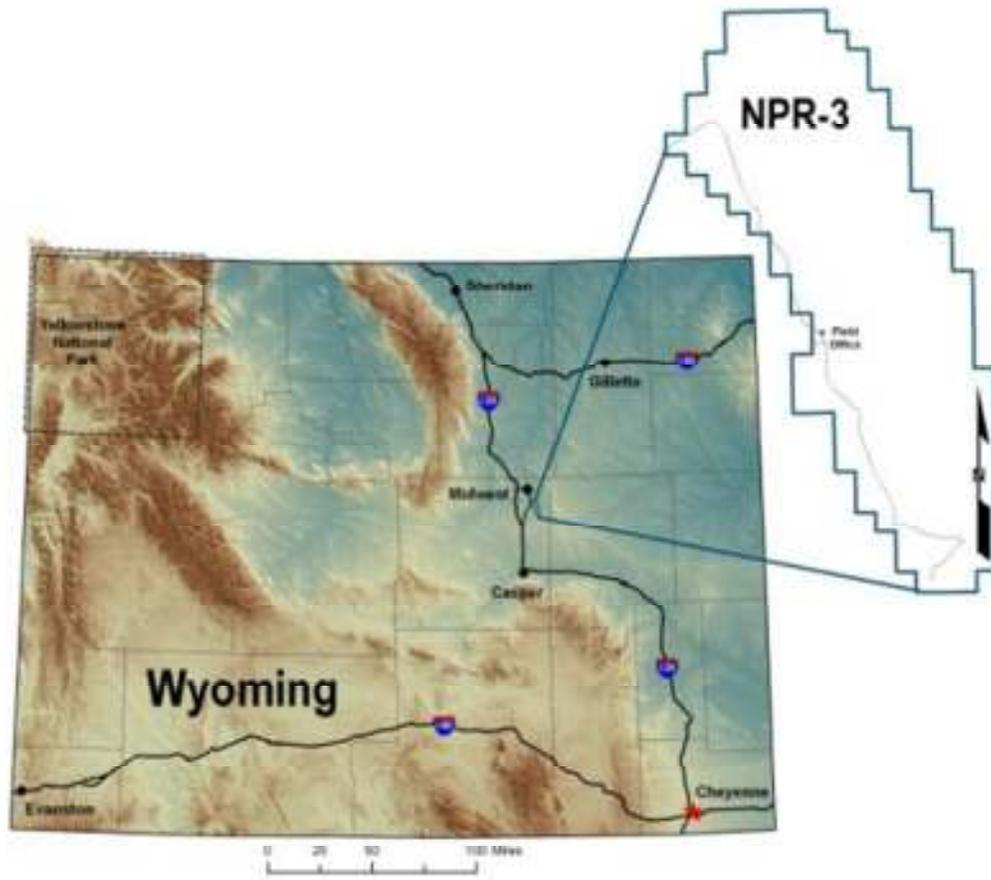


Figure 1. Geographic Location of RMOTC / NPR-3

NPR-3 Facilities

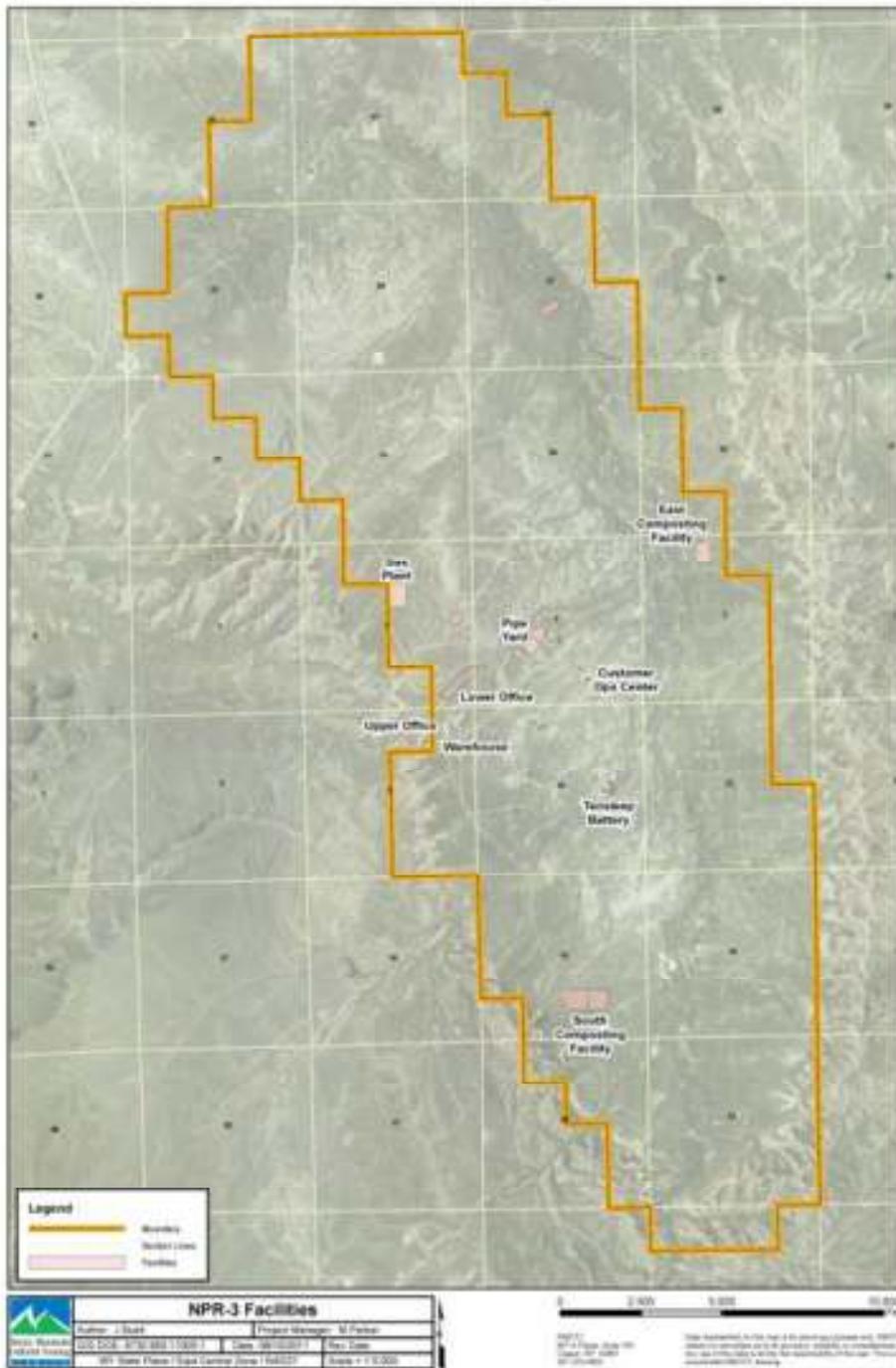


Figure 2. RMOTC/NPR-3 Facilities Map

III. COMPLIANCE SUMMARY

A. CLEAN AIR ACT (CAA)

Air emissions are regulated through a variety of Federal and State guidance. They are regulated primarily under the Federal Clean Air Act (42 USC 7401 through 7642). The Environmental Protection Agency's (EPA) regulations for air are contained within the Code of Federal Regulations (CFR) 40 CFR Parts 50 through 87, and OSHA's regulations are contained in 29 CFR Part 1910. Wyoming regulates air quality through the Rules and Regulations of the WYDEQ, Air Quality Division.

Per a phone conversation with Jeff Hancock at the WYDEQ, Air Quality Division, on September 22, 2010: RMOTC does not have, and is not required to have, an air quality permit because emissions are below permit requirements. RMOTC will be required to submit a permit application to the WYDEQ if a planned action or process could cause any air emissions. In 2008, one such application was submitted, and a permit waiver was approved for the installation and operation of one tri-ethylene glycol (TEG) dehydration unit with a reboiler heater and Kimray Model 9015 PV glycol pump.

Air Emission Sources

The Low Temperature Separation (LTS) Gas Plant has a dehydration unit to re-circulate produced gas from the backsides of wells and storage tank vents. None of the LTS units are required to have emissions monitored by either State or Federal requirements because the LTS Gas Plant, including the three emergency flares and two gas fired heaters, has been inactive since 2006.

During the summer of 1994, a field-wide emissions inventory was conducted to provide reasonable estimates of emissions from the H₂S flares, wells, and tanks. Hydrogen sulfide (H₂S) monitoring around tank batteries and at well sites were collected at 102 locations in 2010. Readings were 0 at all but 19 sites; 8 sites averaged <20 ppm, 10 sites ranged between 20 ppm and 61 ppm, and one site averaged 132 ppm. Monitoring is conducted at all active sites. H₂S sampling procedures and results for RMOTC / NPR-3 are described in a report dated Oct 15, 2009 and prepared by Pat Toft. The results fell within the parameters set by the regulations and were submitted to WYDEQ.

The flare at the LTS gas plant was used to flare purged gas in 2011. A total estimated volume of 4 Million Cubic Feet (MCF) of natural gas, propane, and butane was flared during two events in 2011. Per a conversation with Chris Hannify at the WYDEQ, Air Quality Division, on March 7, 2011: the use of the flare during the purge and drain operations at the NPR-3 LTS Gas Plant is covered by the two Air Quality Permit Waivers that RMOTC holds. A Notice of Intent (NOI) sundry was also submitted to the WOGCC before any flaring was done and the NOI was approved.

