NM1 - 1

# MONITORING REPORTS

YEAR(S):

12/1995

# Introduction

Tipperary Corporation

# Lane Salt Lake Water Disposal Pits

## Pit Closure Project

**Whole Earth**
**Environmental, Inc.**
16337 Park Row
Houston, Texas 77084

WHOLE EARTH

**Whole Earth Environmental, Inc.**

16337 Park Row, Houston, Texas 77084-5191
713/492-7077 Fax: 713/578-1190

December 29, 1995

Tipperary Corporation
633 Seventeenth St.
Denver, CO 80202

Attn: Bob Fehlmann

Dear Bob:

Enclosed, please find the closure results for the Lane Salt Lake Pit Remediation Project. I sincerely appreciate the opportunity of having worked for you on this very interesting and logistically challenging project.

Warmest personal regards,

Mike Griffin
President
Whole Earth Environmental, Inc.

Exec. Summary

Manifests
7

# EXECUTIVE SUMMARY

**Site Evaluation**
The preliminary site evaluation was conducted in April, 1995 and involved the excavation and analysis of soil samples obtained from the pits and surrounding areas. Results of the survey were sent to Tipperary on May 1, 1995 and forwarded to the New Mexico Oil Conservation Division for review and acceptance of a closure protocol. The protocol was received by the OCD on June 6, 1995 and a conditional approval was issued on July 20, 1995 by Bill Olson on July 20.

**Remediation Overview**
The remediation phase of the project was begun on October 2, 1995 and concluded on November 20.
The project involved the excavation, aeration and dilution of approximately 47,000 cubic yard of contaminated soils mixed with approximately 51,000 cubic yards of fresh topsoils obtained from the location.

The project consisted of three major phases:

**1. Removal of surface equipment**
Tipperary arranged for the removal of three storage tanks and interconnected piping from the location. Whole Earth removed the metal flow lines, netting, supports and transported them to the Gandy Oilfield Services disposal facility near Tatum, New Mexico. The transite flow lines were sent to Waste Management Company in Hobbs, New Mexico.

**2. Excavation, testing and remediation**
Excavation, mixing and blending was performed using two D-6 bulldozers, a four yard trackhoe and a six yard front end loader.

The typical excavation procedure was to remove the contaminated materials to a central remediation site, test the sub-strait material to insure that the contamination concentrations did not exceed 5,000 ppm TPH as measured by a General Analysis Corporation "Mega" TPH Analyzer, and that BTEX concentrations measured less than 50 ppm with Benzene levels not to exceed 10 ppm as measured by a Photovac PID chromatograph.

On pits 2 & 3 a total of 4,590 bbls of fluid were transported to one of four disposal facilities for purposes of recycling, (manifests enclosed).

**3. Site restoration**

At the conclusion of the remediation portion of the project, the areas surrounding the pits were contoured to provide positive drainage and a new fence erected around the site. Seeding of the location will be performed in the spring by the land owner.

NEW MEXICO ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION
2040 S. Pacheco St.
Santa Fe, New Mexico 87505

July 20, 1995

CERTIFIED MAIL
RETURN RECEIPT NO. Z-765-962-378

Mr. Robert H. Fehlmann
Environmental Coordinator
Tipperary Corporation
633 Seventeenth St., Suite 1550
Denver, Colorado 80202

**RE: CLOSURE PLAN**
**LANE SALT LAKE DISPOSAL FACILITY**
**BURRO PIPELINE CORPORATION**

Dear Mr. Fehlmann:

The New Mexico Oil Conservation Division (OCD) has completed a review of Tipperary Corporation's (TC) May 1, 1995 "LANE SALT LAKE WATER DISPOSAL PITS SITE ASSESSMENT PROJECT" which was recieved by the OCD on June 6, 1995. This document contains the results of TC's assessment of the extent of contamination related to the use of unlined skimmer pits at Burro Pipeline Corporation's Lane Salt Lae Disposal Facility. The document also contains TC's plan for remediation of contaminants at the site and closure of the facility.

The above referenced remediation and closure plan is approved with the following conditions:

1. All soil samples taken for verification of completion of remedial actions will be sampled and analyzed for benzene, toluene, ethylbenzene, xylene (BTEX), total petroleum hydrocarbons (TPH) using EPA approved methods.

   **NOTE: A photoionization detector (PID) field headspace measurement of 100 parts per million (mg/l) of total organic vapor, if determined in accordance with OCD guidelines, may be substituted for a laboratory analysis of the concentrations of BTEX in soils. However, PID field measurements cannot be substituted for the concentrations of TPH in soils.**

Tank Area

## TANK AREA

The section of the facility lying to the extreme South had a series of three separation and storage tanks which were removed by a contractor selected by Discovery Operating Company prior to the commencement of any soil remediation activities. Two large (12") fiberglass lines fed the storage facility however one of the lines appeared to have been capped with a slab gate valve and inactive for some period of time. The terminus valves of each line were opened and examined for the presence of fluids and the newer line was vacuumed with approximately 120 bbls. of fluid being removed prior to capping and abandonment. The older line was left buried approximately 3' below ground level with the terminus valve in place.

The contamination of the area appeared to be topical with a maximum contamination depth of 12' below ground level at the extreme southwest corner of the site. The contaminated soils were excavated and each of the four sides and the bottom of the tank storage area were tested for TPH and BTEX concentrations, (results attached). All contaminated soils were removed to a central remediation site and replaced after mixing and blending with fresh soils obtained from elsewhere within the location.

