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REPORTS

DATE:

2004

MAXIM TECHNOLOGIES
A DIVISION OF TETRA TECH, INC

1703 W. Industrial Ave.
Midland, Texas 79701
(432) 686-8081

August 27, 2004

Mr. Wayne Price
New Mexico Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

RE: Wantz Historic Production Pit
Lea County, New Mexico
SE Qtr, Sec 21, T21S, R37E
Work Plan for Unlined Surface Impoundment Characterization

Dear Mr. Price:

Maxim Technologies (Maxim) submits this proposed work plan, on behalf of ConocoPhillips, to conduct a subsurface investigation at a historic production pit adjacent to Wantz Tank Battery (site). The site will be investigated to describe the lateral and horizontal subsurface environmental conditions of the historic earthen pit. The site is located approximately 1.2 miles north of Eunice, New Mexico, off State Highway Loop 18, in the southeastern portion of Lea County, New Mexico (Figure 1). The intent of the investigation is to document whether or not there is impact at or from the site that could cause a significant risk to human health or the environment.

Based on information provided by ConocoPhillips, Maxim will upon approval by the New Mexico Oil Conservation Division (NMOCD), initiate the following subsurface investigation.

Scope of Work

Maxim will follow the subsurface, Site Assessment Characterization protocol outlined in ConocoPhillips' *Unlined Surface Impoundment Characterization and Surface Restoration Plan, Southeastern New Mexico*, prepared and submitted to the NMOCD for review and concurrence.

Maxim will follow the assessment guidelines outlined in Steps 1 and 2 of the above referenced document in developing background data and maps. Site information would be gathered to describe impairments seen, including damage to crops or pasture; surface soil type; hydrocarbon stains, odors, and seeps; buildings, equipment, and power lines; evidence of underground utilities or pipelines. Observable area information (e.g. agricultural or other land use; all wells and water bodies within 1000 feet; known and flagged oil and gas lines) would also

be identified. Other records, such as data on rural water lines, water well records, and local water system wellhead protection area would also be collected and used to describe the area.

In order to develop required sampling data, Maxim will advance one center site assessment boring, three delineation borings and one background boring (5 total borings) with a truck-mounted rotary air drill unit to delineate the horizontal/vertical extent and concentration(s) of the impact area (500 feet x 250 feet) with samples taken in, around, and under the affected soil (Figure 2). The center boring will define the vertical clean boundary and the delineation borings will define the horizontal extent of the clean boundary. The background boring will describe naturally occurring chloride concentrations in the soil in the vicinity of the site. The clean boundary will be based on photo-ionization detector (PID) measurements (soil gas analysis) and chloride field kit checks, used to identify the impacted versus un-impacted areas. The task would also pinpoint the areas for confirmation sampling prior to site restoration. Soil samples from the borings would be collected to establish current soil conditions with respect to potential environmental concerns.

The center boring will define the vertical clean boundary and the delineation borings will define the horizontal extent of the clean boundary. The background boring will describe naturally occurring chloride concentrations in the soil in the vicinity of the site.

Site Assessment Characterization protocol includes:

1. New Mexico One-Call notification and notification of NMOCD and local affected parties will be made prior to the initiation of this investigation.
2. The borings will be continuously sampled during drilling activities and logged according to the Unified Soil Classification System so that observations concerning soil types, lithologic changes, and the environmental condition of the encountered soils would be noted.
3. The soil samples will be field screened with a PID to detect the presence of volatile organic vapors. Soils will also be field checked with chloride field kits to describe chloride content.
4. Sampling Data will be collected as follows: Soil samples will be collected from 5-foot intervals below ground surface (bgs) from the center site assessment boring. Confirmation samples at the highest PID reading and at the bottom of the hole will be analyzed at an NMOCD/ConocoPhillips-approved laboratory for confirmation of benzene, toluene, ethylbenzene and total xylenes (BTEX) (only if PID readings exceed 100 parts per million [ppm]), total petroleum hydrocarbons (TPH) and chlorides for each boring. Final PID readings will be used as final confirmation of bottom residual for a total BTEX reading of 100 ppm or less. Additional criteria for determining confirmation depth will be based on NMOCD Site Assessment Criteria for TPH and a proposed 250 ppm for chloride residual.
5. Sampling for geochemical/leaching parameters will be completed in the center boring using Environmental Protection Agency (EPA) Method 1312 Synthetic Precipitation Leachate Procedures (SPLP) for determining the potential for pit leachate to migrate downward. The sample will be taken from the "highly contaminated" material as defined by the NMOCD, if possible.
6. An appropriate depth for the lateral borings will be determined based on information determined from the center site boring, including pit material thickness, stratigraphy, depth

of impacts, etc. The depth of the lateral borings will be deep enough to ensure that any lateral movement of pit-generated leachate, if any, will be detected. Borings will be sampled per the protocol defined in Item No. 4 above.

7. All sampling equipment would be cleaned between each boring installation.
8. Soil samples would be placed into glass sample jars, sealed with Teflon-lined lids, and placed on ice for transportation to an analytical laboratory where they would be analyzed for total TPH (Method 8015B GRO - DRO), BTEX (Method 8260), and chloride (Method 300.0A). Sample collected from the center boring will be subjected to the SPLP to analyze for volatiles (USEPA Procedure 1312, Method 8260B), for semi-volatiles (USEPA Procedure 1312, Method 8270C) and Chlorides (USEPA Procedure 1312, Method 300A) and to analyze for soil moisture content (Method SM 2540G).
9. If groundwater is encountered prior to reaching unaffected soil conditions, a soil sample would be collected from immediately above the groundwater interface. Samples would be collected through a temporary monitor well, and analyzed by the methods defined above (costs not included in this proposal). After conferring with and under direction of ConocoPhillips, monitoring wells would then be constructed in accordance with NMODC guidelines and surveyed for location and elevation (costs not included in this proposal).
10. Drill cuttings will be staged in bermed areas and managed at the time of site restoration.
11. If the SPLP values exceed the NMWQCC standards for chloride and organics, then confirmation laboratory totals analyses for BTEX and chlorides will be analyzed to use for modeling purposes. VADSAT model results or equivalent analytic model will be used to determine if leachate will impact groundwater. Included in the model will be individual constituents of BTEX.
12. A findings report will be prepared and submitted to the NMOCD. Included in the report will be a detailed descriptive log from the surface to total depth (TD), with information as to changes in soil (using sand-silt-clay percentages) and/or rock types and apparent degree of contamination for each boring or excavation using a standard classification system such as the Unified Soil Classification System. Cross-sections will be made from these logs showing changes across the site in soil/rock type, contamination with depth, and relative water table information. The horizontal extent of each site will be determined using lateral soil borings and analyses as described in Step 2 of this section. A table of sampling data with a map showing sampling locations will also be included.
13. Once the subsurface environmental conditions are known, the Surface Restoration Plan protocol, outlined in ConocoPhillips' *Unlined Surface Impoundment Characterization and Surface Restoration Plan, Southeastern New Mexico*, would be developed and presented in the report along with a completed Form 144 to NMOCD.

Project Schedule

Maxim is prepared to commence work on this project immediately following receipt of NMOCD notification to proceed.

