2R - 6

REPORTS

DATE: 2005

Delta
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May 12, 2005

Jack Ford
New Mexico Oil Conservation Division
1220 South Francis Drive
Santa Fe, New Mexico 87505

Subject: **Risk Assessment Report**
BP Pipelines (North America), Inc.
Artesia Tank Farm - 2R0006
Approximately 12 Miles Southeast of Artesia
Artesia, Eddy County, New Mexico
Delta Project No. G04Q4-PP5NT

Dear Mr. Ford:

On behalf of Atlantic Richfield (A BP Affiliated Company), Delta Environmental Consultants, Inc. (Delta) is pleased to submit the attached Risk Assessment Report associated with the above-referenced project site for your review and comment.

Please contact Michael Henn at (972) 416-7171 if you have any questions or need additional information.

Sincerely,

DELTA ENVIRONMENTAL CONSULTANTS, INC.

Michael Henn
Project Manager

Mark T. Smith, P.G.
Senior Specialist

cc: Mike Whelan – Atlantic Richfield Company
Jim Lutter (BP – Levelland)

RISK ASSESSMENT REPORT
BP Pipelines – Artesia Tank Farm
Artesia, Eddy County, New Mexico
Delta Project No. G04Q4-PP5NT

May 12, 2005

Prepared for:
Atlantic Richfield Company
(A BP Affiliated Company)
501 Westlake Park Blvd.
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ATTACHMENT A

SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT SCOPING ASSESSMENT SITE ASSESSMENT CHECKLIST

INTRODUCTION

This checklist has been developed as a tool for gathering information about the facility property and surrounding areas, as part of the scoping assessment. Specifically, the checklist assists in the compilation of information on the physical and biological aspects of the site including the site environmental setting, usage of the site, releases at the site, contaminant fate and transport mechanisms, and the area's habitats, receptors, and exposure pathways. The completed checklist can then be used to construct the preliminary conceptual site exposure model (PCSEM) for the site. In addition, the checklist and PCSEM will serve as the basis for the scoping assessment report. Section III of this document provides further information on using the completed checklist to develop the PCSEM.

In general, the checklist is designed for applicability to all sites, however, there may be unusual circumstances which require professional judgment in order to determine the need for further ecological evaluation (*e.g,* cave-dwelling receptors). In addition, some of the questions in the checklist may not be relevant to all sites. Some facilities may have large amounts of data available regarding contaminant concentrations and hydrogeologic conditions at the site, while other may have only limited data. In either case, the questions on the checklist should be addressed as completely as possible with the information available.

Habitats and receptors, which may be present at the site, can be identified by direct or indirect[1] observations and by contacting local and regional natural resource agencies. Habitat types may be determined by reviewing land use and land cover maps (LULC), which are available via the Internet at http://www.nationalatlas.gov/mapit.html. With regard to receptors, it should be noted that receptors are often present at a site even when they are not observed. Therefore, for the purposes of this checklist, it should be assumed that receptors are present if viable habitat is present. The presence of receptors should be confirmed by contacting one or several of the organizations listed below.

Sources of general information available for the identification of ecological receptors and habitats include:

- U.S. Fish and Wildlife Service (http://www.fws.gov)
- Biota Information System of New Mexico (BISON-M) maintained by the New Mexico Department of Game and Fish (NMGF) (http://151.199.74.229/states/nm.htm)
- U.S. Forest Service (USFS) (http://www.fs.fed.us/)
- New Mexico Forestry Division (NMFD) of the Energy, Minerals and Natural Resources Department (http://www.emnrd.state.nm.us/forestry/index.htm)

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1 Examples of indirect observations that indicate the presence of receptors include: tracks, feathers, burrows, scat

- U.S. Bureau of Land Management (USBLM) (http://www.blm.gov/nhp/index.htm) or (http://www.nm.blm.gov/www/new_home_2.html)
- United States Geological Service (USGS) (http://www.usgs.gov)
- National Wetland Inventory Maps (http://wetlands.fws.gov)
- National Audubon Society (http://www.audobon.com)
- National Biological Information Infrastructure (http://biology.usgs.gov)
- Sierra Club (http://www.sierraclub.org)
- National Geographic Society (http://www.nationalgeographic.com)
- New Mexico Natural Heritage Program (http://nmnhp.unm.edu/)
- State and National Parks System
- Local universities
- Tribal organizations

INSTRUCTIONS FOR COMPLETING THE CHECKLIST

The checklist consists of four sections: Site Location, Site Characterization, Habitat Evaluation, and Exposure Pathway Evaluation. Answers to the checklist should reflect existing conditions and should not consider future remedial actions at the site. Completion of the checklist should provide sufficient information for the preparation of a PCSEM and scoping report and allow for the identification of any data gaps.

Section I - Site Location, provides general site information, which identifies the facility being evaluated, and gives specific location information. Site maps and diagrams, which should be attached to the completed checklist, are an important part of this section. The following elements should be clearly illustrated: 1) the location and boundaries of the site relative to the surrounding area, 2) any buildings, structures or important features of the facility or site, and 3) all ecological areas or habitats identified during completion of the checklist. It is possible that several maps will be needed to clearly and adequately illustrate the required elements. Although topographical information should be illustrated on at least one map, it is not required for every map. Simplified diagrams (preferably to scale) of the site and surrounding areas will usually suffice.

Section II - Site Characterization, is intended to provide additional temporal and contextual information about the site, which may have an impact on determining whether a certain area should be characterized as ecologically viable habitat or contains receptors. Answers to the questions in Section II will help the reviewer develop a broader and more complete evaluation of the ecological aspects of a site.

Section III - Habitat Evaluation, provides information regarding the physical and biological characteristics of the different habitat types present at or in the locality of the site. Aquatic features such as lakes, ponds, streams, arroyos and ephemeral waters can be identified by reviewing aerial photographs, LULC and topographic maps and during site reconnaissance visits. In New Mexico, there are several well-defined terrestrial communities, which occur naturally. Typical communities include wetlands, forest (e.g., mixed conifer,

ponderosa pine and pinyon juniper), scrub/shrub, grassland, and desert. Specific types of vegetation characterize each of these communities and can be used to identify them. Field guides are often useful for identifying vegetation types. A number of sites may be in areas that have been disturbed by human activities and may no longer match any of the naturally occurring communities typical of the southwest. Particularly at heavily used areas at facilities, the two most common of these areas are usually described as "weed fields" and "lawn grass". Vegetation at "weed fields" should be examined to determine whether the weeds consist primarily of species native to the southwest or introduced species such as Kochia. Fields of native weeds and lawn grass are best evaluated using the short grass prairie habitat guides.

The applicable portions of Section III of the checklist should be completed for each individual habitat identified. For example, the questions in Section III.A of the checklist should be answered for each wetland area identified at or in the locality of the site and the individual areas must be identified on a map or maps.

Section IV- Exposure Pathway Evaluation, is used to determine if contaminants at the site have the potential to impact habitat identified in Section III. An exposure pathway is the course a chemical or physical agent takes from a source to an exposed organism. Each exposure pathway includes a source (or release from a source), an environmental transport mechanism, an exposure point, and an exposure route. A complete exposure pathway is one in which each of these components, as well as a receptor to be exposed, is present. Essentially, this section addresses the fate and transport of contaminants that are known or suspected to have been released at the site. In most cases, without a complete exposure pathway between contaminants and receptors, additional ecological evaluation is not warranted.

Potential transport pathways addressed in this checklist include migration of contaminants via air dispersion, leaching into groundwater, soil erosion/runoff, groundwater discharge to surface water, and irradiation. Due to New Mexico's semi-arid climate, vegetation is generally sparse. The sparse vegetation, combined with the intense nature of summer storms in New Mexico, results in soil erosion that occurs sporadically over a very brief time frame. Soil erosion may be of particular concern for sites located in steeply sloped areas. Several questions within Section IV of this checklist have been developed to aid in the identification of those sites where soil erosion/runoff would be an important transport mechanism.

USING THE CHECKLIST TO DEVELOP THE PRELIMINARY CONCEPTUAL SITE EXPOSURE MODEL

The completed Site Assessment Checklist can be used to construct the PCSEM. An example PCSEM diagram is presented in Figure 1. The CSM illustrates actual and potential contaminant migration and exposure pathways to associated receptors. The components of a complete exposure pathway are simplified and grouped into three main categories: sources, release mechanisms, and potential receptors. As a contaminant migrates and/or is transformed in the environment, sources and release mechanisms may expand into primary, secondary, and tertiary levels. For example, Figure 1 illustrates releases from inactive

lagoons (primary sources) through spills (primary release mechanism), which migrate to surface and subsurface soils (secondary sources), which are then leached (secondary release mechanism) to groundwater (tertiary source). Similarly, exposures of various trophic levels to the contaminant(s) and consequent exposures via the food chain may lead to multiple groups of receptors. For example, Figure 1 illustrates groups of both aquatic and terrestrial receptors which may be exposed and subsequently serve as tertiary release mechanisms to receptors which prey on them.

Although completing the checklist will not provide the user with a readymade PCSEM, a majority of the components of the PCSEM can be found in the answers to the checklist. It is then up to the user to put the pieces together into a comprehensive whole. The answers from Section II of the checklist, Site Characterization, can be used to identify sources of releases. The answers to Section IV, Exposure Pathway Evaluation, will assist users in tracing the migration pathways of releases in the environment, thus helping to identify release mechanisms and sources. The results of Section III, Habitat Evaluation, can be used to both identify secondary and tertiary sources and to identify the types of receptors which may be exposed. Appendix B of the NMED's *Guidance for Assessing Ecological Risks Posed by Chemicals: Screening-Level Ecological Assessment* also contains sample food webs which may be used to develop the PCSEM.

Once all of the components have been identified, one can begin tracing the steps between the primary releases and the potential receptors. For each potential receptor, the user should consider all possible exposure points (e.g., prey items, direct contact with contaminated soil or water, etc.) then begin eliminating pathways, which are not expected to result in exposure to the contaminant at the site. Gradually, the links between the releases and receptors can be filled in, resulting in potential complete exposure pathways.

For further guidance on constructing a PCSEM, consult the NMED's *Guidance for Assessing Ecological Risks Posed by Chemicals: Screening-Level Ecological Assessment* (2000), and EPA's Office of Solid Waste and Emergency *Response's Soil Screening Guidance: User's Guide* (1996).

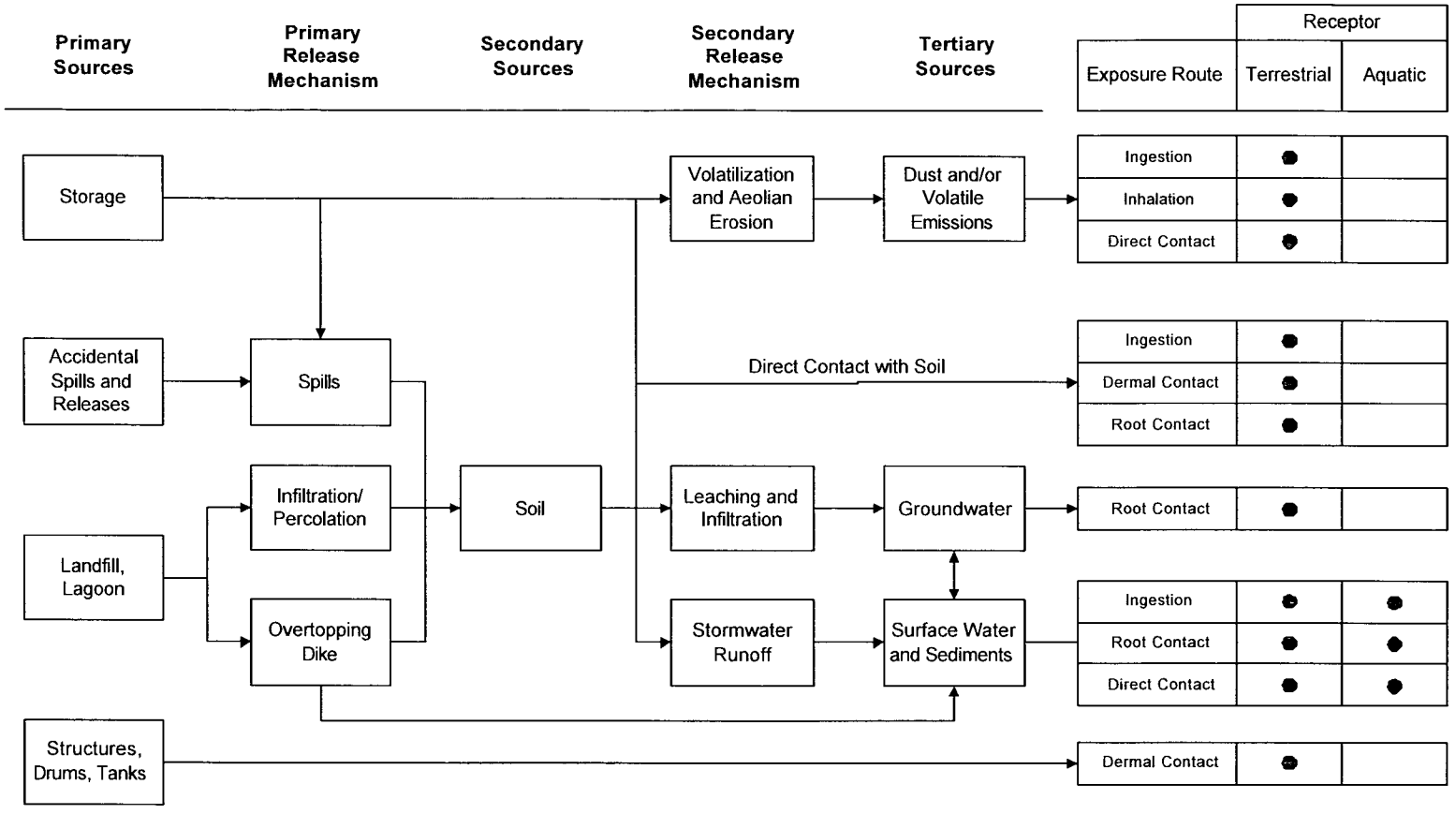


Figure 1. Example Preliminary Conceptual Site Exposure Model Diagram

NEW MEXICO ENVIRONMENT DEPARTMENT
SITE ASSESSMENT CHECKLIST

I. SITE LOCATION

1. Site Nam: BP Pipelines - Artesia Tank Farm
   US EPA I.D. Number: NA
   Location: Approximately 12 miles southeast of Artesia
   County: Eddy City: Artesia State: NM

2. Latitude: 32°45'42" N Longitude: 104°16

3. Attach site maps, including a topographical map, a diagram which illustrates the layout of the facility (e.g., site boundaries, structures, etc.), and maps showing all habitat areas identified in Section III of the checklist. Also, include maps which illustrate known release areas, sampling locations, and any other important features, if available.

II. SITE CHARACTERIZATION

1. Indicate the approximate area of the site (i.e., acres or sq. ft) 133 Acres
2. Provide an approximate breakdown of the land uses on the site:

____% Heavy Industrial	_<5_% Light Industrial[b]	____% Urban
____% Residential	____% Rural	____% Agricultural[d]
____% Recreational[a]	_<95_% Undisturbed[c]	____% Other[e]

[a]For recreational areas, please describe the usage of the area (e.g., park, playing field, etc.):

[b]For light industrial areas, please describe the usage of the area:
Crude oil pipeline pumping/storage station

[c]For undisturbed areas, please describe the usage of the area:
Seasonal cattle grazing

[d]For agricultural areas, please list the crops and/or livestock which are present:

3. Provide an approximate breakdown of the land uses in the area surrounding the site. Indicate the radius (in miles) of the area described: 3.5 mile

_____% Heavy Industrial	_<5_% Light Industrial[b]	_____% Urban
_____% Residential	_____% Rural	_____% Agricultural[d]
_____% Recreational[a]	_<95 % Undisturbed[c]	_____% Other[f]

[a]For recreational areas, please describe the usage of the area (e.g., park, playing field, etc.):

_____

[b]For light industrial areas, please describe the usage of the area:
Oil production activities are present in all surrounding areas

[c]For undisturbed areas, please describe the usage of the area:
Seasonal cattle grazing

[d]For agricultural areas, please list the crops and/or livestock which are present:

_____

4. Describe reasonable and likely future land and/or water use(s) at the site.
It is likely that the land use at the site will remain the same.

5. Describe the historical uses of the site. Include information on chemical releases that may have occurred as a result of previous land uses. For each chemical release, provide information on the form of the chemical released (i.e., solid, liquid, vapor) and the known or suspected causes or mechanism of the release (i.e., spills, leaks, material disposal, dumping, explosion, etc.).
The site has historically been undeveloped/undisturbed land and oilfield operations. No record of releases occurring as a result of previous land uses are known.

6. If any movement of soil has taken place at the site, describe the degree of the disturbance. Indicate the likely source of any disturbances (e.g., erosion, agricultural, mining, industrial activities, removals, etc.) and estimate when these events occurred.
An interception trench was installed in 1994. A total of 17 Monitor wells have been installed on the site (Water Development Easement/Lease # WD-72, July 23, 2004). An interception trench was installed in 2001 due to a release from a Duke Energy Pipeline, unrelated to this site. Refer to Figure 2 Site Plan.

7. Describe the current uses of the site. Include information on recent (previous 5 years) disturbances or chemical releases that have occurred. For each chemical

release, provide information on the form of the chemical released and the causes or mechanism of the release.
The site is currently utilized as a crude oil pipeline pumping/storage station. No recent disturbances or chemical releases have occurred. An interception trench was installed in 2001 due to a release from a Duke Energy Pipeline, unrelated to this site.

8. Identify the location or suspected location of chemical releases at the site. Provide an estimate of the distance between these locations and the areas identified in Section III.
The source release location (30,000 gallon storage tank) at the site is located within the tank berm. The tank berm is located approximately 20-50 feet to the west of Scoggin Draw as identified on Figure 2 Site Map.

9. Identify the suspected contaminants of concern (COCs) at the site. If known, include the maximum contaminant levels. Please indicate the source of data cited (e.g., RFI, confirmatory sampling, etc.).
Refer to Section 3 of the Risk Assessment Report and reference Tables 2, 3, and 4

10. Identify the media (e.g., soil (surface or subsurface), surface water, air, groundwater) which are known or suspected to contain COCs. Groundwater and subsurface soil

11. Indicate the approximate depth to groundwater (in feet below ground surface [(bgs)].
Range of 4.50 – 17.23 feet bgs, data from all monitor wells gauged on 3/29/04

12. Indicate the direction of groundwater flow (e.g., north, southeast, etc.)

South-southwest

III. HABITAT EVALUATION

III.A Wetland Habitats

Are any wetland[2] areas such as marshes or swamps on or adjacent to the site?

? Yes X No

If yes, indicate the wetland area on the attached site map and answer the following questions regarding the wetland area. If more than one wetland area is present on or adjacent to the site, make additional copies of the following questions and fill out for each individual wetland area. Distinguish between wetland areas by using names or other designations (such as location), and clearly identify each area on the site map. Also, obtain and attach a National Wetlands Inventory Map (or maps) to illustrate each wetland area.

Identify the sources of the observations and information (e.g., National Wetland Inventory, Federal or State Agency, USGS topographic maps) used to make the determination that wetland areas are or are not present.

__National Wetlands Inventory, http://wetlands.fws.gov/mapper_tool.htm

If no wetland areas are present, proceed to Section III.B.

2Wetlands are defined in 40 CFR §232.2 as " Areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Examples of typical wetlands plants include: cattails, cordgrass, willows and cypress trees. National wetland inventory maps may be available at http:\\nwi.fws.gov. Additional information on wetland delineation criteria is also available from the Army Corps of Engineers.

Wetland Area Questions

? Onsite ? Offsite

Name or
Designation:_____

1. Indicate the approximate area of the wetland (acres or ft^2)_____

2. Identify the type(s) of vegetation present in the wetland.

   - ❑ Submergent (i.e., underwater) vegetation
   - ❑ Emergent (i.e., rooted in the water, but rising above it) vegetation
   - ❑ Floating vegetation
   - ❑ Scrub/shrub
   - ❑ Wooded
   - ❑ Other (Please describe):_____

3. Estimate the vegetation density of the wetland area.

   - ❑ Dense (i.e., greater than 75% vegetation)
   - ❑ Moderate (i.e., 25% to 75% vegetation)
   - ❑ Sparse (i.e., less than 25% vegetation)

4. Is standing water present? ? Yes ? No

   If yes, is the water primarily: ? Fresh or ? Brackish

   Indicate the approximate area of the standing water (ft^2): _____

   Indicate the approximate depth of the standing water, if known (ft. or in.)_____

5. If known, indicate the source of the water in the wetland.

   - ❑ Stream/River/Creek/Lake/Pond
   - ❑ Flooding
   - ❑ Groundwater
   - ❑ Surface runoff

6. Is there a discharge from the facility to the wetland? ? Yes ? No

   If yes, please
   describe:_____
   _____
   _____
   _____
   _____

Wetland Area Questions (Continued)

7. Is there a discharge from the wetland? ? Yes ? No
   If yes, indicate the type of aquatic feature the wetland discharges into:

   - ❑ Surface stream/River (Name:_____)
   - ❑ Lake/Pond (Name:_____)
   - ❑ Groundwater
   - ❑ Not sure

8. Does the area show evidence of flooding? ? Yes ? No
   If yes, indicate which of the following are present (mark all that apply):

   - ❑ Standing water
   - ❑ Water-saturated soils
   - ❑ Water marks
   - ❑ Buttressing
   - ❑ Debris lines
   - ❑ Mud cracks
   - ❑ Other (Please describe):_____

9. Animals observed in the wetland area or suspected to be present based on indirect evidence or file material:

   - ❑ Birds
   - ❑ Fish
   - ❑ Mammals
   - ❑ Reptiles (e.g., snakes, turtles)
   - ❑ Amphibians (e.g., frogs, salamanders)
   - ❑ Sediment-dwelling invertebrates (e.g., mussels, crayfish, insect nymphs)

   Specify species, if known:

   _____
   _____
   _____
   _____

III.B Aquatic Habitats
III.B.1 Non-Flowing Aquatic Features

Are any non-flowing aquatic features (such as ponds or lakes) located at or adjacent to the site?

? Yes X No

If yes, indicate the aquatic feature on the attached site map and answer the following questions regarding the non-flowing aquatic features. If more than one non-flowing aquatic feature is present on or adjacent to the site, make additional copies of the following questions and fill out for each individual aquatic feature. Distinguish between aquatic features by using names or other designations, and clearly identify each area on the site map.

If no, proceed to Section III.B.2.

Non-Flowing Aquatic Feature Questions

? Onsite ? Offsite

Name or Designation:_____

1. Indicate the type of aquatic feature present:

   - ❑ Natural (e.g., pond or lake)
   - ❑ Man-made (e.g., impoundment, lagoon, canal, etc.)

2. Estimate the approximate size of the water body (in acres or sq. ft.)_____

3. If known, indicate the depth of the water body (in ft. or in.)._____

Non-Flowing Aquatic Feature Questions (Continued)

4. Indicate the general composition of the bottom substrate. Mark all sources that apply from the following list.

? Bedrock	? Sand	? Concrete
? Boulder (>10 in.)	? Silt	? Debris
? Cobble (2.5 - 10 in.)	? Clay	? Detritus
? Gravel (0.1 - 2.5 in.)	? Muck (fine/black)	

? Other (please specify):_____

5. Indicate the source(s) of the water in the aquatic feature. Mark all sources that apply from the following list.

- ❑ River/Stream/Creek
- ❑ Groundwater
- ❑ Industrial Discharge
- ❑ Surface Runoff
- ❑ Other (please specify):_____

6. Is there a discharge from the facility to the aquatic feature? ? Yes ? No
   If yes, describe the origin of each discharge and its migration path:

   _____
   _____
   _____
   _____

7. Does the aquatic feature discharge to the surrounding environment? ? Yes ? No
   If yes, indicate the features from the following list into which the aquatic feature discharges, and indicate whether the discharge occurs onsite or offsite:

❑ River/Stream/Creek	? onsite	? offsite
❑ Groundwater	? onsite	? offsite
❑ Wetland	? onsite	? offsite
❑ Impoundment	? onsite	? offsite

❑ Other (please describe)_____

Non-Flowing Aquatic Feature Questions (Continued)

8. Animals observed in the vicinity of the aquatic feature or suspected to be present based on indirect evidence or file material:

- ❑ Birds
- ❑ Fish
- ❑ Mammals
- ❑ Reptiles (e.g., snakes, turtles)
- ❑ Amphibians (e.g., frogs, salamanders)
- ❑ Sediment-dwelling invertebrates (e.g., mussels, crayfish, insect nymphs)

Specify species, if known:

_____

_____

_____

_____

III.B.2 Flowing Aquatic Features

Are any flowing aquatic features (such as streams or rivers) located at or adjacent to the site?

X Yes ? No

If yes, indicate the aquatic feature on the attached site map and answer the following questions regarding the flowing aquatic features. If more than one flowing aquatic feature is present on or adjacent to the site, make additional copies of the following questions and fill out for each individual aquatic feature. Distinguish between aquatic features by using names or other designations, and clearly identify each area on the site map

If no, proceed to Section III.C.

Flowing Aquatic Feature Questions

× Onsite ? Offsite

Name or Designation: Scoggin Draw

1. Indicate the type of flowing aquatic feature present.

- ❑ River
- ❑ Stream
- ❑ Creek
- ❑ Brook
- ❑ Dry wash
- × Arroyo
- ❑ Intermittent stream
- ❑ Artificially created (ditch, etc.)
- ❑ Other (specify)
- ❑

2. Indicate the general composition of the bottom substrate.

?	Bedrock	×	Sand	?	Concrete
?	Boulder (>10 in.)	?	Silt	?	Debris
?	Cobble (2.5 - 10 in.)	?	Clay	?	Detritus
?	Gravel (0.1 - 2.5 in.)	?	Muck (fine/black)		

? Other (please specify): _____

3. Describe the condition of the bank (e.g., height, slope, extent of vegetative cover) of the aquatic feature.

Height 0-4 feet,
Slope - gradual to steep
No vegetation to heavy vegetation

4. Is there a discharge from the facility to the aquatic feature? ? Yes ×No

If yes, describe the origin of each discharge and its migration path:

5. Indicate the discharge point of the water body. Specify name, if known.

N/A

Flowing Aquatic Feature Questions (Continued)

6. If the flowing aquatic feature is a dry wash or arroyo, answer the following questions.
   - ❑ Check here if feature is not a dry wash or arroyo

   If known, specify the average number of days in a year in which flowing water is present in the feature: Unknown

   Is standing water or mud present? Check all that apply.
   - ❑ Standing water
   - ❑ Mud
   - ☒ Neither standing water or mud

   Does the area show evidence of recent flow (e.g., flood debris clinging to vegetation)?
   - ☒ Yes
   - ❑ No
   - ❑ Not sure

7. Animals observed in the vicinity of the aquatic feature or suspected to be present based on indirect evidence or file material:

   - ☒ Birds
   - ❑ Fish
   - ❑ Mammals
   - ☒ Reptiles (e.g., snakes, turtles)
   - ❑ Amphibians (e.g., frogs, salamanders)
   - ❑ Sediment-dwelling invertebrates (e.g., mussels, crayfish, insect nymphs)

   Specify species, if known:
   Based on information obtained from http://criticalhabitat.fws.gov/, no threatened or endangered species critical habitats were identified in the subject area.