A smaller 3" "fast line" was discovered entering the western edge of the facility perimeter at a distance of approximately 110' north of the extreme southwest corner. The line contained very minor amounts of fluid ( <1 bbl.) consisting primarily of brine water. This line was drained, and excavated to a distance of approximately 80' from the facility. The excavated line was sent to Gandy Corporation's disposal facility as non-hazardous oilfield waste.

WHOLE EARTH

## ANALYTICAL REPORT FORM

**Well Name:** Lane Salt Lake
**Date of Collection:** 10 / 05 / 95

**Pit Type:** N / A
**Date of Analysis:** 10 / 05 /95

**Client:** Tipperary Corp.
**Analyst:** E. Werner

**TPH Analyzer S/N:** 01159
**VOC Analyzer S/N:** N / A

**Chromatograph S / N** SA920043
**E.C. Analyzer:** 07945-A14

**ANALYSIS:** TPH & BTEX

**ANALYTICAL METHOD:** Extraction by Means of EPA 418.1 (WEQP-06),

**SAMPLE LOCATION:** TANK AREA

| | No. Wall 6' | So. Wall 6' | East Wall 6' | West Wall 8' | Bottom |
|---|---|---|---|---|---|
| TPH[1] | 1,050 | 205 | 276 | 780 | 713 |
| E.C.[2] | N / A | N / A | N / A | N / A | N / A |
| VOC[1] | N / A | N / A | N / A | N / A | N / A |
| Benzene[1] | N / D | 3 | N / D | 2 | N / D |
| Toluene[1] | N / D | N / D | N / D | N / D | N / D |
| Ethyl-Benzene[1] | N / D | N / D | N / D | N / D | N / D |
| Xylene[1] | N / D | N / D | N / D | N / D | N / D |

**Temperature of sample:** 72 $^{0}$F

**Notes:** 1. Results shown in mg / L (ppm).
2. Results shown in mmhos / cm$^2$

WHOLE EARTH

## ANALYTICAL REPORT FORM

**Well Name:** Lane Salt Lake **Date of Collection:** 10 / 05 / 95

**Pit Type:** N / A **Date of Analysis:** 10 / 05 /95

**Client:** Tipperary Corp. **Analyst:** E. Werner

**TPH Analyzer S/N:** 01159 **VOC Analyzer S/N:** N / A

**Chromatograph S / N** SA920043 **E.C. Analyzer:** 07945-A14

**ANALYSIS:** TPH & BTEX

**ANALYTICAL METHOD:** Extraction by Means of EPA 418.1 (WEQP-06),

**SAMPLE LOCATION:** TANK AREA

| | Bottom 6' | Bottom 12' | Bottom 12' | | |
|---|---|---|---|---|---|
| TPH[1] | 116 | 54 | 2,170 | | |
| E.C.[2] | N / A | N / A | N / A | | |
| VOC[1] | N / A | N / A | N / A | | |
| Benzene[1] | N / D | N / D | N / D | | |
| Toluene[1] | N / D | N / D | N / D | | |
| Ethyl-Benzene[1] | N / D | N / D | N / D | | |
| Xylene[1] | N / D | N / D | N / D | | |

**Temperature of sample:** 72 °F

**Notes:** 1. Results shown in mg / L (ppm).
2. Results shown in mmhos / $cm^2$


ION

Pit # 1

## PIT AREA # 1

This area is described as the southernmost fenced and netted pit at the facility having the approximate dimensions of 100' east to west and 200' north to south. This pit was the primary receiving pit for the facility and contained the deepest contamination.

The first step in the remediation process was to remove the netting, support wires and posts and remove them to a central location for subsequent removal to the Gandy Corporation's non-hazardous oilfield waste site near Tatum, New Mexico. The pit was excavated in sections from the south to the north using a track hoe, bulldozer and front end loader. Once each section was excavated, tests were conducted on each side wall and pit bottom to confirm the hydrocarbon and BTEX concentrations fell below the New Mexico OCD guidelines (results attached).

The contaminated soils were removed to a location between the pit and the tank area for mixing and blending with additional soils obtained from elsewhere on the site. TPH and BTEX concentrations of the remediated soils were taken and once they were found to meet the concentration guidelines, were replaced into the excavation. The newly back-filled pit areas were then used as a base from which the heavy equipment could operate in continuing the pit excavation.

Only minor amounts of water from the perched table were encountered during the excavation operation. These fluids were transferred to the second pit by means of a transfer pump while the excavation activities continued. No north wall samples are recorded on the final closure report due to the fact that the north wall of Pit # 1 blended into the south wall of Pit # 2.

where did
nettings,
wires, etc
go ?

WHOLE EARTH

## ANALYTICAL REPORT FORM

**Well Name:** Lane Salt Lake **Date of Collection:** 10 / 05 / 95

**Pit Type:** N / A **Date of Analysis:** 10 / 05 /95

**Client:** Tipperary Corp. **Analyst:** E. Werner

**TPH Analyzer S/N:** 01159 **VOC Analyzer S/N:** N / A

**Chromatograph S / N** SA920043 **E.C. Analyzer:** 07945-A14

**ANALYSIS:** TPH & BTEX

**ANALYTICAL METHOD:** Extraction by Means of EPA 418.1 (WEQP-06),

**SAMPLE LOCATION:** PIT AREA # 1

| | Location West Wall | Location West Wall | Location West Wall | Location West Wall | Location East Wall |
|---|---|---|---|---|---|
| TPH[1] | 410 | 4,900 | 1,170 | 68 | 1,740 |
| E.C.[2] | N / A | N / A | N / A | N / A | N / A |
| VOC[1] | N / A | N / A | N / A | N / A | N / A |
| Benzene[1] | N / D | N / D | N / D | N / D | N / D |
| Toluene[1] | N / D | N / D | N / D | N / D | N / D |
| Ethyl-Benzene[1] | N / D | N / D | N / D | N / D | N / D |
| Xylene[1] | N / D | N / D | N / D | N / D | N / D |

**Temperature of sample:** 72 °F

**Notes:** 1. Results shown in mg / L (ppm).
2. Results shown in mmhos / $cm^2$

map showing location of sample.