Project Approach

Mr. Charles Durrett will serve as the Project Manager and will have the authority to commit whatever resources are necessary to support the project team. It will be Mr. Durrett's responsibility to ensure that the Client's needs are met in terms of scope of work and schedule. Mr. Durrett is located in Maxim's Midland, Texas, office.

Maxim has been authorized to proceed by ConocoPhillips If you agree with this Work Plan. Please contact Mr. Neal Goates (832-379-6427) or me, if you have any questions or require additional information.

Sincerely,

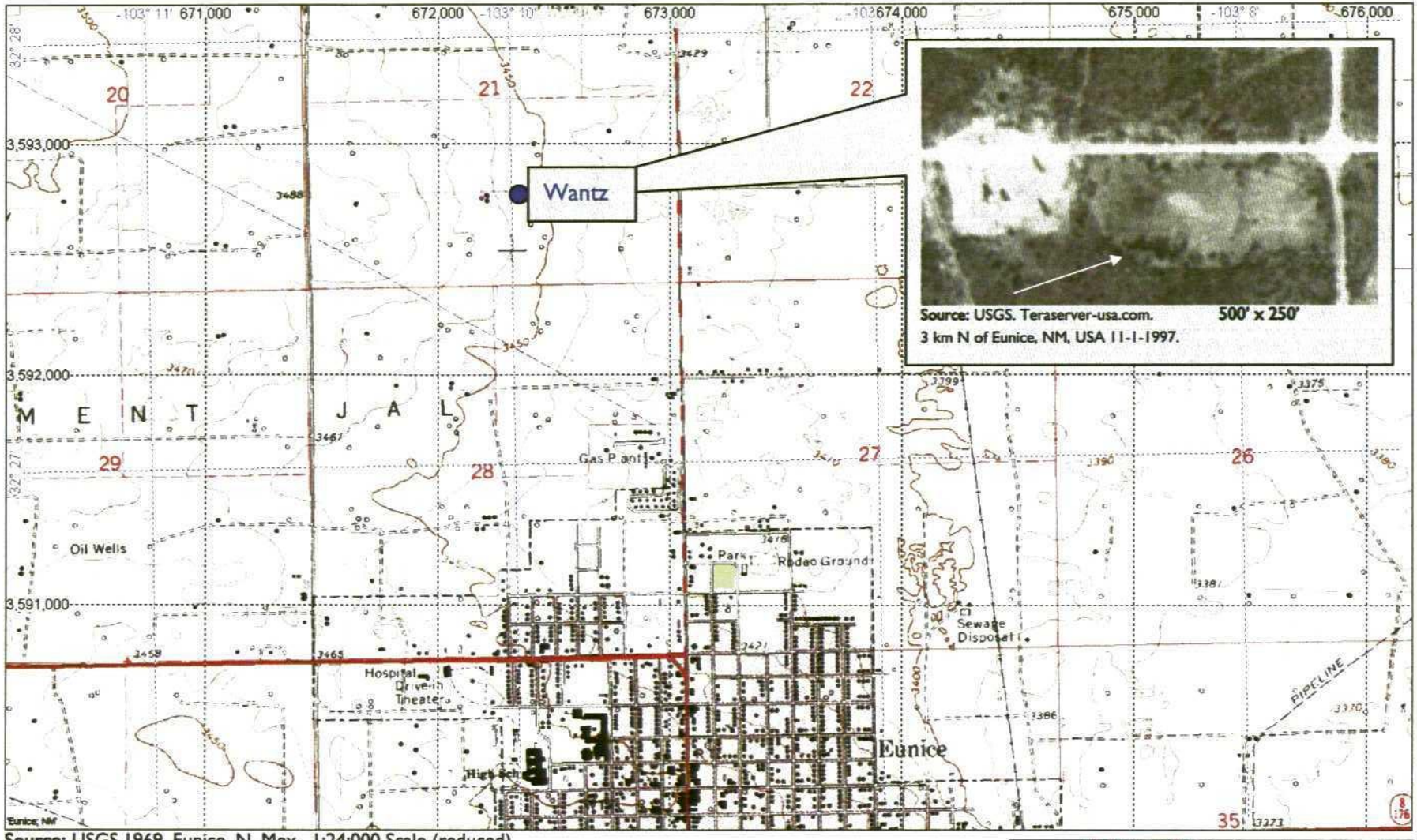
MAXIM TECHNOLOGIES

Charles Durrett

Digitally signed by Charles Durrett
DN: CN = Charles Durrett, C = US, O = Maxim Technologies, Inc.
Date: 2004.08.27 11:10:41 -05'00'

Charles Durrett
Office Manager

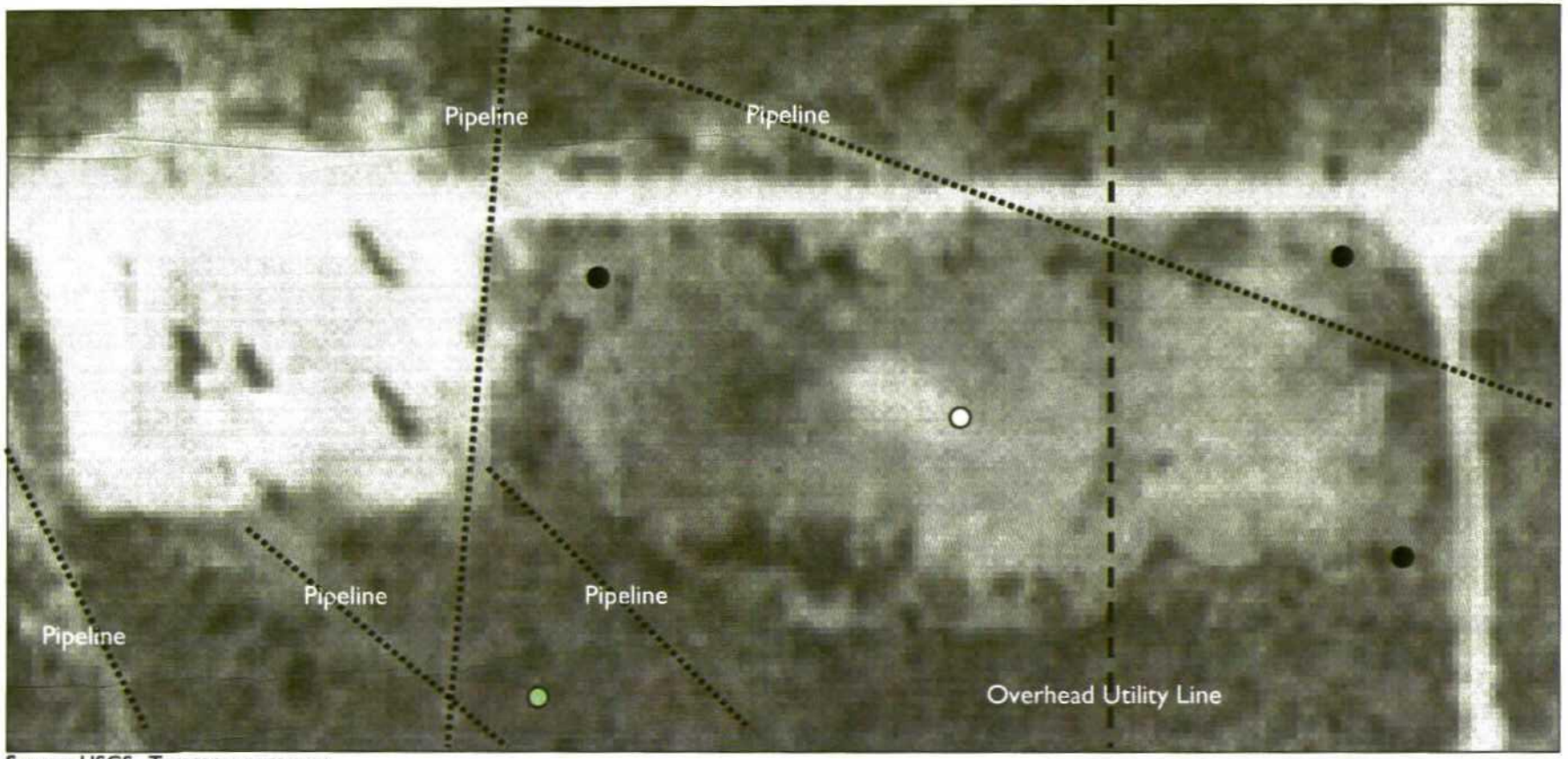
Cc: Mr. Chris Williams, District I NMOCD
Mr. Neal Goates