III.C Terrestrial Habitats
III.C.1 Wooded

Are any wooded areas on or adjacent to the site? ? Yes X No

If yes, indicate the wooded area on the attached site map and answer the following questions. If more than one wooded area is present on or adjacent to the site, make additional copies of the following questions and fill out for each individual wooded area. Distinguish between wooded areas by using names or other designations, and clearly identify each area on the site map.

If no, proceed to Section III.C.2.

Wooded Area Questions

? On-site ? Off-site

Name or Designation:_____

1. Estimate the approximate size of the wooded area (in acres or sq. ft.)_____

2. Indicate the dominant type of vegetation in the wooded area.

   - ❑ Evergreen
   - ❑ Deciduous
   - ❑ Mixed

   Dominant plant species, if known:_____

3. Estimate the vegetation density of the wooded area.

   - ❑ Dense (i.e., greater than 75% vegetation)
   - ❑ Moderate (i.e., 25% to 75% vegetation)
   - ❑ Sparse (i.e., less than 25% vegetation)

4. Indicate the predominant size of the trees at the site. Use diameter at chest height.

   - ❑ 0-6 inches
   - ❑ 6-12 inches
   - ❑ >12 inches
   - ❑ No single size range is predominant

5. Animals observed in the wooded area or suspected to be present based on indirect evidence or file material:

   - ❑ Birds
   - ❑ Mammals
   - ❑ Reptiles (e.g., snakes, lizards)
   - ❑ Amphibians (e.g., toads, salamanders)

   Specify species, if known:

   _____
   _____
   _____
   _____

III.C.2 Shrub/Scrub

Are any shrub/scrub areas on or adjacent to the site? XYes ? No

If yes, indicate the shrub/scrub area on the attached site map and answer the following questions. If more than one shrub/scrub area is present on or adjacent to the site, make additional copies of the following questions and fill out for each individual shrub/scrub area. Distinguish between shrub/scrub areas, using names or other designations, and clearly identify each area on the site map.

If no, proceed to Section III.C.3.

Shrub/Scrub Area Questions

X Onsite ? Offsite

Name or Designation: Scoggin Draw and surrounding areas

1. Estimate the approximate size of the shrub/scrub area (in acres or sq. ft.). 53 acres

2. Indicate the dominant type of shrub/scrub vegetation present, if known.
   Unknown

3. Estimate the vegetation density of the shrub/scrub area.

   ☐ Dense (i.e., greater than 75% vegetation)
   ☒ Moderate (i.e., 25% to 75% vegetation)
   ☐ Sparse (i.e., less than 25% vegetation)

4. Indicate the approximate average height of the scrub/shrub vegetation.

   ☐ 0-2 feet
   ☒ 2-5 feet
   ☐ >5 feet

5. Animals observed in the shrub/scrub area or suspected to be present based on indirect evidence or file material:
   ☒ Birds
   ☒ Mammals
   ☒ Reptiles (e.g., snakes, lizards)
   ☐ Amphibians (e.g., toads, salamanders)

   Specify species, if known:
   Based on information obtained from http://criticalhabitat.fws.gov/, no threatened or endangered species critical habitats were identified in the subject area.

III.C.3 Grassland

Are any grassland areas on or adjacent to the site? ? Yes × No

If yes, indicate the grassland area on the attached site map and answer the following questions. If more than one grassland area is present on or adjacent to the site, make additional copies of the following questions and fill out for each individual grassland area. Distinguish between grassland areas by using names or other designations, and clearly identify each area on the site map.

If no, proceed to Section III.C.4.

Grassland Area Questions

? Onsite ? Offsite

Name or Designation:_____

1. Estimate the approximate size of the grassland area (in acres or sq. ft.)._____

2. Indicate the dominant plant type, if known.

_____
_____
_____
_____

3. Estimate the vegetation density of the grassland area.

- ❑ Dense (i.e., greater than 75% vegetation)
- ❑ Moderate (i.e., 25% to 75% vegetation)
- ❑ Sparse (i.e., less than 25% vegetation)

4. Indicate the approximate average height of the dominant plant type (in ft. or in.)_

5. Animals observed in the grassland area or suspected to be present based on indirect evidence or file material:

- ❑ Birds
- ❑ Mammals
- ❑ Reptiles (e.g., snakes, lizards)
- ❑ Amphibians (e.g., toads, salamanders)

Specify species, if known:

III.C.4 Desert

Are any desert areas on or adjacent to the site? ? Yes X No

If yes, indicate the desert area on the attached site map and answer the following questions. If more than one desert area is present on or adjacent to the site, make additional copies of the following questions and fill out for each individual desert area. Distinguish between desert areas by using names or other designations, and clearly identify each area on the site map.

If no, proceed to Section III.C.5.

Desert Area Questions

? Onsite ? Offsite

Name or Designation:_____

1. Estimate the approximate size of the desert area (in acres or sq. ft.). __

2. Describe the desert area (e.g., presence or absence of vegetation, vegetation types, presence/size of rocks, sand, etc.)

_____

3. Animals observed in the desert area or suspected to be present based on indirect evidence or file material:

   - ☐ Birds
   - ☐ Mammals
   - ☐ Reptiles (e.g., snakes, lizards)
   - ☐ Amphibians (e.g., toads, salamanders)

   Specify species, if known:

   _____

III.C.5 Other

1. Are there any other terrestrial communities or habitats on or adjacent to the site which were not previously described?

   ? Yes XNo

   If yes, indicate the "other" area(s) on the attached site map and describe the area(s) below. Distinguish between onsite and offsite areas. If no, proceed to Section III.D.

   None identified

III.D Sensitive Environments and Receptors

1. Do any other potentially sensitive environmental areas[3] exist adjacent to or within 0.5 miles of the site? If yes, list these areas and provide the source(s) of information used to identify sensitive areas. *Do not answer "no" without confirmation from the U.S. Fish and Wildlife Service and appropriate State of New Mexico division.* ___

   Have submitted a request, pending response

3 Areas that provide unique and often protected habitat for wildlife species. These areas are typically used during critical life stages such as breeding, hatching, rearing of young and overwintering. Refer to **Table** 1 at the end of this document for examples of sensitive environments.

2. Are any areas on or near (i.e., within 0.5 miles) the site which are owned or used by local tribes? If yes, describe. *Contact the Tribal Liason in the Office of the Secretary (505)827-2855 to obtain this information.*
None identified, pending response

4. Does the site serve or potentially serve as a habitat, foraging area, or refuge by rare, threatened, endangered, candidate and/or proposed species (plants or animals), or any otherwise protected species? If yes, identify species. *This information should be obtained from the U.S. Fish and Wildlife Service and appropriate State of New Mexico division*
Unknown, awaiting response from the USFWS. However, according to the following website, http://criticalhabitat.fws.gov/, no threatened or endangered species critical habitats were identified.

5. Is the site potentially used as a breeding, roosting or feeding area by migratory bird species? If yes, identify which species.
Based on information obtained from http://criticalhabitat.fws.gov/, no threatened or endangered species critical habitats or migratory pathways were identified in the subject area.

6. Is the site used by any ecologically[4], recreationally, or commercially important species? If yes, explain. Yes, seasonal cattle grazing

4 Ecologically important species include populations of species which provide a critical (i.e., not replaceable) food resource for higher organisms and whose function as such would not be replaced by more tolerant species; or perform a critical ecological function (such as organic matter decomposition) and whose functions will not be replaced by other species. Ecologically important species include pest and opportunistic species that populate an area if they serve as a food source for other species, but do not include domesticated animals (e.g., pets and livestock) or plants/animals whose existence is maintained by continuous human interventions (e.g., fish hatcheries, agricultural crops, etc.,)

IV. EXPOSURE PATHWAY EVALUATION

1. Do existing data provide sufficient information on the nature, rate, and extent of contamination at the site?

- [x] Yes
- [ ] No
- [ ] Uncertain

Please provide an explanation for your answer:
COCs have been sufficiently delineated. COCs are naturally attenuating.

2. Do existing data provide sufficient information on the nature, rate, and extent of contamination in offsite affected areas?

- [x] Yes
- [ ] No
- [ ] Uncertain
- [ ] No offsite contamination

Please provide an explanation for your answer:
Most recent analytical results verify that COCs are now naturally attenuating.

3. Do existing data address potential migration pathways of contaminants at the site?

- [x] Yes
- [ ] No
- [ ] Uncertain

Please provide an explanation for your answer:
Refer to Section 3 of the Risk Assessment

4. Do existing data address potential migration pathways of contaminants in offsite affected areas?

- [x] Yes
- [ ] No
- [ ] Uncertain
- [ ] No offsite contamination

Please provide an explanation for your answer:
Refer to Section 3 of the Risk Assessment.

5. Are there visible indications of stressed habitats or receptors on or near (i.e., within

0.5 miles) the site that may be the result of a chemical release? If yes, explain. Attach photographs if available.

No

6. Is the location of the contamination such that receptors might be reasonably expected to come into contact with it? For soil, this means contamination in the soil 0 to 5 feet below ground surface (bgs). If yes, explain.

No, Known locations of contaminated soil are located within a fenced compound with no public access

7. Are receptors located in or using habitats where chemicals exist in air, soil, sediment or surface water? If yes, explain.

No

8. Could chemicals reach receptors via groundwater? Can chemicals leach or dissolve to groundwater? Are chemicals mobile in groundwater? Does groundwater discharge into receptor habitats? If yes, explain.

1. The adjacent arroyo is a losing stream.
2. The source of the COCs has been repaired.
3. The contaminant plume is stable and natural attenuation is occurring.
4. No

9. Could chemicals reach receptors through runoff or erosion? Answer the following questions: No

What is the approximate distance from the contaminated area to the nearest watercourse or arroyo?

- ❑ 0 feet (i.e., contamination has reached a watercourse or arroyo)
- ❑ 1-10 feet
- ❑ 11-20 feet

- [x] 21-50 feet
- [ ] 51-100 feet
- [ ] 101-200 feet
- [ ] >200 feet
- [ ] >500 feet
- [ ] >1000 feet

What is the slope of the ground in the contaminated area?

- [x] 0-10%
- [ ] 10-30%
- [ ] >30%

What is the approximate amount of ground and canopy vegetative cover in the contaminated area?

- [ ] <25%
- [x] 25-75%
- [ ] >75%

Is there visible evidence of erosion (e.g., a rill or gully) in or near the contaminated area?

- [x] Yes
- [ ] No
- [ ] Do not know

Do any structures, pavement, or natural drainage features direct run-on flow (i.e., surface flows originating upstream or uphill from the area of concern) into the contaminated area?

- [ ] Yes
- [x] No
- [ ] Do not know

10. Could chemicals reach receptors through the dispersion of contaminants in air (e.g., volatilization, vapors, fugitive dust)? If yes, explain.

No

11. Could chemicals reach receptors through migration of non-aqueous phase liquids (NAPLs)? Is a NAPL present at the site that might be migrating towards receptors or habitats? Could NAPL discharge contact receptors or their habitat?

Based on recent data the LNAPL plume is decreasing and stable.

12. Could receptors be impacted by external irradiation at the site? Are gamma emitting radionuclides present at the site? Is the radionuclide contamination buried or at the surface?

No

PHOTOGRAPHIC DOCUMENTATION

During the site visit(s), photographs should be taken to document the current conditions at the site and to support the information entered in the checklist. For example, photographs may be used to document the following:

- The nature, quality, and distribution of vegetation at the site
- Receptors or evidence of receptors
- Potentially important ecological features, such as ponds and drainage ditches
- Potential exposure pathways
- Any evidence of contamination or impact

The following space may be used to record photo subjects.

See Attached Photos Attachment B

SUMMARY OF OBSERVATIONS AND SITE SETTING

Include information on significant source areas and migration pathways that are likely to constitute complete exposure pathways.

Refer to Section 3 within the Risk Assessment

Checklist Completed by Scott Barnica

Affiliation Delta Environmental Consultants, Inc.

Author Assisted by Michael Henn

Date January 27, 2005

TABLE 1
EXAMPLES OF SENSITIVE ENVIRONMENTS

National Parks and National Monuments

Designated or Administratively Proposed Federal Wilderness Areas

National Preserves

National or State Wildlife Refuges

National Lakeshore Recreational Areas

Federal land designated for protection of natural ecosystems

State land designated for wildlife or game management

State designated Natural Areas

Federal or state designated Scenic or Wild River

All areas that provide or could potentially provide critical habitat[1] for state and federally listed Threatened or Endangered Species, those species that are currently petitioned for listing, and species designated by other agencies as sensitive or species of concern

All areas that provide or could potentially provide habitat for state protected species as defined in the Wildlife Code, Chapter 17 of the New Mexico Statutes

All areas that provide or could potentially provide habitat for migratory birds as protected by the Migratory Bird Treaty Act (16 U.S.C. §§ 703-712)

---

1 Critical habitats are defined by the Endangered Species Act (50 CFR §424.02(d)) as:

> 1) Specific areas within the geographical area currently occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (ii) that may require special management considerations or protection, and 2) Specific areas outside the geographical area occupied by a species at the time it is listed upon a determination by the Secretary [of Interior] that such areas are essential for the conservation of the species.

All areas that provide or could potentially provide habitat for bald eagles and golden eagles as protected by the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d)

All areas that provide or could potentially provide habitat for song birds as protected by the State of New Mexico statute (New Mexico Statute, 1978, Chapter 17, Game and Fish, 17-2-13)

All areas that provide or could potentially provide habitat for hawks, vultures and owls as protected by the State of New Mexico statute (New Mexico Statute, 1978, Chapter 17, Game and Fish, 17-2-14)

All areas that provide or could potentially provide habitat for horned toads and Bullfrogs as protected by the State of New Mexico statute (New Mexico Statute, 1978, Chapter 17, Game and Fish, 17-2-15 and 16, resp.)

All perennial waters (e.g., rivers, lakes, playas, sloughs, ponds, etc)

All ephemeral drainage (e.g., arroyos, puddles/pools, intermittent streams, etc) that provide significant wildlife habitat or that could potentially transport contaminants off site to areas that provide wildlife habitat

All riparian habitats

All perennial and ephemeral wetlands (not limited to jurisdictional wetlands)

All areas that are potentially important breeding, staging, and overwintering habitats as well as other habitats important for the survival of animals during critical periods of their life cycle.

ATTACHMENT B

ECOLOGICAL SITE EXCLUSION CRITERIA CHECKLIST AND DECISION TREE

1. NEW MEXICO ECOLOGICAL EXCLUSION CRITERIA CHECKLIST

The following questions are designed to be used in conjunction with the Ecological Exclusion Criteria Decision Tree (Figure 1). After answering each question, refer to the Decision Tree to determine the appropriate next step. In some cases, questions will be omitted as the user is directed to another section as indicated by the flow diagram in the Decision Tree. For example, if the user answers "yes" to Question 1 of Section I, he or she is directed to proceed to Section II.

I. Habitat

In the following questions, "affected property" refers to all property on which a release has occurred or is believed to have occurred, including off-site areas where contamination may have occurred or migrated.

1. Are any of the below-listed sensitive environments at, adjacent to, or in the locality of the affected property? None identified, pending response
   - National Park or National Monument
   - Designated or administratively proposed Federal Wilderness Area
   - National Preserve
   - National or State Wildlife Refuge
   - Federal or State land designated for wildlife or game management
   - State designated Natural Areas
   - All areas that are owned or used by local tribes
   - All areas that are potentially important breeding, staging, and overwintering habitats as well as other habitats important for the survival of animals during critical periods of their life cycle
   - All areas that provide or could potentially provide habitat for state and federally listed Threatened or Endangered Species, those species that are currently petitioned for listing, and species designated by other agencies as sensitive or species of concern
   - All areas that provide or could potentially provide habitat for state protected species as defined in the Wildlife Code, Chapter 17 of the New Mexico Statutes
   - All areas that provide or could potentially provide habitat for migratory birds as protected by the Migratory Bird Treaty Act (16 U.S.C. §§ 703-712)
   - All areas that provide or could potentially provide habitat for bald eagles and golden eagles as protected by the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d)
   - All areas that provide or could potentially provide habitat for song birds as protected by the state of New Mexico statute (New Mexico Statute, 1978, Chapter 17, Game and Fish, 17-2-13)

- All areas that provide or could potentially provide habitat for hawks, vultures and owls as protected by the state of New Mexico statute (New Mexico Statute, 1978, Chapter 17, Game and Fish, 17-2-14)
- All areas that provide or could potentially provide habitat for horned toads and bullfrogs as protected by the state of New Mexico statute (New Mexico Statute, 1978, Chapter 17, Game and Fish, 17-2-15 and 16, respectively)

2. Does the affected property contain land areas which were not listed in Question 1, but could be considered viable ecological habitat? The following are examples (but not a complete listing) of viable ecological habitats:

- Wooded areas
- **Shrub/scrub vegetated areas**
- Open fields (prairie)
- Other grassy areas
- Desert areas
- Any other areas which support wildlife and/or vegetation, excluding areas which support only opportunistic species (such as house mice, Norway rats, pigeons, etc.) that do not serve as prey to species in adjacent habitats.

The following features are <u>not</u> considered ecologically viable:

- Pavement
- Buildings
- Paved areas of roadways
- Paved/concrete equipment storage pads
- Paved manufacturing or process areas
- Other non-natural surface cover or structure

3. Does the affected property contain any perennial or ephemeral aquatic features which were not listed in Question 1? **No**

II. Receptors

1. Is any part of the affected property used for habitat, foraging area, or refuge by any rare, threatened, or endangered species (plant *or* animal), or otherwise protected species (e.g., raptors, migratory birds)? **None identified, pending response.**

2. Is any part of the affected property used for habitat, foraging area, or refuge by any species used as a recreational (e.g., game animals) and/or commercial resource? **Cattle, seasonal grazing.**

3. Is any part of the affected property used for habitat, foraging area, or refuge by any plant or animal species? This includes plants considered "weeds" and opportunistic insect and animal species (such as cockroaches and rats) if they are used as a food source for other species in the area. **None identified.**

III. Exposure Pathways

1. Could receptors be impacted by contaminants via direct contact?

   Is a receptor located in or using an area where it could contact contaminated air, soil, or surface water? **No**

For Questions 2 and 3, note that one must answer "yes" to all three bullets in order to be directed to the "exclusion denied" box of the decision tree. This is because answering "no" to one of the questions in the bullet list indicates that a complete exposure pathway is not present. For example, in Question 2, if the chemical cannot leach or dissolve to groundwater (bullet 1), there is no chance of ecological receptors being exposed to the chemical through contact with contaminated groundwater. Similarly, the responses to the questions in Question 4 determine whether a complete pathway exists for exposure to NAPL.

2. Could receptors contact contaminants via groundwater?
   - Can the chemical leach or dissolve to groundwater[4]? Yes
   - Can groundwater mobilize the chemical? Yes, based on recent data the plume is decreasing and stable.
   - Could (does) contaminated groundwater discharge into known or potential receptor habitats? No

3. Could receptors contact contaminants via runoff (i.e., surface water and/or suspended sediment) or erosion by water or wind?

---

4 Information on the environmental fate of specific chemicals can be found on the Internet at http://www.epa.gov/opptintr/chemfact/ or at a local library in published copies of the *Hazardous Substances Data Bank.*

- Are chemicals present in surface soils? No
- Can the chemical be leached from or eroded with surface soils? No
- Is there a receptor habitat located downgradient of the leached/eroded surface soil? No

4. Could receptors contact contaminants via migration of non-aqueous phase liquids (NAPL)?

- Is NAPL present at the site? Yes
- Is NAPL migrating toward potential receptors or habitats? No
- Could NAPL discharge impact receptors or habitats? No

Figure 1 -Ecological Exclusion Criteria Decision Tree

(Refer to corresponding checklist for the full text of each question)

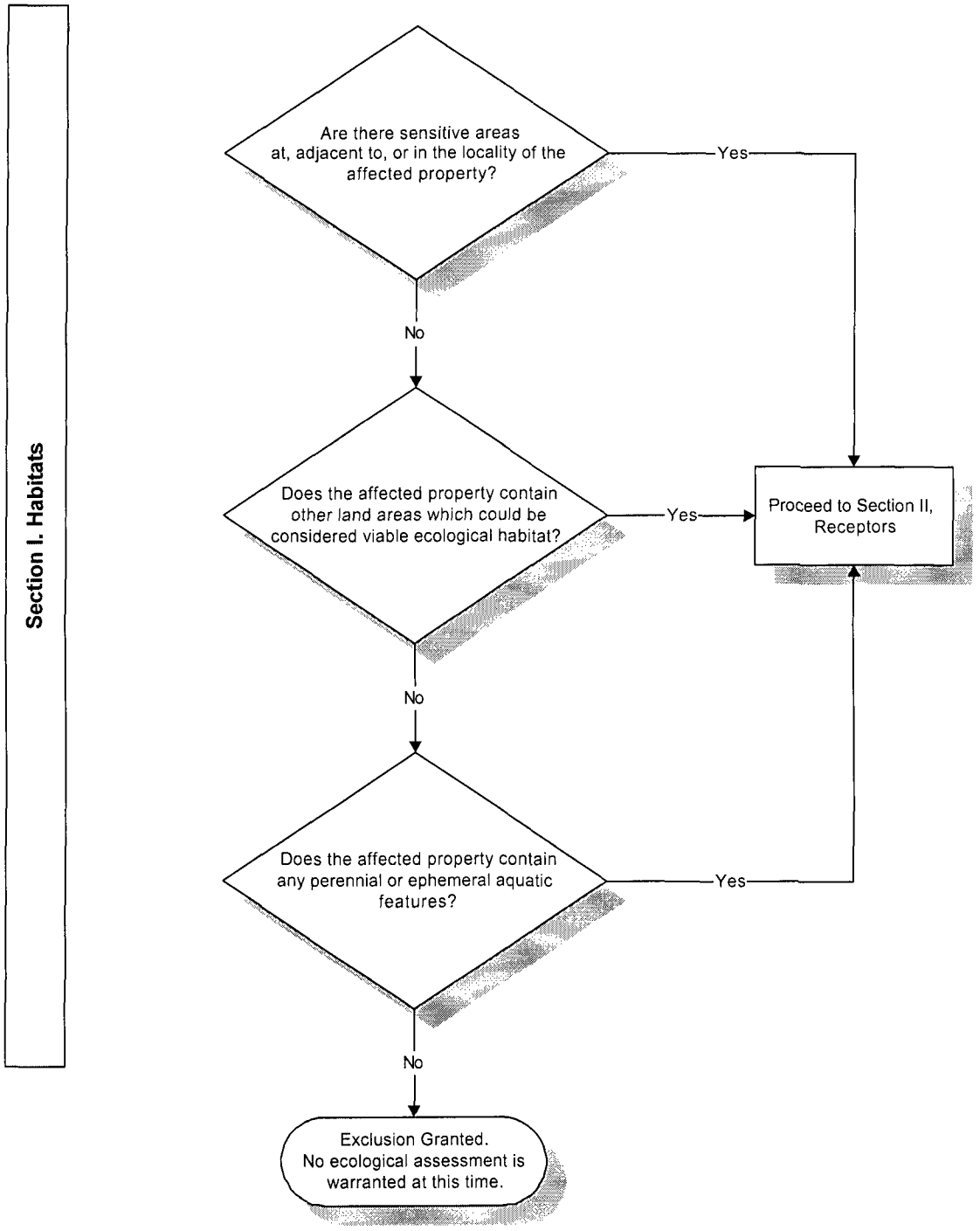


Figure 1 - Exclusion Criteria Decision Tree (continued)

