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STAGE 1 & 2 WORKPLANS

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GENERAL WORK PLAN FOR REMEDIATION OF EOTT PIPELINE SPILLS, LEAKS AND RELEASES IN NEW MEXICO

Prepared for:

EOTT ENERGY PIPELINE LIMITED PARTNERSHIP
Midland, Texas

Prepared by:

ENTRIX, Inc.
Houston, TX

Project No. 466503

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1. INTRODUCTION

This General Work Plan (Work Plan) has been prepared to support an overall program of regulatory closure of potential environmental issues at EOTT Energy Pipeline Limited Partnership (EOTT) crude oil release sites in New Mexico. This program includes: 1) a comprehensive review of historical data including records from previous work, 2) personnel interviews, 3) delineation of release sites, 4) comparison of site characterization data to appropriate New Mexico Oil Conservation Division (NMOCD) and/or remediation standards, 5) remediation or abatement (if necessary), and 6) No Further Action (NFA) closure request from the NMOCD.

1.1 Background

EOTT acquired several pipeline systems in southeast New Mexico including the Shell-Hobbs and Texas-New Mexico (Tex-New Mex) pipeline systems. Since the acquisition, EOTT has been evaluating historical and current pipeline releases along the two systems. In March 2000, ENTRIX, Inc. was retained to provide technical oversight of the evaluation process. More than 30 discrete sites have been evaluated by ENTRIX since the program started in mid-March of this year.

1.2 Purpose

This Work Plan has been prepared to provide a consistent remediation program for identified release sites along EOTT's pipeline and associated facilities in New Mexico. The Work Plan serves as the core document for performing site characterization and remediation to support NFA closure status using procedures specified in the NMOCD Guidelines for Remediation of Leaks, Spills, and Releases guidance document (NMOCD, 1993), and also site investigation requirements "pursuant to Stage 1 Abatement Plan" 19 NMAC 15E.3(a) & (b). The Work Plan will serve as the Stage 1 Abatement Plan required to be developed per NMOCD, 1993.

The purpose of the program is to identify and understand the current site conditions in preparation for designing a site closure strategy for potential environmental issues. The overall goal of the program is to achieve closure of each release site in a consistent manner that is protective of human health and the environment while being in conformance with NMOCD regulations. The closure will be documented to the extent necessary for NMOCD to issue a determination of NFA for each site. On a site by site basis, future tasks will involve the implementation of this Work Plan (once approved by NMOCD) a Quality Assurance Project Plan (QAPP), associated Work Plan Supplement, a Subsurface Investigation Report and a Stage 2 Abatement Plan, if needed.

As EOTT's pipeline operations are similar in nature throughout the system, potential environmental impacts associated with the operations will be similar throughout the system. Areas of potential environmental impact and constituents of concern (COCs) along EOTT's

pipeline are well understood based on extensive pipeline industry operational knowledge in the area, EOTT's specific operational knowledge of the pipeline systems in question, and from previous investigations performed across the EOTT system. The Work Plan has been designed to leverage that knowledge and serve as the base document for site characterization and closure at release sites along the pipeline facilities earmarked for investigation.

Although all EOTT pipeline operations are similar in nature, site-specific modifiers may serve to slightly alter characterization activities at a particular location. Modifiers at a location that may affect characterization activities include: 1) operational adjustments or equipment that has been added or removed, 2) previous investigation and remediation of impacted media, 3) use of surrounding land, and 4) site-specific physical characteristics including geology, hydrogeology, nearby surface water bodies, and non EOTT-related contamination. Because of these modifiers, investigation Work Plan Supplements will be provided for NMOCD's review as needed. The supplement for each site will document site-specific and regional characteristics, previous data, reconnaissance activities, and other site-specific data required (either known or needed) to support NFA closure status.

1.3 Work Plan Organizational Structure

This Work Plan is organized as follows: **Section 2** outlines the program objectives, the specific proposed scope of work for completing the investigation, and the general abatement plan for site closure. The general data collection and field sampling program methodologies as well as laboratory analytical protocols are provided in **Section 3.** A program QAPP and Standard Operating Procedures (SOP) manual containing program field sampling procedures have been developed to support this program. Procedures from these documents will be used, as appropriate, at each release site. Documentation of procedures used will be provided in the respective Work Plan Supplements and investigation reports. These documents are discussed below.