WHOLE EARTH

## ANALYTICAL REPORT FORM

Well Name: Lane Salt Lake — Date of Collection: 10 / 05 / 95

Pit Type: N / A — Date of Analysis: 10 / 05 /95

Client: Tipperary Corp. — Analyst: E. Werner

TPH Analyzer S/N: 01159 — VOC Analyzer S/N: N / A

Chromatograph S / N SA920043 — E.C. Analyzer: 07945-A14

ANALYSIS: TPH & BTEX

ANALYTICAL METHOD: Extraction by Means of EPA 418.1 (WEQP-06),

SAMPLE LOCATION: PIT AREA # 1

| | Location East Wall | Location East Wall | Location East Wall | Location South Wall | Location South Wall |
|---|---|---|---|---|---|
| TPH[1] | 4,600 | 2,350 | 4,210 | 391 | 4,750 |
| E.C.[2] | N / A | N / A | N / A | N / A | N / A |
| VOC[1] | N / A | N / A | N / A | N / A | N / A |
| Benzene[1] | 2 | N / D | N / D | N / D | 3 |
| Toluene[1] | N / D | N / D | N / D | N / D | 1 |
| Ethyl-Benzene[1] | N / D | N / D | N / D | N / D | 1 |
| Xylene[1] | N / D | N / D | N / D | N / D | N / D |

Temperature of sample: 72 °F

Notes: 1. Results shown in mg / L (ppm).
2. Results shown in mmhos / $cm^2$

WHOLE EARTH

## ANALYTICAL REPORT FORM

Well Name: Lane Salt Lake — Date of Collection: 10 / 05 / 95

Pit Type: N / A — Date of Analysis: 10 / 05 /95

Client: Tipperary Corp. — Analyst: E. Werner

TPH Analyzer S/N: 01159 — VOC Analyzer S/N: N / A

Chromatograph S / N SA920043 — E.C. Analyzer: 07945-A14

ANALYSIS: TPH & BTEX

ANALYTICAL METHOD: Extraction by Means of EPA 418.1 (WEQP-06),

SAMPLE LOCATION: PIT AREA # 1

| | Location Bottom | Location Bottom | Location Bottom | Location Bottom | Location Bottom |
|---|---|---|---|---|---|
| TPH[1] | 160 | 107 | 263 | 391 | 23 |
| E.C.[2] | N / A | N / A | N / A | N / A | N / A |
| VOC[1] | N / A | N / A | N / A | N / A | N / A |
| Benzene[1] | N / D | N / D | N / D | N / D | N / D |
| Toluene[1] | N / D | N / D | N / D | N / D | N / D |
| Ethyl-Benzene[1] | N / D | N / D | N / D | N / D | N / D |
| Xylene[1] | N / D | N / D | N / D | N / D | N / D |