Potential concerns with respect to ambient air quality standards at RMOTC / NPR-3 are primarily limited to H₂S. The RMOTC Safety Coordinator continually evaluates the H₂S levels in the field. Personal H₂S monitors are used by RMOTC employees, visitors, contractors, and partners.

B. CLEAN WATER ACT (CWA)

Wyoming is a National Pollutant Discharge Elimination System (NPDES) authorized State (referred to in Wyoming as WYPDES), and wastewater discharges are regulated under the Clean Water Act (CWA) (33 USC 1251 to 1387) and its associated EPA regulations (40 CFR Parts 122, 136, 403, and 405-471). Wyoming regulations are codified under the Wyoming Water Quality Rules and Regulations.

Wastewater Discharges

During 2011, RMOTC / NPR-3 held two WYPDES permits, issued by WYDEQ.

- WY-0028274-001 located at the B-TP-10 Tank Battery;
- WYG-720231 located at the North Water Flood Building (inactive in 2011);

Table 2 presents information regarding environmental permits at RMOTC, including these two WYPDES permits.

The WYPDES permits impose discharge limits on oil and grease, specific conductivity, pH, and Radium 226. Oil and grease, conductivity, and pH were required to be sampled six times per year (every other month) and Radium 226 was to be sampled annually. RMOTC sampled bi-monthly in CY-2011.

RMOTC's only active permit, at the B-TP-10 #1 outfall (WYPDES permit # WY-0028274-001), discharged continuously during 2011. The permit at the North Water Flood Building did not discharge during CY-2011. The sample results are listed in Table 1 below.

Table 1. WYPDES Discharge Results for permit #WY-0028274-001

| Date | Chloride (mg/L) | Oxygen Demand, Chemical (COD) (mg/L) | pH (s.u.) | Solids, Total Dissolved TDS @ 180 C (mg/L) | Radium 226 (pCi/L) | Oil & Grease (HEM) (mg/L) |
|--------------------------------|-------------------|--------------------------------------|---------------------|--|--------------------|---------------------------|
| <i>WYDEQ Standard or Limit</i> | <i>2,000 mg/L</i> | <i>N/A</i> | <i>6.5-9.0 s.u.</i> | <i>5,000 mg/L</i> | <i>60 pCi/L</i> | <i>10 mg/L</i> |
| 2/17/2011 | 1000 | 46 | 8.18 | 3210 | 19 | ND |
| 4/21/2011 | 962 | 44 | 8.02 | 3210 | 21 | ND |
| 6/16/2011 | 1010 | 30 | 8.05 | 3200 | 18 | ND |
| 8/18/2011 | 982 | 87 | 8.08 | 3280 | 19 | ND |
| 10/27/2011 | 991 | 47 | 7.97 | 3210 | 20 | ND |
| 12/22/2011 | 918 | 38 | 7.9 | 3260 | 14 | ND |

During 2011, the semi-annual and annual discharge monitoring reports (DMR's) were filed with WYDEQ as required by the permit.