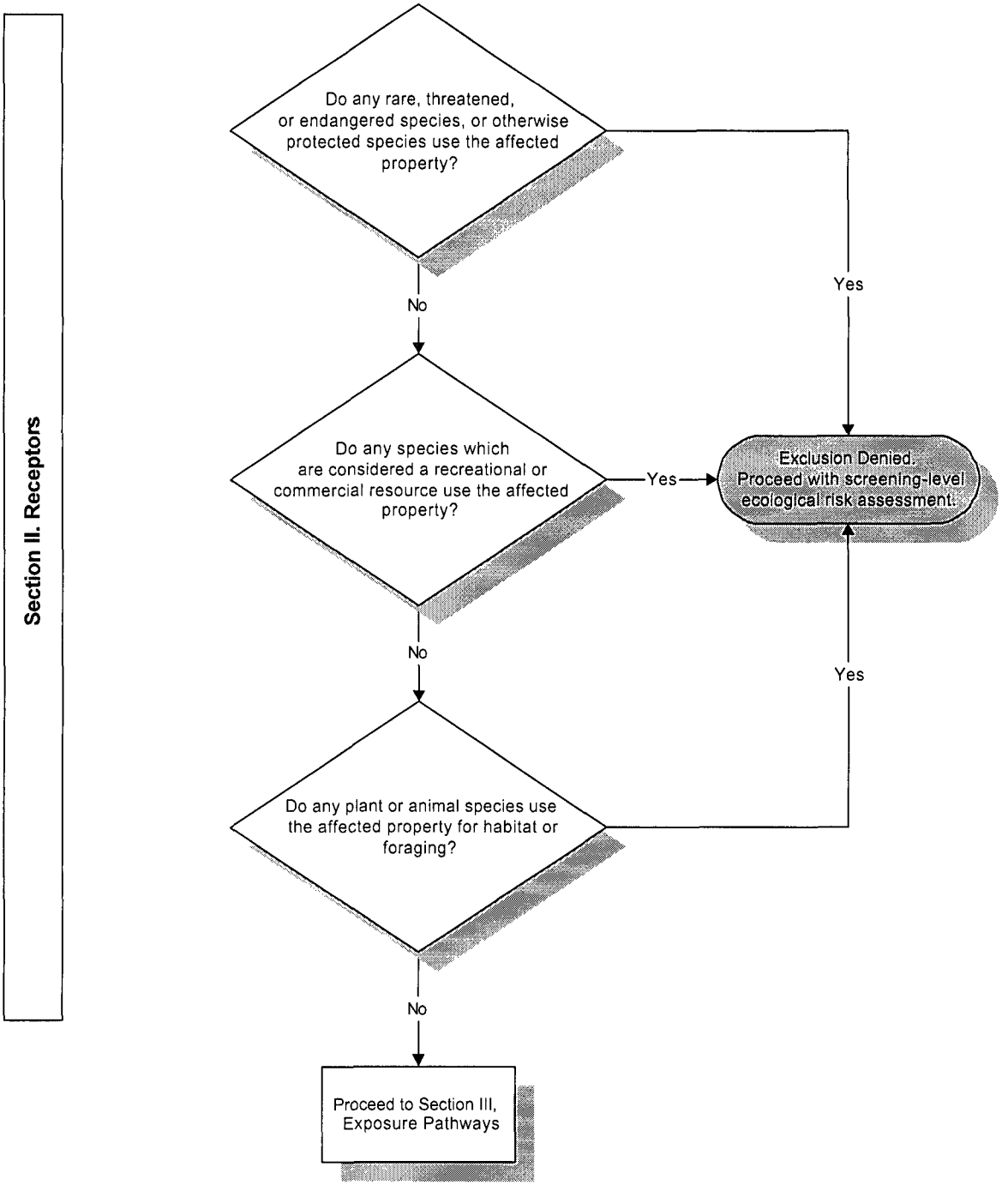


Figure 1 - Exclusion Criteria Decision Tree (continued)

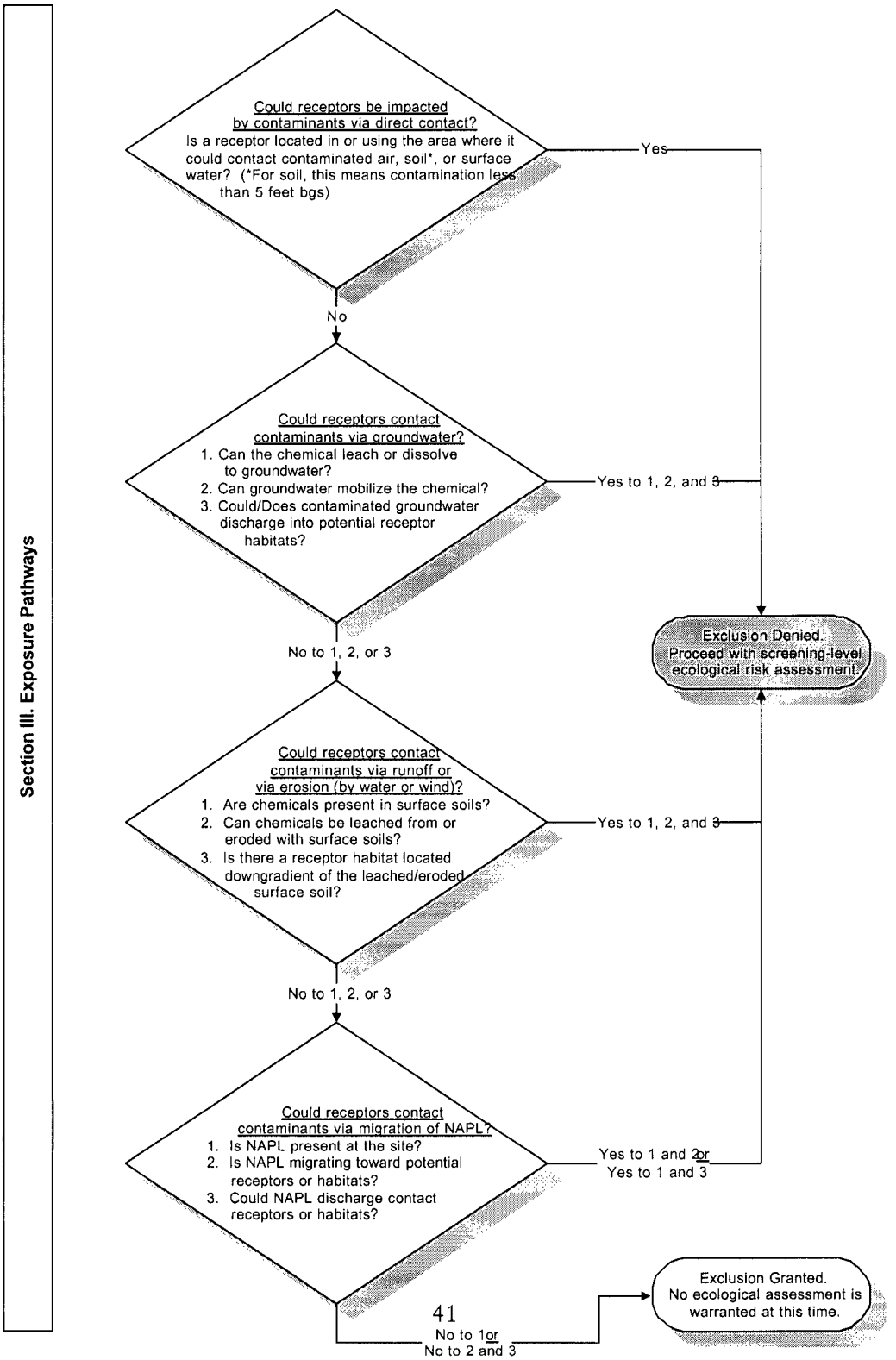


TABLE 1

SOIL ANALYTICAL DATA
BP PIPELINE - ARTESIA TANK FARM
ARTESIA, NEW MEXICO

SAMPLE	DATE	DEPTH (feet)	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYL-BENZENE (mg/kg)	XYLENES (mg/kg)	TPH (mg/kg)
MW-1	05/17/93	15-17	0.178	<0.050	<0.050	0.059	<10
MW-2	05/17/93	25-25.5 26-26.5	<0.050 <0.050	<0.050 43.310	<0.050 13.110	<0.050 122.410	14 19,300
MW-3	05/17/93	10-12.0 17-19	6.314 0.9100	46.5180 5.941	10.0310 2.379	67.6460 22.262	18,900 3,650

Notes:
1. TPH - Total Petroleum Hydrocarbons by EPA Method 418.1
2. mg/kg - milligrams per Kilogram.
3. N/A - Not Applicable

TABLES

FIGURES

APPENDIX E

Water Well Survey

APPENDIX D

Photographs of Site and Adjacent Properties

APPENDIX C

Sediment and Surface Water Analytical Results

APPENDIX B

NMED Screening-Level Ecological Risk Assessment, Scoping Assessment and Site Assessment Checklist

APPENDIX A

NMED RBDM Software Printout

APPENDICES

7.0 REFERENCES

New Mexico Energy, Minerals and Natural Resources Department – Oil Conservation Division Rulebook (§19.15.1.12 NMAC – Enforcement of Statutes and Rules), May 15, 2001.

New Mexico Environment Department, Underground Storage Tank Division Guidelines for Corrective Action (as adopted from (§20.5.12 NMAC and §20.5.13 NMAC), March 13, 2000. Specifically, Overview of the New Mexico Risk-Based Decision Making Program (Chapter 4.0)

New Mexico Water Quality Control Commission Regulations (§20.6.2 NMAC), September 15, 2002.

Surficial Geology of Southeast New Mexico, New Mexico Bureau of Mines & Mineral Resources, A Division of New Mexico Institute of Mining & Technology, 1977.

U.S. Geologic Survey, 7.5 Minute Series, Spring Lake Quadrangle (obtained from MapTech.com).

Water Well Report - Artesia, GeoSearch, Job #18619, September 14, 2004.

No private wells or public water supply wells were identified within ½-mile radius of the site.

To address the above-referenced risks and remain in accordance with §20.6.2 NMAC, monitored natural attenuation (MNA), through annual groundwater gauging and sampling, should continue as a response action to address affected groundwater at the site.

6.0 REMARKS

The recommendations contained in this report represent Delta's professional opinions based upon the currently available information and are arrived at in accordance with currently acceptable professional standards. This report is based upon a specific scope of work requested by the Client. The Contract between Delta and its Client outlines the scope of work, and only those tasks specifically authorized by that Contract or outlined in this report were performed. This report is intended only for the use of Delta's Client and anyone else specifically listed on this report. Delta will not and cannot be liable for unauthorized reliance by any other third party. Other than as contained in this paragraph, Delta makes no express or implied warranty as to the contents of this report.

compared to risk-based screening levels for surface soil. No concentrations of COCs in the subsurface exceed the risk-based screening levels for surface soil; therefore, surface soil at the site was eliminated from further evaluation as a risk to human health and the environment. Although this pathway was eliminated, it should be understood that any construction and excavation activities conducted at the site should only be initiated following preparation and adherence to a site health and safety plan that considers dermal contact, ingestion and inhalation of hydrocarbon particulates.

Subsurface soils contain concentrations of benzene, toluene and xylenes in excess of Tier 1 soil concentrations that are protective of groundwater. Because of this, benzene, toluene, and xylenes present in soils on the site were determined to pose a potential threat to groundwater protection. Based on recent groundwater sample laboratory analytical results, COC concentrations in groundwater appear to be naturally attenuating. Therefore, it is unlikely that residual concentrations of COCs in on-site soils are leaching to groundwater. However, the areas of soil known to be affected by benzene toluene, and xylenes at concentrations greater than the Tier 1 soil concentrations that are protective of groundwater must be addressed in accordance with §20.6.2 NMAC.

Based on recent laboratory analytical data, benzene and xylenes concentrations in groundwater at the site exceed their respective NM Standards for Groundwater; and therefore, groundwater poses a potential threat to human health. Historical laboratory analytical results clearly show that the contaminant plume is stable and COC concentrations have declined over time, indicating that natural attenuation is occurring. However, the areas where groundwater is known to be affected by benzene and xylenes at concentrations greater than the NM Standards for Groundwater must be addressed in accordance with §20.6.2 NMAC.

Although no surface soil sample results exist for this project site and subsurface soils contain concentrations of benzene, toluene and xylenes in excess of Tier 1 soil concentrations that are protective of groundwater, analytical results from surface water samples collected on November 23, 2004, indicate that concentrations of COCs are below laboratory method detection limits and thus below NM Standards for Surface Water. On the basis of this information, surface water runoff was determined not to pose a risk to human health or the environment.

Analytical results from the sediment samples indicate that concentrations of COCs are below laboratory method detection limits. On the basis of this information, potential impact to sediments was determined not to pose a risk to human health or the environment.

The GCM developed for the site indicates that the site is located adjacent to an arroyo (Scoggin Draw). The GCM further indicates that Scoggin Draw (an unclassified stream segment) is a losing stream. That is, a horizontal pathway(s) does not appear to exist between known impacted monitor wells and Scoggin Draw.

No concentrations of COCs, above the laboratory method detection limits, were identified in the sediment and surface water samples collected from Scoggin Draw in November 2004. On the basis of this information, it can be concluded that impact to surface water bodies (Scoggin Draw) resulting from groundwater discharge has not occurred and is not likely to occur at the site.

No potential ecological receptors were identified during the Screening-Level Ecological Risk Assessment.

No concentrations of COCs, above the laboratory method detection limits, were identified in the sediment and surface water samples collected from Scoggin Draw in November 2004. The absence of residual impact in sediment and surface water, in addition to survey data that shows groundwater elevations are below the stream channel elevation, indicates that COCs have not migrated through sediments to impact Scoggin Draw. On the basis of this information, it can be concluded that impact to surface water bodies (Scoggin Draw) resulting from groundwater discharge is not likely to occur at the site. Therefore, the potential for terrestrial or aquatic life to be exposed to COCs in the surface water is low. Thus, the pathway of groundwater discharge to surface water was eliminated from further evaluation in this risk assessment.

4.0 ADDITIONAL EXPOSURE PATHWAYS

Based on the location of the remaining petroleum hydrocarbons in soil and groundwater, and the current and expected future land use of the site and surrounding area, the potential for terrestrial or aquatic life to be exposed to COCs in the soil and/or groundwater is not likely. Please refer to Appendix B for the completed New Mexico Environmental Department Screening-Level Ecological Risk Assessment, Scoping Assessment and Site Assessment Checklist. Based on this information, the ecological pathway has been eliminated for both current and future exposure scenarios.

A water well survey for residential and public water wells located within a ½-mile radius of the source area was conducted on September 14, 2004. No water wells were identified within a ½-mile radius of the site. Additionally, no water wells were observed during a walking receptor survey. The Water Well Survey performed by GeoSearch is included in Appendix E.

5.0 CONCLUSIONS AND RECOMMENDATIONS

A Risk Assessment of the Artesia Tank Farm site has been prepared by Delta on behalf Atlantic Richfield (A BP Affiliated Company). The risk assessment involved evaluation of risk to human health and the environment posed by residual hydrocarbon affected environmental media present at the site. Potential pathways of exposure were evaluated during this risk assessment.

Based on analysis of site geologic and environmental data, and consideration of the potential human health exposure pathways, the following conclusions were reached.

The pathway for exposure to volatile COCs via inhalation was evaluated and determined not to present a risk to human health or the environment. No concentrations of COCs exceed the risk-based screening levels for air inhalation in subsurface soil, sediments or groundwater.

The pathway for exposure to COCs by dermal contact and ingestion was evaluated. Because it is reasonable to assume that if any impacted surface soils were to exist, they would be encountered within the confines of the BP facility compound, and because this facility is surrounded with a security fence, the only pathway evaluated was that related to construction workers. Because the surface soil exposure pathway for a construction worker may extend to 15 feet bgs, subsurface soil sample results were

excess of Tier 1 soil concentrations that are protective of groundwater. Because of this, benzene, toluene, and xylenes present in soils on the site were determined to pose a potential threat to groundwater protection. Protective actions are discussed in the Section 5.0 of this report.

3.3.3 Groundwater

Because groundwater is present under the site, as confirmed by the installation of groundwater monitor wells, the groundwater ingestion pathway was evaluated. As of the 2004 annual sampling event, no PSH is present in the on-site monitor wells. Maximum concentrations of COCs detected in groundwater at the site that were in excess of their respective NM Standards for Groundwater were benzene, toluene ethylbenzene, xylenes and naphthalene. However, based on recent laboratory analytical data (3-29-04), only benzene and xylenes concentrations in groundwater exceed their respective NM Standards for Groundwater. On the basis of this information, groundwater at the site poses a potential threat to human health. Protective actions are discussed in the Section 5.0 of this report.

3.3.4 Surface Water Runoff, Sediment and Groundwater Discharges to Surface Water

The pathways for surface water runoff, sediment and groundwater discharges to surface water were evaluated.

3.3.4.1 Surface Water Runoff

Although no surface soil sample results exist for this project site, and subsurface soils contain concentrations of benzene, toluene and xylenes in excess of Tier 1 soil concentrations that are protective of groundwater, analytical results from surface water samples collected on November 23, 2004, indicate that concentrations of COCs are below laboratory method detection limits and thus below NM Standards for Surface Water. On the basis of this information, surface water runoff was eliminated from further evaluation in this risk assessment.

3.3.4.2 Sediment

On November 23, 2004, sediment samples were collected in order to determine if horizontal pathways exist between known impacted monitor wells and Scoggin Draw. The sediment samples were collected along Scoggin Draw in locations that are adjacent to MW-1, MW-9 and MW-11. Analytical results from the sediment samples indicate that concentrations of COCs are below laboratory method detection limits. On the basis of this information, sediment impact was eliminated from further evaluation in this risk assessment.

3.3.4.3 Groundwater Discharges to Surface Water

The geologic conceptual model (GCM) developed for the site indicates that the site is located adjacent to an arroyo (Scoggin Draw). The GCM further indicates that Scoggin Draw (an unclassified stream segment) is a losing stream. That is, a horizontal pathway(s) does not appear to exist between known impacted monitor wells and Scoggin Draw (See the cross section provided by Figure 5).

workers and construction workers utilizing target concentrations at POE that are set equal to WQCC Standards or equivalent. See Appendix A for the completed form provided within the NMED RBDM program software package. Land use in the site vicinity generally consists of oil field operations and undeveloped land that is reportedly utilized for seasonal cattle grazing. Land use is likely to remain unchanged in the future.

3.2.1 Air (Breathing Zone)

The POE for human breathing zone exposure pathway is located within the breathing zone (2 meters) above ground surface was evaluated. The ground surface on-site is not covered by an impervious material that could act as a barrier to the upward migration of potentially volatilizing organic compounds to the atmosphere and potentially the breathing zone. Therefore, risk in the breathing zone for air human exposure pathway was considered complete and evaluated. No buildings are located on the site.

The maximum detected concentration of each respective COC in on-site soils (subsurface, as well as sediment) was compared to the risk-based screening levels for a residential scenario (for both child and adult), for a commercial worker and for a construction worker. According to the NMED RBDM program, the pathway for inhalation via groundwater is considered to be incomplete for outdoor inhalation of vapor emissions for both residential and commercial scenarios; however, it is considered to be complete for a construction worker. No concentrations of COCs exceed the risk-based screening levels for air inhalation in subsurface soil, sediments or groundwater. Therefore, the human exposure pathway for air was eliminated from further evaluation in this risk assessment.

3.2.2 Soil (Surface Soil)

Construction activities conducted at the site could result in exposure of workers to direct contact with COCs present in the soil, additional health risks include the potential risk of inhalation and ingestion of COC affected soil particulates. Therefore, the soil to human exposure pathway was evaluated.

Although it is unlikely any residual concentrations of COCs exist in surface soils, because no surface soil sample results are available for this site, a potential threat to human health via dermal contact, inhalation and/or ingestion of surface soils exists. However, because it is reasonable to assume that if any impacted surface soils were to exist, they would be encountered within the confines of the BP facility compound, and because this facility is surrounded with a security fence, the only pathway evaluated was that related to construction workers. The surface soil exposure pathway for a construction worker may extend to 15 feet bgs; therefore, subsurface soil sample results were compared to risk-based screening levels for surface soil. Because no concentrations of COCs in the subsurface exceed the risk-based screening levels for surface soil, the human exposure pathway for surface soil was eliminated from further evaluation in this risk assessment. Although this pathway was eliminated, it should be understood that any construction and excavation activities conducted at the site should only be initiated following preparation and adherence to a site health and safety plan that considers dermal contact, ingestion and inhalation of hydrocarbon particulates.

3.2.3 Soil Leaching to Groundwater

Because COCs have been detected in on-site soils, the risk for COC migration from the soil matrix to the water table was evaluated. Subsurface soils contain concentrations of benzene, toluene and xylenes in

COC detected and Maximum Concentration	Surface Soil 0-1 feet bgs	Subsurface Soil >1 feet bgs	Groundwater	Surface Water	Sediment
Sodium	--	--	412	--	--
Sulfate	--	--	1890	--	--
Tritium	--	--	193.180+/- 58.3100 (pCi/L)	--	--
Total Dissolved Solids	--	--	6300	--	--

As discussed in §20.12 NMAC, petroleum products are composed of a large number of hydrocarbon compounds and additives whose physical and chemical properties and percent compositions in the product vary considerably. Further, the environmental behavior of the product, including mobility, persistence, and inter-media transport, as well as the adverse environmental and human health effects depend on the properties of each chemical in the product and each chemical's percent composition in the petroleum product. While evaluating sites contaminated by these products, the NMED focuses on a limited set of contaminants for which there is toxicity data, state WQCC groundwater quality standards or MCLs. These are referred to as the COCs in §20.12 NMAC and the guidance for the NMED RBDM. Thus, the site-specific COCs, listed above, that are also listed on the COC list provided in §20.6.2.3103 NMAC were evaluated for potential risk to human health and the environment for those exposure pathways determined to be complete at the Artesia project site.

3.2 EXPOSURE ASSESSMENT

An exposure assessment consists of identifying who, or what, might be exposed to COCs that may be located at or originate from a site. The following prescribed human health pathways and environmental pathways were evaluated in this risk assessment in accordance with generally accepted points of exposures (POE).

Air (breathing zone);

Soil (surface soil);

Soil leaching to groundwater (subsurface soil);

Groundwater;

Surface water runoff or groundwater discharges to surface water;

Sediment;

The exposure pathways listed above were initially considered complete or potentially complete. Each human health exposure and environmental pathway was evaluated for completeness in this risk assessment. Guidance and software provided in the NMED RBDM program was used to evaluate the complete pathways and routes of exposure for children and adults in a residential setting, commercial

- As yet unpublished surface water and sediment analytical data collected during sampling activities undertaken by Delta Environmental Consultants, Inc. in November 2004.

3.1 CHEMICALS OF CONCERN EVALUATED

After review of available laboratory data associated with the above-referenced reports, the following maximum concentrations of COCs were detected in soil, groundwater, surface water and/or sediments at the site.

COC detected and Maximum Concentration	Surface Soil 0-1 feet bgs	Subsurface Soil >1 feet bgs	Groundwater	Surface Water	Sediment
	mg/kg	mg/kg	mg/L	µg/L	mg/kg
Benzene	--	1.7	7.9	<0.000140	<0.00920
Toluene	--	12	4.5	<0.000110	<0.00880
Ethylbenzene	--	15	1.2	<0.000138	<0.0100
Total Xylenes	--	41	4.4	<0.000177	<0.0100
Total TPH	--	--		--	--
Butylbenzene, n-	--	--	0.025	--	--
Chrysene	--	0.0040	--	--	--
Fluorene	--	0.054	--	--	--
Isopropylbenzene	--	--	0.070	--	--
Methylnaphthalene, 1-	--	4.8	0.018	--	--
Methylnaphthalene, 2-	--	4.4	0.024	--	--
Naphthalene	--	0.12	0.067	--	--
Phenanthrene	--	0.94	0.0009	--	--
Propylbenzene, n-	--	--	0.091	--	--
Trimethylbenzene, 1,2,4-	--	--	1.1	--	--
Trimethylbenzene, 1,3,5-	--	--	0.46	--	--
Arsenic	--	--	0.14	--	--
Barium	--	--	0.025	--	--
Boron	--	--	0.94	--	--
Calcium	--	--	686	--	--
Chloride	--	--	1300	--	--
Chromium	--	--	0.065	--	--
Fluoride	--	--	0.84	--	--
Magnesium	--	--	208	--	--
Nitrate	--	--	7.22	--	--
Potassium	--	--	13.3	--	--

MW-1, MW-9, and MW-11. The samples were analyzed for BTEX utilizing EPA Method 8021B. Figure 2 depicts the location of the sediment and surface water samples. Sediment and surface water analytical data are presented in Table 6 and Table 7, respectively, and the laboratory analytical reports are included in Appendix C.

A summary of historical groundwater elevation data is presented in Table 1. According to the March 29, 2004 data, groundwater flows to the south-southwest, which is consistent with previous data and reported groundwater flow directions. Figure 3 depicts the depths to groundwater data obtained during the March 29, 2004 gauging event.

Monitor wells MW-11 and MW-14 have consistently exhibited dissolved BTEX concentrations below laboratory method detection limits. Monitor wells MW-1, MW-2A, MW-3A, MW-5, MW-8, MW-9, and MW-10 recently exhibited dissolved benzene concentrations that ranged from 0.0085 mg/l in MW-5 to 1.30 mg/L in MW-1. No free-phase hydrocarbons were observed in the groundwater monitor wells during the 2004 annual sampling event. The historical results indicate that concentrations of crude oil constituents present in the groundwater at the site are decreasing. This indicates that natural attenuation is occurring. Historical groundwater analytical data are presented in Tables 3,4 and 5. Figure 4 depicts a dissolved-phase concentration map based on the March 29, 2004 sampling event.

3.0 RISK ASSESSMENT

The goal of this risk assessment is to determine the cumulative risk and hazard to potentially exposed populations through complete or potentially complete routes of exposure. Because the OCD does not currently have a risk-based decision making program (RBDM), this risk assessment is generally consistent with the RBDM program that has been adopted by the New Mexico Environmental Department (NMED) for managing petroleum releases at underground storage tank (UST) sites. The NMED RBDM program is generally consistent with ASTM's standard entitled *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites*. The NMED RBDM framework was developed within the existing statutes and regulations of the New Mexico Water Quality Control Commission (WQCC), and is consistent with the OCD's and the NMED's overall objectives of protecting public health, safety and welfare, and the environment and the natural resources of the state for present and future use.

This risk assessment report incorporates analytical data and site-specific geologic data obtained from the following sources:

- Subsurface Investigation – Artesia Pumping Station, Artesia, New Mexico, Mittelhauser Corporation, October 1993.
- 2002 Seventh Annual Report, Bascor Environmental, Inc., May 23, 2002.
- Duke Energy Trench Investigation – Supplemental Report, Bascor Environmental, Inc., March 14, 2003.
- Monitoring Report 2002-2003, Delta Environmental Consultants, Inc., September 26, 2003.
- 2004 Annual Monitoring Report, Delta Environmental Consultants, Inc., August 27, 2004.

In August 1993, twenty three soil borings were advanced by Mittelhauser Corporation (MC). The borings ranged in depth from 20.0 to 66.5 feet bgs. Continuous coring of the gypsum that was encountered was reportedly not possible and thus representative soil samples were not collected. A total of four monitor wells (MW-4, MW-5, MW-6 and MW-7) were installed. Groundwater samples were collected from MW-4, MW-5 and MW-7 and analyzed for benzene, toluene, ethylbenzene and xylenes (BTEX) using EPA Method 8020 and polynuclear aromatics (PNAs) by EPA Method 8270. Laboratory analytical results are presented in Tables 3, 4 and 5. MC concluded that impacts from phase-separated hydrocarbons (PSH) were identified from the BP facility extending approximately 1,700 feet down Scoggin Draw. This information was presented in the "Subsurface Investigation – Artesia Pumping Station – Artesia, New Mexico" dated October 1993.