Source: USGS,1969. Eunice, N. Mex. 1:24:000 Scale (reduced)
Location: NW/NW/SE Qtr, Sec 21, T21S, R37E
32° 27.629N, 103° 09.993W; 27 NAD

MAXIM Technologies	
ConocoPhillips	Southeastern New Mexico

Figure 1. Wantz Site Location



Source: USGS., Teraserver-usa.com.
3 km N of Eunice, NM, USA 11-1-1997

MAXIM Technologies	
ConocoPhillips	Southeastern New Mexico

Figure 2. Wantz Boring Locations (•)

Price, Wayne

From: Clyde Yancey [CYancey@maximusa.com]
Sent: Tuesday, July 06, 2004 12:51 PM
To: Olson, William; WPrice@state.nm.us; EMartin@state.nm.us
Cc: Goates, R. Neal
Subject: Historic pit closure plan

Bill, Wayne and Ed:

Please find attached the Historic Pit Closure Plan proposed by ConocoPhillips. I have incorporated the changes we discuss in Santa Fe on June 29th. Please call me if you have any questions.

Once we receive your comments/approval, I will finalize with attachments and submit hard copies to each of you.

Thanks
Clyde

Clyde L. Yancey, P.G.
Maxim Technologies, Inc.
10601 Lomas Blvd. NE, Suite 106
Albuquerque, NM 87112
(505) 237-8440

CONOCOPHILLIPS
GENERAL PLAN FOR
UNLINED SURFACE IMPOUNDMENT CHARACTERIZATION
AND SURFACE RESTORATION OF
HISTORIC PITS
SOUTHEASTERN NEW MEXICO

Prepared for

ConocoPhillips

Prepared by:
MAXIM TECHNOLOGIES

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(505) 237-8440

Maxim Project No. 4690036

July 1, 2004

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CONOCOPHILLIPS
GENERAL PLAN FOR
UNLINED SURFACE IMPOUNDMENT CHARACTERIZATION
AND SURFACE RESTORATION FOR
HISTORIC PITS
SOUTHEASTERN NEW MEXICO

SUMMARY

ConocoPhillips is submitting to the New Mexico Oil Conservation Division (NMOCD) our proposed restoration program for certain pit sites in New Mexico southeastern production region that are located greater than one mile from the city limits or over one-quarter mile from any occupied residence. The pits located within one mile of city limits or within one-quarter mile from any occupied residence will be addressed by NMOCD on a case-by-case basis. This program is intended to apply to pits previously used exclusively in connection with oil and gas production operations. The program is not intended to apply to pits used in connection with operational facilities involved with operations other than the production of oil and gas.

The historic earthen pit sites (i.e., overflow, basic sediment or production pits) are generally located at or near current or abandoned production tank batteries at upstream operations. The subject sites were constructed of native soils used to contain sediments and fluids during historic operation. At the time the pit was operational, and in accordance with then existing regulations and industry practices, the material was allowed to equilibrate through subsoil and surface evaporation and residual hydrocarbon sheen was burned to allow the evaporation to persist. Upon abandonment, surrounding native material was used for backfill.

The pits to be addressed by this program are primarily located in Lea County, New Mexico. ConocoPhillips is requesting that NMOCD work in a collaborative effort to develop an environmentally sound remedial strategy with general applicability for such pits.

Our objective will be to:

1. Improve sustainable development by incorporating sound scientific principles and evaluations for aged/weathered upstream constituents.

2. Utilize assessment guidelines published by the NMOCD Unlined Surface Impoundment Closure Guidelines.

3. Implement surface restoration and incorporate controls protective to human health and the environment.

INITIAL REPORTING, ACTIONS, AND CLEANUP

Figure 1 presents a flow diagram of the process to be followed during the surface impoundment characterization and restoration efforts. Steps 1 through 6 of the process are fully described in the following section.

STEP 1 SUBMIT GENERAL SITE CLOSURE PLAN REQUEST – INITIAL ASSESSMENT

Submit to NMOCD a list of proposed pits to be closed following the protocols presented in this Plan. A location map and specific site description for each pit will be submitted on an Initial Assessment (IA) form prior to the commencement of work. (See the attached example of an Initial Assessment form to be completed during the initial site visit to confirm pit location, depth to groundwater determined through available literature, a completed NMOCD Site Assessment Criteria form, any infrastructure or stakeholder issues, and stake location for One Call notification). Notification will also be given to appropriate surface stakeholders for each site. This list will be reviewed and, if necessary, revised and resubmitted whenever new site information is obtained.

STEP 2 SITE ASSESSMENT CHARACTERIZATION

The purpose of the Site Assessment Characterization is to document whether or not there is impact at or from the site that could cause a significant risk to human health or the environment.

A typical Site Assessment Characterization report to NMOCD includes the following:

A. Background data and maps.

   1. Site legal location (qtr-qtr-qtr, Sec-Twp-Rng).
   2. Locate site on an aerial photo or a topographic, county road, or other appropriate map that is labeled with the site's section, township, and range.
   3. Include the Latitude/Longitude from GPS readings or other sources when available.
   4. Topographic map, area geological and hydrological data (including water table depth and water quality) if available can help in determining possible migration pathways. Soils information can be obtained from the USDA-NRCS soil survey maps and descriptions.

B. Site information – photos will be taken at the site and included with the site assessment report. In addition a short, written narrative and site map for the following:

   1. A visual site inspection at and near the pit area (e.g., impairments seen, including damage to crops or pasture; surface soil type; hydrocarbon stains, odors, and seeps; buildings, equipment, and power lines; evidence of underground utilities or pipelines). Draw structure and observation locations on a site map (form provided).
   2. Observable area information (e.g., agricultural or other land use; all wells and water bodies within 1000 feet; known and flagged oil and gas lines).
   3. Obtainable records, such as data on rural water lines, water well records, and local water system wellhead protection area.
   4. Completed NMOCD Site Assessment Criteria form to best of ability (form provided).