Temperature of sample: 72 $^{0}$F

Notes: 1. Results shown in mg / L (ppm).
2. Results shown in mmhos / cm$^2$

WHOLE EARTH

## ANALYTICAL REPORT FORM

Well Name: Lane Salt Lake — Date of Collection: 10 / 05 / 95

Pit Type: N / A — Date of Analysis: 10 / 05 /95

Client: Tipperary Corp. — Analyst: E. Werner

TPH Analyzer S/N: 01159 — VOC Analyzer S/N: N / A

Chromatograph S / N SA920043 — E.C. Analyzer: 07945-A14

ANALYSIS: TPH & BTEX

ANALYTICAL METHOD: Extraction by Means of EPA 418.1 (WEQP-06),

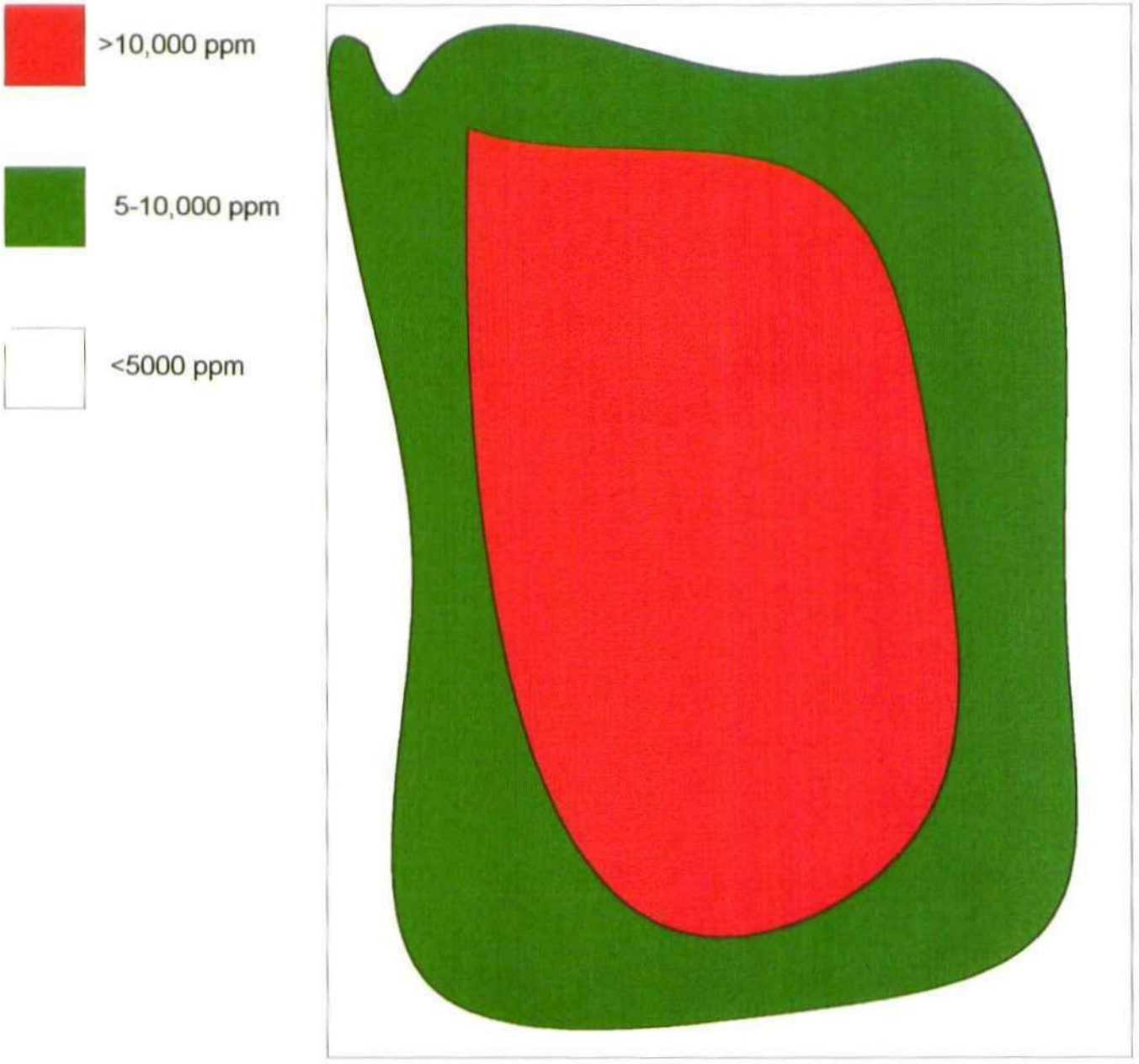
SAMPLE LOCATION: PIT AREA # 1

| | Location Bottom | Location Bottom | Location Bottom | Location Bottom | |
|---|---|---|---|---|---|
| TPH[1] | 163 | 4,600 | 4,210 | 770 | |
| E.C.[2] | N / A | N / A | N / A | N / A | |
| VOC[1] | N / A | N / A | N / A | N / A | |
| Benzene[1] | N / D | 2 | N / D | N / D | |
| Toluene[1] | N / D | N / D | N / D | N / D | |
| Ethyl-Benzene[1] | N / D | N / D | 1 | N / D | |
| Xylene[1] | N / D | N / D | N / D | N / D | |