BP installed an interception trench and a groundwater separation/air stripper remediation system in November 1994, to control and remediate the PSH and dissolved-phase hydrocarbons associated with the release. Additionally, seven additional monitor wells (MW-8 through MW-14) were installed along Scoggin Draw to evaluate the extent of groundwater impact. The system operated from that time until early 1997, when a request was made to and granted by the OCD to discontinue operation. The system was dismantled in the fall of 1998. Quarterly reporting had been submitted to the OCD throughout operation of the remediation system.

Subsequent to the groundwater sampling event in April 1997, the on-site monitor wells have been monitored and sampled on an annual basis.

In September 2001, three additional (replacement) wells (MW-2A, MW-3A and MW3B) were installed at locations depicted on Figure 2. These wells were installed to verify PSH/dissolved-phase concentrations in the vicinity of MW-2 and MW-3, as well as confirm correct installation of well screen since no well construction logs are available for MW-2 and MW-3. On October 10, 2001, all of the on-site wells were analyzed for TPH using EPA Method 418.1. MW-2A, MW-3A and MW3B were also analyzed for volatile organic compounds using EPA Method 8260B and RCRA Metals using EPA Method 6010B and polyaromatic hydrocarbons (PAHs) using EPA Method SW8310. Laboratory analytical results are presented in Tables 3, 4 and 5.

On December 16 2002, subsequent to a release from one of Duke Energy (Duke) pipelines in the site area, Bascor Environmental advanced 4 soil borings around the trench that Duke installed to clean up the release. The boring locations are depicted on Figure 2. Soil samples were collected and analyzed for TPH using EPA Method 418.1, BTEX using EPA Method 8021 and PAHs using EPA Method SW8310. Laboratory analytical results are presented in Tables 3, 4 and 5 It was determined that a petroleum hydrocarbon impact to the shallow soils near the Duke trench area is present. The presence of petroleum hydrocarbons was anticipated and is consistent with the historic impact from the original crude oil release.

Per OCD approval, five monitor wells (MW-4, MW-6, MW-7, MW-12, and MW-13) were plugged and abandoned at the site on June 19, 2003.

On November 23, 2004, surface water and sediment samples were collected in order to determine if horizontal pathways exist between known impacted monitor wells and Scoggin Draw. The sediment samples were collected along Scoggin Draw in locations that are adjacent to MW-1, MW-9 and MW-11. The surface water samples were collected from the centroid of flow from Scoggin Draw adjacent to

located approximately 3.8 miles to the south.

2.2.1 Site Geology/Hydrogeology

The site is located within the Pecos River Valley drainage basin. The subsurface geology in the immediate area of the site consists primarily of gypsum from the Yates Formation of the middle Permian Age. Layers of silts, clays, and limestone are interbedded in the gypsum.

The surficial geology consists of floodplain and channel alluvium deposits along generally dry arroyos and washes. Most surficial deposits are formed from various sized particles of weathered bedrock that have been transported by water, wind, ice, or gravity to an area of deposition. The deposits are susceptible to erosion and transportation. These deposits are much younger than, and unrelated to the underlying bedrock. The soils consist of mostly sand, silt, and some layers of gravel. Topographic gradients in the area range from 5 to 15 percent. Arroyos 10 feet deep are common, and surrounding surfaces are commonly flat where deposits are formed by overflowing streams. Well-stratified sandy and silty stream deposits with gravel lenses and gravel terraces along valley sides are present.

Gypsiferous sand is also present within eastern portions of the Pecos Valley. In alluvial fans, unlike floodplain alluvium, beds tend to be thick, massive, and highly lenticular rather than well stratified. This is characteristic of all the facies, whether boulders, gravel, sand, or silt. The lenticular beds elongate down the slope of the fans, which slope from 2 to 20 percent. Deposition mostly occurs during flash floods, with poor sorting and mixed textures. Coarse-textured lenses commonly form ridges extending down the fan onto generally fine-grained sediment. Boundaries between the textural facies of the deposits roughly parallel the fan contour, but detailed boundaries are irregularly lobate. Fan textures and slopes depend partly on composition of the parent material and partly on the height and steepness of the bordering landforms. These areas are subject to sheet flooding.

A shallow intermittent water-bearing zone, which appears to be a perched zone, underlies the site. This intermittent zone appears to be encountered along bedding planes and is coincident to a fractured zone of the underlying gypsum. A second water-bearing zone consisting of silty sand appears to underlie the gypsum. The apparent groundwater gradient is towards the south-southwest following the direction of Scoggin Draw. The north/south trending Scoggin Draw, which is located east-adjacent to the BP facility, is listed as an unclassified intermittent stream and meanders in a southwest direction towards Chalk Bluff Draw. Chalk Bluff Draw, which is listed as an intermittent stream, meanders in a western direction towards the Pecos River, which is located approximately 3.75 miles west-southwest of the site. The Pecos River is classified for irrigation, limited warm water fishery, livestock watering, wildlife habitat, and secondary contact. The Scoggin Draw stream channel, in the site vicinity, generally has a width that ranges from 1 to 15 feet and a depth that ranges from grade to five feet below grade surface (bgs).

2.3 PREVIOUS INVESTIGATIONS

In March 1993, a release of crude oil was discovered at the BP tank farm. The release originated near the northern berm area, which had a breach that allowed crude oil to flow towards Scoggin Draw. An initial investigation was reportedly conducted by CURA, Inc. in May of 1993. Four borings were advanced during this investigation, three of which were converted to groundwater monitor wells (MW-1, MW-2 and MW-3). No boring logs are available for these wells.

RISK ASSESSMENT REPORT

BP Pipelines - Artesia Tank Farm
Artesia, Eddy County, Texas
Delta Project No. F002-007

1.0 INTRODUCTION

On behalf of Atlantic Richfield (A BP Affiliated Company), Delta Environmental Consultants, Inc. (Delta) is pleased to submit this risk assessment (RA) associated with the above-referenced project site.

The purpose of this risk assessment is to evaluate the risk to human health and the environment due to the presence of chemicals of concern (COCs) in soil and groundwater at the site. In March 1993, a release of crude oil occurred at BP's tank farm, which is located approximately 12 miles southeast of Artesia, New Mexico. The release overfilled the berm and flowed approximately 4,000 feet down the adjacent arroyo (Scoggin Draw).

The New Mexico Energy, Minerals and Natural Resources Department, Oil Conservation Division (OCD) has regulatory jurisdiction over the site. Where applicable, cleanup standards, as presented in §20.6.2.3103 New Mexico Administrative Code (NMAC) were used to assess potential risks to human health and environment posed by COCs present in environmental media at the site.

2.0 SITE HISTORY

2.1 SITE LOCATION

The subject property is located in the Empire Oil field, approximately 12 miles southeast of Artesia, Eddy County, New Mexico. It is located approximately ½mile south of Eddy County Road 227 (Lat. - 32°45'30" N, Long. - 104°16'10" W). A site vicinity map is included as Figure 1. Land use in the vicinity of the site consists generally of oil field operations and undeveloped land. Photographs of the subject property and adjacent properties are included in Appendix D.

2.2 SITE DESCRIPTION

The approximate 5-acre BP compound is utilized as a crude oil pipeline pumping/storage station. Three utility buildings are located in the northeast area of the site. An active 30,000 barrel (bbl) crude oil storage tank is located in the southeast corner of the site. The tank is surrounded by an earthen berm with associated pipeline manifolds, piping, and booster/transfer pumps and flow equipment. A second bermed area is located immediately north of the tank berm. The operational equipment listed above is surrounded by a barbed-wire security fence.

Land use of the surrounding properties generally consists of oil field operations and undeveloped land that is reportedly utilized for seasonal cattle grazing. The property that the BP facility occupies, as well as the immediately surrounding area, is owned by the State of New Mexico. The nearest residence is

TABLE OF CONTENTS

APPENDICES

TABLE OF CONTENTS

FIGURES

TABLES

RISK ASSESSMENT REPORT
BP Pipelines – Artesia Tank Farm
Artesia, Eddy County, New Mexico
Delta Project No. G04Q4-PP5NT

May 12, 2005

Prepared for:
Atlantic Richfield Company
(A BP Affiliated Company)
501 Westlake Park Blvd.
Houston, Texas 77079

Michael Henn
Project Manager

Mark T. Smith, P.G.
Senior Specialist

Delta Environmental Consultants, Inc.
2833 Trinity Square, Suite 149, Carrollton, Texas 75006
972-416-7171

May 12, 2005

Jack Ford
New Mexico Oil Conservation Division
1220 South Francis Drive
Santa Fe, New Mexico 87505

Subject: **Risk Assessment Report**
BP Pipelines (North America), Inc.
Artesia Tank Farm
Approximately 12 Miles Southeast of Artesia
Artesia, Eddy County, New Mexico
Delta Project No. G04Q4-PP5NT

Dear Mr. Ford:

On behalf of Atlantic Richfield (A BP Affiliated Company), Delta Environmental Consultants, Inc. (Delta) is pleased to submit the attached Risk Assessment Report associated with the above-referenced project site for your review and comment.

Please contact Michael Henn at (972) 416-7171 if you have any questions or need additional information.

Sincerely,

DELTA ENVIRONMENTAL CONSULTANTS, INC.

Michael Henn
Project Manager

Mark T. Smith, P.G.
Senior Specialist

cc: Mike Whelan – Atlantic Richfield Company
Jim Lutter (BP – Levelland)

Water Well Report Research Mapping Protocol

The GeoSearch Water Well Report is prepared from the existing state water well databases maintained by the office of the New Mexico State Engineer's W.A.T.E.R.S. (Water Administration Technical Engineering Resource System) Project. This well information comes from permitted wells in New Mexico and various other sources including but not limited to the USGS. Actual water well site locations of this report are geocoded and geoplotted directly from the longitude and latitude submitted from the licensed water well driller for each well. This information is maintained by the New Mexico State Engineer's Office. When driller's logs are requested GeoSearch only provides printouts of forms (ex. Application for Permits, Declaration of Owner of Underground Water Rights, etc.) GeoSearch does not provide additional information including correspondence and receipts, unless specifically requested by client.

Disclaimer

GeoSearch has performed a thorough and diligent search of all wells recorded with the New Mexico State Engineer's Office and United States Geological Survey, (USGS). All mapped locations are based on information obtained from the New Mexico State Engineer's Office and USGS. Although GeoSearch performs quality assurance and quality control on all research projects, we recognize that any inaccuracies of the records and mapped well locations could possibly be traced to the regulatory authority or the water well driller. Many water well schedules may have never been submitted to the regulatory authority by the water well driller and, thus may explain the possible unaccountability of private drilled wells. It is uncertain if the above listing provides 100% of the existing well locations within the area of review. Therefore, GeoSearch cannot guarantee the accuracy of the data or well location(s) of those maps and records maintained by New Mexico's regulatory authorities.

510 S. CONGRESS AVE. SUITE 103 • AUSTIN, TEXAS 78704 • 888.396.0042 • TEL. 512.472.9966 • FAX 512.472.9967
WWW.GEO-SEARCH.NET

GeoSearch

DATABASE FINDINGS SUMMARY

DATABASE	ACRONYM	LOCA-TABLE	UNLOCA-TABLE	SEARCH RADIUS
STATE				
WATER WELL DATABASE	WATERWELL	0	0	1.000 mi

GeoSearch

2705 Bee Caves Rd, Suite 330 · Austin, Texas 78746 · phone: 1-866-396-0042 · fax: 512-472-9967

WATERWELL REPORT

Property:

Artesia
Artesia, NM
Project # F002-007

Prepared For:

Delta Environmental Consultants - Plano

Job #: 18619 / Date: 09/14/04

2705 Bee Caves Rd, Suite 330 · Austin, Texas 78746 · phone: 1-866-396-0042 · fax: 512-472-9967
www.geo-search.net

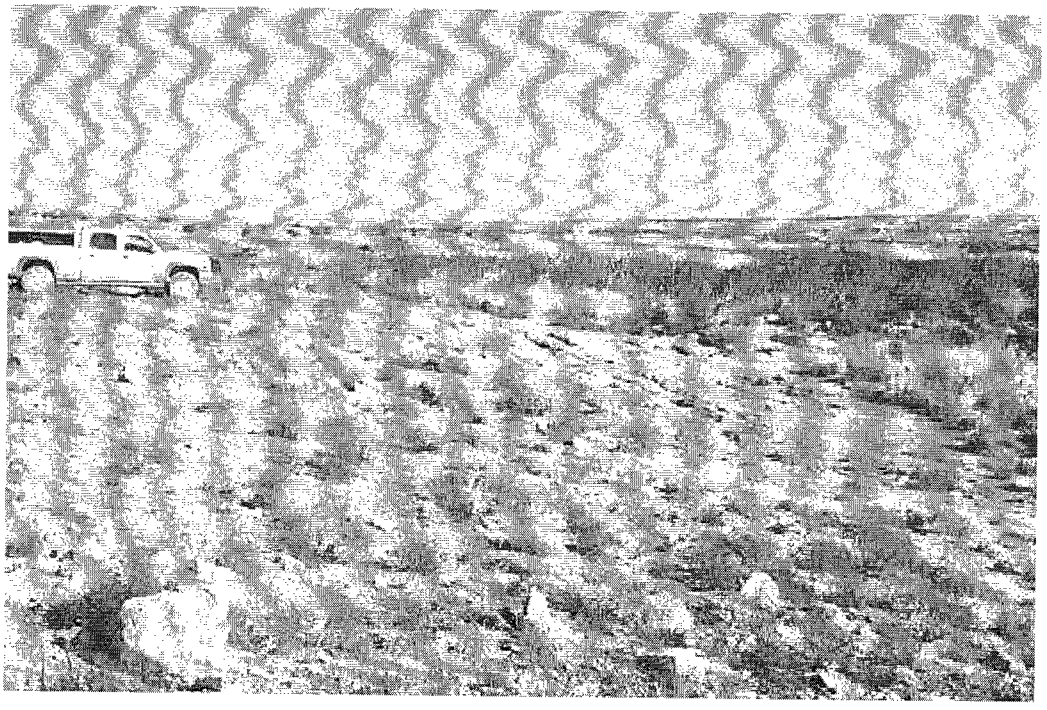


PHOTO #1: View of subject property looking north along Scoggin Draw.

PHOTO #2: View of subject property looking south. Scoggin Draw in foreground. West adjacent properties visible in background.

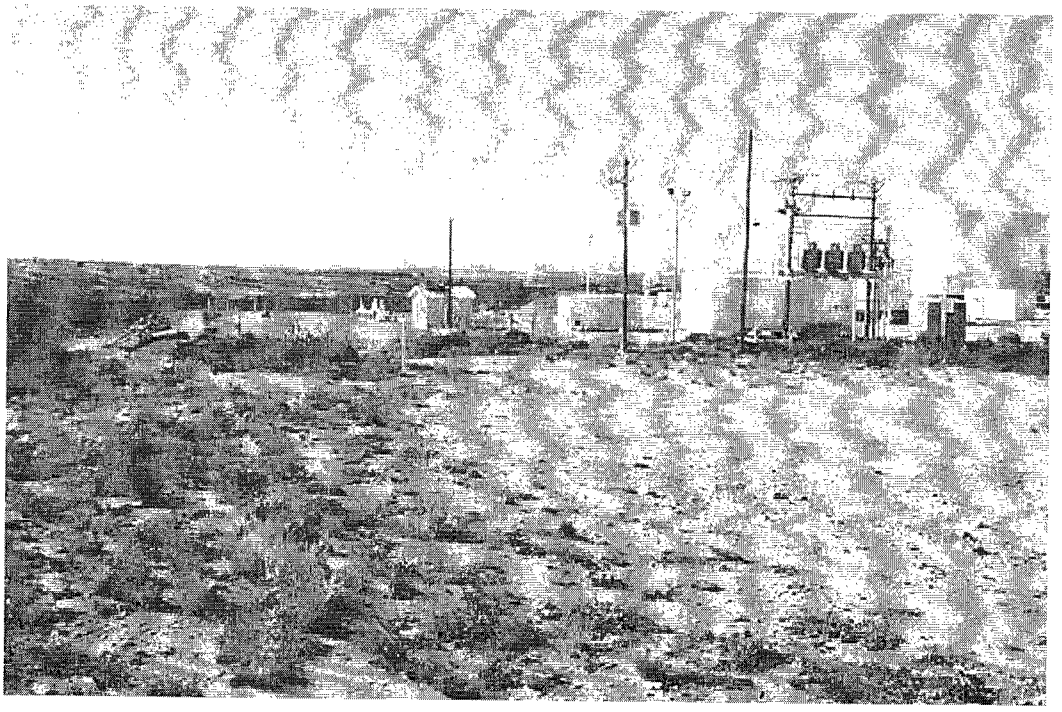


PHOTO #3: View of subject property looking south. Tank farm in foreground.

PHOTO #4: View of subject property looking southwest. Scoggin Draw in foreground. West adjacent properties visible in background.

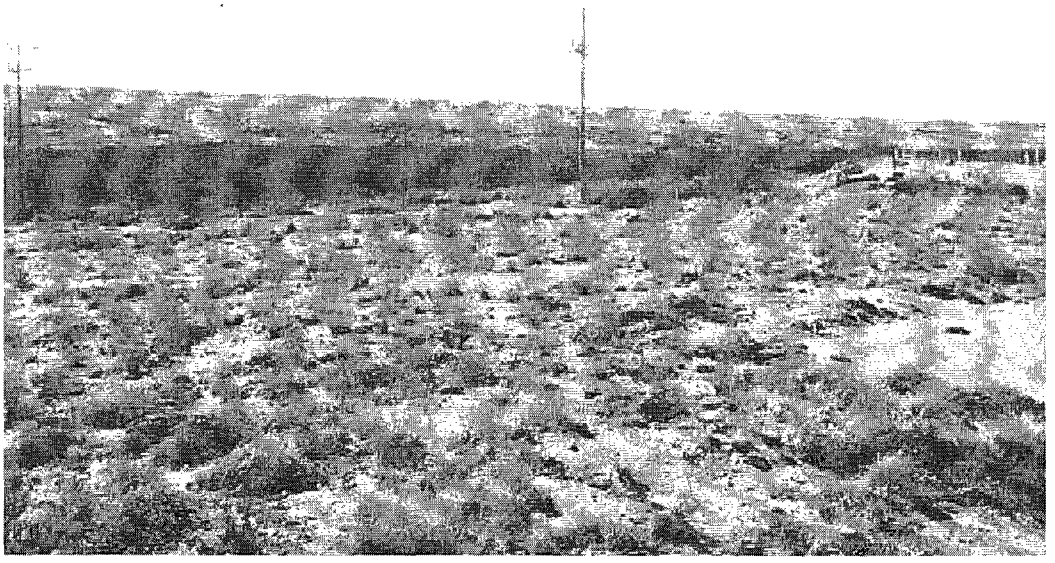


PHOTO #5: View of subject property looking southeast. East adjacent property in background.

PHOTO #6: View of subject property looking west. Scoggin Draw in foreground.

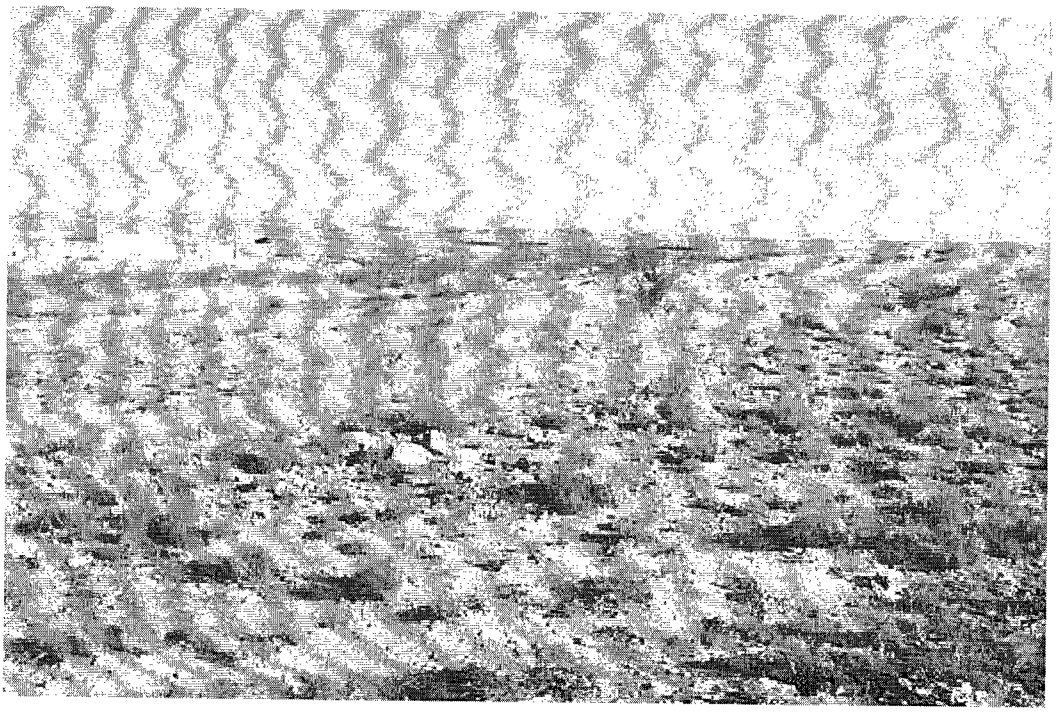


PHOTO #7: View of north and east adjacent properties looking north from MW-7. Note tank farm.

PHOTO #8: Sediment and surface water sample location (SS-1 and SW-1). Adjacent to MW-11.

PHOTO #9: Sediment sample location (SS-2). Adjacent to MW-9.

PHOTO #10: Surface water sample location (SW-2). Adjacent to MW-9.

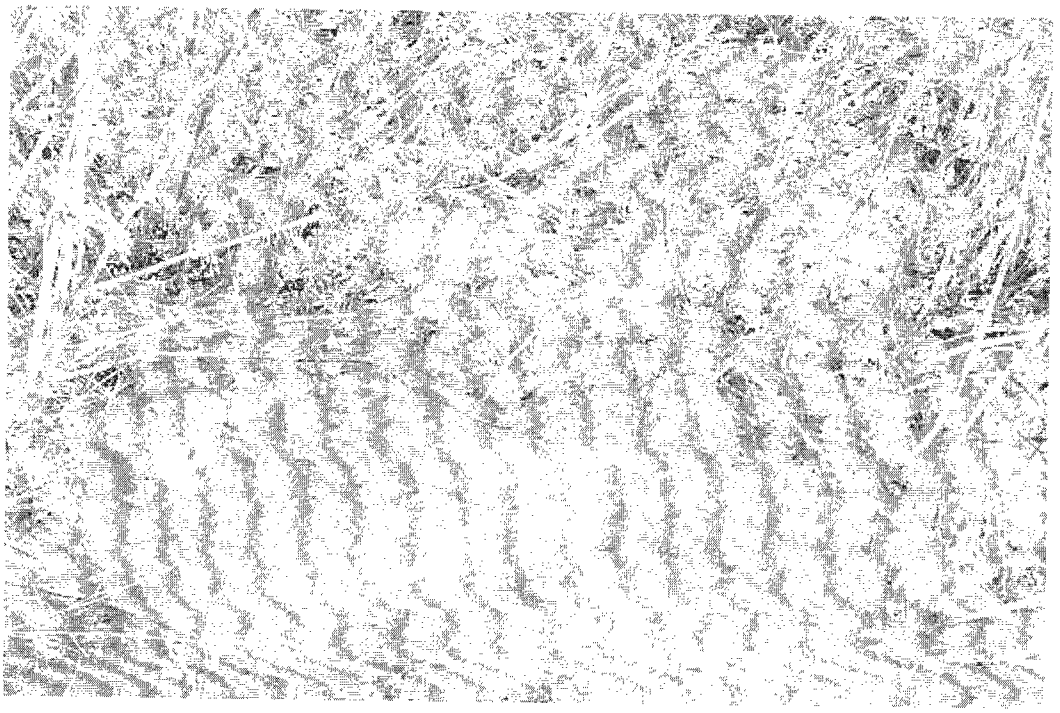


PHOTO #11: Sediment sample location (SS-3). Adjacent to MW-1.

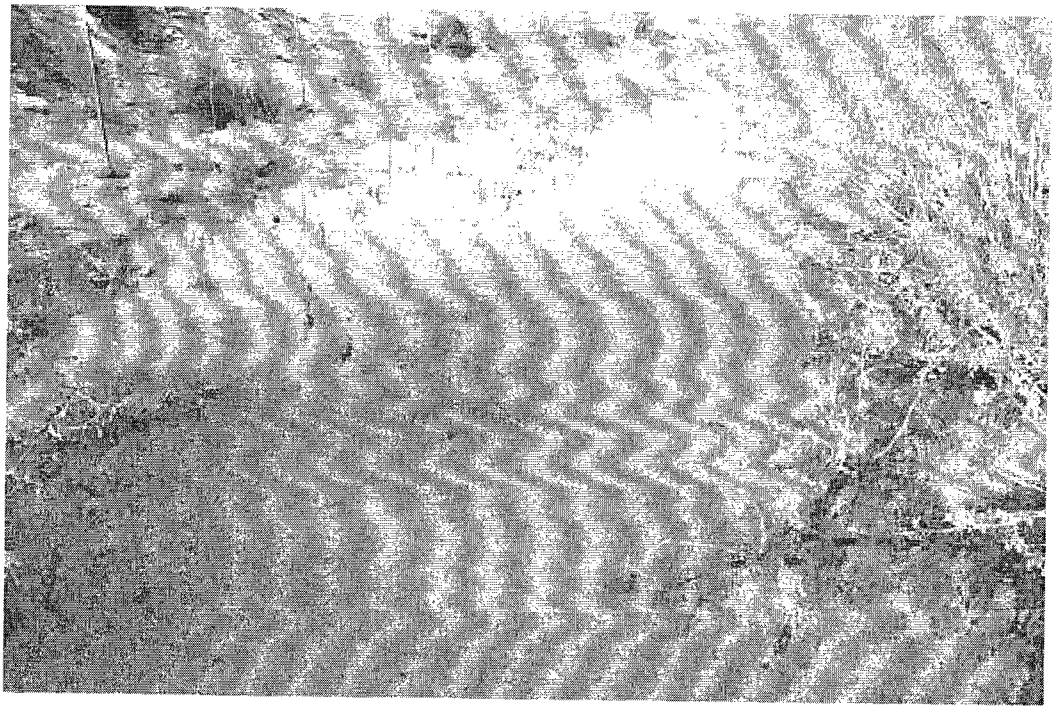


PHOTO #12: Surface water sample location (SW-3). Adjacent to MW-1.