C. Sampling Data - delineate the horizontal/vertical extent and concentration(s) of the impact area(s) extent with samples taken in, around, and under the affected soil.

1. All sampling shall be:
   a. NMOCD personnel witnessed, or
   b. Performed by or under the oversight of a qualified geoscientist, or
   c. Performed by other qualified person(s) with appropriate soil and/or water sampling training and/or experience; document training/experience.
2. Utilize NMOCD's standard operating procedure for sampling.
3. A field kit, field photo-ionization detector (PID), soil gas analyses, or other on-site testing or screening methodology may be used to identify the impacted versus unimpacted areas. The task will also pinpoint the areas for confirmation sampling prior to site restoration.
4. Sampling includes borings (or other excavations) in the site area(s) most likely to be impacted based on site screening data, visual criteria, normal movement of liquid contaminants downhill/downgradient, and/or other information. A typical boring program is presented in Figure 1.
   a. Sampling Data will be collected as follows: Soil samples will be collected from 5-foot intervals below ground surface (bgs) from the center site assessment boring. Confirmation samples at the highest PID reading and at the bottom of the hole will be analyzed at an NMOCD/ConocoPhillips-approved laboratory for confirmation of benzene, toluene, ethylbenzene and total xylenes (BTEX) (only if PID readings exceed 100 parts per million [ppm]), total petroleum hydrocarbons (TPH) and chlorides for each boring. Final PID readings will be used as final confirmation of bottom residual for a total BTEX reading of 100 ppm or less. Additional criteria for determining confirmation depth will be based on NMOCD Site Assessment Criteria for TPH and a proposed 250 ppm for chloride residual.
   a. An appropriate depth for the lateral borings will be determined based on information determined from the center site boring, including pit material thickness, stratigraphy, depth of impacts, etc. The depth of the lateral borings will be deep enough to ensure that any lateral movement of pit-generated leachate, if any, will be detected. Borings will be sampled per the protocol defined in Item No. C.4.a. above.
   b. Detailed descriptive logs from the surface to total depth (TD), with information as to changes in soil (using sand-silt-clay percentages) and/or rock types and apparent degree of contamination, will be made for each boring or excavation using a standard classification system such as the Unified Soil Classification System or Wentworth and the Munsel color charts.
   c. Cross-sections will be made from these logs showing changes across the site in soil/rock type, contamination with depth, and relative water table information.

d. Sampling for geochemical/leaching parameters will be completed in the center boring using Environmental Protection Agency (EPA) Method 1312 Synthetic Precipitation Leachate Procedures (SPLP) for determining the potential for pit leachate to migrate downward. The sample will be taken from the "highly contaminated" material as defined by the NMOCD, if possible.

If the SPLP results are below New Mexico Water Quality Control Commission (NMWQCC) standards, ConocoPhillips will install a Method A cover (see Step 5 below) and close the pit. If the SPLP values exceed the NMWQCC standards for chloride and organics, then confirmation laboratory totals analyses for BTEX and chlorides will be analyzed to use for modeling purposes. ConocoPhillips will model results with VADSAT or equivalent analytic model to demonstrate that leachate will not impact groundwater. Included in the model will be individual constituents of BTEX. If model results indicate leachate will not impact groundwater, ConocoPhillips will install a Method A cover and close the pit. If model indicates that leachate will impact groundwater, ConocoPhillips will do a limited source removal and demonstrate that leachate will not impact groundwater and then install a Method B cover (see Step 5 below) and close the pit.

This EPA Method is widely accepted for determining the leaching characteristics of organic constituents of concern relative to human health and the environment. *Please see attachment for Methodology description.* In addition, soil moisture content will be analyzed in the center boring to determine any associated risk with the gravitational potential of residual material after moisture barrier is in place. *Please see Step 5 Stabilization Methodology Summary for further explanation.*

e. The horizontal extent of each site will be determined using lateral soil borings and analyses as described in Step 2 and Figure 1 of this section.

f. Submit a table of sampling data with a map showing sampling locations.

g. Borings not converted to monitoring wells will be properly plugged back to surface using cement, bentonite, or other means as required by the NMOCD.

STEP 3 DETERMINE IF IMPACT TO WATERS OF THE STATE HAS OCCURRED.IS GROUNDWATER IMPACTED? CAN THE RESTORATION PLAN BE IMPLEMENTED?

Make any necessary revisions following the Site Assessment if groundwater was found at a different depth than predicted in the Initial Assessment or surface water is impacted. If water is not impacted, skip Step 4 and proceed to Step 5. If cleanup criteria are not met, go to Step 4 and repeat Steps 1, 2 and 4, as necessary. If groundwater or surface water is impacted, go to Step 4.

STEP 4 GROUNDWATER OR SURFACE WATER IMPACT PLAN

Discuss with NMOCD Santa Fe office to develop a site-specific plan for each site.

STEP 5 SURFACE RESTORATION PLAN

Stabilization Methodology Summary

The specific surface restoration plan for each pit will be based on the laboratory analyses of the EPA Method 1312 (SPLP) of site soil samples and follow-up modeling analysis. The resulting of the laboratory data modeling will result in one of the following three scenarios:

1. SPLP levels for hydrocarbon and chloride are below NMWQCC standards.
2. SPLP levels are above NMWQCC standards.
    a. Further analysis and modeling (Step 3) show that groundwater will not be impacted by either hydrocarbon or chloride leachate.
3. SPLP levels for hydrocarbon and chloride are above NMWQCC standards.
    a. Further analysis and modeling show that groundwater will be impacted by hydrocarbon and chloride leachate.
    b. Limited source removal and demonstrate that groundwater will not be impacted by leachate.

Based on the three scenarios presented above, two restoration plans were developed. These plans were termed Method A and Method B and are outlined below.

Stabilization Method A – SPLP Levels 1 and 2

Enhanced in-situ bioremediation will be implemented to reduce the concentrations of hydrocarbon constituents in the soil through the addition of nitrate to the impacted soils. The upper two feet of soil at the site will be removed and stockpiled. Solid nitrated fertilizer will be applied to the soil overlying the delineated horizontal extent of the hydrocarbon-impacted area to support microbial degradation of organic material.

The fertilizer will consist of approximately 42% nitrogen, 4% potassium, and 5% phosphorous fertilizer. Potassium and phosphorous are necessary nutrients for growth of bacteria required to mediate decomposition of hydrocarbons. This application will be designed to deliver 500 milligrams per liter (mg/L) of nitrate in infiltration groundwater to the hydrocarbon-impacted soil at a site for a period of five years.

Distribution of fertilizer in the upper part of the soil column beneath the topsoil ensures that fertilizer will not blow away or provide a source of nitrate to overland flow across the site. It also will provide for optimal leachability (an ongoing source) of nitrate into the subsurface soils. After the fertilizer is applied to the site soils, stockpiled soils will be replaced and graded such that ponding of surface water will not occur.

After the surface is re-graded, soil samples will be taken to confirm that the material in the upper 2 feet meets NMOCD standards. Composite samples will be taken from the area of disturbed soil, the number dependent upon the size of the site. Each composite sample consisted of grab samples taken at appropriate intervals across the site. If necessary, offsite soils will be brought into meet grade and/or soil standards.