Temperature of sample: 72 $^{0}$F

Notes: 1. Results shown in mg / L (ppm).
2. Results shown in mmhos / cm$^{2}$

Pit # 1
Hydrocarbon
Concentrations
Surface Depth

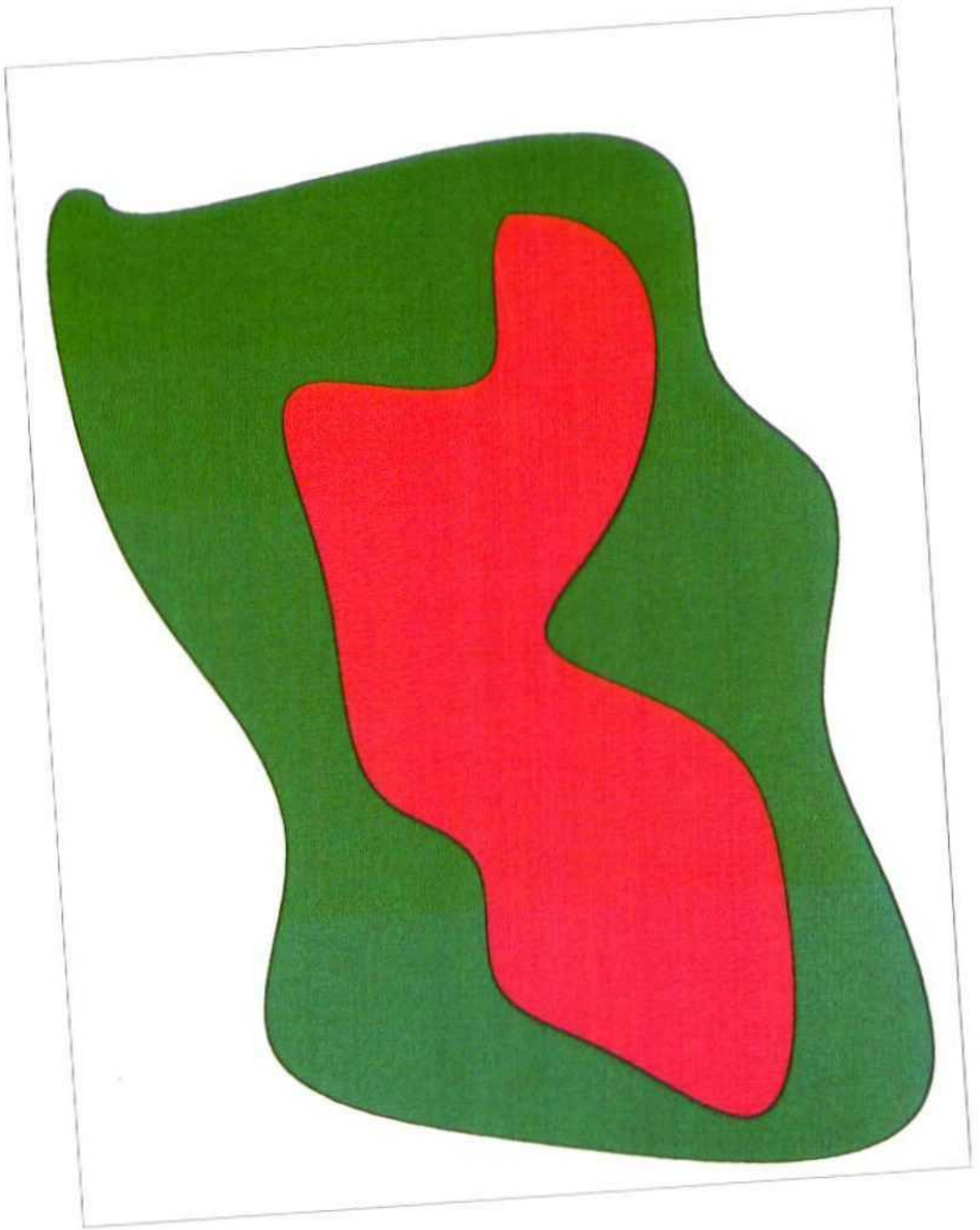


Pit # 1
Hydrocarbon
Concentrations
10' Depth

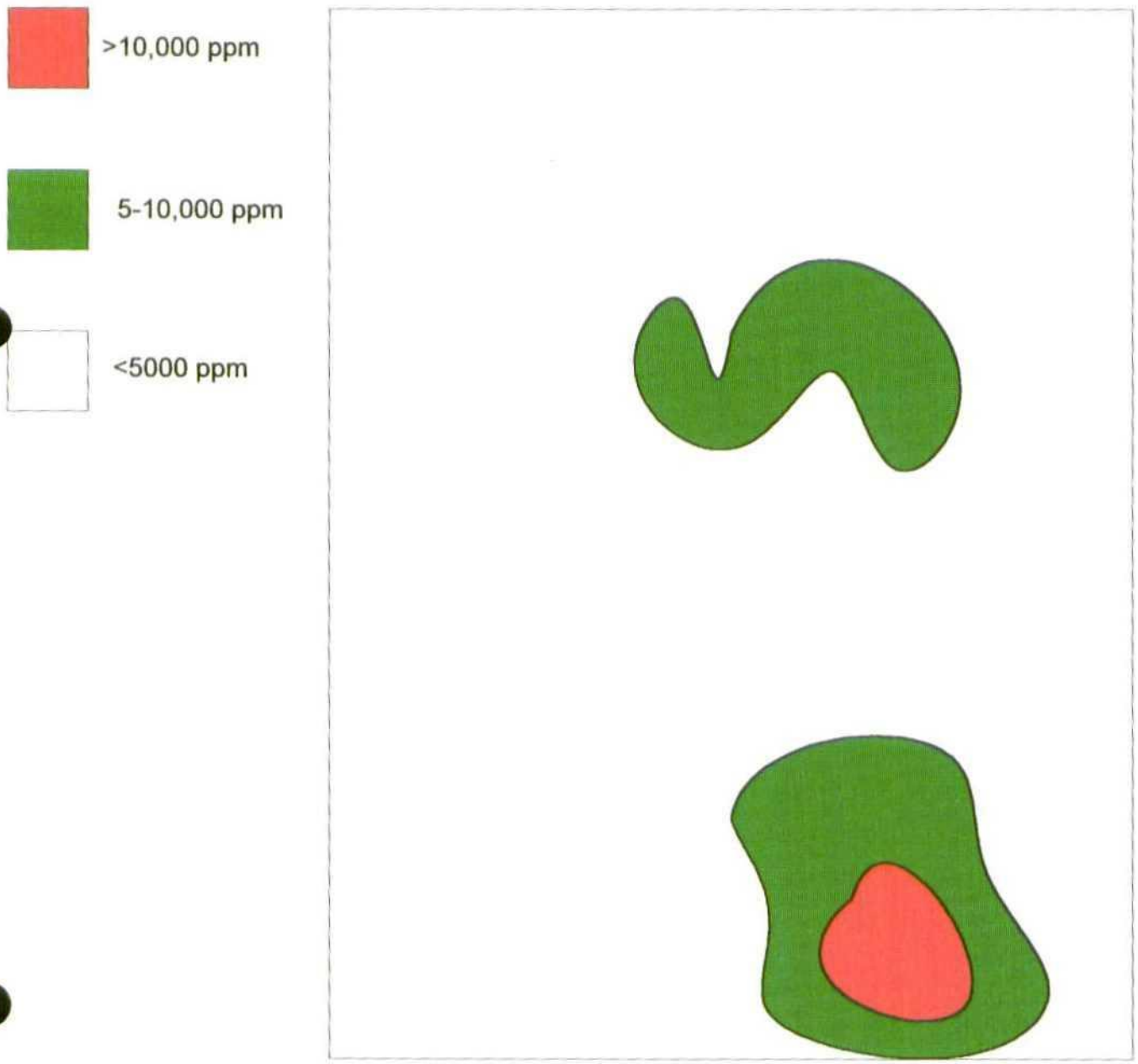
>10,000 ppm

5-10,000 ppm

<5000 ppm



Pit # 1
Hydrocarbon
Concentrations
20' Depth



## PIT AREA # 2

This area is described as the center pit having the approximate excavated dimensions of 150' east to west and 100' north to south. This pit was the second settling pit in the series and contained the highest hydrocarbon concentrations within the facility. The hydrocarbon concentrations tended to be heavier end paraffinic and asphaltic compounds with some limited aromatic fractions.