Geothermal

In CY-2011, hot produced water was a defined waste stream in the oil field. Historically, at RMOTC / NPR-3, geothermal produced water is treated through a series of treatment ponds and then discharged into an adjacent stream. Samples are routinely collected from the treatment ponds at the Tensleep battery.

The Ormat Project was in operation throughout CY-2011. It is a binary geothermal power generation system that uses hot produced oil field water to produce electricity. The system is an air-cooled, factory-integrated, and skid mounted Ormat organic Rankine-Cycle Power Plant. This plant is part of a testing program to demonstrate and evaluate the production of electrical power from the water produced (coproduced fluid) during normal oil and gas operations. The power generation system is a binary system that uses a process fluid in a closed system to power the turbine-generator to produce electricity. The process fluid is never exposed to the atmosphere. The coproduced water is from the Tensleep production battery, and after use, the water is returned to the wastewater ponds at the Tensleep battery.

This process removes some of the heat from the produced water prior to its being cooled in the wastewater ponds. Cooling of the wastewater in the ponds is desirable because it facilitates oil separation. The produced electricity generated from this project was metered and checked for reliability / quality and then used to power field production equipment.



Figure 3. ORMAT Geothermal Unit located at the Tensleep facility

A second geothermal facility was installed at the North Water Flood building in 2011 but was

not used. The geothermal system at the North Water Flood building is also a binary generator system that will eventually use the hot water produced from the Madison formation. The wastewater from the process will be discharged into an adjacent creek bed through a WYPDES permit. The wastewater will be sampled every time the system is used.

In 2011, the renewable energy purchased from Rocky Mountain Power offset of carbon dioxide (CO²) produced from a coal-fired power plant was 1,616,981 pounds of CO².



Figure 4. RMOTC / NPR-3's Certificate of Blue Sky Renewable Energy Support

Petroleum Management

Petroleum discharges are regulated under the CWA (Clean Water Act). The associated EPA regulations are codified in 40 CFR Parts 110, 112, 280, 300, and 302. Wyoming regulations concerning the discharge of oil into waters of the State are codified in Water Quality Rules and Regulations Chapter VII. WYDEQ has also prepared a "Wyoming Oil and Hazardous Substances Pollution Contingency Plan" that RMOTC / NPR-3 uses as a planning tool to prevent, and mitigate as necessary, releases of petroleum to waters of the state.

Petroleum management at RMOTC / NPR-3 consists of the management of oil and associated wastes (e.g., produced water / sludge), to prevent oil from being discharged into surface water.

Oil spill prevention measures are outlined in the RMOTC / NPR-3 Spill Prevention Control and Countermeasure (SPCC) Plan. The SPCC was in revision throughout 2009 and was finalized in 2010. In 2011, it was reviewed for accuracy as part of the Environmental Management Systems annual review.

RMOTC / NPR-3 has numerous potential sources for crude oil spills, including specifically:

- Tank batteries
- Test satellites
- Pipelines, and
- Reserve pits

Earthen retaining pits, used to store produced water, are permitted by the Wyoming Oil and Gas Conservation Commission (WOGCC). Craig Toll of the WYDEQ performed an inspection of the B-Tp-10 produced water pits on November 7, 2011 and no compliance issues were identified.

C. *COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA) ISSUES*

DOE sites have been required under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and DOE Order 5480.4 to develop and implement a program to identify and evaluate inactive hazardous waste disposal sites to determine the necessity of remediation.

CERCLA Reportable Releases

Hazardous substances are stored at RMOTC / NPR-3 in small quantities to support operations. In most cases, substances are maintained at individual sites in quantities less than a reportable quantity (RQ). There were four (4) spills that were reportable under CERCLA in 2011. They are described later in “Environmental Occurrences.”

D. *EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT (EPCRA)*

The Emergency Planning and Community Right-to-Know Act (EPCRA) (42 USC 11001 through 11050) imposes reporting requirements for hazardous chemicals. This act appears as Title III of the Superfund Amendments Reauthorization Act (SARA) and is often referred to as SARA Title III. EPA reporting requirements are codified in 40 CFR Parts 350, 355, 370, and 372.

Title III Reporting

RMOTC / NPR-3 is under the jurisdiction of the Wyoming Emergency Management Agency located in Cheyenne and the Natrona County Emergency Management Agency located in Casper. Emergency assistance is available through the Natrona County and Midwest / Edgerton Fire Departments.

RMOTC submitted four (4) reportable spill notifications in 2011, as per SARA Section 304 (40 CFR 355.40) requirements. Tier Two Emergency and Hazardous Chemical Inventory forms for the facility were submitted in June of 2011 for the 2010 calendar year. An inventory of RMOTC’s EPCRA Section 313 chemicals and chemical categories was conducted and the results were compared to the thresholds for the individual chemicals and chemical categories. The results of the analyses dictated that there were no reportable chemicals in exceedance of threshold reporting quantities and therefore no Toxic Release Inventory (TRI) report was filed.

E. *ENDANGERED SPECIES ACT (ESA)*

To ensure that federal actions are not likely to jeopardize the continued existence of an

endangered or threatened species, regulatory protection is provided under Section 7 of the Endangered Species Act (ESA) of 1973 (16 USC. 1536).



Figure 5. Black Tailed Prairie Dogs
(Courtesy of Britannica.org)



Figure 6. Golden Eagle
(Courtesy of draperwildlife.org)



Figure 7. Sage Grouse
(Courtesy of Prairie Ice)

Endangered Species Surveys:

A survey for raptors was conducted at RMOTC / NPR-3, in August 1998, and no endangered Raptors were found. During the survey, a pair of Golden Eagles (*Aquila chrysaetos*) and their nest was found just outside of the RMOTC / NPR-3 boundary.