1.4 Quality Assurance Project Plan (QAPP)

A program QAPP was developed by ENTRIX to provide guidance on the appropriate quality assurance and quality control measures to be followed throughout the characterization program. As stated above, relevant sections of the QAPP will be implemented and documented at each release site. *The QAPP will be addressed under a separate cover and will be included with site-specific Work Plan Supplements.*

1.5 Standard Operating Procedures (SOP)

Standard operating procedures (SOPs) and associated sampling checklists have been developed to assist in field activities at each release site. As with the QAPP, SOPs will be utilized at each release site as part of data collection activities. The SOP will be addressed under a separate cover and will be included with site-specific Work Plan Supplements.

2. PROGRAM OBJECTIVES AND APPROACH

This section identifies the objectives of the remediation program at each EOTT release site. Once the data are collected and evaluated, the analytical results will be considered together with site exposure information, intended EOTT and landowner use of the specific site, and other considerations to develop a closure plan that is tailored to that site. This closure plan will be detailed in subsequent submittals and may include a proposal for additional corrective action/abatement if deemed necessary. This section provides an overview of the closure options that may be used.

2.1 Investigation Goals and Program Objectives

The goals of the investigation that will be conducted per this Work Plan are to first confirm the presence or absence of COCs in environmental media at each pipeline release site. If COCs are present above remediation action levels based on the NMOCD Site Ranking Criteria (NMOCD, 1993), the next goal will be to delineate the lateral and vertical extent of COCs in site media to a published or risk-based standard. Samples will be collected from soils in the immediate vicinity of the release site to evaluate the nature and extent of any COCs and potential impacts at each site. If groundwater is encountered, samples will also be collected for COC analyses in accordance with NMOCD, 1993. At the same time, a groundwater sample will be collected to characterize the potential use of the aquifer based on total dissolved solids (TDS) concentration. Per NMOCD Rule 19 NMAC 15.A.19A and WQCC Statute 20.6.2.3101, groundwater with a TDS concentration 10,000 mg/L or less is considered to be of beneficial use, and hence, is subject to abatement. These data will be presented to the NMOCD in a comprehensive subsurface investigation report.

Based on the results of the investigation activities, concentrations of COCs at the identified sites may be less than the default NMOCD remediation action levels. If COCs at a site are less than NMOCD action levels, then an NFA status will be requested from NMOCD. If the COC concentrations exceed the default NMOCD action levels, then action levels will be calculated, using exposure scenarios specific to that particular release site. The action levels will be calculated via a risk assessment. The risk assessment will comply with appropriate NMOCD regulations/guidelines while accounting for potential receptors, migration pathways, and media characteristics (depth and quality of groundwater, soil conditions, etc.) that exist at each release site. If the COC concentrations at the site exceed the action levels, then options for abatement of the COCs to the levels will be proposed for NMOCD's approval. The abatement plans will follow the guidance available in NMOCD, 1993 and 19 NMAC 15.A.19.A.

The overall objective of this program is to achieve regulatory closure at each release site in a consistent manner that is in compliance with NMOCD rules and is protective of human health and the environment (based on exposures that are specific to each site). The general

approach to achieving regulatory closure of EOTT-New Mexico pipeline release sites, within the NMOCD framework, is provided below.

2.2 Program Approach

2.2.1 NMOCD Closure Guidance

NMOCD, 1993 uses the evaluation of factors to: (1) identify COC levels in impacted media that do not pose unacceptable risks to human health and the environment, and (2) determine if corrective action/abatement is necessary for the protection of human health and the environment.

This Work Plan briefly discusses the generic closure options for potentially impacted sites in New Mexico. However, the specific closure option proposed for a particular site will be dependent on the following factors:

- Site environmental data;
- EOTT and landowner future plans for the site and the timeframe for realizing those plans;
- Presence or absence of potentially sensitive receptors at or in the immediate vicinity of the site;
- Feasibility of remediation; and
- Consideration of other factors (geology, hydrogeology, other non EOTT-related contamination sources, etc.).

The aforementioned factors can influence significantly the type of closure requested for a particular site. Therefore, under circumstances where factors will likely play a significant role, Work Plan Supplements will be developed proposing a specific closure method for that particular site. Regardless, the overall closure strategy will conform to that discussed in this Work Plan.

