3R - 79

REPORTS

DATE:

9/18/1992

Progress Report for Reclamation of Soil and Groundwater at Thomas #1 Natural Gas Well, San Juan County, New Mexico

September 18, 1992

Prepared for:

Mr. Terry Hubele
Mobil E&P
500 West Illinois
P.O. Box 633
Midland, TX 79702

Prepared by:

H+GCL

ALBUQUERQUE OFFICE
505 Marquette Avenue, NW
Suite 1100
Albuquerque, New Mexico 87102
(505) 842-0001
FAX (505) 842-0595

Table of Contents

List of Appendices

List of Plates

1.0 Introduction

On July 22 and 23, 1992, H⁺GCL installed a passive vapor venting system at the Thomas #1 gas well, San Juan County, New Mexico. H⁺GCL prepared the reclamation proposal for this system and submitted it to the New Mexico Oil Conservation Division (NMOCD) on May 18, 1992. The agency conditionally approved the proposal on July 2, 1992. H⁺GCL subsequently conducted the field activities in accordance with the Draft Guidelines for Surface Impoundment Closure (NMOCD, 1992). Additional information concerning the environmental setting of the site is presented in the H⁺GCL November 26, 1991, Subsurface Investigation Report.

2.0 Description of Site Activities

On July 22, H⁺GCL crews began excavating soil near the tank battery and from a nearby trench created to accommodate the passive soil venting system. Plate 1 shows the area of excavation and the layout of the passive venting systems installed at the tank battery and at the closed produced water disposal pit.

Approximately 234 cubic yards of soil were removed to the Envirotech land farm in Bloomfield, New Mexico. Because the subsurface soil appeared to be either highly contaminated or uncontaminated, no soil was removed from the subsurface for "thin spreading" at the site. Hydrocarbon-contaminated soil was segregated from uncontaminated topsoil to permit its use as backfill.

Field personnel excavated the designated areas and trenches were excavated to the top of the ground water, approximately 3 feet below ground surface. One hundred pounds of nitrogen-rich lawn fertilizer were added to the ground water in the excavations to enhance the natural biodegradation of petroleum hydrocarbons in the groundwater. The rationale for this slight deviation from the reclamation plan is explained below.

Crews then emplaced 2-foot thick layer of 1/2- to 3/4-inch gravel in the excavations. Four-inch PVC septic leach line and solid pipe were installed on top of the gravel and covered with approximately 1 foot of additional gravel. A total of 120 cubic yards of gravel was utilized. H⁺GCL then spread PVC sheeting over the gravel in the large excavation near the tank cavity and roofing paper over the gravel in the trenches. Finally, excavations and trenches were backfilled with uncontaminated soil.

H⁺GCL installed the sheeting and roofing paper for two reasons. First, the impermeable material will ensure that air will be drawn from the surrounding sediments, not from the backfill. Second, the material will prevent the fine soil backfill from clogging the gravel. Due to the installation of these impermeable membranes, our original plan to add fertilizer to the backfill material was replaced with the approach described above.

H⁺GCL restored the site using uncontaminated soil for backfill and native grasses for revegetation. Excavations and trenches were filled with clean topsoil excavated at the site. In addition, approximately 120 cubic yards of clean fill was transported from the Envirotech land farm to completely restore the site contours and required tank berms. The site was then seeded to complete the surface restoration.

As specified in the reclamation proposal, the venting system at the tank battery utilizes two 6-inch turbine ventilators. The system at the produced water disposal pit employs a 4-inch ventilator. Appendix A contains photographs of the system installation. Site observations during the installation are presented below.

3.0 Observations

Visual observations and headspace evaluation of soils permitted us to determine relative concentrations of hydrocarbons in site soils. Near the tank, the soils were highly contaminated from 2 feet below land surface to the groundwater. Excavation below the water table showed that the color of the soils changed from black to brown 2 feet below the groundwater level.

Groundwater in the excavations showed a sheen of hydrocarbons. After the excavation stood open overnight, the sheen was slightly more evident. An accumulation of floating hydrocarbons was not observed in the excavation.

The material excavated near the tank and near the produced water disposal pit were typical of San Juan River sediments. Coarse-grained sand and gravel dominated the lithology. The material was highly permeable to water, and presumably to air as well.