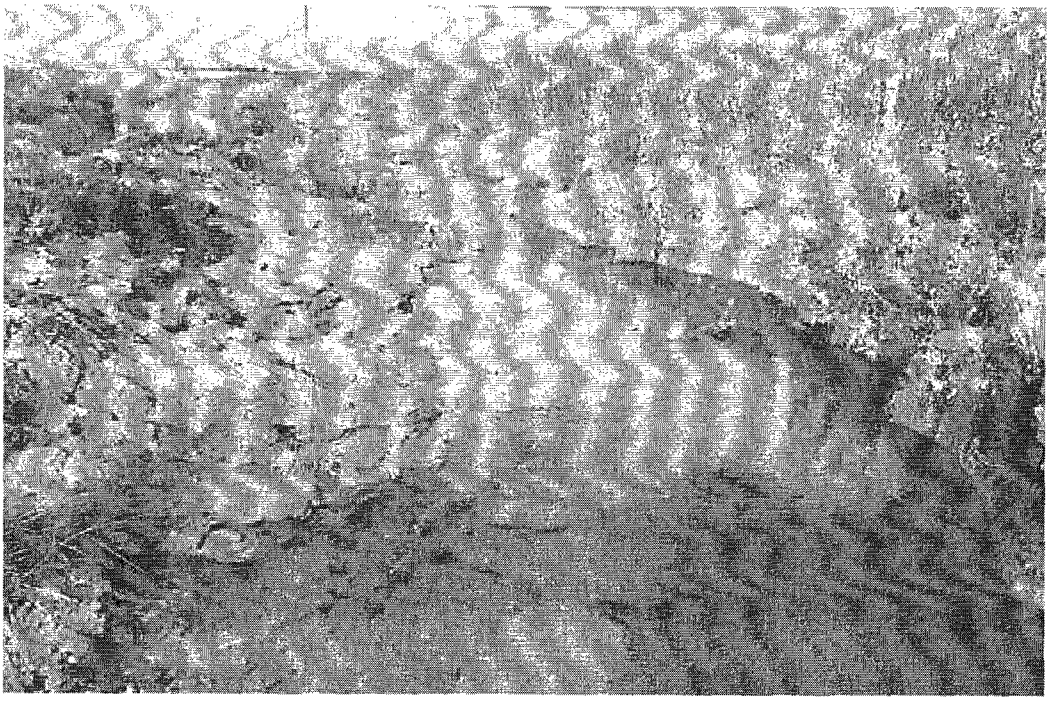


PHOTO #13: View of Scoggin Draw creek bed. Photograph looking north adjacent to MW-9.

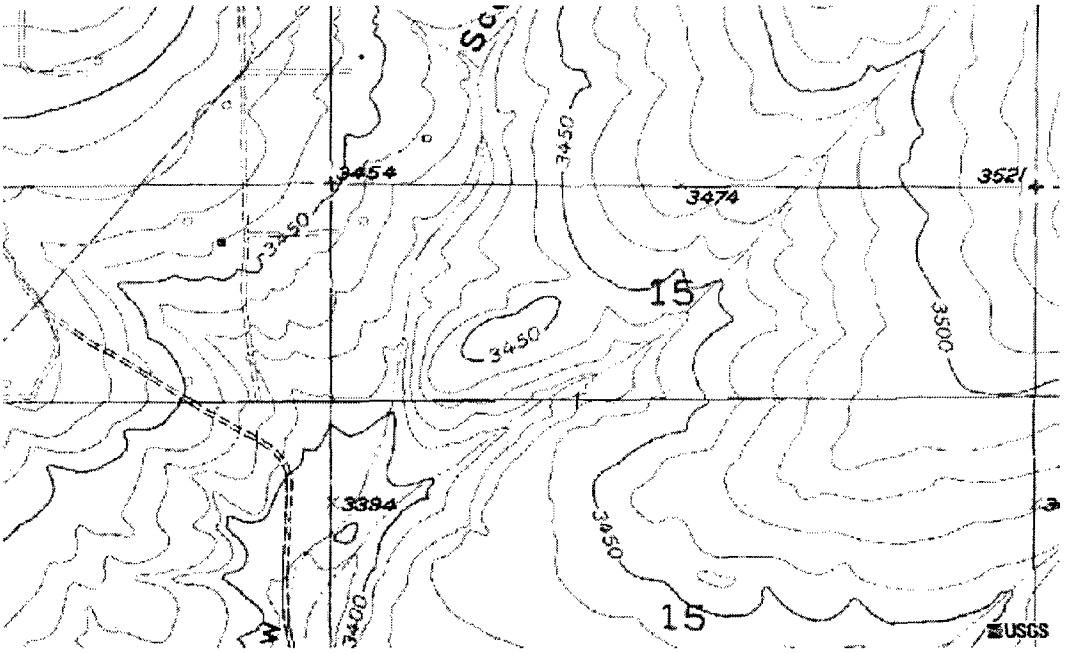


FIGURE 1 - SITE VICINITY MAP

ARTESIA TANK FARM
BP PIPELINE COMPANY
ARTESIA, NEW MEXICO

PROJECT NO: F002-007
DATE: 11/17/04
SCALE: 1:48,000

Delta
Environmental
Consultants, Inc.
2833 Trinity Square, Suite 149
Carrollton, Texas 75006

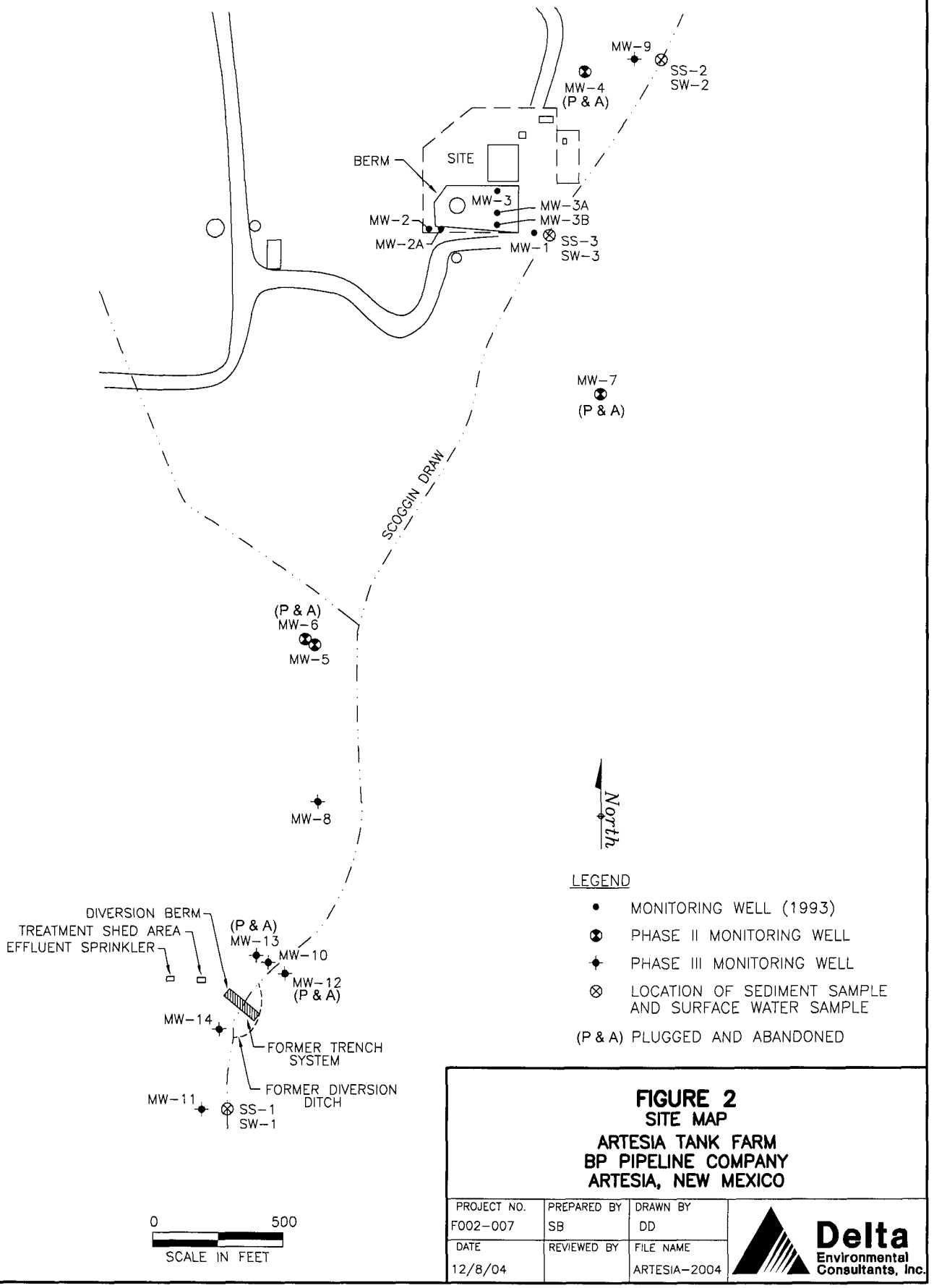


FIGURE 2
SITE MAP
ARTESIA TANK FARM
BP PIPELINE COMPANY
ARTESIA, NEW MEXICO

PROJECT NO.	PREPARED BY	DRAWN BY	
F002-007	SB	DD	
DATE	REVIEWED BY	FILE NAME	
12/8/04		ARTESIA-2004	

Delta Environmental Consultants, Inc.

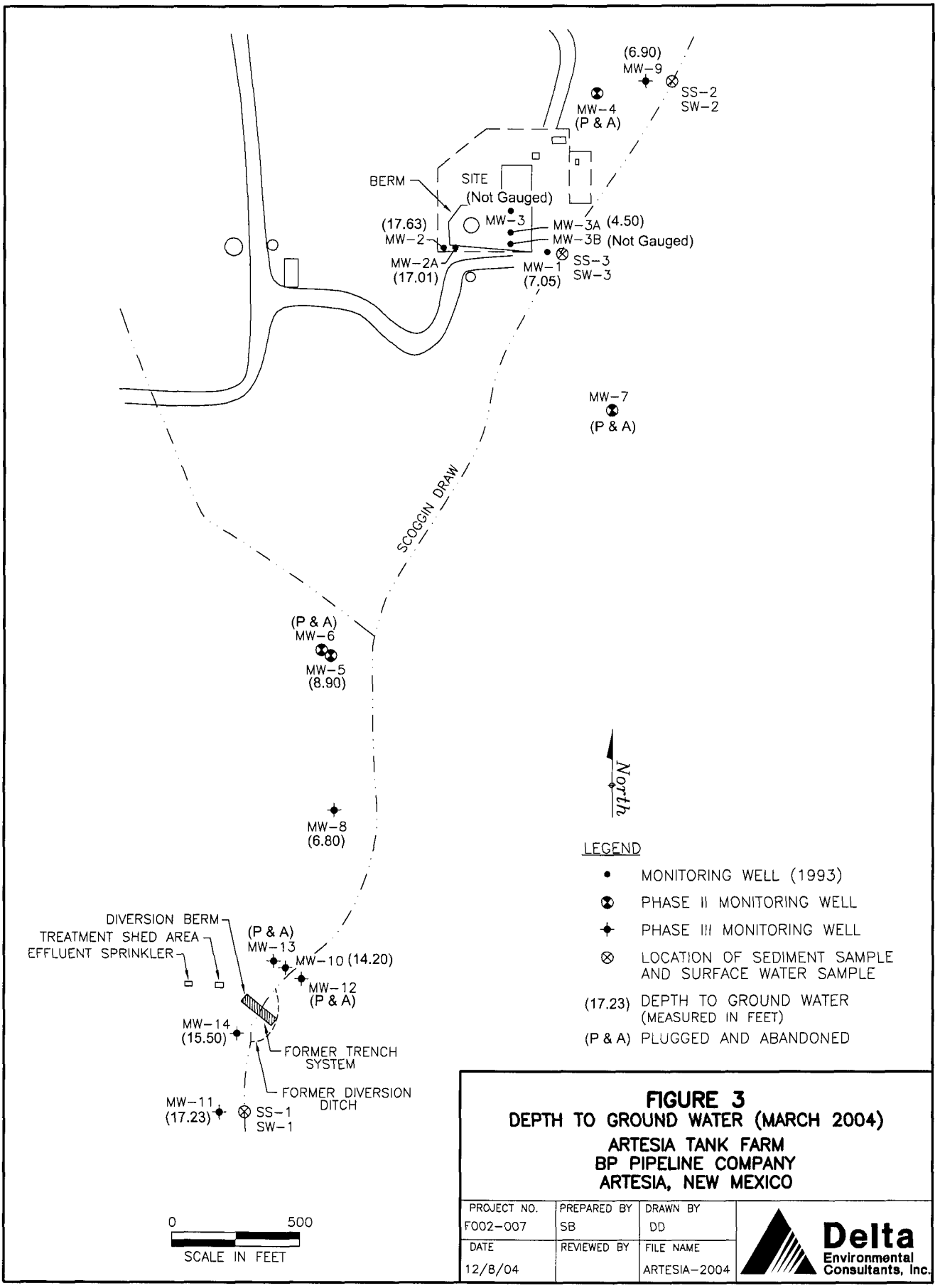


FIGURE 3
DEPTH TO GROUND WATER (MARCH 2004)
ARTESIA TANK FARM
BP PIPELINE COMPANY
ARTESIA, NEW MEXICO

PROJECT NO.	PREPARED BY	DRAWN BY
F002-007	SB	DD
DATE	REVIEWED BY	FILE NAME
12/8/04		ARTESIA-2004

Delta Environmental Consultants, Inc.

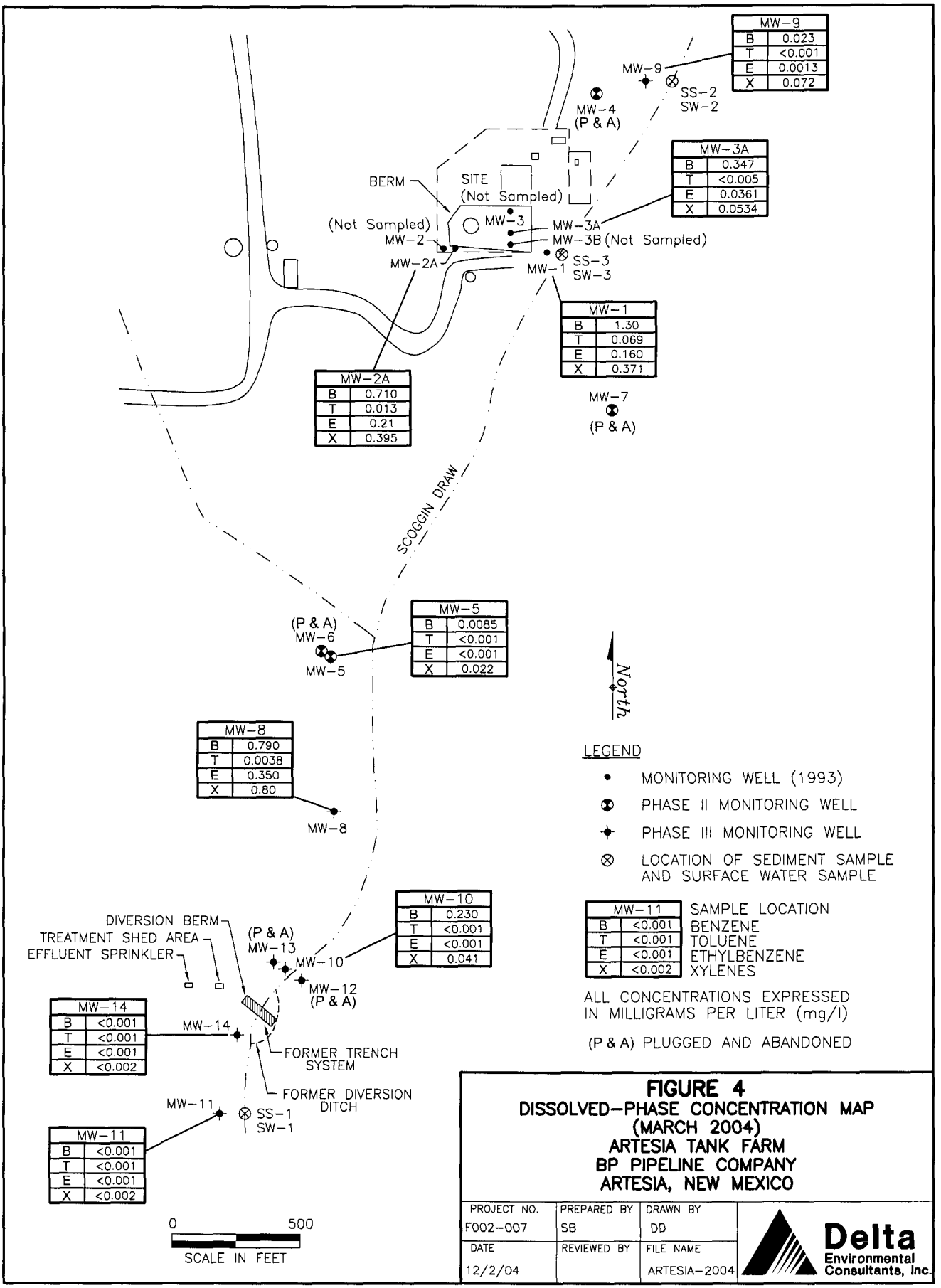
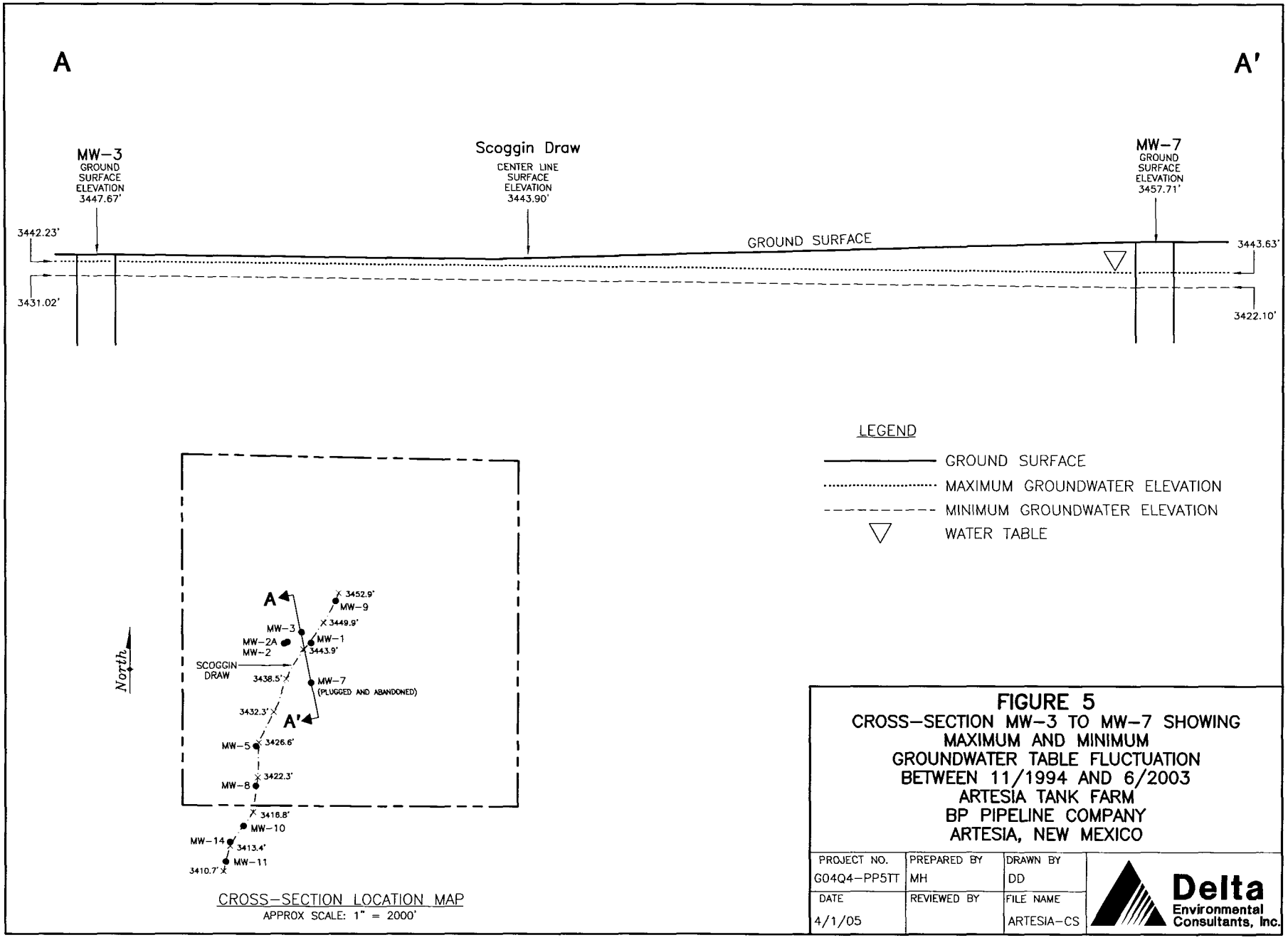


FIGURE 4
DISSOLVED-PHASE CONCENTRATION MAP (MARCH 2004)
ARTESIA TANK FARM
BP PIPELINE COMPANY
ARTESIA, NEW MEXICO

PROJECT NO.	PREPARED BY	DRAWN BY
F002-007	SB	DD
DATE	REVIEWED BY	FILE NAME
12/2/04		ARTESIA-2004

Delta Environmental Consultants, Inc.



CROSS-SECTION LOCATION MAP
APPROX SCALE: 1" = 2000'

FIGURE 5
CROSS-SECTION MW-3 TO MW-7 SHOWING
MAXIMUM AND MINIMUM
GROUNDWATER TABLE FLUCTUATION
BETWEEN 11/1994 AND 6/2003
ARTESIA TANK FARM
BP PIPELINE COMPANY
ARTESIA, NEW MEXICO

PROJECT NO.	PREPARED BY	DRAWN BY
G04Q4-PP5TT	MH	DD
DATE	REVIEWED BY	FILE NAME
4/1/05		ARTESIA-CS

Delta Environmental Consultants, Inc.

TABLE 1

SOIL ANALYTICAL DATA
BP PIPELINE - ARTESIA TANK FARM
ARTESIA, NEW MEXICO

SAMPLE	DATE	DEPTH (feet)	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYL-BENZENE (mg/kg)	XYLENES (mg/kg)	TPH (mg/kg)
MW-1	05/17/93	15-17	0.178	<0.050	<0.050	0.059	<10
MW-2	05/17/93	25-25.5 26-26.5	<0.050 <0.050	<0.050 43.310	<0.050 13.110	<0.050 122.410	14 19,300
MW-3	05/17/93	10-12.0 17-19	6.314 0.9100	46.5180 5.941	10.0310 2.379	67.6460 22.262	18,900 3,650

Notes:
1. TPH - Total Petroleum Hydrocarbons by EPA Method 418.1
2. mg/kg - milligrams per Kilogram.
3. N/A - Not Applicable

TABLE 2
GROUNDWATER ELEVATION DATA
BP PIPELINES - ARTESIA TANK FARM
ARTESIA, NEW MEXICO

LOCATION	DATE	CASING ELEVATION	DEPTH TO PRODUCT	DEPTH TO WATER	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-1	05/21/93	3448.58	20.52	20.73	0.21	3428.03
	11/17/94		17.54	17.56	0.02	3431.04
	02/09/95		18.02	18.05	0.03	3430.56
	06/16/95		19.15	19.21	0.06	3429.42
	10/02/95		Sheen	16.48	Sheen	3432.10
	11/26/95		15.85	15.87	0.02	3432.73
	04/16/96		14.32	14.33	0.01	3434.26
	07/06/96		15.55	15.57	0.02	3433.03
	09/30/96		11.70	11.75	0.05	3436.87
	01/10/97		12.79	12.90	0.11	3435.77
	04/02/97		13.60	13.62	0.02	3434.98
	07/10/97		14.78	14.79	0.01	3433.80
	10/17/97		14.62	14.63	0.01	3433.96
	01/18/98		NP	13.74	NA	3434.84
	04/18/98		13.75	13.76	0.01	3434.83
	05/29/98		NP	14.56	NA	3434.02
	06/30/98		NP	14.90	NA	3433.68
	07/23/98		NP	15.71	NA	3432.87
	08/19/98		NP	16.49	NA	3432.09
	12/05/98		NP	17.94	NA	3430.64
	04/01/99		NP	18.30	NA	3430.28
	06/03/99		NP	17.65	NA	3430.93
	09/16/99		NP	11.02	NA	3437.56
	01/08/00		NP	10.18	NA	3438.40
	06/08/00		NP	9.84	NA	3438.74
	07/24/01		9.88	9.90	0.02	3438.70
	03/12/02		7.70	7.73	0.03	3440.88
	07/18/03		9.67	9.68	0.01	3438.91
	03/29/04		NP	7.05	NA	3441.53
MW-2	05/21/93	3456.88	25.81	27.56	1.75	3430.81
	11/17/94		23.28	26.67	3.39	3433.09
	02/09/95		23.98	26.50	2.52	3432.52
	06/16/95		25.63	26.45	0.82	3431.13
	10/02/95		22.01	26.18	4.17	3434.24
	11/26/95		21.23	26.17	4.94	3434.91
	04/16/96		20.58	22.46	1.88	3436.02
	07/06/96		21.86	25.18	3.32	3434.52
	09/30/96		19.17	20.94	1.77	3437.44
	01/10/97		20.20	22.98	2.78	3436.26
	04/02/97		21.00	24.04	3.04	3435.42
	07/10/97		22.41	23.50	1.09	3434.31
	10/17/97		21.92	26.18	4.26	3434.32
	01/18/98		20.03	24.00	3.97	3436.25
	04/18/98		21.04	25.31	4.27	3435.20
	05/29/98		21.68	25.86	4.18	3434.57
	06/30/98		22.00	26.20	4.20	3434.25
	07/23/98		23.08	26.25	3.17	3433.32
	08/19/98		23.66	26.16	2.50	3432.85
	12/05/98		24.90	26.70	1.80	3431.71
	04/01/99		25.15	26.47	1.32	3431.53
	06/01/99		23.10	26.20	3.10	3433.32
	09/16/99		NP	18.28	NA	3438.60
	01/08/00		18.65	19.23	0.58	3438.14
	06/07/00		19.28	19.31	0.03	3437.60
	07/24/01		17.03	17.50	0.47	3439.78
	03/12/02		16.61	17.03	0.42	3440.21
	07/18/03		17.22	17.63	0.41	3439.60
	03/29/04	Not gauged, not assessible				
MW-2A (MW-2R)	10/10/01	3457.46	NP	19.01	NA	3438.45
	03/12/02		NP	17.76	NA	3439.70
	07/18/03		NP	18.39	NA	3439.07
	03/29/04		NP	17.10	NA	3440.36