Stabilization Method B- SPLP Level 3

Two sources of hydraulic head exist that could conceivably drive contaminants vertically down through the soil column toward groundwater.

- Moisture already existing in the impacted soil column
- Moisture from infiltration of direct precipitation

A geo-membrane will be placed over the limits of the historic pit in such a manner as to inhibit storm water runoff, infiltration of direct precipitation and ponding. In conjunction with the engineered cover, the topsoil will be re-vegetated with a shallow-rooted vegetation (grasses) to limit erosion and enhance evapotranspiration of surficial water.

Procedure:

- Restore surface by stripping and stockpiling the upper 3 feet of soil and installing a geo-membrane over the horizontal extent of the historic pit surface. If, after removing the top 3 feet of topsoil, the visible contamination indicates that the original boring was not representative of the maximum concentration of contaminants, then a second boring may be required in the area of maximum visible contamination. The geo-membrane would suffice for containment/isolation of impact and prevention of downward percolation or migration from surface or near surface influences. The installation would consist of the following construction sequencing:
- Determine final excavation horizontal dimensions (areal extent) for cover materials (geo-membrane). The geo-membrane will extend laterally 2 feet beyond the areal extent of contamination. This effort will be done through test pits and/or trenching (with the use of a backhoe or suitable equipment) across the site at locations determined by the field representative on each side of the contaminated area.
- Excavate hydrocarbon impacted soils to a depth of 3 feet.
- Haul heavily impacted soils will be sent offsite to a licensed landfarm for disposal.
- Following excavation and removal of the impacted soils, the excavation bottom shall be cleaned of loose debris and disturbed soils. Grade surface of impacted soils (in excavation) for drainage.
- Place minimum of six inches of "clean" soils over impacted area such as a silty sand. This soil shall be free from rocks and/or debris greater than 2 inches in size that could potentially damage the geo-membrane. Coarse gravel size materials shall be limited to

10 percent by weight of the backfill soils. The center of the excavation will be slightly domed (approximately 6 inches) to promote lateral drainage over the geo-membrane.

- Prepare subgrade for placement of geo-membrane, i.e., have a clean smooth surface.
- Place polyethylene geo-membrane (20 mil) and anchor (with trench). Field seams will be applied as warranted.
- Backfill excavated area with one foot of clean soils such as a silty sand free of rocks and debris greater than 2 inches. Coarse gravel size materials shall be limited to 10 percent by weight of the backfill soils. Finish backfilling with approved soil and regrade as needed to conform to existing site topography.
- Re-vegetate according to NMOCD/BLM/SLO preferred practice. The default grass seed mix per BLM will be as follows: Sand Dropseed (1 pound/live seed/acre), Sand Lovegrass (1 pound/live seed/acre), and Plains Bristlegrass (2 pounds/live seed/acre). One-foot of topsoil will provide an adequate root zone.
- Provide up to two years of re-vegetation monitoring.
- Install tangible controls applicable to the site.

Note: Deviations from this plan may be permitted if approved by NMOCD

DATA SUBMISSION AND CLOSURE REQUEST

STEP 6 SUBMIT INFORMATION, REQUEST NO FURTHER ACTION.

- Submit photos of the site with final report along with necessary maps
- Submit copy of the Site Assessment report
- Restoration documentation completed
- Surface restoration demonstrated by site photography
- Complete the NMOCD Pit Remediation and Closure Report form
- Cover letter requesting no further action for each site

ATTACHMENT 1

SYNTHETIC PRECIPITATION LEACHING PROCEDURE METHOD 1312

1.0 SCOPE AND APPLICATION

1.1 Method 1312 is designed to determine the mobility of both organic and inorganic analytes present in liquids, soils, and wastes.

2.0 SUMMARY OF METHOD

2.1 For liquid samples (i.e., those containing less than 0.5% dry solid material), the sample, after filtration through a 0.6 to 0.8 um glass fiber filter, is defined as the 1312 extract.

2.2 For samples containing greater than 0.5% solids, the liquid phase, if any, is separated from the solid phase and stored for later analysis. The particle size of the solid phase is reduced, if necessary. The solid phase is extracted with an amount of extraction fluid equal to 20 times the weight of the solid phase. The extraction fluid employed is a function of the region of the country where the sample site is located if the sample is a soil. If the sample is a waste or wastewater, the extraction fluid employed is a pH 4.2 solution. A special extractor vessel is used when testing for volatile analytes (see Table 1 for a list of volatile compounds). Following extraction, the liquid extract is separated from the solid phase by filtration through a 0.6 to 0.8 um glass fiber filter.

2.3 If compatible (i.e., multiple phases will not form on combination), the initial liquid phase of the waste is added to the liquid extract, and these are analyzed together. If incompatible, the liquids are analyzed separately and the results are mathematically combined to yield a volume-weighted average concentration.

For complete information about Method 1312, the 30 pages reference can be found at http://www.epa.gov/epaoswer/hazwaste/test/main.htm

Price, Wayne

From: Price, Wayne
Sent: Tuesday, November 16, 2004 4:34 PM
To: Neal Goates (E-mail); Clyde Yancey (E-mail)
Cc: Martin, Ed
Subject: ConocoPhillips Historical Unlined surface impoundment closures 1R0416

Dear Mr. Goates:

The OCD understands this project is on hold. A file has been up-set 1R0416 in case you decide to re-open.

Sincerely:

Wayne Price
New Mexico Oil Conservation Division
1220 S. Saint Francis Drive
Santa Fe, NM 87505
505-476-3487
fax: 505-476-3462
E-mail: WPRICE@state.nm.us

IR0416

CONOCOPHILLIPS
UNLINED SURFACE IMPOUNDMENT CHARACTERIZATION AND SURFACE RESTORATION PLAN SOUTHEASTERN NEW MEXICO

Prepared for

ConocoPhillips

RECEIVED

MAY 14 2004

Oil Conservation Division
Environmental Bureau

Prepared by:

MAXIM TECHNOLOGIES INC®

10601 Lomas Blvd. NE, Suite 106
Albuquerque, NM 87112
(505) 237-8440

Maxim Project No. 4690036

April 21, 2004

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CONOCOPHILLIPS
UNLINED SURFACE IMPOUNDMENT CHARACTERIZATION AND SURFACE RESTORATION PLAN SOUTHEASTERN NEW MEXICO

SUMMARY

ConocoPhillips is submitting to the New Mexico Oil Conservation Division (NMOCD) our proposed restoration program for certain pit sites in New Mexico southeastern production region that are located greater than one mile from the city limits or over one-quarter mile from any occupied residence. The pits located within one mile of city limits or within one-quarter mile from any occupied residence will be addressed by NMOCD on a case-by-case basis. This program is intended to apply to pits previously used exclusively in connection with oil and gas production operations. The program is not intended to apply to pits used in connection with operational facilities involved with operations other than the production of oil and gas.

The historic earthen pit sites (i.e., overflow, basic sediment or production pits) are generally located at or near current or abandoned production tank batteries at upstream operations. The subject sites were constructed of native soils used to contain sediments and fluids during historic operation. At the time the pit was operational, and in accordance with then existing regulations and industry practices, the material was allowed to equilibrate through subsoil and surface evaporation and residual hydrocarbon sheen was burned to allow the evaporation to persist. Upon abandonment, surrounding native material was used for backfill.