At the end of the first day, several piles of black, contaminated soil with a strong petroleum odor were present at the site. By noon on the second day, the color of the piles had changed from black to brown. The petroleum odor was absent from the surface soils of the piles. Our excavations showed that the black, highly-contaminated soil was present within 2 feet of the surface of the pile.

4.0 Conclusions

These observations yield the following conclusions:

- Floating hydrocarbons are not present at the site. The high BTEX values observed in previous groundwater samples is most likely due to the proximity of highly contaminated soils. Floating hydrocarbons have not been detected in previous sampling programs at the site.

- Highly-contaminated subsurface soils can be readily remediated via the addition of oxygen and pressure to increase air movement. The changes in the excavated soil (color and odor) as observed in the contaminated piles suggest that biologic activity and volatilization are rapid.

- The highly-permeable soils observed at the site are well-suited for a passive vapor venting restoration program.

5.0 Subsequent Actions

Groundwater was sampled on September 2, 1992. Analytical results will be forwarded to the NMOCD when available. H⁺GCL does not anticipate improvement in water quality. Increased levels of BTEX may occur due to the disturbance of highly-contaminated soils up-gradient from the monitor wells. Petroleum hydrocarbons previously sorbed to the sediments may be released causing a temporary degradation of water quality.

The second semi-annual groundwater monitoring event is scheduled for March 1993. NMOCD will be notified in advance of sampling.

Despite the age of the spill, the observed groundwater contamination is not extensive. Therefore, we believe the plume is currently in dynamic equilibrium: the addition of hydrocarbons to the groundwater from contaminated soil is balanced by the down-gradient removal of hydrocarbons via volatilization and metabolism by microorganisms. One year of monitoring should prove or disprove this hypothesis.

6.0 Contingency Plan

If the water quality does not improve after one year, additional measures may be taken to accelerate the restoration process. Such measures may include installation of powered blowers to enhance the movement of air through the contaminated soils, the addition of hydrogen peroxide to the groundwater system, the addition of non-native hydrocarbon degrading bacteria, or other measures.

Appendix A

System Installation Photographs

Photo by trench, 55 feet west of storage tank. Groundwater is present in trench. Note thickness of soil contamination is significantly less than near the tank.

Soil contamination observed in trench near production pit.

Photo looking east showing excavated area west of storage tank. Note discoloration of subsurface soils due to hydrocarbons. Groundwater is present in excavation.

Photo looking west from storage tank. Note groundwater in excavation and thickness of contaminated soil.

Gravel is installed in large excavation from level of groundwater to top of soil contamination. PVC is installed over gravel and clean dirt backfilled on PVC.