2.2.2 Program Outline

Upon learning of a release, EOTT's plan will consist of the following steps:

2.2.2.1 Initial Response Actions

- Stop the release source and limit site access to reduce the potential for public exposure.
- Contain the released material by constructing berms, dikes, using absorbent material, etc. to limit the surface migration of the released material so that impacts to surface waters and public health and safety are prevented.
- Recover any product which can be physically removed from the surface within the containment area.

- Undertake initial response actions, as necessary, using guidance available in NMOCD, 1993. EOTT will first assess if the released material has a reasonable probability to injure or be detrimental to public health, fresh waters, animal or plant life, or property, or unreasonably interfere with the welfare or use of the property. This assessment will be based on a site visit and the professional opinion of EOTT's field representatives and consultants.

2.2.2.2 Site Assessment

A site assessment will be performed at each release site to evaluate the nature and extent of contamination. Based on guidance available in NMOCD, 1993, appropriate soil and groundwater remediation action levels will be identified for each site. The site will be assessed based on the severity of contamination and the potential threat the contamination poses to human health and the environment using a risk-based ranking system, as discussed below. As discussed in NMOCD, 1993, the following characteristics will be considered in ranking the site to assess its potential to pose a risk to human health and the environment:

- Depth to groundwater
- Wellhead protection areas
- Distance to surface water body

The aforementioned characteristics will also be used to ascertain the need for remedial action and the level of cleanup required at the site.

The site assessment will consist of soil and groundwater sampling and analysis (other media may be added, as appropriate, on a site-by-site-basis) that will be conducted in compliance with NMOCD, 1993 and as discussed in Section 3 of this Work Plan. As part of assessing the nature and extent of contamination in soils, observations will be made of the ground surface at the release site and the degree of contamination will be ascertained. Soils will first be classified as Highly Contaminated/Saturated Soils (soils that contain free product or exhibit gross staining) and Unsaturated/Contaminated soils (soils that are not highly contaminated/saturated, but contain COCs as determined via sampling).

If groundwater is encountered during the nature and extent evaluation, samples will be collected to assess whether the release has affected the groundwater zone. A total dissolved solids (TDS) sample will also be collected from the encountered groundwater zone at the site. The TDS analysis will be used to ascertain the potential of the zone to sustain "present or foreseeable future beneficial use" as defined by NMOCD, 1993. In addition to the TDS value, actual groundwater use information from the state engineer's office and field observations will be utilized to determine the use of the groundwater zone. Per NMOCD, 1993 and 19 NMAC 15.A.19.A, groundwater with a TDS value of 10,000 mg/L or less is considered to be of beneficial use, and hence, warrants abatement.

2.2.2.3 Site Ranking

Site ranking is used within NMOCD, 1993 to rank each release site with regard to the urgency of response actions required for the protection of human health and the environment. The site ranking system will be used at each release site to initially identify default remediation action levels. If COC concentrations are below these default action levels, then site closure will be sought documenting the actions undertaken at the site. If the COC concentrations exceed the default NMOCD action levels, then a risk-based approach, as discussed in Section 2.2.3 and allowed under NMOCD, 1993/19 NMAC 15.A.19.A, will be used

As prescribed in NMOCD, 1993, the general site ranking system is based on soils contaminated or saturated with petroleum hydrocarbons. The site ranking criteria for unsaturated contaminated soils are based on:

- Depth to groundwater;
- Distance to wellhead protection areas;
- Distance to surface water bodies;

Each site will be classified according to the ranking system given below (i.e., rank = >19, 10-19, or 0-9) and each rank will be appropriately justified. Based on this ranking system, appropriate NMOCD remediation action levels for soils will be identified for each site. The range of recommended default remediation action levels and associated site ranking is presented below.

	Total Ranking Score (Soil)		
	>19	10-19	0-9
Benzene (ppm)	10	10	10
BTEX (ppm)	50	50	50
TPH (ppm)	100	1000	5000

For aquifers deemed to be of beneficial use (based on a TDS concentration of 10,000 mg/L or less and documented groundwater use), default groundwater action levels will initially be identified using the COC-specific New Mexico WQCC abatement standards available in 20 NMAC 6.2.III.3103.

As with soils, risk assessment will be utilized to calculate action levels at sites where COC concentrations in groundwater exceed the WQCC default standards (see Section 2.2.3). Default WQCC standards for some common crude oil constituents are presented below.