In June of 2005 an additional wildlife survey was conducted by VERITAS. A field inventory of prairie dog colonies within RMOTC / NPR-3 was conducted on June 15, and 16, 2005. One black-tailed prairie dog (*Cynomys ludovicianus*) colony was documented. This colony, located on the western border of RMOTC / NPR-3, is 3.4 acres and low density. No white-tailed prairie dogs were documented on RMOTC / NPR-3 property.

A follow up to this survey was conducted in May of 2007. A Wildlife Range Management Survey was conducted by an outside contractor. Specifically a field inventory of prairie dog colonies within the RMOTC / NPR-3 border was conducted. No prairie dogs were documented on RMOTC / NPR-3 property, during the May 2007 survey. Prairie dogs were noticed on NPR-3 property in 2011. Their low density population centers were located in unfrequented areas of the field and the colonies were not disturbed.

RMOTC / NPR-3 lands were surveyed for nesting raptors on June 7 and again on June 26, 2007. Aside from ground nesting raptors, the survey area contains little potential raptor nesting habitat. One active northern harrier nest and no inactive raptor nests were documented.

During CY-2011, No ESA conditional changes were observed, and none of the activities conducted at RMOTC / NPR-3, affected endangered or threatened species of any kind.

F. FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDES ACT (FIFRA)

Pesticide / Rodenticide Management

Pesticides are regulated under FIFRA [USC 136 through 136(y)]. EPA Pesticide regulations are codified in 40 CFR Parts 162, 165, 166, and 171.

Only household-type spray insecticides are currently stored at RMOTC / NPR-3. Spray

insecticides are used to control black widow spiders in buildings and flying insects near employee work areas. Relatively small quantities of these pesticides are stored in the Supply Room at the Technical Assurance Department.

Household Rodenticide was used in 2010 in small quantities to control rodent infestation in occupied buildings and work areas.

Herbicide Management

There were no employees at RMOTC / NPR-3 in CY-2011 that held a Wyoming Commercial Pesticide Applicator License and a third-party contractor was requisitioned for weed control. Herbicides were applied to control noxious weeds, limit fire danger, and to clear vegetation around wells and production equipment. The herbicides that were utilized included:

- 2-4-D Amine (14 quarts);
- Cornbelt Premier 90 Surfactant (9 quarts);
- DuPont Texlar XP (7 ounces); and
- DOW Milestone (42 ounces).

G. FLOOD PLAIN / WETLANDS ASSESSMENTS

Two Executive Orders (E.O. 11988 Floodplain Management and E.O. 11990 Protection of Wetlands) require Federal agencies to consider the effects of proposed actions on floodplains and wetlands. During 2004 a wetlands delineation study was conducted by an independent contractor. It was determined that the entire RMOTC / NPR-3 area was affected by an extended drought, which created a wetland delineation situation for seasonal wetland hydrology and associated vegetation parameters in some areas. Designated problem areas were deemed to have met the wetland criteria for all parameters for an appropriate time period, although some criteria may not have been met at the time of the wetland survey. Wetland and non-wetland area boundaries ranged from distinct and abrupt to very gradual based on changes in topography. All identified wetlands were recommended as jurisdictional. No closed basin watersheds were identified within the project area. During 2010, a consultant performed the field work involved in a wetlands delineation study. The results of the 2010 fieldwork became available in 2011. The independent contractor confirmed the wetland areas defined in the 2004 study and re-inventoried many locations. Most of the classified wetlands remain dry for all but spring runoff events. The most common types of wetland found were:

- Palustrine, Aquatic Bed (PAB) wetlands,
- Palustrine, Emergent (PEM) wetlands,
- Palustrine, Unconsolidated Shore (PUS) Other Waters of the United States (OWUS), and
- Riverine, Intermittent, Streambed (R4SB).

H. NATIONAL HISTORIC PRESERVATION ACT (NHPA)

The following is a listing of laws, one Executive Order, and a Presidential Memorandum that provide guidance for the protection of archaeological and historic resources at RMOTC / NPR-3:

- Antiquities Act of 1906 (P.L. 59-209);
- Historic Sites, Buildings, and Antiquities Act of 1935, P.L. 74-292, as amended by P.L.

- 89-249, P.L. 96-625;
- Archaeological Recovery Act of 1960, P.L. 86-523, as amended by P.L. 93-291 (The Archaeological and Historic Preservation Act of 1974), P.L. 95-625, P.L. 96-515, P.L. 98-483, and P.L. 101-70;
- Executive Order 11593 (1971);
- President’s Memorandum on Environmental Quality and Water Resources Management (1978);
- Archaeological Resources Protection Act of 1979, P.L. 96-95, as amended by P.L. and P.L. 100-588; and
- Native American Graves Protection and Repatriation Act of 1990, P.L. 101-601, 25 U.S.C. 3001-3013

A Cultural Resource inventory was completed in May of 2007 in conjunction with the RMOTC / NPR-3 Site Wide Environmental Assessment (SWEA). RMOTC has multiple sites that are eligible for the National Registry of Historic Places (NRHP) listing. A Cultural Resource Study is performed by a third party contractor prior to any major ground disturbance at RMOTC.

I. RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

Hazardous wastes are regulated under RCRA (42 United States Code (USC) 6901 to 699li), as well as being addressed by EPA’s hazardous waste regulations, which are codified in 40 CFR Parts 260 through 271. Both of these Federal guidance’s are relevant to RMOTC / NPR-3.

Hazardous Waste Management

During 1991, a hazardous waste storage area was established at RMOTC / NPR-3. The area is fenced and locked to provide security and insure that unauthorized personnel are kept out. Procedures for the handling and storage of hazardous waste have been implemented.

The RMOTC / NPR-3 EPA identification number is WY4890090042.

RMOTC / NPR-3 maintains its status as a Small Quantity Generator (SQG), generating between 100 kg and 1000 kg of non-acute hazardous waste a month, less than 1 kg of acute hazardous waste a month. Wastes at RMOTC / NPR-3, are produced generally from equipment maintenance, produced fluid “grind-out” (centrifuge) testing, and spillage of materials in storage. Small amounts of other hazardous wastes are also generated.