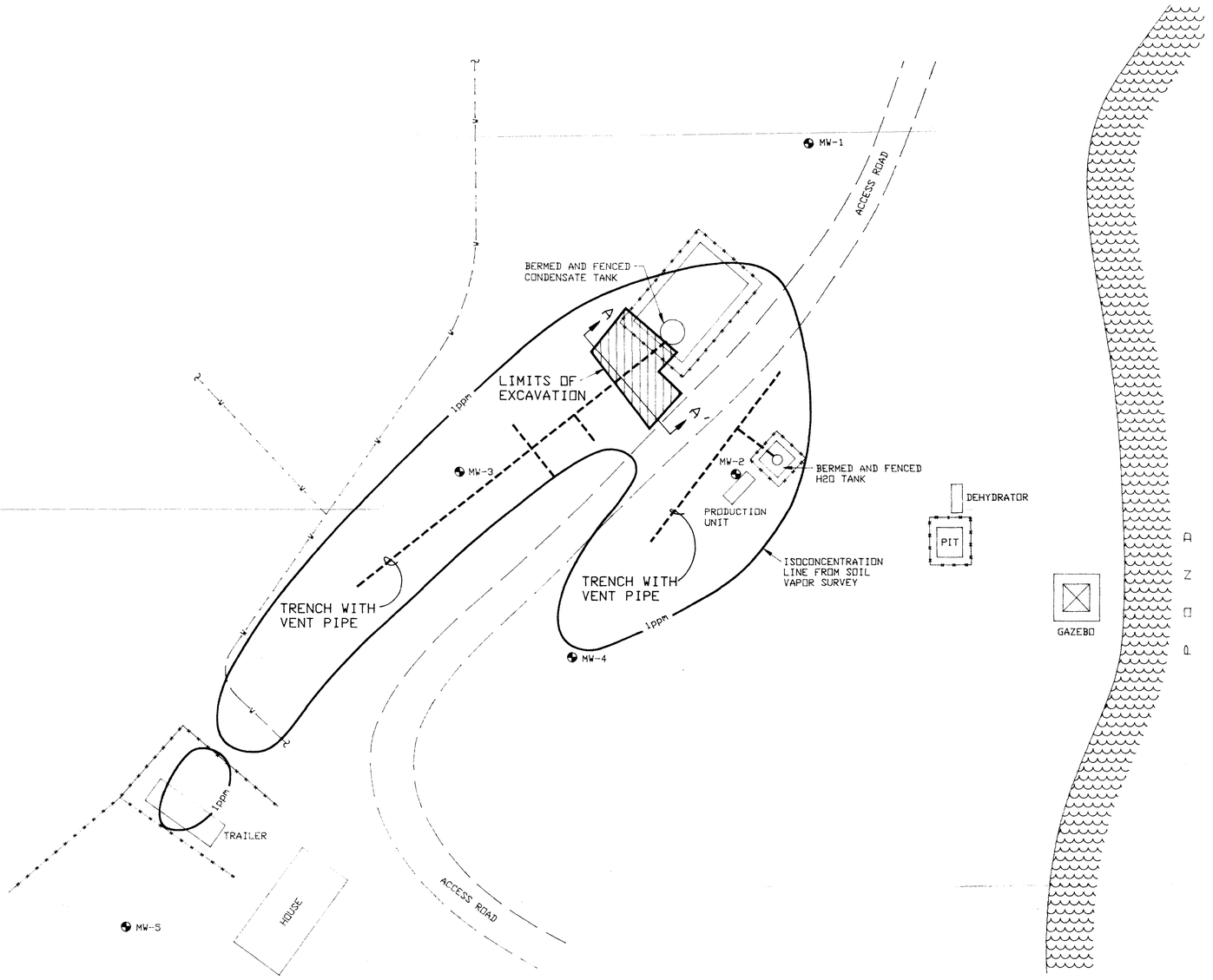
Vent pipe installed with mound of gravel over pipe. PVC sheeting is later folded over pipe.

Vent pipe installed in trench near storage tank.

Vent pipe installed in trench near production pit.

Storage tank passive system completely installed as surface restoration continues

Production pit passive venting system is installed.



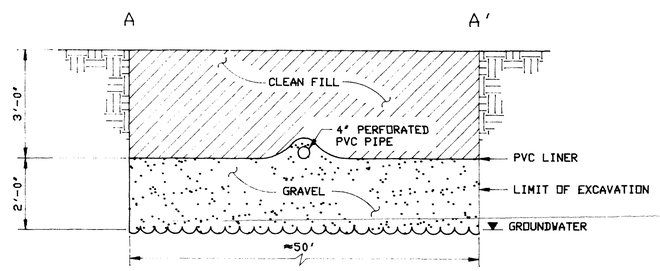
PLAN VIEW

30 20 10 0 60
25 15 5 30
SCALE: 1' = 30'

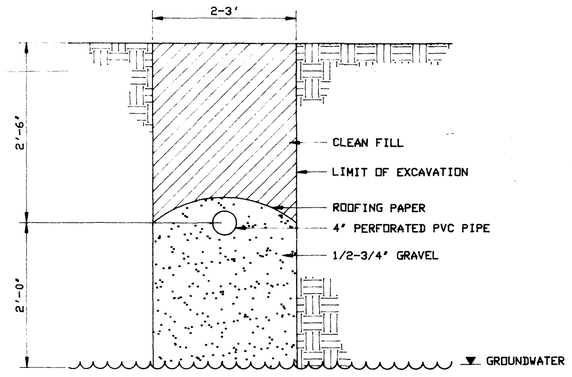
N

LEGEND

- EXISTING 6" WATER LINE
- 1ppm TOTAL BTEX IN SOIL VAPOR
- TRENCH/PVC PIPE LOCATION
- MONITOR WELL LOCATION



SECTION A-A'
NOT TO SCALE



TYPICAL TRENCH DETAIL
NOT TO SCALE

RECEIVED
SEP 29 1992
OIL CONSERVATION DIV.
SANTA FE

H+GCL

PLATE 1
PASSIVE SOIL
VENTING SYSTEM

CLIENT: MOBIL
DATE: AUGUST 1992
DRAWN BY: JTN
CHECKED BY: RTH
DWG. NO.