	Water Standards
Benzene (ppm)	0.01
Toluene (ppm)	0.75
Ethylbenzene (ppm)	0.75
Total Xylenes (ppm)	0.62
PAHs (total naphthalene ppm)	0.03
Benzo-a-pyrene (ppm)	0.0007
TPH (ppm)	Not Available

2.2.3 Site Closure Strategy

At sites with surface soils exhibiting gross staining or product saturation (i.e., surface soils that fall within NMOCD's definition of highly contaminated/saturated soils), surface remediation will be performed even if the COC concentrations are below action levels. The objective of this approach is to restore the land surface that has been visibly impacted by the release to its pre-release condition, to the extent practical. The surface remediation will consist of: 1) excavating the visibly impacted soil from the surface layer to the root zone (0-3-foot depth); 2) shredding the excavated soil and blending the soil with sand and nutrients to facilitate the future growth of vegetation; 3) sampling the shredded, enhanced soil to ensure that COC concentrations are below site action levels, and backfilling the excavation with the shredded, nutritionally-enhanced soil; 4) grading the backfilled area to conform to the topography in the vicinity; and 5) re-seeding the area disturbed by the excavation with suitable vegetation.

Subsurface soils under the root zone that have COC concentrations above the NMOCD action levels will be addressed using risk assessment techniques as allowed under NMOCD guidance. For such deeper contamination, a risk assessment will be conducted that will consider potential receptors and exposure scenarios that may exist at the site. The risk assessment will also address the potential for soil contamination to impact underlying groundwater. At sites where groundwater has already been determined to have been affected by the release, the affected groundwater will directly be included as a medium of concern in the risk assessment itself. As allowed under NMOCD regulations, the potential use of the groundwater zone that is targeted for protection, or is already affected by the pipeline release, will be ascertained by collecting a total dissolved solids (TDS) sample and reviewing information from the state engineer's office regarding documented use of the zone.

As part of the risk assessment, at sites where there are "complete" exposure pathways (completeness is defined as: presence of contamination, existence of pathways for contamination to migrate, presence of receptors, and a means for the receptors to come in contact with the contamination), risk-based action levels will be calculated for the COCs. Guidance published by the U.S. Environmental Protection Agency (USEPA) and other documented sources will be used to conduct the risk assessment. The details of the risk assessment methodology will be presented in Work Plan Supplements or Investigation Reports for each release site.

At sites where exposure pathways are deemed to be incomplete (determined using the aforementioned completeness criteria), a qualitative exposure assessment will be conducted, instead of a comprehensive risk assessment that typically results in the calculation of action levels (termed a "quantitative risk assessment"). An exposure assessment is an integral part of all risk assessments; however, at sites where exposures are not complete (meaning no uptake of COCs by receptor populations can occur) calculation of risk-based action levels is not necessary. Instead, the process is shortened by conducting a qualitative exposure assessment that will document site conditions and a lack of exposure potential at that site. If appropriate, such an assessment will include justification for not instituting any active remedial measures at the site, especially in cases where the contaminant source is inactive, there is no exposure, the contamination plume is stable, and there *is no vertical or lateral migration potential.*

The results of the risk assessment/exposure assessment will be submitted to NMOCD for approval prior to initiating further action at the release site.

At sites that have contamination only in soils, a soil sample will also be collected from the depth interval with the highest TPH contamination for synthetic precipitate leaching procedure (SPLP) analysis. If the BTEX constituents (since there are no WQCC water action levels for TPH) in the leachate from this soil sample are at levels below the respective WQCC action levels, then the vertical migration potential from soils to groundwater will be deemed to be incomplete. This information will be utilized as appropriate in the risk assessment/exposure assessment as discussed above. If BTEX is shown to leach out at levels above the WQCC action levels, then abatement options/calculation of risk-based action levels for groundwater will be proposed on a basis.

In NMOCD regulations, groundwater with TDS concentration greater than 10,000 mg/L is considered not to be unsuitable for beneficial use (i.e. agriculture use, stock water, domestic use, or discharges to beneficial water sources). If groundwater is deemed to be unsuitable for beneficial use by the aforementioned criterion as well as actual groundwater use data from the state engineer's office/field observations, then natural attenuation will be the preferred remedial option. Groundwater with TDS concentrations below 10,000 mg/L will be considered to be of beneficial use and will be subject to abatement according to NMOCD regulations. The abatement plan for beneficial use water will also include a public notification proposal.