Solid Waste Management

RCRA also governs the management of solid waste. EPA’s solid waste regulations are codified in 40 CFR Parts 240 through 246. Wyoming’s Solid Waste Regulations are codified under the Waste Management Division Rules and Regulations, Chapter I, II, VII, VIII, and IX.

RMOTC / NPR-3 did historically operate an industrial solid waste landfill that was permitted by the WYDEQ. In October 1993, a commercial Waste Disposal Firm was contracted to provide solid waste disposal. All solid waste produced at RMOTC / NPR-3 is now transported to the Casper City Bale Fill. While the solid waste permit was renewed by the WYDEQ on January 28, 1998, the RMOTC / NPR-3 landfill has not accepted wastes since. It was closed internally, and RMOTC / NPR-3 has begun the process for official closure.

The initial Closure Plan was submitted to WYDEQ on June 19, 2001. The Closure Plan was resubmitted in November 2007, revising the original plan as requested by the WYDEQ. In 2011, the Technical Assurance Department began conversations with WYDEQ to move the closure process along. Another addendum to the previous closure application, or a new application, will be submitted in 2013.

A recycling program has been implemented at RMOTC / NPR-3 that consists of batteries, cardboard, office paper, magazines, newspaper, antifreeze, used oil, aluminum cans, plastic bottles, florescent light bulbs, phone books, and scrap metals.

Underground Storage Tanks (UST)

USTs are also potentially regulated by RCRA regulations. In 1998, underground vehicle fuel storage tanks were removed and replaced by two aboveground tanks. The two above-ground tanks have double-walled construction and computerized leak detection systems.

J. SAFE DRINKING WATER ACT (SDWA)

Drinking Water

Drinking water is regulated under the SDWA (42 USC 300f through 300j-11). Regulations promulgated pursuant to the SDWA are codified in 40 CFR Parts 141 through 143.

Potable water for RMOTC / NPR-3 is transported from an EPA-approved water source (the town of Midwest, WY), which acquires its water from the Casper Municipal Water System via a pipeline.

One 8,000-gallon buried tank is used to store potable water at the site. This tank is located at the Lower Office Complex. Proper amounts of Sodium Hypochlorite are added to ensure that no bacteria will grow inside the storage tank. The Potable Water System at RMOTC / NPR-3 was activated as a Wyoming Public Water System on March 31, 2004. A Site Sampling Plan was developed and submitted to EPA on April 28, 2004 and will be revised and updated in 2012. RMOTC maintains 2 certified Water Treatment Operators, and potable water sampling / analysis is conducted monthly. Additional assistance was sought from the Wyoming Association of Rural Water Systems and EPA in order to improve water compliance.

RMOTC received a Monitoring Violation from the EPA in 2011 for a 2010 event. RMOTC is required to sample potable water Lead and Copper every year, between June 1 and September 1, and submit those results to the EPA. The samples were collected and analysis was performed, however, the results were not submitted to EPA in a timely manner. The Monitoring Violation was rescinded when the sample results were submitted to EPA during 2011. RMOTC is now on a triennial Lead and Copper sampling schedule. Samples will be taken in 2012 and again in 2015.

In May of 2011 RMOTC received a Notice of Violation from the EPA regarding the number of routine samples taken after a positive total coliform event. RMOTC routinely collected four (4) potable water samples per month. 40 CFR 141 requires that five (5) samples be taken after a positive bacteriological result. RMOTC experienced a positive total coliform test in April of 2011. All subsequent samples were analyzed and deemed 'safe'. The violation was a technical one and the RMOTC drinking water has not had a positive event since.

The Department of Energy (DOE) is proposing to construct and operate an underground pipeline to connect RMOTC / NPR-3, to an existing potable water line which runs between Casper and Midwest, Wyoming. This action would provide potable water to site personnel that currently depend upon supplies brought to the site by truck. A NEPA Environmental Assessment has been issued, (DOE EA#1604). The construction of this pipeline has been postponed, due to lack of funds.

Underground Injection Control (UIC)

Underground injection is also regulated under the SDWA. EPA regulations are codified in 40 CFR Parts 144 through 149. Class II wells are regulated in Wyoming by the WOGCC Rules and Regulations.

RMOTC / NPR-3 holds Underground Injection Control (UIC) permits on wells 74 CMX 10WD, 51 CMX 10WD, and 34 CMX 10WD. These permits were issued by the WOGCC. These wells are available to dispose of produced water from the Shannon, Second Wall Creek, Third Wall Creek, Muddy, and Dakota formations, into the Crow Mountain formation.

RMOTC / NPR-3 also has eight (8) UIC-permitted gas injection wells that are used for pressure maintenance. These wells are also permitted by the WOGCC under the UIC program (see Table 2 for permit information).

K. STATE OIL AND GAS REGULATIONS

The Wyoming Oil and Gas Conservation Commission (WOGCC) administers oil and gas regulations in the state of Wyoming. UIC permits and the plugging and abandonment (P&A) of wells are governed by WOGCC rules and regulations. A P&A plan was developed in 1999, which prioritized 185 of the highest-ranking wells that need to be plugged and abandoned due to environmental, safety, mechanical, or economic conditions at RMOTC / NPR-3. During CY-2010, one well was successfully plugged and abandoned.

In 2010, evaluation of production wells was continued and specific wells were identified for P&A in 2011. In CY-2011 35 wells underwent Mechanical Integrity Testing (MIT) to assess the condition of the down hole casing. Five plugged wells were approved for base and pipe removal, contouring, and backfilling. In 2013, all of the wells that were plugged in 2011 and 2012 will be seeded and considered to be abandoned per WOGCC regulations.

During 2011, WOGCC completed several inspections of RMOTC / NPR-3 facilities to ensure regulatory compliance with WOGCC regulations and no issues were found.

L. TOXIC SUBSTANCE CONTROL ACT (TSCA)

PCB Management

Polychlorinated biphenyls (PCBs) are regulated under TSCA (15 USC 2601 to 2654). EPA regulations regarding the production, use, storage, handling, and disposal of PCBs are codified in 40 CFR Part 761.