The pits to be addressed by this program are primarily located in Lea County, New Mexico. ConocoPhillips is requesting that NMOCD work in a collaborative effort to develop an environmentally sound remedial strategy with general applicability for such pits.

Our objective will be to:

1. Improve sustainable development by incorporating sound scientific principles and evaluations for aged/weathered upstream constituents.

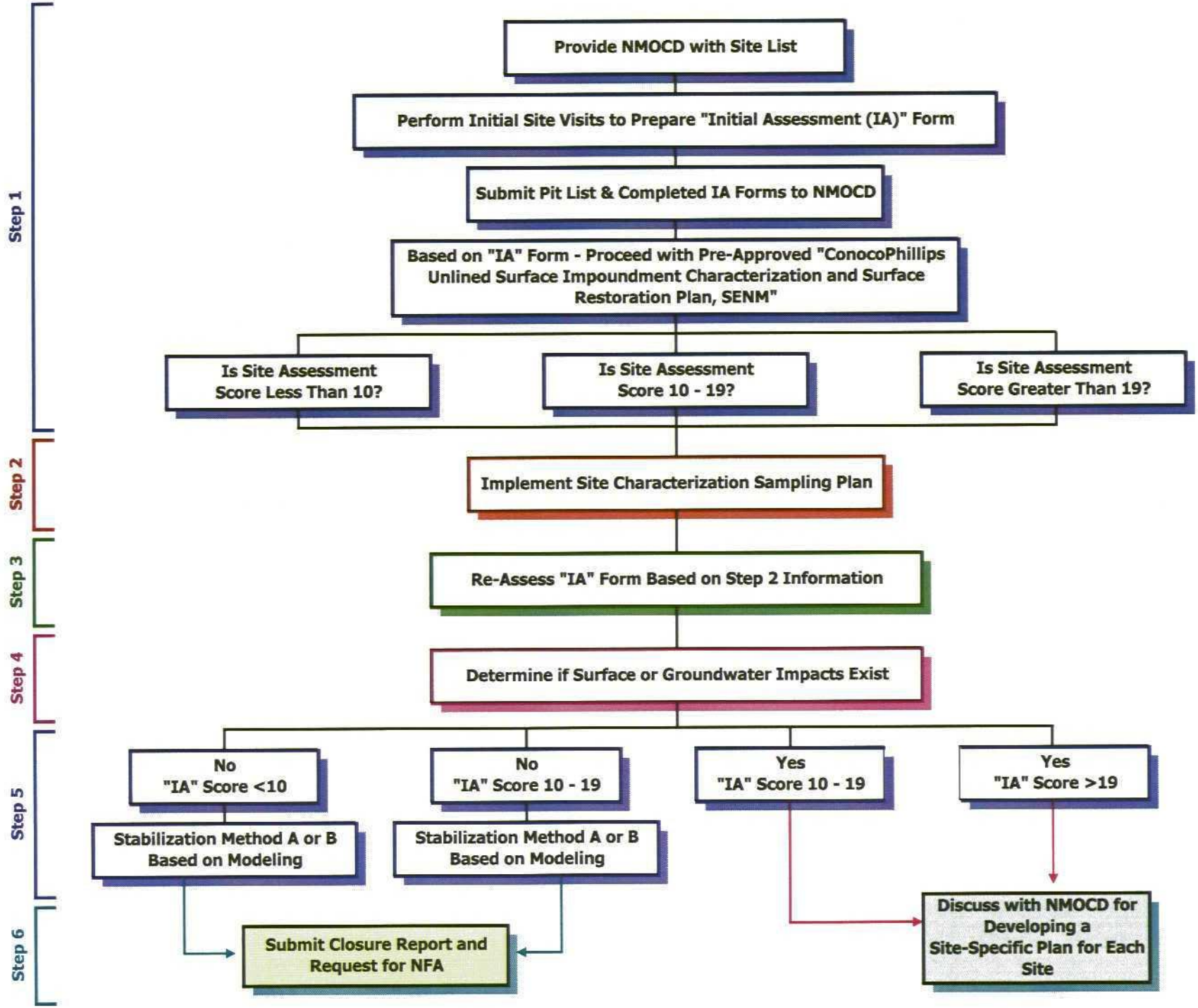
2. Utilize assessment guidelines published by the NMOCD Unlined Surface Impoundment Closure Guidelines.

3. Implement surface restoration and incorporate controls protective to human health and the environment.

INITIAL REPORTING, ACTIONS, AND CLEANUP

Figure 1 presents a flow diagram of the process to be followed during the surface impoundment characterization and restoration efforts. Steps 1 through 6 of the process are fully described in the following section.

Figure 1. Summary of Steps and Actions to be Taken by Operator



STEP 1 SUBMIT GENERAL SITE CLOSURE PLAN REQUEST – INITIAL ASSESSMENT

Submit to NMOCD a list of proposed pits to be closed following the protocols presented in this Plan. A location map and specific site description for each pit will be submitted on an Initial Assessment (IA) form prior to the commencement of work. (See the attached example of an Initial Assessment form to be completed during the initial site visit to confirm pit location, depth to groundwater determined through available literature, a completed NMOCD Site Assessment Criteria form, any infrastructure or stakeholder issues, and stake location for One Call notification). Notification will also be given to appropriate surface stakeholders for each site. This list will be reviewed and, if necessary, revised and resubmitted whenever new site information is obtained.

STEP 2 SITE ASSESSMENT CHARACTERIZATION

The purpose of the Site Assessment Characterization is to document whether or not there is impact at or from the site that could cause a significant risk to human health or the environment.

A typical Site Assessment Characterization report to NMOCD includes the following:

A. Background data and maps.

1. Site legal location (qtr-qtr-qtr, Sec-Twp-Rng).
2. Locate site on an aerial photo or a topographic, county road, or other appropriate map that is labeled with the site's section, township, and range.
3. Include the Latitude/Longitude from GPS readings or other sources when available.
4. Topographic map, area geological and hydrological data (including water table depth and water quality) if available can help in determining possible migration pathways. Soils information can be obtained from the USDA-NRCS soil survey maps and descriptions.

B. Site information – photos will be taken at the site and included with the site assessment report. In addition a short, written narrative and site map for the following:

1. A visual site inspection at and near the pit area (e.g., impairments seen, including damage to crops or pasture; surface soil type; hydrocarbon stains, odors, and seeps; buildings, equipment, and power lines; evidence of underground utilities or pipelines). Draw structure and observation locations on a site map (form provided).
2. Observable area information (e.g., agricultural or other land use; all wells and water bodies within 1000 feet; known and flagged oil and gas lines).
3. Obtainable records, such as data on rural water lines, water well records, and local water system wellhead protection area.
4. Completed NMOCD Site Assessment Criteria form to best of ability (form provided).

C. Sampling Data - delineate the horizontal/vertical extent and concentration(s) of the impact area(s) extent with samples taken in, around, and under the affected soil.