TABLE 2
GROUNDWATER ELEVATION DATA
BP PIPELINES - ARTESIA TANK FARM
ARTESIA, NEW MEXICO

LOCATION	DATE	CASING ELEVATION	DEPTH TO PRODUCT	DEPTH TO WATER	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-3	05/21/93	3447.67	16.45	17.81	1.36	3431.02
	11/17/94		13.07	13.65	0.58	3434.51
	02/09/95		13.75	14.32	0.57	3433.83
	06/16/95		15.20	15.84	0.64	3432.37
	10/02/95		10.69	11.43	0.74	3436.87
	11/26/95		9.69	10.41	0.72	3437.87
	04/16/96		9.58	9.63	0.05	3438.08
	07/06/96		11.70	11.80	0.10	3435.96
	09/30/96		8.71	8.75	0.04	3438.95
	01/10/97		10.33	10.40	0.07	3437.33
	04/02/97		11.36	11.42	0.06	3436.30
	07/10/97		13.02	13.10	0.08	3434.64
	10/17/97		13.22	13.24	0.02	3434.45
	01/18/98		10.68	10.78	0.10	3436.98
	04/18/98		11.47	11.55	0.08	3436.19
	05/29/98		12.34	12.45	0.11	3435.31
	06/30/98		12.70	12.80	0.10	3434.96
	07/23/98		13.95	14.02	0.07	3433.71
	08/19/98		15.08	15.15	0.07	3432.58
	12/05/98		16.40	16.50	0.10	3431.26
	04/01/99		16.00	16.08	0.08	3431.66
	06/03/99		14.35	14.38	0.03	3433.32
	09/16/99		7.82	7.87	0.05	3439.84
	01/08/00		8.50	8.60	0.10	3439.16
	06/08/00		6.98	7.05	0.07	3440.68
	07/24/01		6.63	6.73	0.10	3441.03
	03/12/02		5.43	5.50	0.07	3442.23
	07/18/03		Not gauged			
	03/29/04		Not gauged			
MW-3A	10/10/01	ND	NP	7.34	NA	ND
(MW-3RS)	03/12/02		NP	5.24	NA	ND
(MW-3C)	07/18/03		NP	6.34	NA	ND
	03/29/04		NP	4.50	NA	ND
MW-3B	10/10/01	ND	NP	7.47	NA	ND
(MW-3R)	03/12/02		NP	5.62	NA	ND
	07/18/03		NP	6.81	NA	ND
	03/29/04		Not gauged			
MW-4	11/17/94	ND	NP	28.28	NA	ND
	02/09/95		NP	28.51	NA	ND
	06/16/95		NP	29.58	NA	ND
	10/02/95		NP	24.42	NA	ND
	11/26/95		NP	22.61	NA	ND
	04/16/96		NP	20.63	NA	ND
	07/06/96		NP	26.44	NA	ND
	09/30/96		NP	21.88	NA	ND
	01/10/97		NP	25.24	NA	ND
	04/02/97		NP	25.49	NA	ND
	04/18/98		NP	25.02	NA	ND
	12/05/98		29.52	29.70	0.18	ND
	04/01/99		28.65	28.67	0.02	ND
	06/03/99		NP	26.48	NA	ND
	09/20/99		NP	18.85	NA	ND
	01/08/00		NP	19.30	NA	ND
	06/08/00		NP	18.46	NA	ND
	07/24/01		NP	16.93	NA	ND
	03/12/02		NP	14.89	NA	ND
	06/19/03		Plugged and Abandoned			

TABLE 2
GROUNDWATER ELEVATION DATA
BP PIPELINES - ARTESIA TANK FARM
ARTESIA, NEW MEXICO

LOCATION	DATE	CASING ELEVATION	DEPTH TO PRODUCT	DEPTH TO WATER	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-5	11/17/94	3430.25	16.22	24.19	7.97	3412.83
	02/09/95		16.84	24.85	8.01	3412.21
	06/16/95		19.44	21.14	1.70	3410.56
	10/02/95		16.19	17.85	1.66	3413.81
	11/26/95		17.58	19.31	1.73	3412.41
	04/16/96		17.04	17.25	0.21	3413.18
	07/06/96		16.20	16.36	0.16	3414.03
	09/30/96		11.17	11.38	0.21	3419.05
	01/10/97		13.45	13.60	0.15	3416.78
	04/02/97		14.19	14.35	0.16	3416.04
	07/10/97		16.22	16.25	0.03	3414.03
	10/17/97		13.37	13.39	0.02	3416.88
	01/18/98		13.57	13.58	0.01	3416.68
	04/18/98		14.04	14.05	0.01	3416.21
	05/29/98		NP	15.09	NA	3415.16
	06/30/98		NP	15.42	NA	3414.83
	07/23/98		NP	17.30	NA	3412.95
	08/19/98		18.09	18.10	0.01	3412.16
	12/05/98		NP	18.94	NA	3411.31
	04/01/99		NP	19.48	NA	3410.77
	06/03/99		NP	14.46	NA	3415.79
	09/20/99		NP	9.91	NA	3420.34
	01/08/00		NP	12.11	NA	3418.14
	06/08/00		NP	12.13	NA	3418.12
	07/24/01		NP	12.77	NA	3417.48
	03/21/02		NP	10.43	NA	3419.82
	07/17/03		NP	12.02	NA	3418.23
	03/29/04		NP	8.90	NA	3421.35
MW-6	11/17/94	ND	Sheen	14.53	Sheen	ND
	02/09/95		NP	15.02	NA	ND
	06/16/95		16.24	16.27	0.03	ND
	10/02/95		NP	13.55	NA	ND
	11/26/95		NP	14.84	NA	ND
	04/16/96		NP	13.80	NA	ND
	07/06/96		NP	14.55	NA	ND
	09/30/96		NP	9.62	NA	ND
	01/10/97		NP	12.26	NA	ND
	04/02/97		NP	12.03	NA	ND
	04/18/98		NP	12.14	NA	ND
	12/05/98		NP	15.95	NA	ND
	04/01/99		NP	16.04	NA	ND
	06/03/99		NP	13.60	NA	ND
	09/20/99		NP	8.69	NA	ND
	01/08/00		NP	10.73	NA	ND
	06/08/00		NP	11.45	NA	ND
	07/24/01		NP	11.69	NA	ND
	03/21/02		NP	9.43	NA	ND
	06/19/03		Plugged and Abandoned			
MW-7 *	11/17/94	3460.55	NP	34.33	NA	3426.22
	02/09/95		NP	34.67	NA	3425.88
	06/16/95		NP	35.61	NA	3424.94
	10/02/95		NP	33.79	NA	3426.76
	11/26/95		NP	33.20	NA	3427.35
	04/16/96		NP	30.95	NA	3429.60
	07/06/96		NP	33.36	NA	3427.19
	09/30/96		NP	29.15	NA	3431.40
	01/10/97		NP	30.72	NA	3429.83
	04/02/97		NP	31.85	NA	3428.70
	04/18/98		NP	31.94	NA	3428.61
	12/05/98		NP	35.24	NA	3425.31
	04/01/99		NP	35.24	NA	3425.31
	06/03/99		NP	33.32	NA	3427.23
	09/20/99		NP	27.25	NA	3433.30
	01/08/00		NP	27.95	NA	3432.60
	06/08/00		NP	26.91	NA	3433.64
	07/24/01		NP	25.65	NA	3434.90
	03/21/02		NP	24.08	NA	3436.47
	06/19/03		Plugged and Abandoned			

TABLE 2
GROUNDWATER ELEVATION DATA
BP PIPELINES - ARTESIA TANK FARM
ARTESIA, NEW MEXICO

LOCATION	DATE	CASING ELEVATION	DEPTH TO PRODUCT	DEPTH TO WATER	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-8	11/17/94	3424.57	13.69	14.95	1.26	3410.69
	02/09/95		14.46	15.02	0.56	3410.03
	06/16/95		15.50	16.41	0.91	3408.93
	10/02/95		13.03	13.45	0.42	3411.48
	11/26/95		14.16	14.71	0.55	3410.33
	04/16/96		13.66	13.70	0.04	3410.90
	07/06/96		13.05	13.07	0.02	3411.52
	09/30/96		8.04	8.07	0.03	3416.53
	01/10/97		9.89	9.90	0.01	3414.68
	04/02/97		10.58	10.60	0.02	3413.99
	07/10/97		NP	12.59	NA	3411.98
	10/17/97		NP	10.20	NA	3414.37
	01/18/98		NP	10.08	NA	3414.49
	04/18/98		NP	10.52	NA	3414.05
	05/29/98		NP	11.55	NA	3413.02
	06/30/98		NP	11.87	NA	3412.70
	07/23/98		NP	13.65	NA	3410.92
	08/19/98		NP	14.42	NA	3410.15
	12/05/98		NP	15.30	NA	3409.27
	04/01/99		NP	15.73	NA	3408.84
	06/03/99		NP	11.88	NA	3412.69
	09/20/99		NP	7.20	NA	3417.37
	01/08/00		NP	8.58	NA	3415.99
	06/08/00		NP	9.71	NA	3414.86
	07/24/01		NP	9.53	NA	3415.04
	03/21/02		NP	7.28	NA	3417.29
	07/17/03		NP	8.59	NA	3415.98
	03/29/04		NP	6.80	NA	3417.77
MW-9	11/17/94	3456.12	23.07	23.10	0.03	3433.05
	02/09/95		Sheen	23.41	Sheen	3432.71
	06/16/95		Sheen	24.65	Sheen	3431.47
	10/02/95		Sheen	20.73	Sheen	3435.39
	11/26/95		Sheen	19.52	Sheen	3436.60
	04/16/96		17.53	17.54	0.01	3438.59
	07/06/96		21.20	21.23	0.03	3434.92
	09/30/96		16.00	16.02	0.02	3440.12
	01/10/97		17.55	17.57	0.02	3438.57
	04/02/97		18.91	18.92	0.01	3437.21
	07/10/97		20.39	20.41	0.02	3435.73
	10/17/97		20.13	20.15	0.02	3435.99
	01/18/98		18.39	18.40	0.01	3437.73
	04/18/98		18.80	18.81	0.01	3437.32
	05/29/98		NP	19.50	NA	3436.62
	06/30/98		NP	19.82	NA	3436.30
	07/23/98		21.00	21.01	0.01	3435.12
	08/19/98		NP	21.75	NA	3434.37
	12/05/98		NP	23.18	NA	3432.94
	04/01/99		NP	22.85	NA	3433.27
	06/03/99		NP	20.85	NA	3435.27
	09/20/99		NP	12.56	NA	3443.56
	01/08/00		NP	12.64	NA	3443.48
	06/08/00		NP	11.65	NA	3444.47
	07/24/01		NP	10.65	NA	3445.47
	03/12/02		7.80	7.81	0.01	3448.32
	07/18/03		Sheen	9.71	Sheen	3446.41
	03/29/04		NP	6.90	NA	3449.22

TABLE 2
GROUNDWATER ELEVATION DATA
BP PIPELINES - ARTESIA TANK FARM
ARTESIA, NEW MEXICO

LOCATION	DATE	CASING ELEVATION	DEPTH TO PRODUCT	DEPTH TO WATER	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-10	11/17/94	3418.33	19.02	21.24	2.22	3398.98
	02/09/95		19.74	22.36	2.62	3398.20
	06/16/95		20.97	23.30	2.33	3397.01
	10/02/95		18.49	19.55	1.06	3399.68
	11/26/95		20.13	22.03	1.90	3397.92
	04/16/96		20.26	20.88	0.62	3397.98
	07/06/96		19.86	20.03	0.17	3398.44
	09/30/96		NP	15.62	NA	3402.71
	01/10/97		19.00	19.05	0.05	3399.32
	04/02/97		19.35	19.40	0.05	3398.97
	07/10/97		20.37	20.42	0.05	3397.95
	10/17/97		NP	16.58	NA	3401.75
	01/18/98		NP	17.82	NA	3400.51
	04/18/98		NP	18.27	NA	3400.06
	05/29/98		NP	18.72	NA	3399.61
	06/30/98		NP	19.04	NA	3399.29
	07/23/98		NP	19.26	NA	3399.07
	08/19/98		NP	19.40	NA	3398.93
	12/05/98		NP	19.69	NA	3398.64
	04/01/99		NP	19.62	NA	3398.71
	06/03/99		NP	17.10	NA	3401.23
	09/16/99		NP	16.39	NA	3401.94
	01/08/00		NP	17.75	NA	3400.58
	06/08/00		NP	17.80	NA	3400.53
	07/24/01		NP	17.44	NA	3400.89
	03/21/02		NP	16.36	NA	3401.97
	07/17/03		NP	16.86	NA	3401.47
	03/29/04		NP	14.20	NA	3404.13
MW-11	11/17/94	3415.81	NP	19.34	NA	3396.47
	02/09/95		NP	19.61	NA	3396.20
	06/16/95		NP	20.08	NA	3395.73
	10/02/95		NP	19.74	NA	3396.07
	11/26/95		NP	19.94	NA	3395.87
	04/16/96		NP	19.68	NA	3396.13
	07/06/96		NP	19.75	NA	3396.06
	09/30/96		NP	18.65	NA	3397.16
	01/10/97		NP	19.92	NA	3395.89
	04/02/97		NP	19.50	NA	3396.31
	01/18/98		NP	18.91	NA	3396.90
	04/18/98		NP	19.07	NA	3396.74
	06/30/98		NP	19.39	NA	3396.42
	08/19/98		NP	19.54	NA	3396.27
	12/05/98		NP	19.47	NA	3396.34
	04/01/99		NP	19.44	NA	3396.37
	06/02/99		NP	19.58	NA	3396.23
	09/16/99		NP	18.20	NA	3397.61
	01/08/00		NP	18.22	NA	3397.59
	06/07/00		NP	18.55	NA	3397.26
	07/24/01		NP	18.69	NA	3397.12
	03/21/02		NP	17.62	NA	3398.19
	07/17/03		NP	17.65	NA	3398.16
	03/29/04		NP	17.23	NA	3398.58
MW-12	11/17/94	ND	NP	16.47	NA	ND
	02/09/95		NP	16.78	NA	ND
	06/16/95		NP	17.28	NA	ND
	10/02/95		NP	16.03	NA	ND
	11/26/95		NP	16.63	NA	ND
	04/16/96		NP	16.55	NA	ND
	07/06/96		NP	16.45	NA	ND
	09/30/96		NP	13.81	NA	ND
	01/10/97		NP	18.92	NA	ND
	04/02/97		NP	15.20	NA	ND
	04/18/98		NP	14.91	NA	ND
	12/05/98		NP	16.63	NA	ND
	04/01/99		NP	16.87	NA	ND
	06/03/99		NP	15.55	NA	ND
	09/16/99		NP	13.59	NA	ND
	01/08/00		NP	13.70	NA	ND
	06/07/00		NP	14.35	NA	ND
	07/24/01		NP	13.66	NA	ND
	03/21/02		NP	12.94	NA	ND
	06/19/03		Plugged and Abandoned			

TABLE 2
GROUNDWATER ELEVATION DATA
BP PIPELINES - ARTESIA TANK FARM
ARTESIA, NEW MEXICO

LOCATION	DATE	CASING ELEVATION	DEPTH TO PRODUCT	DEPTH TO WATER	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-13	11/17/94	ND	20.41	20.49	0.08	ND
	02/09/95		20.84	20.87	0.03	ND
	06/16/95		21.35	21.40	0.05	ND
	10/02/95		19.35	19.44	0.09	ND
	11/26/95		21.53	21.58	0.05	ND
	04/16/96		21.82	21.90	0.08	ND
	07/06/96		21.00	21.05	0.05	ND
	09/30/96		16.40	16.42	0.02	ND
	01/10/97		19.17	19.19	0.02	ND
	04/02/97		18.50	18.52	0.02	ND
	07/10/97		NP	19.00	NA	ND
	10/17/97		NP	18.03	NA	ND
	01/18/98		NP	19.11	NA	ND
	04/18/98		NP	19.60	NA	ND
	05/29/98		NP	19.96	NA	ND
	06/30/98		NP	20.28	NA	ND
	07/23/98		NP	20.91	NA	ND
	08/19/98		NP	21.25	NA	ND
	12/05/98		NP	21.60	NA	ND
	04/01/99		NP	21.81	NA	ND
	06/03/99		NP	18.52	NA	ND
	09/16/99		NP	13.59	NA	ND
	01/08/00		NP	16.79	NA	ND
	06/07/00		NP	17.81	NA	ND
	07/24/01		NP	18.18	NA	ND
	03/21/02		NP	16.69	NA	ND
	06/19/03		Plugged and Abandoned			
MW-14	11/17/94	3417.70	NP	18.11	NA	3399.59
	02/09/95		NP	18.45	NA	3399.25
	06/16/95		NP	18.93	NA	3398.77
	10/02/95		NP	18.63	NA	3399.07
	11/26/95		NP	18.83	NA	3398.87
	04/16/96		NP	18.55	NA	3399.15
	07/06/96		NP	18.58	NA	3399.12
	09/30/96		NP	17.63	NA	3400.07
	01/10/97		NP	17.42	NA	3400.28
	04/02/97		NP	17.82	NA	3399.88
	01/18/98		NP	17.61	NA	3400.09
	04/18/98		NP	17.77	NA	3399.93
	06/30/98		NP	18.10	NA	3399.60
	08/19/98		NP	18.23	NA	3399.47
	12/05/98		NP	18.15	NA	3399.55
	04/01/99		NP	18.27	NA	3399.43
	06/02/99		NP	18.25	NA	3399.45
	09/16/99		NP	16.82	NA	3400.88
	01/08/00		NP	16.75	NA	3400.95
	06/07/00		NP	17.07	NA	3400.63
	07/24/01		NP	16.16	NA	3401.54
	03/21/02		NP	15.97	NA	3401.73
	07/17/03		NP	15.97	NA	3401.73
	03/29/04		NP	15.50	NA	3402.20

All measurements in feet.
NP = free product not present.
NA = not applicable.
ND = No Data
* - Casing elevation determined by adding 2.84 feet of PVC stick-up (from the MW installation report).
to 3457.71 feet (ground elevation survey, 12/27/04)

TABLE 3
GROUNDWATER ANALYTICAL RESULTS
BP PIPELINES - ARTESIA TANK FARM
ARTESIA, NEW MEXICO

SAMPLE ID	DATE	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL BENZENE (mg/L)	TOTAL XYLENES (mg/L)	NAPHTHALENE (mg/L)	TDS (mg/L)	CHLORIDE (mg/L)
MW-1	07/18/03	not sampled - free product present						
	3/29/2004*	**1.30**	0.069	0.160	0.371	0.028	**4,060**	**395**
MW-2	07/18/03	not sampled - free product present						
	03/29/04	not sampled - not accessible						
MW-2A (MW-2R)	10/10/01	**0.920**	0.2100	0.520	**1.200**	NA	**4,700**	**670**
	03/12/02	**0.880**	0.0330	0.200	0.520	NA	**NA**	**590**
	3/14/2003*	**0.980**	0.0150	0.290	0.440	NA	**4,320**	**745**
	07/18/03	**0.690**	< 0.005	0.192	0.410	NA	NA	NA
	3/29/2004*	**0.710**	0.013	0.21	0.395	<0.005	**4,820**	**835**
MW-3	07/18/03	not sampled						
	3/29/2004*	not sampled						
MW-3A (MW-3RS) (MW-3C)	10/10/01	**5.800**	0.400	0.570	1.400	NA	**4,700**	**690**
	03/12/02	**2.400**	0.120	0.310	0.700	NA	NA	**520**
	3/14/2003*	**0.720**	< 0.001	0.087	0.110	NA	**4,220**	**526**
	07/18/03	**0.347**	< 0.005	0.0361	0.0534	NA	NA	NA
	3/29/2004*	**0.14**	<0.001	0.014	0.026	<0.005	**3,840**	**383**
MW-3B (MW-3R)	10/10/01	**7.900**	**4.500**	**1.200**	**4.400**	NA	**6,300**	**1,300**
	03/12/02	**3.300**	**1.200**	0.440	**1.100**	NA	NA	**1,200**
	07/18/03	**2.92**	0.226	0.448	**0.908**	NA	NA	NA
	3/29/2004*	not sampled						
MW-4	08/31/93	< 0.0005	< 0.0005	< 0.0005	< 0.0005	NA	NA	NA
	11/25/94	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	12/22/94	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	02/16/95	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	06/16/95	**0.0544**	< 0.001	0.0025	0.0067	NA	NA	NA
	10/02/95	0.0098	< 0.001	< 0.001	< 0.001	NA	NA	NA
	11/26/95	0.0047	0.0020	0.0013	0.0038	NA	NA	NA
	04/17/95	0.0063	0.0011	< 0.001	0.0036	NA	NA	NA
	07/05/96	0.0050	< 0.001	< 0.001	0.0020	NA	NA	NA
	09/30/96	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	01/10/97	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	04/02/97	0.0013	< 0.001	< 0.001	< 0.001	NA	NA	NA
	07/10/97	NA	NA	NA	NA	NA	NA	NA
	09/14/97	NA	NA	NA	NA	NA	NA	NA
	01/18/98	NA	NA	NA	NA	NA	NA	NA
	04/18/98	**0.750**	0.130	0.100	0.150	NA	NA	NA
	09/20/99	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	06/08/00	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	07/24/01	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	03/12/02	**0.031**	0.0024	0.012	0.019	NA	NA	NA
	3/14/2003*	< 0.001	< 0.001	< 0.001	< 0.002	NA	**3,290**	**328**
	06/19/03	plugged and abandoned						
MW-5	08/31/93	1.500	0.290	0.094	0.480	0.0059	NA	NA
	12/22/94	NA	NA	NA	NA	NA	NA	NA
	02/16/95	NA	NA	NA	NA	NA	NA	NA
	06/16/95	NA	NA	NA	NA	NA	NA	NA
	10/02/95	NA	NA	NA	NA	NA	NA	NA
	11/26/95	NA	NA	NA	NA	NA	NA	NA
	04/17/95	NA	NA	NA	NA	NA	NA	NA
	07/05/96	NA	NA	NA	NA	NA	NA	NA
	09/30/96	NA	NA	NA	NA	NA	NA	NA
	01/10/97	NA	NA	NA	NA	NA	NA	NA
	04/02/97	NA	NA	NA	NA	NA	NA	NA
	04/18/98	NA	NA	NA	NA	NA	NA	NA
	09/20/99	NA	NA	NA	NA	NA	NA	NA
	06/08/00	NA	NA	NA	NA	NA	NA	NA
	07/25/01	**0.400**	0.0097	0.060	0.160	NA	NA	NA
	03/21/02	**0.440**	0.0091	0.064	0.240	NA	NA	**590**
	3/14/2003*	0.0094	< 0.001	< 0.001	0.008	NA	**4,170**	**832**
	07/17/03	**0.0157**	< 0.005	0.000558	0.00403	NA	NA	NA
	3/29/2004*	0.0085	< 0.001	< 0.001	0.022	<0.005	**4,020**	**570**

TABLE 3
GROUNDWATER ANALYTICAL RESULTS
BP PIPELINES - ARTESIA TANK FARM
ARTESIA, NEW MEXICO

SAMPLE ID	DATE	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL BENZENE (mg/L)	TOTAL XYLENES (mg/L)	NAPHTHALENE (mg/L)	TDS (mg/L)	CHLORIDE (mg/L)
MW-6	11/25/94	not sampled - free product present						
	12/21/94	not sampled - free product present						
	02/16/95	0.0022	< 0.001	< 0.001	< 0.001	NA	NA	NA
	06/16/95	not sampled - free product present						
	10/02/95	0.0031	< 0.001	< 0.001	0.0025	NA	NA	NA
	11/26/95	0.0058	< 0.001	0.0061	0.0190	NA	NA	NA
	04/16/95	0.0063	0.0011	< 0.001	0.0036	NA	NA	NA
	07/06/96	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	09/30/96	< 0.001	< 0.001	0.002	< 0.001	NA	NA	NA
	01/10/97	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	04/02/97	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	07/10/97	NA	NA	NA	NA	NA	NA	NA
	09/14/97	NA	NA	NA	NA	NA	NA	NA
	01/18/98	NA	NA	NA	NA	NA	NA	NA
	04/18/98	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	09/20/99	NA	NA	NA	NA	NA	NA	NA
	06/08/00	NA	NA	NA	NA	NA	NA	NA
	07/24/01	NA	NA	NA	NA	NA	NA	NA
	03/21/02	**0.013**	0.00077	0.0025	0.006	NA	NA	**990**
	3/14/2003*	< 0.001	< 0.001	< 0.001	< 0.002	NA	**4,740**	**1100**
	06/19/03	plugged and abandoned						
MW-7	08/31/93	< 0.0005	< 0.0005	< 0.0005	< 0.0005	NA	NA	NA
	11/25/94	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	12/22/94	**1.590**	< 0.010	0.039	0.0865	NA	NA	NA
	02/16/95	**0.846**	< 0.010	0.0209	0.0527	NA	NA	NA
	06/16/95	**3.100**	0.0036	0.0587	0.140	NA	NA	NA
	10/02/95	**0.880**	< 0.010	0.017	0.0350	NA	NA	NA
	11/26/95	**3.000**	0.0046	0.051	0.200	NA	NA	NA
	04/17/95	**1.900**	<0.020	0.130	0.100	NA	NA	NA
	07/06/96	**1.800**	< 0.010	0.160	0.120	NA	NA	NA
	09/30/96	**0.170**	<0.020	<0.020	0.011	NA	NA	NA
	01/10/97	**0.160**	< 0.001	< 0.001	0.0032	NA	NA	NA
	04/02/97	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	07/10/97	NA	NA	NA	NA	NA	NA	NA
	09/14/97	NA	NA	NA	NA	NA	NA	NA
	01/18/98	NA	NA	NA	NA	NA	NA	NA
	04/18/98	**0.120**	< 0.001	< 0.001	0.0077	NA	NA	NA
	09/20/99	< 0.001	< 0.001	< 0.001	<0.003	NA	NA	NA
	06/08/00	**0.300**	< 0.010	< 0.010	0.04200	NA	NA	NA
	07/24/01	<0.00021	<0.00022	<0.0002	0.0018	NA	NA	NA
	03/21/02	0.00068	<0.0050	0.0011	0.00029	NA	NA	**550**
	3/14/2003*	< 0.001	< 0.001	< 0.001	< 0.002	NA	**3,640**	**503**
	06/19/03	plugged and abandoned						
MW-8	11/17/94	NA	NA	NA	NA	NA	NA	NA
	12/22/94	NA	NA	NA	NA	NA	NA	NA
	02/16/95	NA	NA	NA	NA	NA	NA	NA
	06/16/95	NA	NA	NA	NA	NA	NA	NA
	10/02/95	NA	NA	NA	NA	NA	NA	NA
	11/26/95	NA	NA	NA	NA	NA	NA	NA
	04/16/95	NA	NA	NA	NA	NA	NA	NA
	07/02/96	NA	NA	NA	NA	NA	NA	NA
	09/30/96	NA	NA	NA	NA	NA	NA	NA
	01/10/97	NA	NA	NA	NA	NA	NA	NA
	04/02/97	NA	NA	NA	NA	NA	NA	NA
	07/10/97	NA	NA	NA	NA	NA	NA	NA
	09/14/97	NA	NA	NA	NA	NA	NA	NA
	01/18/98	NA	NA	NA	NA	NA	NA	NA
	04/18/98	**3.800**	**0.820**	0.480	**1.100**	NA	NA	NA
	09/20/99	NA	NA	NA	NA	NA	NA	NA
	06/08/00	NA	NA	NA	NA	NA	NA	NA
	07/24/01	NA	NA	NA	NA	NA	NA	NA
	03/21/02	**1.500**	0.110	0.390	**0.920**	NA	NA	580
	3/21/2003*	**0.760**	0.039	0.270	0.430	NA	**3,990**	**583**
	07/17/03	**1.02000**	0.03750	0.30800	**0.71800**	NA	NA	NA
	3/29/2004*	**0.790**	0.0038	0.350	**0.80**	<0.005	**3,970**	**441**
MW-9	3/12/2003*	0.0082	< 0.001	0.0013	0.072		**3,580**	**530**
	06/19/03	not sampled - free product present						
	3/29/2004*	**0.023**	<0.001	<0.001	0.110	<0.005	**3,840**	**570**