6. Geothermal Energy Enhancement Facilities.

A new Site-Wide Environmental Assessment will be conducted in the years 2012 and 2013 in preparation for the disposition of NPR-3 and the change in RMOTC’s purpose, goals, and scope.

Categorical Exclusion (CX’s) issued in 2011

| # of occurrences in 2011 | CX | Description |
|---------------------------------|-----------|---|
| 1 | B1.2 | Training exercises and simulations |
| 10 | B1.3 | Routine maintenance |
| 1 | B1.22 | Relocation of buildings |
| 1 | B1.26 | Small water treatment facilities |
| 1 | B1.30 | Transfer actions |
| 1 | B2.6 | Recovery of radioactive sealed sources |
| 1 | B3.1 | Site characterization and environmental monitoring |
| 1 | B3.6 | Small-scale research and development, laboratory operations, and pilot projects |
| 4 | B3.7 | New terrestrial infill exploratory and experimental wells |
| 2 | B3.11 | Outdoor tests and experiments on materials and equipment components |
| 1 | B4.6 | Additions and modifications to transmission facilities |
| 1 | B4.7 | Fiber optic cable |
| 1 | B4.12 | Construction of power lines |
| 3 | B5.2 | Modifications to pumps and piping |
| 2 | B5.4 | Repair or replacement of pipelines |
| 1 | B5.6 | Oil spill cleanup |
| 4 | B5.12 | Work over of existing wells |
| 7 | B6.1 | Cleanup actions |

N. OTHER MAJOR ENVIRONMENTAL ISSUES AND ACTIONS

RMOTC received a Letter of Violation from WYDEQ for the Tensleep Facility WYPDES Permit because the annual Electronic Discharge Monitoring reports for 2012 were not submitted on time. RMOTC also received a Letter of Violation for the North Water Flood WYPDES outfall from WYDEQ for not submitting Discharge Monitoring Reports while the system was not in use. RMOTC received two Letters of Violation from the EPA for violations that occurred in 2010, one being a failure to submit Lead and Copper analysis results directly to EPA and another for an insufficient amount of routine samples after a positive total coliform test. All but the last bacteriological violation **were rescinded** when RMOTC took appropriate corrective actions.

WYDEQ review of chloride levels in discharge water.

A Use Attainability Assessment (UAA) was issued to the WYDEQ by Anadarko Petroleum Corporation, in Midwest, Wyoming. The UAA was conducted in response to reclassification of Salt Creek from Class 4 to Class 2C water with the 2001 revision of Chapter 1, Wyoming Water Quality Rules and Regulations. As a result, WYDEQ revised the Wyoming Pollutant Discharge Elimination System (WYPDES) permits for produced water discharges into Salt Creek and imposed a reduced effluent limit of 230 mg/L chloride. WYDEQ chloride levels in discharge

water were under review through CY-2010. The chloride limits for all permits after 2010 were raised to 2,000 mg/L.

Previously, RMOTC / NPR-3 was required to comply with only six water quality parameters: Chloride, Conductivity, pH, Oil & Grease, Radium-226, and Total Dissolved Solids. RMOTC / NPR-3 was proactively testing for more than only the required parameters. The constituents that were tested for in 2011 include the above mentioned requirements and also: Dissolved Metals, Chemical Oxygen Demand, Hardness, and E300.0 Anions.

Over CY-2011 RMOTC / NPR-3 assessed effluent conditions, in order to determine if a UAA would be required to petition for site-specific variances. In 2011, it was decided that there was no need to conduct a UAA because the recent chloride levels specified in the 2011 WYPDES permits (2,000 mg/L) is sufficiently high. RMOTC has not met or exceeded the permit level.

O. SUMMARY OF ENVIRONMENTAL PERMITS

Table 2. Environmental Permits at RMOTC / NPR-3

| Item | Permitting Agency | Permit Number | Facility / Purpose | Expiration Date |
|--|---------------------------------|------------------------------|--|-----------------------------------|
| WYPDES | WYDEQ | WY-0028274-001 | B-TP-10 Discharge | 5/20/2015 |
| | | WYG-720231 | North Water Flood, Binary Generator Unit Discharge | 10/1/2012 |
| Storm Water Discharges (Large Construction General Permit) | WYDEQ | WYR-101963 | B-TP-10 Discharge | 3/15/2016 |
| Air Quality | WYDEQ | AP-SQ0 | Air Quality Waiver for NPR-3 | No renewal required |
| | | AP-8062 | Air Quality Waiver for Gas Plant Installation | No renewal required |
| Solid Waste | WYDEQ | NPR-3 Industrial Landfill #2 | Landfarm / Landfill (ISWD) | Applied for closure November 2007 |
| Surface Water | WYDEQ | 34142 | RMOTC Water Haul Permit (Shannon Crossing) | 8/1/2013 |
| | | 34351 | RMOTC Water Haul Permit (North GTP) - expired | 7/1/2012 |
| Monitoring Wells(Landfill) | Wyoming State Engineer's Office | UW-89006 | 78-55-X-4 | No permit renewal required |
| | | UW-89007 | 88-13-X-4 | |
| | | UW-108987 | 98-1-X-3 replaces 17-32-X-3 | |
| | | UW-108988 | 98-2-X-3 replaces 17-33-X-3 | |
| | | UW-108989 | Actual well is 97-01-X-4. Permit reads 98-01-X-4 | |
| | | UW-108990 | 98-2-X-4 replaces 87-63-X-4 | |