1. All sampling shall be:
   a. NMOCD personnel witnessed, or
   b. Performed by or under the oversight of a qualified geoscientist, or
   c. Performed by other qualified person(s) with appropriate soil and/or water sampling training and/or experience; document training/experience.
2. Utilize NMOCD's standard operating procedure for sampling.
3. A field kit, field photo-ionization detector (PID), soil gas analyses, or other on-site testing or screening methodology may be used to identify the impacted versus unimpacted areas. The task will also pinpoint the areas for confirmation sampling prior to site restoration.
4. Sampling includes borings (or other excavations) in the site area(s) most likely to be impacted based on site screening data, visual criteria, normal movement of liquid contaminants downhill/downgradient, and/or other information. A typical boring program is presented in Figure 1.
   a. Sampling Data will be collected as follows: Soil samples will be collected from 5-foot intervals below ground surface (bgs) from the center site assessment boring. Confirmation samples at the highest PID reading and at the bottom of the hole will be analyzed at an NMOCD/ConocoPhillips-approved laboratory for confirmation of benzene, toluene, ethylbenzene and total xylenes (BTEX) (only if PID readings exceed 100 parts per million [ppm]), total petroleum hydrocarbons (TPH) and chlorides for each boring. Final PID readings will be used as final confirmation of bottom residual for a total BTEX reading of 100 ppm or less. Additional criteria for determining confirmation depth will be based on NMOCD Site Assessment Criteria for TPH and a proposed 250 ppm for chloride residual.
   a. An appropriate depth for the lateral borings will be determined based on information determined from the center site boring, including pit material thickness, stratigraphy, depth of impacts, etc. The depth of the lateral borings will be deep enough to ensure that any lateral movement of pit-generated leachate, if any, will be detected. Borings will be sampled per the protocol defined in Item No. C.4.a. above.
   b. Detailed descriptive logs from the surface to total depth (TD), with information as to changes in soil (using sand-silt-clay percentages) and/or rock types and apparent degree of contamination, will be made for each boring or excavation using a standard classification system such as the Unified Soil Classification System or Wentworth and the Munsel color charts.
   c. Cross-sections will be made from these logs showing changes across the site in soil/rock type, contamination with depth, and relative water table information.

d. Sampling for geochemical/leaching parameters will be completed in the center boring using Environmental Protection Agency (EPA) Method 1312 Synthetic Precipitation Leachate Procedures (SPLP) for determining the potential for pit leachate to migrate downward. The sample will be taken from the "highly contaminated" material as defined by the NMOCD, if possible.

   If the SPLP results are below New Mexico Water Quality Control Commission (NMWQCC) standards, ConocoPhillips will install a Method A cover (see Step 5 below) and close the pit. If the SPLP values exceed the NMWQCC standards for chloride and organics, then confirmation laboratory totals analyses for BTEX and chlorides will be analyzed to use for model. ConocoPhillips will model results with VADSAT or equivalent analytic model to demonstrate that leachate will not impact groundwater. Included in the model will be individual constituents of BTEX. If model results indicate leachate will not impact groundwater, ConocoPhillips will install a Method A cover and close the pit. If model indicates that leachate will impact groundwater, ConocoPhillips will do a limited source removal and demonstrate that leachate will not impact groundwater and then install a Method B cover (see Step 5 below) and close the pit.

   This EPA Method is widely accepted for determining the leaching characteristics of organic constituents of concern relative to human health and the environment. *Please see attachment for Methodology description.* In addition, soil moisture content will be analyzed in the center boring to determine any associated risk with the gravitational potential of residual material after moisture barrier is in place. *Please see Step 5 Stabilization Methodology Summary for further explanation.*

e. The horizontal extent of each site will be determined using lateral soil borings and analyses as described in Step 2 and Figure 1 of this section.

f. Submit a table of sampling data with a map showing sampling locations.

g. Borings not converted to monitoring wells will be properly plugged back to surface using cement, bentonite, or other means as required by the NMOCD.

STEP 3 DETERMINE IF IMPACT TO WATERS OF THE STATE HAS OCCURRED.IS GROUNDWATER IMPACTED? CAN THE RESTORATION PLAN BE IMPLEMENTED?

Make any necessary revisions following the Site Assessment if groundwater was found at a different depth than predicted in the Initial Assessment or surface water is impacted. If water is not impacted, skip Step 4 and proceed to Step 5. If cleanup criteria are not met, go to Step 4 and repeat Steps 1, 2 and 4, as necessary. If groundwater or surface water is impacted, go to Step 4.

STEP 4 GROUNDWATER OR SURFACE WATER IMPACT PLAN

Discuss with NMOCD Santa Fe office to develop a site-specific plan for each site.

STEP 5 SURFACE RESTORATION PLAN

Stabilization Methodology Summary

The specific surface restoration plan for each pit will be based on the laboratory analyses of the EPA Method 1312 (SPLP) of site soil samples and follow-up modeling analysis. The resulting of the laboratory data modeling will result in one of the following three scenarios:

1. SPLP levels for hydrocarbon and chloride are below NMWQCC standards.
2. SPLP levels are above NMWQCC standards.
    a. Further analysis and modeling (Step 3) show that groundwater will not be impacted by either hydrocarbon or chloride leachate.
3. SPLP levels for hydrocarbon and chloride are above NMWQCC standards.
    a. Further analysis and modeling show that groundwater will be impacted by hydrocarbon and chloride leachate.
    b. Limited source removal and demonstrate that groundwater will not be impacted by leachate.

Based on the three scenarios presented above, two restoration plans were developed. These plans were termed Method A and Method B and are outlined below.

Stabilization Method A – SPLP Levels 1 and 2

Enhanced in-situ bioremediation will be implemented to reduce the concentrations of hydrocarbon constituents in the soil through the addition of nitrate to the impacted soils. The upper two feet of soil at the site will be removed and stockpiled. Solid nitrated fertilizer will be applied to the soil overlying the delineated horizontal extent of the hydrocarbon-impacted area to support microbial degradation of organic material.

The fertilizer will consist of approximately 42% nitrogen, 4% potassium, and 5% phosphorous fertilizer. Potassium and phosphorous are necessary nutrients for growth of bacteria required to mediate decomposition of hydrocarbons. This application will be designed to deliver 500 milligrams per liter (mg/L) of nitrate in infiltration groundwater to the hydrocarbon-impacted soil at a site for a period of five years.

Distribution of fertilizer in the upper part of the soil column beneath the topsoil ensures that fertilizer will not blow away or provide a source of nitrate to overland flow across the site. It also will provide for optimal leachability (an ongoing source) of nitrate into the subsurface soils. After the fertilizer is applied to the site soils, stockpiled soils will be replaced and graded such that ponding of surface water will not occur.

After the surface is re-graded, soil samples will be taken to confirm that the material in the upper 2 feet meets NMOCD standards. Composite samples will be taken from the area of disturbed soil, the number dependent upon the size of the site. Each composite sample consisted of grab samples taken at appropriate intervals across the site. If necessary, offsite soils will be brought into meet grade and/or soil standards.

Stabilization Method B- SPLP Level 3

Two sources of hydraulic head exist that could conceivably drive contaminants vertically down through the soil column toward groundwater.