For each release site, actions taken in accordance with the proposed program approach will be documented in work plans and reports, and submitted to NMOCD for approval. Agency approval will be sought prior to initiating any abatement/remedial action at the site

3. SITE ASSESSMENT AND DATA COLLECTION

3.1 Contaminants of Potential Concern

As required by NMOCD, 1993, the COCs and their associated analytical methods include: TPH (by SW 846, Method 8015B GC/FID), and TPH indicator compounds where appropriate, BTEX (by SW 846, Method 8021B) and/or other indicator compounds PAH (SW846, Method 8270C) for soils.

Selected analytical methods for groundwater include: BTEX (SW 846, Method 8021B) and/or other indicator compounds PAH (SW846, Method 8270C). It must be noted that PAH analysis by SW846, Method 8270C has detection limits for some PAHs that are higher than the default NMOCD action levels in water. The COCs at the EOTT release sites are related to crude oil and not a refined product or product of combustion. Therefore, the detection of a PAH in a medium sampled as part of an EOTT release will be considered to be from a source not related to the release.

3.2 Site Assessment Process

The site assessment process will include the collection and laboratory analysis of samples from surface soil, subsurface soil, groundwater, and surface water as appropriate. The lateral and vertical extent of contamination will be delineated with regard to concentrations of TPH and BTEX in soil underlying the site. Samples of groundwater, if encountered, will also be collected and analyzed for these parameters (except TPH, which is not required), in addition to total dissolved solids (TDS) to determine if the water meets the NMOCD definition of "beneficial use" (i.e., less than or equal to 10,000 mg/L TDS).

For each release site, the sampling plan and SOPs for sampling these media will be included in the individual Work Plan Supplements and Site Assessment/Subsurface Investigation Reports.

The development of a SOP manual in support of the site assessment process was necessary to ensure that the following objectives are achieved:

- Site investigations and reporting are in compliance NMOCD Guidelines for Remediation of Leaks, Spills and Releases, NMOCD regulation 19 NMAC 15.A.19, and water quality control commission or WQCC regulation 20 NMAC 6.2 III.3103, and consider landowner concerns.

- Site investigation procedures and the reports generated from the investigations are consistent for all EOTT New Mexico pipeline release sites.
- A framework is provided to ensure that the data generated from site investigations are defensible and usable for site closure within the NMOCD regulatory framework.

3.3 Quality Control Program

A Quality Control (QC) program has been established as part of the program QAPP. This program ensures the validity of analytical results and monitors the quality of field sampling techniques. The QC Program proposed in this QAPP is consistent with NMOCD requirements (NMOCD, 1993). During each site assessment, relevant sections of the program QAPP will be utilized and documented in the Site Assessment/Subsurface Investigation Report.

3.4 Data Quality Assurance/Quality Control Requirements

Data Quality Assurance/Quality Control (QA/QC) is critical to the acquisition of reliable data for risk assessment and site closure purposes. Data on which risk-based decisions are made must meet minimum analytical requirements and be of known quality to allow for an evaluation of uncertainty in the data and the resulting impact on estimated risks. Therefore, data collected during this investigation shall meet the applicable NMOCD requirements including the following:

- The data generated will use rigorous analytical methods such as an approved NMOCD/EPA method;
- The data will be analyte-specific and the identity and concentration will be confirmed;
- As appropriate, the method will produce tangible raw data (e.g. chromatograms, spectra, and digital values) in the form of paper printouts or computer-generated electronic files.

As indicated previously, a program QAPP has been developed for use at the EOTT New Mexico release sites. Relevant sections of the QAPP will be implemented at each release site. Documentation of the QA/QC protocols applicable to each site will be provided in the respective Work Plan Supplements and Site Assessment/Subsurface Investigation Reports.

4. SUMMARY

This Work Plan proposes a risk-based approach in providing a consistent strategy in evaluating, prioritizing, ranking, and obtaining site closure for EOTT releases in New Mexico. The ultimate goals are to protect human health and the environment, and to satisfy NMOCD requirements, while addressing concerns of landowners and other parties that may be potentially affected. The work plan will be modified to include new or more effective technology as the need arises. As stated previously, this Work Plan is a generic strategy document that will be supported by supplements and other deliverables for each release site. Upon receipt of approval from NMOCD, EOTT will implement the remediation program at the crude oil release sites in New Mexico currently being evaluated.

5. REFERENCES

1. NMOCD Guidelines for Remediation of Spills, Leaks and Releases, August, 1993 (NMOCD, 1993)

2. Title 19 NMAC 15.A.19

3. Title 20 NMAC 6.2.III.3103