| Item | Permitting Agency | Permit Number | Facility / Purpose | Expiration Date |
|-------------------------------|---------------------------------|---------------|-----------------------------------|----------------------------|
| Groundwater Appropriation | Wyoming State Engineer's Office | UW-43810 | 17-WX-21 Madison Water Well | No permit renewal required |
| | | UW-60713 | B-1-3 Tank Battery (Not in Use) | |
| | | UW-60714 | B-1-10 Tank Battery (Not in Use) | |
| | | UW-60716 | B-TP-10 Tank Battery (Not in use) | |
| | | UW-60718 | B-1-20 Tank Battery (Not in Use) | |
| | | UW-85156 | 57-WX-3 Madison Water Well | |
| Underground Injection Control | WOGCC | 049-025-06338 | 74-CMX-10-WD for Brine Disposal | No permit renewal required |
| | | 049-025-10025 | 27-A-34 Gas Injector | |
| | | 049-025-10212 | 302-A-3 Gas Injector | |
| | | 049-025-10218 | 103-A-33 Gas Injector | |
| | | 049-025-10431 | 44-MX-10 Gas Injector | |
| | | 049-025-10799 | 85-AX-33 Gas Injector | |
| | | 049-025-10871 | 65-AX-15 Gas Injector | |
| | | 049-025-10880 | 401-A-10 Gas Injector | |
| | | 049-025-10903 | 13-AX-10 Gas Injector | |
| | | 049-025-10929 | 34-CMX-10-WD for Brine Disposal | |
| | | 049-025-11123 | 51-CMX-10-WD for Brine Disposal | |

| Item | Permitting Agency | Permit Number | Facility / Purpose | Expiration Date |
|--------------------|---------------------------------------|-----------------------|------------------------------------|---------------------|
| Sundry Permissions | WOGCC | 049-025-10805 | Concrete Storage Facility | No renewal required |
| | | 049-025-10823 | New B-1-3 Pit and Box | |
| | | 049-025-10871 | South Composting Facility | |
| | | 049-025-10871 | South Composting Facility Pit | |
| | | 049-025-10871 | South Composting Facility #2 | |
| | | 049-25-22645 | East Composting Facility | |
| | | 049-025-22790 | North Composting Facility | |
| USACE | United States Army Corps of Engineers | Nationwide Permit #12 | Binary Generator Nationwide Permit | 5/1/2013 |

IV. ENVIRONMENTAL MANAGEMENT SYSTEM (EMS) PROGRAM INFORMATION

The Technical Assurance Department ensures that Environmental, Safety, and Security programs are implemented in compliance with DOE Order 450.1a and 450.4. The planning objective is to ensure that environmental plans, programs, and processes are an integral part of the RMOTC / NPR-3 site wide strategic view, and implementation processes follow “best management practices” for operation and teaming projects overall.

In general, the RMOTC / NPR-3 Strategic View developed by DOE and the contractor ensure that RMOTC is in compliance with environmental regulations and DOE Orders. The Technical Assurance Department objectives and strategies have been clearly defined and short or long-term systematic planning has and will continue to occur.

During CY-2011 the EMS was reviewed in its entirety as part of the Plan-Do-Check Act cycle which is part of both the EMS and the ISMS process. The documents in the EMS will be reviewed in more depth in 2012 as part of its three year external review requirements.

A. ENVIRONMENTAL COMPLIANCE ASSESSMENT

1. Self-Assessment Program Results:

- RMOTC has established an Environmental Management System (EMS) that monitors

environmental compliance with Federal, State, and Local laws, and DOE Orders. The use of NEPA Compliance Surveys during Project Scoping has become standard practice and as the EMS implementation progresses, this process is expected to improve and become stronger.

B. ENVIRONMENTAL TRAINING

1. Technical Assurance Department personnel attended the following training programs:

- OSHA Required Training;
- Using MSDSPro[®] Provider Training;
- EnergyStar[®] Portfolio Manager Training;
- EMS Awareness Training; and
- SPCC Training for employees.

V. ENVIRONMENTAL RADIOLOGICAL PROTECTION

Regular radiological monitoring is not required in association with oil and gas production operations at RMOTC / NPR-3. However, the WYDEQ - Water Quality Division has implemented a voluntary program for monitoring Naturally Occurring Radioactive Material (NORM) from produced oil field waters. The WYDEQ is primarily concerned with Radium 226 (Ra226) content. The discharge standard has been set at 60 pCi/L. Baseline data obtained during 2005 indicated that produced waters at RMOTC / NPR-3 are well below the 60-pCi/L standard. Data from 2011 sampling events indicate produced waters remain well below the standard.

VI. ENVIRONMENTAL NON-RADIOLOGICAL PROGRAM INFORMATION

A. WYOMING POLLUTANT DISCHARGE ELIMINATION SYSTEM (WYPDES)

Wyoming Pollutant Discharge Elimination System permits are maintained for all facilities discharging produced waters. The WYDEQ placed an effluent limit on chlorides of 2,000 mg/L, which went into effect on the 2011 permits. For any incidence of non-compliance, including non-compliance related to non-toxic pollutants or non-hazardous substances, a written submission shall be provided within five (5) days of the time that the permittee becomes aware of the non-compliance circumstance to WYDEQ.

Results and parameters monitored under WYPDES permits at RMOTC / NPR-3 during CY-2011 are presented in Tables 1 and 2 respectively.

B. AIR EMISSIONS MONITORING DATA

Levels of H₂S:

Following approved sampling procedures, production personnel, and the Field Safety Coordinator sampled every producing well along with every tank used in production throughout RMOTC / NPR-3. Of the 107 producing wells and every tank used in production throughout the field, 19 wells had H₂S present directly at the opening of the backside of the well head. While

some readings at the casing were above the OSHA PEL (20ppm), further sampling showed no H₂S one foot away from this opening.

During CY-2011 each well that was worked on over the year was monitored for H₂S. The results of this ongoing monitoring will be discussed in more depth in the CY-2012 ASER after they have been analyzed.

Entering H₂S Areas:

After reviewing the data, it is determined that there is no evidence of specific areas that contain moderate or high concentrations throughout RMOTC / NPR-3; however, there is potential for H₂S. RMOTC has H₂S plans and programs to inform employees how to safely work in and around possible H₂S areas, and all RMOTC employees are trained.

Conclusion:

With this information, it is determined that:

- Under normal working conditions, there is a very limited hazard for H₂S exposure at RMOTC / NPR-3
- All employees will continue wearing personal H₂S monitors
- The “Buddy System” adopted when conditions were unknown shall apply; and
- Any well that is turned on will be tested to determine the level of H₂S.