- Moisture already existing in the impacted soil column
- Moisture from infiltration of direct precipitation

A low permeability cover (hydraulic conductivity of 1×10^{-7} cm/sec) will be engineered and placed over the limits of the historic pit in such a manner as to inhibit storm water runoff, infiltration of direct precipitation and ponding. In conjunction with the engineered cover, the topsoil will be re-vegetated with a shallow-rooted vegetation (grasses) to limit erosion and enhance evapotranspiration of surficial water.

Procedure:

- Restore surface by stripping and stockpiling the upper 2 feet of topsoil and installing a clay cap or geo-membrane over the horizontal extent of the historic pit surface. If, after removing the top 2 feet of topsoil, the visible contamination indicates that the original boring was not representative of the maximum concentration of contaminants, then a second boring may be required in the area of maximum visible contamination. The clay barrier would suffice for containment/isolation of impact and prevention of downward percolation or migration from surface or near surface influences. The installation would consist of a compacted clay liner approximately 12 inches thick at a minimum. The clay will meet or exceed 95% of a Proctor Test ASTM-D-698 with permeability (hydraulic conductivity) equal to or less than $1x10^{-7}$ cm/sec. The material would be tested for density randomly for compliance. According to reliable sources this material is available at a local site between Eunice and Hobbs, New Mexico. If clay is not available in sufficient quantity and of acceptable quality within a reasonable haul distance of the site, the clay barrier will be replaced with a geo-membrane of sufficient quality, density, and thickness to provide $1X10^{-7}$cm/sec permeability.
- Top dress the surface with 12 inches of unimpacted topsoil.
- Remove the residual stockpiled soils to an approved area for disposal or treatment.
- Re-vegetate according to NMOCD/BLM/SLO preferred practice. The default grass seed mix per BLM will be as follows: Sand Dropseed (1 pound/live seed/acre), Sand Lovegrass (1 pound/live seed/acre), and Plains Bristlegrass (2 pounds/live seed/acre). One-foot of topsoil will provide an adequate root zone.
- Provide up to two years of re-vegetation monitoring.
- Install tangible controls applicable to the site.

Note: Deviations from this plan may be permitted if approved by NMOCD

DATA SUBMISSION AND CLOSURE REQUEST

STEP 6 SUBMIT INFORMATION, REQUEST NO FURTHER ACTION.

- Submit photos of the site with final report along with necessary maps
- Submit copy of the Site Assessment report
- Restoration documentation completed
- Surface restoration demonstrated by site photography
- Complete the NMOCD Pit Remediation and Closure Report form
- Cover letter requesting no further action for each site

ATTACHMENT 1

SYNTHETIC PRECIPITATION LEACHING PROCEDURE METHOD 1312

1.0 SCOPE AND APPLICATION

1.1 Method 1312 is designed to determine the mobility of both organic and inorganic analytes present in liquids, soils, and wastes.

2.0 SUMMARY OF METHOD

2.1 For liquid samples (i.e., those containing less than 0.5% dry solid material), the sample, after filtration through a 0.6 to 0.8 um glass fiber filter, is defined as the 1312 extract.

2.2 For samples containing greater than 0.5% solids, the liquid phase, if any, is separated from the solid phase and stored for later analysis. The particle size of the solid phase is reduced, if necessary. The solid phase is extracted with an amount of extraction fluid equal to 20 times the weight of the solid phase. The extraction fluid employed is a function of the region of the country where the sample site is located if the sample is a soil. If the sample is a waste or wastewater, the extraction fluid employed is a pH 4.2 solution. A special extractor vessel is used when testing for volatile analytes (see Table 1 for a list of volatile compounds). Following extraction, the liquid extract is separated from the solid phase by filtration through a 0.6 to 0.8 um glass fiber filter.

2.3 If compatible (i.e., multiple phases will not form on combination), the initial liquid phase of the waste is added to the liquid extract, and these are analyzed together. If incompatible, the liquids are analyzed separately and the results are mathematically combined to yield a volume-weighted average concentration.

For complete information about Method 1312, the 30 pages reference can be found at http://www.epa.gov/epaoswer/hazwaste/test/main.htm

INITIAL ASSESSMENT FORM

ConocoPhillips Unlined Surface Impoundment
Characterization and Surface Restoration Plan
Southeastern New Mexico

1. **Initial Observation: Arrive on location and make visual assessment and GPS recording. Include the following in Field Notes and attached Initial Assessment Form, including photos where appropriate:**

   All pipelines, facilities, oil and gas wells and production batteries
   Vegetation condition, surface staining and other obvious staining
   Disturbed surface areas, work space, near-surface lithology (caliche, sand, etc.)
   Windmills, water wells, surface water, roads, housing, cattle, public access areas

2. **Initial Sampling Plan**

   Stake proposed bore-hole locations using Drawing 1 as guidance.
   Record driving directions for One-Call notification.

3. **Perform Reconnaissance of Impoundment History**

   Confirm landowner
   Review history through online access of air photos
   Confirm depth to groundwater through online resources (USGS, WATERS database, etc.)
   On a topographical map, confirm nearest wells or surface water within 1 mile
   Complete NMOCD Site Assessment Criteria form

4. **Prepare & Implement Site Characterization Sampling Plan**

   Submit Initial Assessment information to NMOCD and notify NMOCD Field Office prior to starting field work.
   Prepare Health & Safety Plan
   Notify ConocoPhillips Business Unit
   Make One-Call and follow-up with non-responding companies

CONOCOPHILLIPS

_____

Site Name

Section	Township	Range	County	Pit Length	Pit Width	Pit Depth

Land Type: ☐ BLM ☐ State ☐ Fee Landowner _____ ☐ Other _____

Depth to Groundwater _____ feet Restoration Plan _____

Date _____ Latitude _____ Longitude _____ Elevation _____

Field Representative _____ CoP Representative _____

Initial Observation: Arial View Sketch of location as it appears upon arrival: as applicable to remediation plans. Include all wells and surfae water sources, roads, stressed vegetation, cattle, houses, oil wells, pipelines, facilities, dirt piles, fences, measurements, reference point, sample locations, etc.

Site Assessment Criteria (NMOCD)

Depth to Groundwater (Vertical distance from contaminants to seasonal high water elevation of groundwater)	Less than 50 feet	(20 points)
	50 feet to 99 feet	(10 points)
	Greater than 100 feet	(0 points) _____
Wellhead Protection Area (Less than 200 feet from a private domestic water source, or; less than 1000 feet from all other water sources)	Yes	(20 points)
	No	(0 points) _____
Distance to Surface Water Body (Horizontal distance to perennial lakes, ponds, rivers, streams, creeks, irrigation canals and ditches)	Less than 200 feet	(20 points)
	200 feet to 1000 feet	(10 points)
	Greater than 1000 feet	(0 points) _____

RANKING SCORE (TOTAL POINTS): _____

Clean-up Target Concentrations for "Site Closure" (NMOCD)

IF RANKING SCORE IS:	**>19**	**10-19**	**0-9**
Benzene (ppm) *	**10**	**10**	**10**
BTEX (ppm) *	**50**	**50**	**50**
TPH (ppm) *	**100**	**1000**	**5000**

* A field vapor headspace measurement of 100 ppm may be substituted for a laboratory analysis.

** The contaminant concentration for TPH is the concentration above background levels.

Drawing 1

Typical Soil Boring Program