TABLE 3
GROUNDWATER ANALYTICAL RESULTS
BP PIPELINES - ARTESIA TANK FARM
ARTESIA, NEW MEXICO

SAMPLE ID	DATE	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL BENZENE (mg/L)	TOTAL XYLENES (mg/L)	NAPHTHALENE (mg/L)	TDS (mg/L)	CHLORIDE (mg/L)
MW-10	11/17/94	NA	NA	NA	NA	NA	NA	NA
	12/22/94	NA	NA	NA	NA	NA	NA	NA
	02/16/95	NA	NA	NA	NA	NA	NA	NA
	06/14/95	NA	NA	NA	NA	NA	NA	NA
	10/02/95	NA	NA	NA	NA	NA	NA	NA
	11/25/95	NA	NA	NA	NA	NA	NA	NA
	04/16/95	NA	NA	NA	NA	NA	NA	NA
	07/02/96	NA	NA	NA	NA	NA	NA	NA
	09/30/96	**0.062**	<0.001	0.0022	0.0022	NA	NA	NA
	01/10/97	NA	NA	NA	NA	NA	NA	NA
	04/02/97	NA	NA	NA	NA	NA	NA	NA
	07/10/97	NA	NA	NA	NA	NA	NA	NA
	09/14/97	NA	NA	NA	NA	NA	NA	NA
	01/18/98	NA	NA	NA	NA	NA	NA	NA
	04/18/98	**0.061**	<0.001	<0.001	0.020	NA	NA	NA
	03/21/02	**0.013**	0.030	**0.990**	**1.000**	NA	NA	23
	3/14/2003*	**0.220**	0.0078	< 0.001	0.019	NA	**4,480**	**795**
	07/17/03	**0.0209**	0.00129	< 0.005	0.0116	NA	NA	NA
	3/29/2004*	**0.230**	<0.001	<0.001	0.041	<0.005	**2,510**	**671**
MW-11	11/17/94	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	12/22/94	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	02/16/95	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	06/14/95	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	10/02/95	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	11/25/95	0.0013	0.0053	0.0021	0.0061	NA	NA	NA
	04/16/95	< 0.001	0.0028	0.0011	0.0037	NA	NA	NA
	07/02/96	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	09/30/96	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	01/10/97	< 0.001	0.0012	0.0015	0.006	NA	NA	NA
	04/02/97	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	07/10/97	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	09/14/97	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	01/18/98	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	04/18/98	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	03/21/02	<0.0005	<0.0005	0.00052	0.0016	NA	NA	35
	3/14/2003*	< 0.001	< 0.001	< 0.001	< 0.002	NA	**3,000**	41.7
	07/17/03	< 0.005	< 0.005	< 0.005	< 0.0015	NA	NA	NA
	3/29/2004*	<0.001	<0.001	<0.001	<0.002	<0.005	**2,510**	38.5
MW-12	11/17/94	**0.075**	0.0011	0.001	0.001	NA	NA	NA
	12/22/94	0.0056	< 0.001	< 0.001	< 0.001	NA	NA	NA
	02/16/95	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	06/16/95	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	10/02/95	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	11/26/95	0.0011	0.0035	< 0.001	0.0051	NA	NA	NA
	04/16/95	0.0015	0.0051	0.0018	0.0058	NA	NA	NA
	07/02/96	0.0041	<0.001	<0.001	0.0012	NA	NA	NA
	09/30/96	**0.030**	<0.001	<0.001	<0.001	NA	NA	NA
	01/10/97	0.0023	<0.001	<0.001	<0.001	NA	NA	NA
	04/02/97	<0.001	<0.001	<0.001	<0.001	NA	NA	NA
	07/10/97	NA	NA	NA	NA	NA	NA	NA
	09/14/97	NA	NA	NA	NA	NA	NA	NA
	01/18/98	NA	NA	NA	NA	NA	NA	NA
	04/18/98	0.0039	< 0.001	< 0.001	<0.001	NA	NA	NA
	09/16/99	**0.030**	< 0.001	< 0.001	<0.003	NA	NA	NA
	06/07/00	< 0.001	< 0.001	< 0.001	<0.003	NA	NA	NA
	07/24/01	<0.00013	<0.0002	<0.00022	<0.0028	NA	NA	NA
	03/21/02	<0.0005	<0.0005	<0.0005	<0.0015	NA	NA	**570**
	3/14/2003*	< 0.001	< 0.001	< 0.001	< 0.002	NA	**4,150**	**676**
	06/19/03	plugged and abandoned						

TABLE 3
GROUNDWATER ANALYTICAL RESULTS
BP PIPELINES - ARTESIA TANK FARM
ARTESIA, NEW MEXICO

SAMPLE ID	DATE	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL BENZENE (mg/L)	TOTAL XYLENES (mg/L)	NAPHTHALENE (mg/L)	TDS (mg/L)	CHLORIDE (mg/L)
MW-13	11/17/94	NA	NA	NA	NA	NA	NA	NA
	12/22/94	NA	NA	NA	NA	NA	NA	NA
	02/16/95	NA	NA	NA	NA	NA	NA	NA
	06/16/95	NA	NA	NA	NA	NA	NA	NA
	10/02/95	NA	NA	NA	NA	NA	NA	NA
	11/26/95	NA	NA	NA	NA	NA	NA	NA
	04/16/95	NA	NA	NA	NA	NA	NA	NA
	07/02/96	NA	NA	NA	NA	NA	NA	NA
	09/30/96	NA	NA	NA	NA	NA	NA	NA
	01/10/97	NA	NA	NA	NA	NA	NA	NA
	04/02/97	NA	NA	NA	NA	NA	NA	NA
	07/10/97	NA	NA	NA	NA	NA	NA	NA
	09/14/97	NA	NA	NA	NA	NA	NA	NA
	01/18/98	NA	NA	NA	NA	NA	NA	NA
	04/18/98	< 0.001	< 0.001	0.006	0.013	NA	NA	NA
	09/20/99	NA	NA	NA	NA	NA	NA	NA
	06/08/00	NA	NA	NA	NA	NA	NA	NA
	07/24/01	NA	NA	NA	NA	NA	NA	NA
	03/21/02	0.0026	<0.00050	0.0017	0.0048	NA	NA	**520**
	3/14/2003*	< 0.001	0.0011	< 0.001	< 0.002	NA	**2,940**	28.2
	06/19/03	plugged and abandoned						
MW-14	11/17/94	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	12/22/94	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	02/16/95	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	06/16/95	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	10/02/95	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	11/26/95	< 0.001	0.0036	0.0017	0.0068	NA	NA	NA
	04/16/95	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	07/02/96	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	09/30/96	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	01/10/97	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	04/02/97	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	07/10/97	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	09/14/97	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	01/18/98	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	04/18/98	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	NA
	03/21/02	< 0.0050	< 0.0050	< 0.0050	0.0011	NA	NA	31
	3/14/2003*	< 0.001	< 0.001	< 0.001	< 0.002	NA	**2,950**	39.1
	07/17/03	< 0.005	< 0.005	< 0.005	< 0.0015	NA	NA	NA
	3/29/2004*	<0.001	<0.001	<0.001	<0.002	<0.005	**3,000**	38.9
New Mexico Human Health MCLs (mg/L)		**0.01**	**0.75**	**0.75**	**0.62**	**NA**	**1,000**	**250**

mg/L = milligrams per Liter.

NA = Not Analyzed.

See individual laboratory analytical reports for specific analysis methods utilized.

MCLs = Maximum Concentration Levels.

Bold = Indicates concentrations above New Mexico Human Health Maximum Concentration Levels.

* - Sampled by RT Hicks Consulting.

GROUNDWATER ANALYTICAL RESULTS (Continued)
BP PIPELINES - ARTESIA TANK FARM
ARTESIA, NEW MEXICO

TABLE 4

SAMPLE ID	VOCs 8020 (mg/L)									PNAs by Method 8270 (mg/L)
	DATE	Benzene	Toluene	Ethylbenzene	Xylenes	Chloro-benzene	1,2-Dichloro-benzene	1,3-Dichloro-benzene	1,4-Dichloro-benzene	Napthalene
MW-4	08/31/93	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
MW-5	08/31/93	1.500	0.290	0.094	0.480	<0.010	<0.010	<0.010	<0.010	0.0059
MW-7	08/31/93	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

All other constituents analyzed for PNAs were below laboratory method detection limits. Refer to individual laboratory analytical reports.

TABLE 5

SAMPLE ID		VOCs by 8260B (mg/L)						PAHs by Method SW8310 (mg/L)				RCRA 8 Metals 6010B (mg/L)							
	DATE	1,2,4 TMB	1,3,5 TMB	Napthalene	Isopropyl-benzene	n-Butyl-benzene	n-Propyl-benzene	Napthalene	1-Methyl-napthalene	2-Methyl-napthalene	Phenanthrene	Silver	Arsenic	Barium	Cadmium	Chromium	Mercury	Lead	Selenium
MW-2A (MW-2R)	10/10/01	0.820	0.330	0.067	0.070	0.025	0.091	0.022	0.018	0.024	0.00086	<0.005	0.01	0.024	<0.002	0.065	<0.004	<0.005	<0.01
MW-3A (MW-3RS)	10/10/01	0.490	0.210	<0.100	<0.050	<0.050	0.064	0.025	0.017	0.019	0.00093	<0.005	0.04	0.073	<0.002	0.119	<0.0002	<0.005	<0.01
MW-3B (MW-3R)	10/10/01	1.100	0.460	<0.500	<0.250	<0.250	<0.250	0.024	0.017	0.022	0.00094	<0.005	0.14	0.025	<0.002	0.065	<0.0002	<0.005	<0.01

All other constituents analyzed for VOCs and PAHs were below laboratory method detection limits. Refer to individual laboratory analytical reports

TMB=trimethylbenzene

TABLE 6

SEDIMENT ANALYTICAL DATA
BP PIPELINES - ARTESIA TANK FARM
ARTESIA, NEW MEXICO

SAMPLE ID	DATE	DEPTH (feet)	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL-BENZENE (mg/Kg)	XYLENES (mg/Kg)
SS-1	11/23/04	0 - 0.5	<0.00920	<0.00880	<0.0100	<0.00764
SS-2	11/23/04	0 - 0.5	<0.00920	<0.00880	<0.0100	<0.00764
SS-3	11/23/04	0 - 0.5	<0.00920	<0.00880	<0.0100	<0.00764

mg/Kg - milligrams per Kilogram

TABLE 7

SURFACE WATER ANALYTICAL RESULTS
BP PIPELINES - ARTESIA TANK FARM
ARTESIA, NEW MEXICO

SAMPLE ID	DATE	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL-BENZENE (mg/L)	XYLENES (mg/L)
SW-1	11/23/04	<0.000140	<0.000110	<0.000138	<0.000177
SW-2	11/23/04	<0.000140	<0.000110	<0.000138	<0.000177
SW-3	11/23/04	<0.000140	<0.000110	<0.000138	<0.000177

mg/L - milligrams per Liter.

PHYSICAL AND CHEMICAL PROPERTIES OF CONTAMINANTS OF CONCERN

CONTAMINANTS OF CONCERN	Water Solubility (µg/L)	Henry's Law Constant (L-water/L-air)	Org. Carbon Ads. Coef. Koc (mL/g)	Soil-Water Partition Coeff. Kd (mL-water /g-soil)		Diffusion Coefficient in air (cm^2/s)	Diffusion Coefficient in water (cm^2/s)
				Vadose zone	Saturated zone		
ORGANICS							
Benzene	1.75E+06	2.20E-01	8.30E+01	1.66E-01	1.66E-01	9.30E-02	1.10E-05
Toluene	5.35E+05	2.60E-01	1.35E+02	2.70E-01	2.70E-01	8.50E-02	9.40E-06
Ethylbenzene	1.52E+05	3.20E-01	1.29E+03	2.58E+00	2.58E+00	7.60E-02	8.50E-06
Xylenes (mixed)	1.98E+05	2.90E-01	2.40E+02	4.80E-01	4.80E-01	7.20E-02	8.50E-06
1,2-Dibromoethane (EDB)	3.40E+06	1.33E-02	2.80E+01	5.60E-02	5.60E-02	7.30E-02	6.35E-06
1,2-Dichloroethane (EDC)	8.52E+06	4.01E-02	3.80E+01	7.60E-02	7.60E-02	1.04E-01	9.90E-06
Methyl-tert-butyl-ether (MTBE)	4.80E+07	4.16E-02	1.20E+01	2.40E-02	2.40E-02	1.02E-01	1.05E-05
Acenaphthene	4.24E+03	6.36E-03	4.90E+03	9.80E+00	9.80E+00	4.21E-02	7.69E-06
Anthracene	4.34E+01	2.67E-03	2.35E+04	4.70E+01	4.70E+01	3.24E-02	7.74E-06
Benzo(a)anthracene	9.40E+00	1.37E-04	3.58E+05	7.16E+02	7.16E+02	5.10E-02	9.00E-06
Benzo(a)pyrene	1.20E+00	5.80E-08	3.89E+05	7.78E+02	7.78E+02	5.00E-02	5.80E-06
Benzo(b)fluoranthene	1.50E+00	4.55E-03	1.23E+06	2.46E+03	2.46E+03	2.26E-02	5.56E-06
Benzo(k)fluoranthene	8.00E-01	3.40E-05	1.23E+06	2.46E+03	2.46E+03	2.26E-02	5.56E-06
Chrysene	1.60E+00	3.88E-03	3.98E+05	7.96E+02	7.96E+02	2.48E-02	6.21E-06
Dibenz(a,h)anthracene	2.49E+00	6.03E-07	1.79E+06	3.58E+03	3.58E+03	2.02E-02	5.18E-06
Fluoranthene	2.06E+02	6.60E-04	4.91E+04	9.82E+01	9.82E+01	3.02E-02	6.35E-06
Fluorene	1.98E+03	2.61E-03	7.71E+03	1.54E+01	1.54E+01	3.63E-02	7.88E-06
Naphthalene	3.10E+04	4.90E-02	1.29E+03	2.58E+00	2.58E+00	7.20E-02	9.40E-06
Phenanthrene	1.00E+03	6.61E-03	1.41E+04	2.82E+01	2.82E+01	3.24E-02	7.74E-06
Pyrene	1.35E+02	4.51E-04	6.80E+04	1.36E+02	1.36E+02	2.72E-02	7.24E-06
METALS							
Lead	N/A	N/A	N/A	1.22E+02	1.22E+02	N/A	N/A

Note: N/A : Not applicable
Soil-water partition coefficient (Kd) is calculated from fractionl organic carbon (foc) and organic carbon adsorption coefficient (Koc)

GROUNDWATER RESOURCE PROTECTION - WITHOUT DECAY

CONTAMINANTS OF CONCERN	Target Groundwater Conc.at POE [µg/L]	User Specified Unsaturated Zone DAF [--]	Saturated Zone DAF		Soil Conc. Protective of Groundwater [mg/kg]	Allowable Groundwater Conc. at POC [µg/L]	Allowable Groundwater Conc. at Source [µg/L]
			at POC [--]	at POE [--]			
ORGANICS							
Benzene	1.00E+01	1	1.00E+00	1.00E+00	1.85E-02	1.00E+01	1.00E+01
Toluene	7.50E+02	1	1.00E+00	1.00E+00	2.10E+00	7.50E+02	7.50E+02
Ethylbenzene	7.50E+02	1	1.00E+00	1.00E+00	1.72E+01	7.50E+02	7.50E+02
Xylenes (mixed)	6.20E+02	1	1.00E+00	1.00E+00	2.89E+00	6.20E+02	6.20E+02
1,2-Dibromoethane (EDB)	--	1	1.00E+00	1.00E+00	--	--	--
1,2-Dichloroethane (EDC)	--	1	1.00E+00	1.00E+00	--	--	--
Methyl-tert-butyl-ether (MTBE)	--	1	1.00E+00	1.00E+00	--	--	--
Acenaphthene	--	1	1.00E+00	1.00E+00	--	--	--
Anthracene	--	1	1.00E+00	1.00E+00	--	--	--
Benzo(a)anthracene	--	1	1.00E+00	1.00E+00	--	--	--
Benzo(a)pyrene	--	1	1.00E+00	1.00E+00	--	--	--
Benzo(b)fluoranthene	--	1	1.00E+00	1.00E+00	--	--	--
Benzo(k)fluoranthene	--	1	1	1.00E+00	--	--	--
Chrysene	1.17E+02	1	1.00E+00	1.00E+00	8.10E+02 >RES	1.17E+02 >SOL	1.17E+02 >SOL
Dibenz(a,h)anthracene	--	1	1.00E+00	1.00E+00	--	--	--
Fluoranthene	--	1	1.00E+00	1.00E+00	--	--	--
Fluorene	1.46E+03	1	1.00E+00	1.00E+00	1.96E+02 >RES	1.46E+03	1.46E+03
Naphthalene	1.46E+03	1	1.00E+00	1.00E+00	3.30E+01 >RES	1.46E+03	1.46E+03
Phenanthrene	1.10E+03	1	1.00E+00	1.00E+00	2.70E+02 >RES	1.10E+03 >SOL	1.10E+03 >SOL
Pyrene	--	1	1.00E+00	1.00E+00	--	--	--
METALS							
Lead	--	1	1.00E+00	1.00E+00	--	--	--

NC: Pathway is not complete

'--': Not a COC

>RES: Calculated target level is greater than saturated soil concentration

>SOL: Calculated target level is greater than pure component solubility

Soil concentrations are presented on a dry weight basis.

Half life and unsaturated zone DAF are user specified inputs. Enter the values in COC table (sheet tab "COC").

CONTAMINANTS OF CONCERN, HALF-LIFE AND UNSATURATED ZONE DAF

CONTAMINANTS OF CONCERN	Half-Life [days]	Unsaturated Zone DAF [--]
ORGANICS		
☑ Benzene	1825	1
☑ Toluene	1825	1
☑ Ethylbenzene	1825	1
☑ Xylenes (mixed)	1825	1
☐ 1,2-Dibromoethane (EDB)	1825	1
☐ 1,2-Dichloroethane (EDC)	1825	1
☐ Methyl-tert-butyl-ether (MTBE)	10000000	1
☐ Acenaphthene	1825	1
☐ Anthracene	1825	1
☐ Benzo(a)anthracene	1825	1
☐ Benzo(a)pyrene	1825	1
☐ Benzo(b)fluoranthene	1825	1
☐ Benzo(k)fluoranthene	1825	1
☑ Chrysene	1825	1
☐ Dibenz(a,h)anthracene	1825	1
☐ Fluoranthene	1825	1
☑ Fluorene	1825	1
☑ Naphthalene	1825	1
☑ Phenanthrene	1825	1
☐ Pyrene	1825	1
METALS		
☐ Lead	1	1

RISK-BASED SCREENING LEVELS FOR A COMMERCIAL WORKER

CONTAMINANTS OF CONCERN	AIR INHALATION		SURFICIAL SOIL		SUB-SURFACE SOIL	GROUNDWATER
	Indoor [µg/m^3-air]	Outdoor [µg/m^3-air]	Surficial soil: ingestion, inhalation (vapor emissions and particulates), and dermal contact [mg/kg]		Indoor inhalation of vapor emissions [mg/kg]	Indoor inhalation of vapor emissions [µg/L]
ORGANICS						
Benzene	6.58E+00	4.93E+00	7.33E+01		NC	NC
Toluene	7.49E+02	5.62E+02	1.48E+04	>RES	NC	NC
Ethylbenzene	1.98E+03	1.48E+03	7.77E+03	>RES	NC	NC
Xylenes (mixed)	5.86E+02	4.39E+02	8.62E+04	>RES	NC	NC
1,2-Dibromoethane (EDB)	--	--	--		NC	NC
1,2-Dichloroethane (EDC)	--	--	--		NC	NC
Methyl-tert-butyl-ether (MTBE)	--	--	--		NC	NC
Acenaphthene	--	--	--		NC	NC
Anthracene	--	--	--		NC	NC
Benzo(a)anthracene	--	--	--		NC	NC
Benzo(a)pyrene	--	--	--		NC	NC
Benzo(b)fluoranthene	--	--	--		NC	NC
Benzo(k)fluoranthene	--	--	--		NC	NC
Chrysene	3.13E+01	2.35E+01	2.15E+03	>RES	NC	NC
Dibenz(a,h)anthracene	--	--	--		NC	NC
Fluoranthene	--	--	--		NC	NC
Fluorene	2.73E+02	2.04E+02	1.96E+04	>RES	NC	NC
Naphthalene	2.73E+02	2.04E+02	1.85E+04	>RES	NC	NC
Phenanthrene	2.04E+02	1.53E+02	1.45E+04	>RES	NC	NC
Pyrene	--	--	--		NC	NC
METALS						
Lead	N/A	N/A	--		N/A	N/A

N/A: Not Applicable
NC: Pathway is not complete
--: Not a COC
>RES: Calculated target level is greater than saturated soil concentration
>SOL: Calculated target level is greater than pure component solubility

RISK-BASED SCREENING LEVELS FOR A CONSTRUCTION WORKER

CONTAMINANTS OF CONCERN	AIR INHALATION	SOIL WITHIN CONSTRUCTION ZONE		GROUNDWATER	
	Outdoor	Surficial soil: ingestion, inhalation (vapor emissions and particulates), and dermal contact		Outdoor inhalation of vapor emissions	
	[µg/m^3-air]	[mg/kg]		[µg/L]	
ORGANICS					
Benzene	8.69E+00	1.67E+02		3.33E+04	
Toluene	5.62E+02	6.31E+03	>RES	1.99E+06	>SOL
Ethylbenzene	1.48E+03	5.98E+03	>RES	4.77E+06	>SOL
Xylenes (mixed)	4.39E+02	8.00E+03	>RES	1.65E+06	>SOL
1,2-Dibromoethane (EDB)	--	--		--	
1,2-Dichloroethane (EDC)	--	--		--	
Methyl-tert-butyl-ether (MTBE)	--	--		--	
Acenaphthene	--	--		--	
Anthracene	--	--		--	
Benzo(a)anthracene	--	--		--	
Benzo(a)pyrene	--	--		--	
Benzo(b)fluoranthene	--	--		--	
Benzo(k)fluoranthene	--	--		--	
Chrysene	5.86E+02	3.99E+04	>RES	4.77E+08	>SOL
Dibenz(a,h)anthracene	--	--		--	
Fluoranthene	--	--		--	
Fluorene	2.04E+02	1.10E+04	>RES	1.69E+08	>SOL
Naphthalene	2.04E+02	3.23E+03	>RES	4.54E+06	>SOL
Phenanthrene	1.53E+02	7.90E+03	>RES	5.61E+07	>SOL
Pyrene	--	--		--	
METALS					
Lead	N/A	--		N/A	

N/A: Not Applicable
NC: Pathway is not complete
--: Not a COC

>RES: Calculated target level is greater than saturated soil concentration
>SOL: Calculated target level is greater than pure component solubility

EXPOSURE FACTORS

(Page 1 of 2)

Parameter	Symbol	Unit	Tier 1 Values	Values Used	Source
Averaging time for carcinogen	ATc	year	70	70	Tier 1
Averaging time for non-carcinogen	ATnc	year	=ED	=ED	Tier 1
Body weight:					
Resident child	BW	kg	15	15	Tier 1
Resident adult	BW	kg	70	70	Tier 1
Commercial worker	BW	kg	70	70	Tier 1
Construction worker	BW	kg	70	70	Tier 1
Exposure duration:					
Resident child	ED	year	6	6	Tier 1
Resident adult	ED	year	30	30	Tier 1
Commercial worker	ED	year	25	25	Tier 1
Construction worker	ED	year	1	1	Tier 1
Exposure frequency:					
Resident child	EF	day/year	350	350	Tier 1
Resident adult	EF	day/year	350	350	Tier 1
Commercial worker	EF	day/year	250	250	Tier 1
Construction worker	EF	day/year	250	250	Tier 1
Soil ingestion rate:					
Resident child	IRs	mg/day	200	200	Tier 1
Resident adult	IRs	mg/day	100	100	Tier 1
Commercial worker	IRs	mg/day	50	50	Tier 1
Construction worker	IRs	mg/day	100	100	Tier 1
Groundwater ingestion rate:					
Resident adult	IRw	L/day	2	2	Tier 1
Indoor inhalation rate:					
Resident child	IRai	m^3/hr	0.417	0.417	Tier 1
Resident adult	IRai	m^3/hr	0.633	0.633	Tier 1
Commercial worker	IRai	m^3/hr	1.5	1.5	Tier 1
Exposure time for indoor inhalation:					
Resident child	ETin	hr/day	24	24	Tier 1
Resident adult	ETin	hr/day	24	24	Tier 1
Commercial worker	ETin	hr/day	10	10	Tier 1