C. ENVIRONMENTAL OCCURRENCES

During CY-2010, four (4) releases were reportable. These events required that DOE occurrence reports be submitted. The following is a description of the occurrences:

1/10/2011

Madison water spill into Upper Water Disposal Facility Pit
FE—GONP-RMOTC-2011-0001

Madison water was pumped from B-1-3 to the Tensleep Facility through the Water Disposal Facility. 595 barrels of Madison water escaped from inside the Water Disposal Facility Pump Building in the Upper Pit located at the Water Disposal Facility. The diversion berm at the facility diverted the water to the pit, as it was designed to do.

3/15/2011

Tank Flash Incident and oil spill at the Customer Operations Center
FE—GONP-RMOTC-2011-0003

A RMOTC Project involved the installation of 6 new 400 barrel tanks and associated piping that would be connected to the existing flow loop. The tanks were configured with overflow piping that connected the tops of each bank of 3 tanks and was extended to ground level at one end of each tank arrangement. After preparation to the tanks a loud noise occurred and smoke was observed from 3 tanks on the east side. It is suspected that gas vapors separated from the oil in the tanks and traveled through the overflow lines and down to the area where the welding was being conducted. The ignition appeared to have occurred at ground level, and the “flash” propagated upwards and across all three tanks through the overflow piping. The tops and bottoms of all three tanks on the east side were mushroomed out. The three tank batteries on the west side were unaffected. Two tanks developed crude oil leaks. The entire spill was contained within the immediate area around the tanks. The amount of oil leaked is estimated to

be approximately 60 barrels. A vacuum truck started unloading the tank with the worst leak then began to suck up liquids out of a small depression where oil was pooling. A backhoe helped containment by digging a catch pit. A bobcat built a berm around the spill to prevent the spread of oil.

6/2/2011

Flow line leak between 15-SX-35 and East Zone Tank

FE—GONP-RMOTC-2011-0004

A flow line leak was discovered near the well 26-1-SX-35 and it was determined that the flow line ran from nearby well, 15-SX-35 to the East Zone Tank. The flow line was flushed with clean Madison water on 6/1/2011 to ensure that it was open and not blocked in preparation for the well 15-SX35 to be pumped. It is suspected that the flow line was compromised, due to age and disuse, and that is what caused the leak. The leak is estimated to be approximately 5 barrels of oil. The oil flowed from the leak site on the road, down to a nearby drainage via a sinkhole near the road. The drainage is technically classified as Waters of the State; however, at the time of the spill, it was a dry drainage, and it is approximately .5 miles from the closest live water, Little Teapot Creek. The spill was contained in the drainage in a small depression. The spill was cleaned up with a frontend loader and a dump truck. All of the contaminated soil was removed to the composting facility.

12/13/2011

Copper Sulfate release at well site 25-SX-14

FE—GONP-RMOTC-2011-0007

A well site facility was being reclaimed by third-party contractors and RMOTC personnel. The cardboard barrel of Copper Sulfate was mistakenly placed in the 'trash' pile by third-party contractors, and RMOTC personnel commenced to pick it up with a backhoe, not knowing that it contained a hazardous material. 10 pounds of Copper Sulfate was spilled. The backhoe ruptured the barrel of Copper Sulfate. The solid chemical was completely contained in the soil that it fell upon, and the chemical-contaminated soil was cleaned up per the MSDS directions and was taken to the RMOTC Chemical Hazardous Waste Storage Yard for proper disposal through an EPA approved disposal company.

VII. SITE HYDROLOGY, GROUNDWATER MONITORING, AND PUBLIC DRINKING WATER PROTECTION

A. GROUNDWATER MONITORING INFORMATION

There are six groundwater monitoring wells at the Industrial Solid Waste Disposal Facility #2. The wells are used to detect contamination of groundwater emanating from RMOTC / NPR-3's Landfill, which is no longer operated, and the Land Farm that has not received any contaminated soil since 1998. Permitted water disposal wells are used to dispose of produced water and wastewater, which do not meet discharge requirements. No significant, shallow, fresh-water zones have been detected in the more than 500 wells drilled since 1976. Casing and cementing plans are designed to prevent migration of fluids between zones. Injection wells are tested every five years to ensure the integrity of the casing and to detect migration of fluids.

B. PUBLIC DRINKING WATER PROTECTION

The use of groundwater as a drinking water source around RMOTC / NPR-3 is very limited because of poor water quality (high total dissolved solids) and the lack of significant water-bearing units. Groundwater is used mainly as a non-potable supply. Where no better source is available at isolated ranches, the groundwater is utilized for watering livestock and is treated for household use (dishes, washing machine, etc.). Potable water for the communities of Midwest and Edgerton (6 miles north of RMOTC / NPR-3) is pumped and piped approximately 40 miles from the water treatment facility in Casper, Wyoming.

There is no source of potable water underlying RMOTC / NPR-3. The only two formations at RMOTC / NPR-3 that produce water of reasonable quality for livestock use are the Tensleep and Madison formations. Water from both formations is produced and used in RMOTC / NPR-3 operations and is then discharged through WYPDES permitted facilities. Various controls are used at RMOTC / NPR-3 to prevent fluid migration between subsurface formations. These controls include WOGCC-approved practices and compliance with the UIC regulations. Production wells are cased and cemented according to WOGCC rules and regulations, to prevent fluid migration.

Injection wells are tested periodically for casing integrity, for assurance that injected fluids enter the proper geologic unit and that leaks are not occurring. Solid waste disposal operations at RMOTC / NPR-3 are unlikely to be pollution sources for either soil or groundwater. The absence of shallow groundwater and the presence of relatively impermeable weathered shale and bentonite, at the surface, prevent contaminant transport. The semiarid climate and the immobility of wastes that were allowed in the permitted landfill, greatly reduce this possibility. Other groundwater protection controls include general good housekeeping and the practice of using production chemicals in small quantities away from waterways. Oil production operations also utilize aboveground vessels and spill-containing berms.

VIII. QUALITY ASSURANCE

Procedures are available which detail the proper method of groundwater, surface water, and WYPDES sampling according to EPA-established protocol. These procedures include proper well purging technique, decontamination technique, test measurements (pH, conductivity, etc.), personal protective equipment, etc.

Laboratory analyses are performed by subcontracted EPA-certified laboratories that utilize EPA-approved methods and maintain QA / QC programs.