Once the netting and support posts were removed, excavation began at the southwestern corner of the pit and progressed to the east and north. Due to the close proximity to the perched water table, (average depth 5') the excavated areas were required to be vacuumed on an almost continual basis with part of the fluids being sent to pit 3 through a transfer pump and the balance being removed via vacuum truck to one of four disposal or reclamation facilities.

No north or south wall samples are shown on the final closure report as there were completely removed in the excavation process.

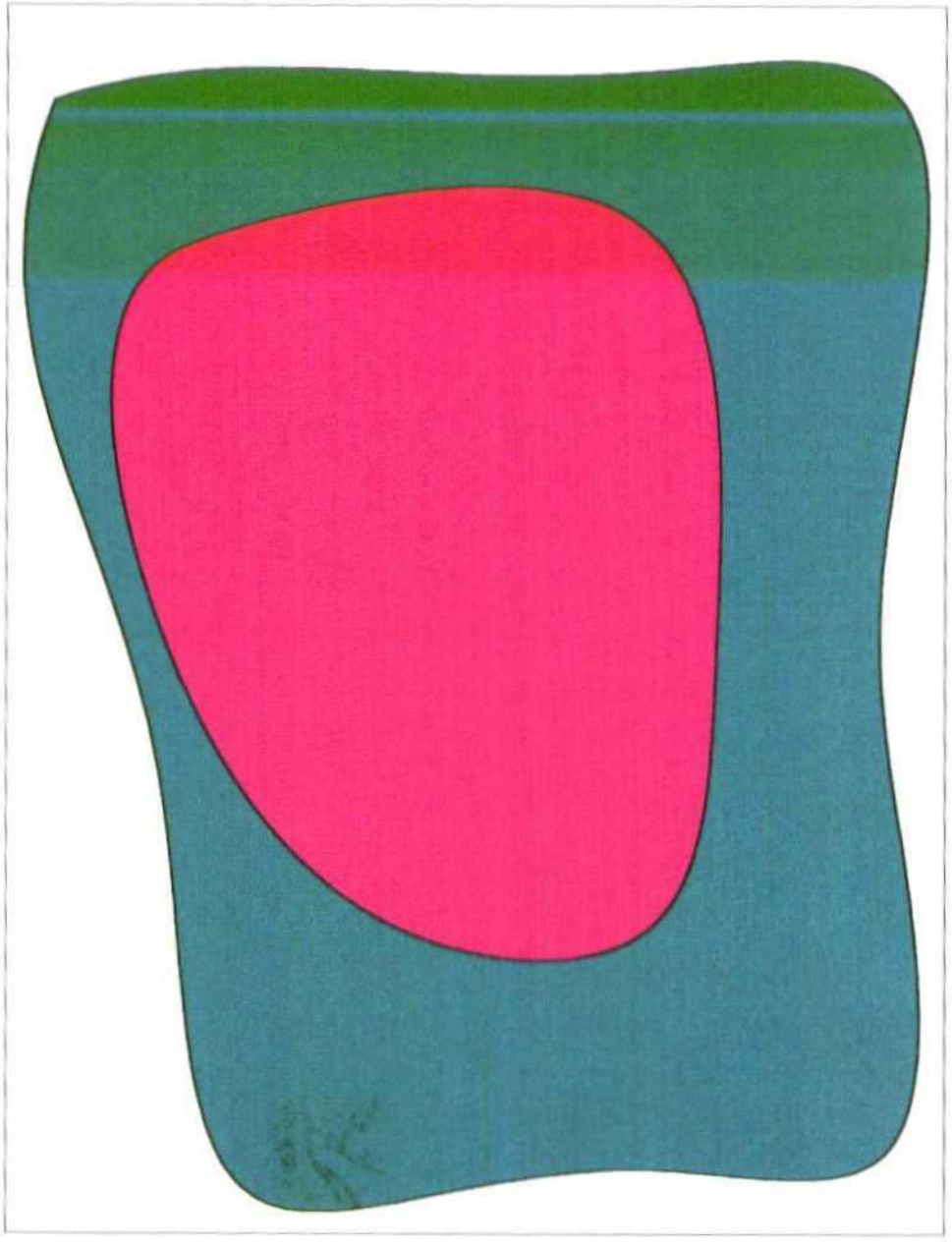
Pit # 2

Pit # 2
Hydrocarbon
Concentrations
Surface Depth

>10,000 ppm

5-10,000 ppm

<5000 ppm

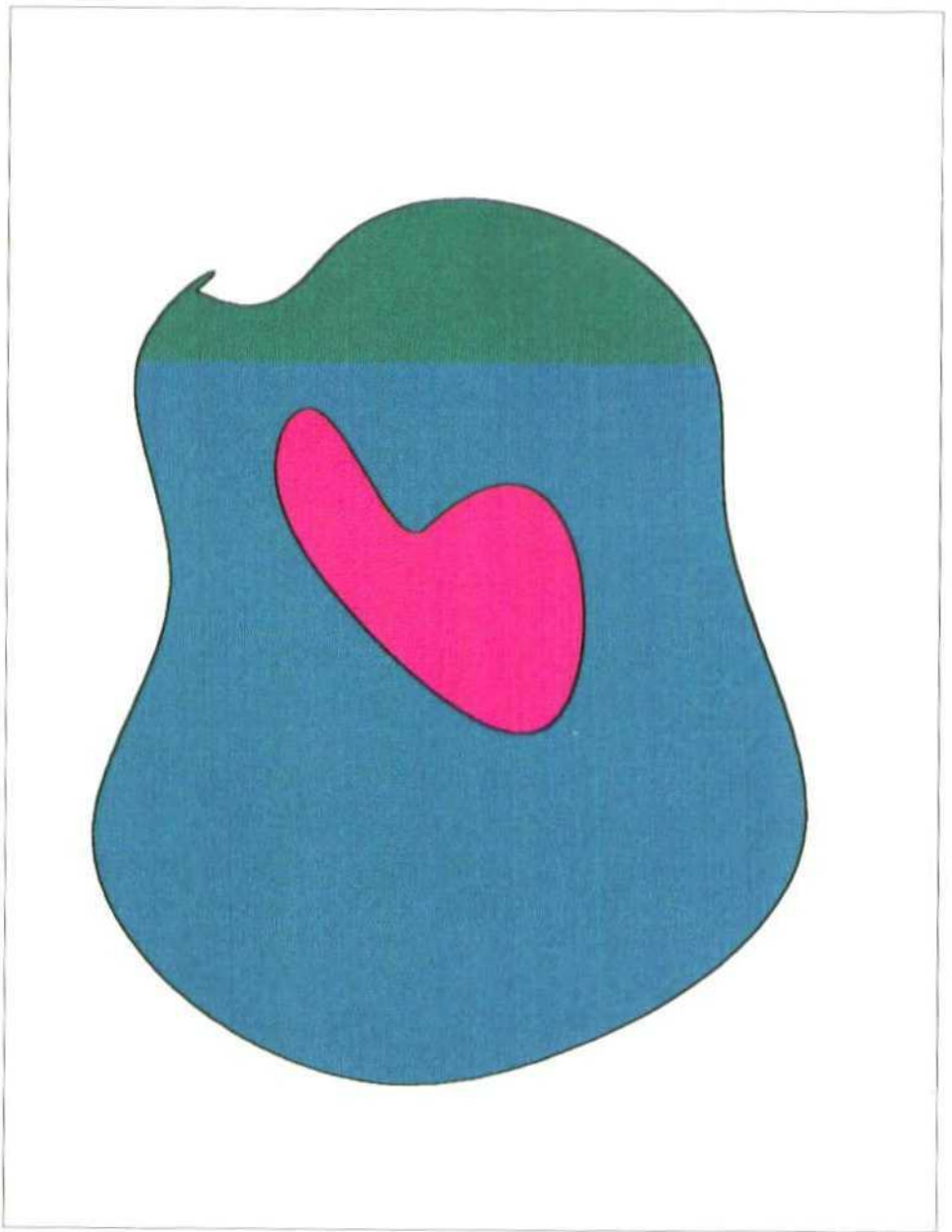


Pit # 2
Hydrocarbon
Concentrations
10' Depth

>10,000 ppm

5-10,000 ppm

<5000 ppm



Pit # 2
Hydrocarbon
Concentrations
20' Depth

Conflicts with data

>10,000 ppm