EXPOSURE FACTORS

(Page 2 of 2)

Parameter	Symbol	Unit	Tier 1 Values	Values Used	Source
Outdoor inhalation rate:					
Resident child	IRao	m^3/hr	1	1	Tier 1
Resident adult	IRao	m^3/hr	1	1	Tier 1
Commercial worker	IRao	m^3/hr	2	2	Tier 1
Construction worker	IRao	m^3/hr	2	2	Tier 1
Exposure time for outdoor inhalation:					
Resident child	ETout	hr/day	10	10	Tier 1
Resident adult	ETout	hr/day	10	10	Tier 1
Commercial worker	ETout	hr/day	10	10	Tier 1
Construction worker	ETout	hr/day	10	10	Tier 1
Skin surface area:					
Resident child	SA	cm^2/day	2500	2500	Tier 1
Resident adult	SA	cm^2/day	5000	5000	Tier 1
Commercial worker	SA	cm^2/day	5000	5000	Tier 1
Construction worker	SA	cm^2/day	5000	5000	Tier 1
Soil to skin adherence factor:					
Resident child	M	mg/cm^2	0.5	0.5	Tier 1
Resident adult	M	mg/cm^2	0.5	0.5	Tier 1
Commercial worker	M	mg/cm^3	0.5	0.5	Tier 1
Construction worker	M	mg/cm^2	0.5	0.5	Tier 1
Target risk level	TR	--	1.00E-05	1.00E-05	Tier 1
Target hazard quotient	THQ	--	1	1	Tier 1

FATE AND TRANSPORT PARAMETERS

Parameter	Symbol	Unit	Tier 1 Values	Values Used	Source
Soil parameters:					
Length of soil source area parallel to wind direction	W_a	cm	1524	1524	Tier 1
Depth to contaminants in subsurface soil	L_s	cm	30.48	30.48	Tier 1
Lower depth of surficial soil zone	d	cm	30.48	30.48	Tier 1
Dry soil bulk density	ρ_s	g/cm^3	1.58	1.58	Tier 1
Fractional organic carbon content in the vadose zone	foc	g-C/g-soil	0.002	0.002	Tier 1
Total soil porosity in the vadose zone	θ_T	cm^3/cm^3-soil	0.25	0.25	Tier 1
Volumetric water content in vadose zone	θ_{ws}	cm^3/cm^3	0.024	0.024	Tier 1
Volumetric air content in vadose zone	θ_{as}	cm^3/cm^3	0.226	0.226	Tier 1
Groundwater parameters:					
Depth to groundwater	Lgw	cm	300	300	Tier 1
Width of groundwater source perpendicular to GW flow direction	Y	cm	1524	1524	Tier 1
Length of groundwater source parallel to GW flow direction	W	cm	1524	1524	Tier 1
Fractional organic carbon content in the saturated zone	foc_s	g-C/g-soil	0.002	0.002	Tier 1
Total soil porosity in the saturated zone	θ_{TS}	cm^3/cm^3-soil	0.25	0.25	Tier 1
Hydraulic conductivity in the saturated zone	K	cm/year	315360	315360	Tier 1
Hydraulic gradient	i	--	0.005	0.005	Tier 1
Groundwater Darcy velocity	Ugw	cm/year	1577	1577	Tier 1
Groundwater mixing zone thickness	δ_{gw}	cm	305	305	Tier 1
Infiltration rate	I	cm/year	41	41	Tier 1
Ambient air parameters:					
Breathing zone height	δ_a	cm	200	200	Tier 1
Wind speed within the breathing zone	Ua	cm/s	225	225	Tier 1
Enclosed space parameters:					
Enclosed space air exchange rate:					Tier 1
Residential	N	1/day	12	12	Tier 1
Commercial	N	1/day	20	20	Tier 1
Height of enclosed space:					
Residential	h	cm	200	200	Tier 1
Commercial	h	cm	300	300	Tier 1
Fraction of cracks in foundation/walls through which diffusion occurs					
Residential	f	cm^2/cm^2	0.01	0.01	Tier 1
Commercial	f	cm^2/cm^2	0.01	0.01	Tier 1
Particulate emission rate:					
Residential and commercial	Pe	g/cm^2sec	6.90E-14	6.90E-14	Tier 1
Construction worker	Pe	g/cm^2sec	6.90E-09	6.90E-09	Tier 1
Averaging time for vapor flux:					
Resident child	τ	sec	1.89E+08	1.89E+08	Tier 1
Resident adult	τ	sec	9.46E+08	9.46E+08	Tier 1
Commercial worker	τ	sec	7.88E+08	7.88E+08	Tier 1
Construction worker	τ	sec	3.15E+07	3.15E+07	Tier 1

GROUNDWATER RESOURCE PROTECTION

Parameter	Symbol	Unit	Tier 1 Values	Values Used	Source
SITE PARAMETERS:					
Distance to the point of exposure from the downgradient edge of the source	X_{poe}	ft	variable	2.9	
Longitudinal dispersivity	$\alpha_{x,poe}$	ft	variable	0.29	
Transverse dispersivity	$\alpha_{y,poe}$	ft	variable	0.1	
Vertical dispersivity	$\alpha_{z,poe}$	ft	variable	0.0145	
Distance to the point of compliance from the downgradient edge of the Source	X_{poe}	ft	variable	2.9	
Longitudinal dispersivity	$\alpha_{x,poe}$	ft	variable	0.29	
Transverse dispersivity	$\alpha_{y,poe}$	ft	variable	0.1	
Vertical dispersivity	$\alpha_{z,poe}$	ft	variable	0.0145	

Additional input parameters required to calculate the allowable soil concentrations protective of groundwater, whose values are input on other screens include:

Source dimensions

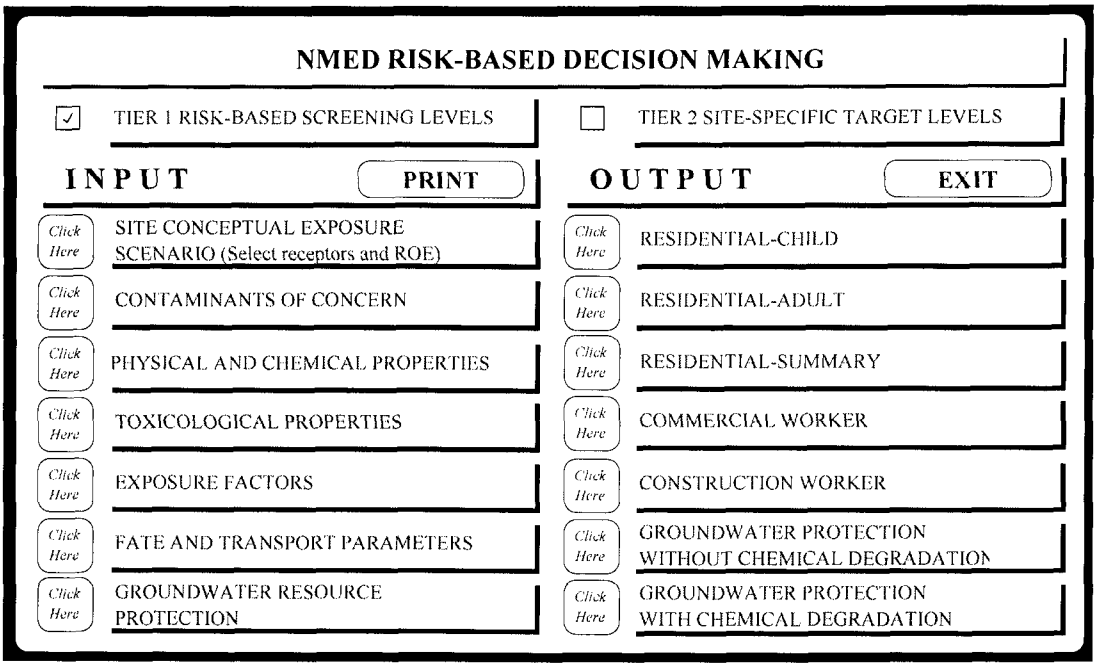
- Width of source area perpendicular to GW flow direction (Y)
- Length of source area parallel to GW flow direction (W)
- Groundwater mixing zone thickness (δ_{gw})

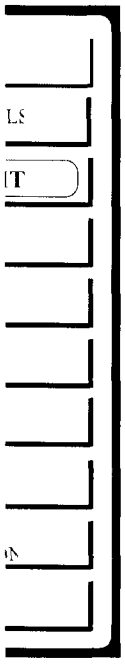
Soil and groundwater properties

- Dry soil bulk density (ρ_s)
- Total soil porosity in the vadose zone (θ_T) and saturated zone (θ_{TS})
- Hydraulic conductivity in the saturated zone (K)
- Hydraulic gradient (i)
- Fractional organic carbon contents in the vadose zone (foc) and saturated zone (foc_s)

Chemical specific properties

- Organic carbon adsorption co-efficient (Koc)


NMED RISK-BASED DECISION MAKING
TIER 1 RISK-BASED SCREENING LEVELS
TIER 2 SITE-SPECIFIC TARGET LEVELS
INPUT
PRINT
OUTPUT
EXIT
Click Here
SITE CONCEPTUAL EXPOSURE SCENARIO (Select receptors and ROE)
CONTAMINANTS OF CONCERN
PHYSICAL AND CHEMICAL PROPERTIES
TOXICOLOGICAL PROPERTIES
EXPOSURE FACTORS
FATE AND TRANSPORT PARAMETERS
GROUNDWATER RESOURCE PROTECTION
RESIDENTIAL-CHILD
RESIDENTIAL-ADULT
RESIDENTIAL-SUMMARY
COMMERCIAL WORKER
CONSTRUCTION WORKER
GROUNDWATER PROTECTION WITHOUT CHEMICAL DEGRADATION
GROUNDWATER PROTECTION WITH CHEMICAL DEGRADATION



SELECT ALL
UNSELECT ALL
PRINT
MAIN

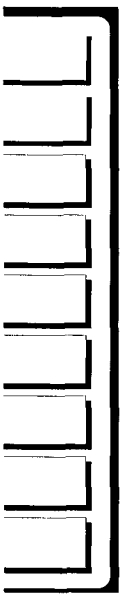
SELECT INPUT DATA AND OUTPUT TO PRINT

INPUT

- [x] SITE CONCEPTUAL EXPOSURE SCENARIO (Select receptors and ROE)
- [x] CONTAMINANTS OF CONCERN
- [x] PHYSICAL AND CHEMICAL PROPERTIES
- [x] TOXICOLOGICAL PROPERTIES
- [x] EXPOSURE FACTORS
- [x] FATE AND TRANSPORT PARAMETERS
- [x] GROUNDWATER RESOURCE PROTECTION

OUTPUT

- [x] RESIDENTIAL - CHILD
- [x] RESIDENTIAL - ADULT
- [x] RESIDENTIAL - SUMMARY
- [x] COMMERCIAL WORKER
- [x] CONSTRUCTION WORKER
- [x] WITHOUT DECAY
- [x] WITH DECAY



TRUE
TRUE
TRUE
TRUE
TRUE
TRUE
TRUE
TRUE
TRUE
TRUE
TRUE
TRUE
TRUE
TRUE

TRUE RISK-BASED SCREENING LEVELS
FALSE

RISK-BASED SCREENING LEVELS FOR A RESIDENT ADULT

CONTAMINANTS OF CONCERN	AIR INHALATION		SURFICIAL SOIL		SUB-SURFACE SOIL	GROUNDWATER
	Indoor	Outdoor	Surficial soil: ingestion, inhalation (vapor emissions and particulates), and dermal contact		Indoor inhalation of vapor emissions	Indoor inhalation of vapor emissions
	[µg/m^3-air]	[µg/m^3-air]	[mg/kg]		[mg/kg]	[µg/L]
ORGANICS						
Benzene	3.87E+00	5.87E+00	4.30E+01		NC	NC
Toluene	5.29E+02	8.03E+02	1.06E+04	>RES	NC	NC
Ethylbenzene	1.39E+03	2.12E+03	5.38E+03	>RES	NC	NC
Xylenes (mixed)	4.13E+02	6.28E+02	8.34E+04	>RES	NC	NC
1,2-Dibromoethane (EDB)	--	--	--		NC	NC
1,2-Dichloroethane (EDC)	--	--	--		NC	NC
Methyl-tert-butyl-ether (MTBE)	--	--	--		NC	NC
Acenaphthene	--	--	--		NC	NC
Anthracene	--	--	--		NC	NC
Benzo(a)anthracene	--	--	--		NC	NC
Benzo(a)pyrene	--	--	--		NC	NC
Benzo(b)fluoranthene	--	--	--		NC	NC
Benzo(k)fluoranthene	--	--	--		NC	NC
Chrysene	1.84E+01	2.79E+01	1.03E+03	>RES	NC	NC
Dibenz(a,h)anthracene	--	--	--		NC	NC
Fluoranthene	--	--	--		NC	NC
Fluorene	1.92E+02	2.92E+02	1.23E+04	>RES	NC	NC
Naphthalene	1.92E+02	2.92E+02	1.21E+04	>RES	NC	NC
Phenanthrene	1.44E+02	2.19E+02	9.04E+03	>RES	NC	NC
Pyrene	--	--	--		NC	NC
METALS						
Lead	N/A	N/A	--		N/A	N/A

N/A: Not Applicable
NC: Pathway is not complete
—: Not a COC

>RES: Calculated target level is greater than saturated soil concentration
>SOL: Calculated target level is greater than pure component solubility

RISK-BASED SCREENING LEVELS FOR A RESIDENT CHILD

CONTAMINANTS OF CONCERN	AIR INHALATION		SURFICIAL SOIL		SUB-SURFACE SOIL	GROUNDWATER
	Indoor	Outdoor	Surficial soil: ingestion, inhalation (vapor emissions and particulates), and dermal contact		Indoor inhalation of vapor emissions	Indoor inhalation of vapor emissions
	[µg/m^3-air]	[µg/m^3-air]	[mg/kg]		[mg/kg]	[µg/L]
ORGANICS						
Benzene	2.66E+00	2.66E+00	6.91E+01		NC	NC
Toluene	1.72E+02	1.72E+02	3.19E+03	>RES	NC	NC
Ethylbenzene	4.53E+02	4.54E+02	1.83E+03	>RES	NC	NC
Xylenes (mixed)	1.34E+02	1.35E+02	1.11E+04	>RES	NC	NC
1,2-Dibromoethane (EDB)	--	--	--		NC	NC
1,2-Dichloroethane (EDC)	--	--	--		NC	NC
Methyl-tert-butyl-ether (MTBE)	--	--	--		NC	NC
Acenaphthene	--	--	--		NC	NC
Anthracene	--	--	--		NC	NC
Benzo(a)anthracene	--	--	--		NC	NC
Benzo(a)pyrene	--	--	--		NC	NC
Benzo(b)fluoranthene	--	--	--		NC	NC
Benzo(k)fluoranthene	--	--	--		NC	NC
Chrysene	2.99E+01	2.99E+01	9.40E+02	>RES	NC	NC
Dibenz(a,h)anthracene	--	--	--		NC	NC
Fluoranthene	--	--	--		NC	NC
Fluorene	6.25E+01	6.26E+01	2.15E+03	>RES	NC	NC
Naphthalene	6.25E+01	6.26E+01	1.79E+03	>RES	NC	NC
Phenanthrene	4.69E+01	4.69E+01	1.59E+03	>RES	NC	NC
Pyrene	--	--	--		NC	NC
METALS						
Lead	N/A	N/A	--		N/A	N/A

N/A: Not Applicable
NC: Pathway is not comp
--: Not a COC

>RES: Calculated target level is greater than saturated soil concentration
>SOL: Calculated target level is greater than pure component solubility

RISK-BASED SCREENING LEVELS FOR RESIDENTIAL SCENARIO (LOWER OF THE TARGET LEVELS FOR CHILD AND ADULT)

CONTAMINANTS OF CONCERN	AIR INHALATION		SURFICIAL SOIL		SUB-SURFACE SOIL	GROUNDWATER
	Indoor	Outdoor	Surficial soil: ingestion, inhalation (vapor emissions and particulates), and dermal contact		Indoor inhalation of vapor emissions	Indoor inhalation of vapor emissions
	[µg/m^3-air]	[µg/m^3-air]	[mg/kg]		[mg/kg]	[µg/L]
ORGANICS						
Benzene	2.66E+00	2.66E+00	4.30E+01		NC	NC
Toluene	1.72E+02	1.72E+02	3.19E+03	>RES	NC	NC
Ethylbenzene	4.53E+02	4.54E+02	1.83E+03	>RES	NC	NC
Xylenes (mixed)	1.34E+02	1.35E+02	1.11E+04	>RES	NC	NC
1,2-Dibromoethane (EDB)	--	--	--		NC	NC
1,2-Dichloroethane (EDC)	--	--	--		NC	NC
Methyl-tert-butyl-ether (MTBE)	--	--	--		NC	NC
Acenaphthene	--	--	--		NC	NC
Anthracene	--	--	--		NC	NC
Benzo(a)anthracene	--	--	--		NC	NC
Benzo(a)pyrene	--	--	--		NC	NC
Benzo(b)fluoranthene	--	--	--		NC	NC
Benzo(k)fluoranthene	--	--	--		NC	NC
Chrysene	1.84E+01	2.79E+01	9.40E+02	>RES	NC	NC
Dibenz(a,h)anthracene	--	--	--		NC	NC
Fluoranthene	--	--	--		NC	NC
Fluorene	6.25E+01	6.26E+01	2.15E+03	>RES	NC	NC
Naphthalene	6.25E+01	6.26E+01	1.79E+03	>RES	NC	NC
Phenanthrene	4.69E+01	4.69E+01	1.59E+03	>RES	NC	NC
Pyrene	--	--	--		NC	NC
METALS						
Lead	N/A	N/A	--		N/A	N/A

N/A: Not Applicable
NC: Pathway is not complete
--: Not a COC
>RES: Calculated target level is greater than saturated soil concentration
>SOL: Calculated target level is greater than pure component solubility

COMPLETE PATHWAY(S) AND ROUTE(S) OF EXPOSURE

Source and Route of Exposure	Resident		Commercial	Construction
	Child	Adult	Worker	Worker
Surficial Soil				
Outdoor Inhalation (vapors and particulates), Ingestion, and Dermal Contact	☑	☑	☑	☑
Subsurface Soil				
Indoor Inhalation of Vapor Emission	☐	☐	☐	☐
Outdoor Inhalation of Vapor Emission	☑	☑	☑	☑
Groundwater				
Indoor Inhalation of Vapor Emission	☐	☐	☐	☐
Outdoor Inhalation of Vapor Emission	☑	☑	☑	☑
Groundwater Protection: Estimation of groundwater target levels at POC and source, and soil target levels protective of groundwater is based on one of the following two options:				
Option 1: Target concentrations at POE are set equal to MCLs or equivalent	☐	If neither of the options is selected, groundwater protection standards will be calculated based on MCLs as default standards.		
Option 2: Target concentrations at POE are set equal to WQCC Standards or equivalent	☑			

Equivalent target concentrations for COCs without MCLs and/or WQCC standards are estimated assuming adult water ingestion rate of 2L/day and a target risk of $1x10^{-5}$ or a target hazard quotient of 1.

NEW MEXICO ENVIRONMENT DEPARTMENT
UNDERGROUND STORAGE TANK BUREAU
RBDM COMPUTATIONAL SOFTWARE

Considerable care was exercised in developing this software. However, neither NMED nor RAM Group, Inc. makes any warranty regarding the accuracy of this software and shall not be held liable for any damages resulting from its use.

CONTIN

EXIT

Version 1.
March, 20

Developed for the NMED by:

RISK ASSESSMENT AND MANAGEMENT GROUP, INC.

7457 Harwin Drive, Suite 308, Houston, TX 77036

Ph. (713) 784-5151 Fax: (713) 784-6105

VIRONMENT DEPARTMENT
) STORAGE TANK BUREAU
UTATIONAL SOFTWARE

CONTINUE

EXIT

Version 1.0
March, 2000

)ed for the NMED by:

AND MANAGEMENT GROUP, INC.
've, Suite 308, Houston, TX 77036
4-5151 Fax: (713) 784-6105

TOXICOLOGICAL PROPERTIES OF CONTAMINANTS OF CONCERN

CONTAMINANTS OF CONCERN	Slope Factor		Reference Dose		Oral RA Factor	Dermal RA Factor
	Oral (SFo) [kg-day/mg]	Inh. (SFi) [kg-day/mg]	Oral (RfDo) (mg/kg-day)	Inh. (RfDi) (mg/kg-day)	(RAFo)	(RAFd)
ORGANICS						
Benzene	0.029	0.029	NA	0.0017	1	0.5
Toluene	NA	NA	0.2	0.11	1	0.5
Ethylbenzene	NA	NA	0.1	0.29	1	0.5
Xylenes (mixed)	NA	NA	2	0.086	1	0.5
1,2-Dibromoethane (EDB)	85	0.77	NA	NA	1	0.5
1,2-Dichloroethane (EDC)	0.091	0.091	0.05	0.0014	1	0.5
Methyl-tert-butyl-ether (MTBE)	NA	NA	0.005	0.86	1	0.5
Acenaphthene	NA	NA	0.06	0.06	1	0.05
Anthracene	NA	NA	0.3	0.3	1	0.05
Benzo(a)anthracene	0.73	0.61	NA	NA	1	0.05
Benzo(a)pyrene	7.3	6.1	NA	NA	1	0.05
Benzo(b)fluoranthene	0.73	0.61	NA	NA	1	0.05
Benzo(k)fluoranthene	0.73	0.61	NA	NA	1	0.05
Chrysene	0.0073	0.0061	NA	NA	1	0.05
Dibenz(a,h)anthracene	7.3	3.1	NA	NA	1	0.05
Fluoranthene	NA	NA	0.04	0.04	1	0.05
Fluorene	NA	NA	0.04	0.04	1	0.05
Naphthalene	NA	NA	0.04	0.04	1	0.05
Phenanthrene	NA	NA	0.03	0.03	1	0.05
Pyrene	NA	NA	0.03	0.03	1	0.05
METALS						
Lead	NA	NA	NA	NA	1	0.001

GROUNDWATER RESOURCE PROTECTION - WITH DECAY

CONTAMINANTS OF CONCERN	Target Groundwater Conc.at POE [µg/L]	Half-Life [days]	Saturated Zone Retardation Factor [--]	Unsaturated Zone DAF [--]	Saturated Zone DAF		Soil Conc. Protective of Groundwater [mg/kg]	Allowable Groundwater Conc. at POC [µg/L]	Allowable Groundwater Conc. at Source [µg/L]
					at POC [--]	at POE [--]			
ORGANICS									
Benzene	1.00E+01	1.83E+03	2.05E+00	1	1.00E+00	1.00E+00	1.85E-02	1.00E+01	1.00E+01
Toluene	7.50E+02	1.83E+03	2.71E+00	1	1.00E+00	1.00E+00	2.10E+00	7.50E+02	7.50E+02
Ethylbenzene	7.50E+02	1.83E+03	1.73E+01	1	1.00E+00	1.00E+00	1.72E+01	7.50E+02	7.50E+02
Xylenes (mixed)	6.20E+02	1.83E+03	4.03E+00	1	1.00E+00	1.00E+00	2.89E+00	6.20E+02	6.20E+02
1,2-Dibromoethane (EDB)	--	1.83E+03	1.35E+00	1	1.00E+00	1.00E+00	--	--	--
1,2-Dichloroethane (EDC)	--	1.83E+03	1.48E+00	1	1.00E+00	1.00E+00	--	--	--
Methyl-tert-butyl-ether (MTBE)	--	1.00E+07	1.15E+00	1	1.00E+00	1.00E+00	--	--	--
Acenaphthene	--	1.83E+03	6.29E+01	1	1.00E+00	1.00E+00	--	--	--
Anthracene	--	1.83E+03	2.98E+02	1	1.00E+00	1.00E+00	--	--	--
Benzo(a)anthracene	--	1.83E+03	4.53E+03	1	1.00E+00	1.00E+00	--	--	--
Benzo(a)pyrene	--	1.83E+03	4.92E+03	1	1.00E+00	1.00E+00	--	--	--
Benzo(b)fluoranthene	--	1.83E+03	1.55E+04	1	1.00E+00	1.00E+00	--	--	--
Benzo(k)fluoranthene	--	1.83E+03	1.55E+04	1	1.00E+00	1.00E+00	--	--	--
Chrysene	1.17E+02	1.83E+03	5.03E+03	1	1.00E+00	1.00E+00	8.10E+02 >RES	1.17E+02 >SOL	1.17E+02 >SOL
Dibenz(a,h)anthracene	--	1.83E+03	2.26E+04	1	1.00E+00	1.00E+00	--	--	--
Fluoranthene	--	1.83E+03	6.22E+02	1	1.00E+00	1.00E+00	--	--	--
Fluorene	1.46E+03	1.83E+03	9.85E+01	1	1.00E+00	1.00E+00	1.96E+02 >RES	1.46E+03	1.46E+03
Naphthalene	1.46E+03	1.83E+03	1.73E+01	1	1.00E+00	1.00E+00	3.30E+01 >RES	1.46E+03	1.46E+03
Phenanthrene	1.10E+03	1.83E+03	1.79E+02	1	1.00E+00	1.00E+00	2.70E+02 >RES	1.10E+03 >SOL	1.10E+03 >SOL
Pyrene	--	1.83E+03	8.61E+02	1	1.00E+00	1.00E+00	--	--	--
METALS									
Lead									

NC: Pathway is not complete

'--: Not a COC

Soil concentrations are presented on a dry weight basis.

Half life and unsaturated zone DAF are user specified inputs. Enter the values in COC table (sheet tab "COC").