5-10,000 ppm

<5000 ppm

WHOLE EARTH

## ANALYTICAL REPORT FORM

Well Name: Lane Salt Lake

Date of Collection: 10 / 05 / 95

Pit Type: N / A

Date of Analysis: 10 / 05 /95

Client: Tipperary Corp.

Analyst: E. Werner

TPH Analyzer S/N: 01159

VOC Analyzer S/N: N / A

Chromatograph S / N SA920043

E.C. Analyzer: 07945-A14

ANALYSIS: TPH & BTEX

ANALYTICAL METHOD: Extraction by Means of EPA 418.1 (WEQP-06),

SAMPLE LOCATION: PIT AREA # 2

| | Location West Wall | Location West Wall | Location West Wall | Location West Wall | Location East Wall |
|---|---|---|---|---|---|
| TPH[1] | 3,560 | 4,310 | 1,120 | 765 | 4,120 |
| E.C.[2] | N / A | N / A | N / A | N / A | N / A |
| VOC[1] | N / A | N / A | N / A | N / A | N / A |
| Benzene[1] | N / D | 4 | N / D | N / D | 2 |
| Toluene[1] | N / D | N / D | N / D | N / D | N / D |
| Ethyl-Benzene[1] | N / D | N / D | N / D | N / D | N / D |
| Xylene[1] | N / D | 1 | N / D | N / D | N / D |

Temperature of sample: 72 °F

Notes: 1. Results shown in mg / L (ppm).
2. Results shown in mmhos / $cm^2$

WHOLE EARTH

## ANALYTICAL REPORT FORM

Well Name: Lane Salt Lake — Date of Collection: 10 / 05 / 95

Pit Type: N / A — Date of Analysis: 10 / 05 /95

Client: Tipperary Corp. — Analyst: E. Werner

TPH Analyzer S/N: 01159 — VOC Analyzer S/N: N / A

Chromatograph S / N SA920043 — E.C. Analyzer: 07945-A14

ANALYSIS: TPH & BTEX

ANALYTICAL METHOD: Extraction by Means of EPA 418.1 (WEQP-06),

SAMPLE LOCATION: PIT AREA # 2

| | Location EastWall | Location East Wall | Location East Wall | Location Bottom | Location Bottom |
|---|---|---|---|---|---|
| TPH[1] | 563 | 3,620 | 822 | 8 | 2,350 |
| E.C.[2] | N / A | N / A | N / A | N / A | N / A |
| VOC[1] | N / A | N / A | N / A | N / A | N / A |
| Benzene[1] | N / D | N / D | N / D | N / D | N / D |
| Toluene[1] | N / D | N / D | N / D | N / D | N / D |
| Ethyl-Benzene[1] | N / D | N / D | N / D | N / D | N / D |
| Xylene[1] | N / D | N / D | N / D | N / D | N / D |

Temperature of sample: 72 °F

Notes: 1. Results shown in mg / L (ppm).
2. Results shown in mmhos / $cm^2$

WHOLE EARTH

## ANALYTICAL REPORT FORM

Well Name: Lane Salt Lake

Date of Collection: 10 / 05 / 95

Pit Type: N / A

Date of Analysis: 10 / 05 /95

Client: Tipperary Corp.

Analyst: E. Werner

TPH Analyzer S/N: 01159

VOC Analyzer S/N: N / A

Chromatograph S / N SA920043

E.C. Analyzer: 07945-A14

ANALYSIS: TPH & BTEX

ANALYTICAL METHOD: Extraction by Means of EPA 418.1 (WEQP-06),

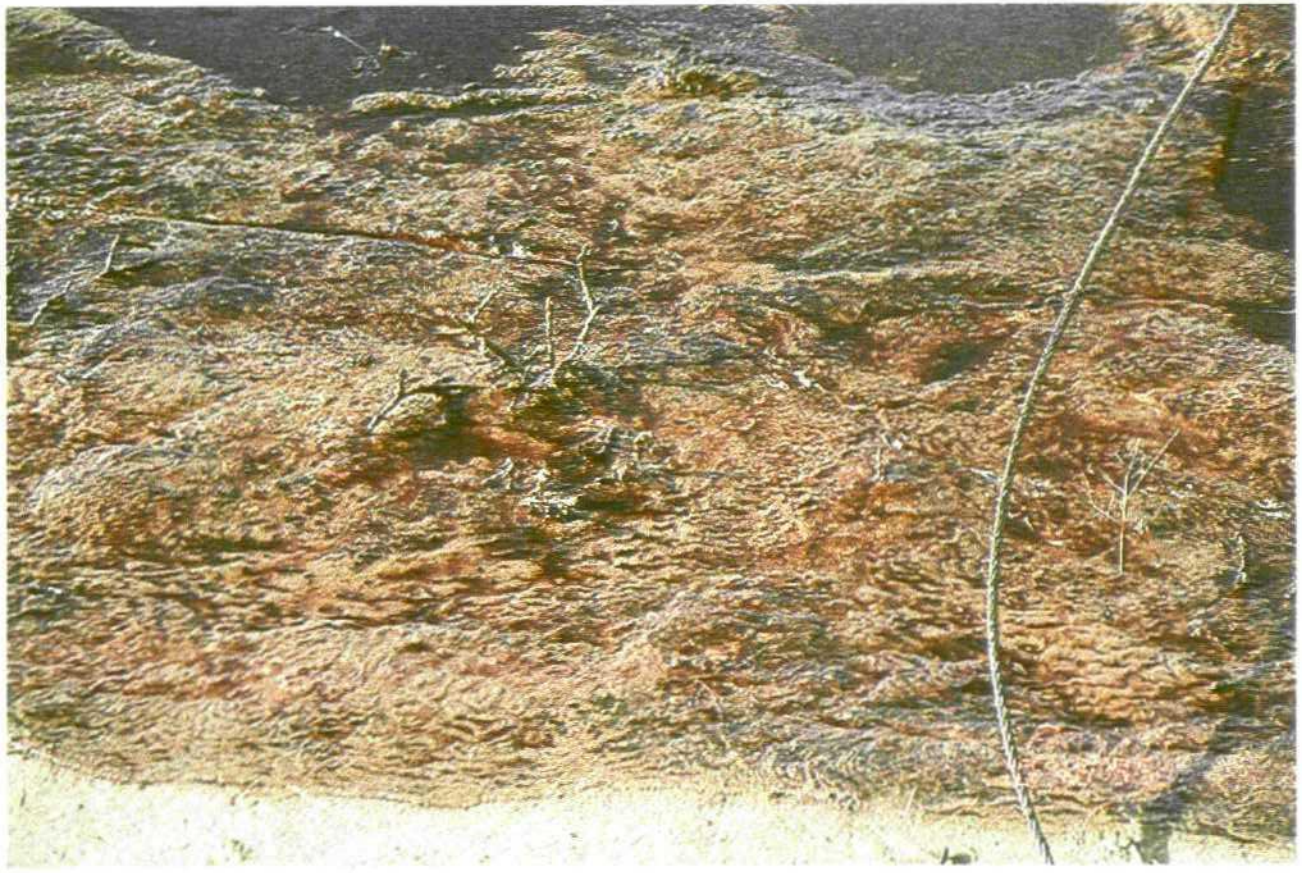
SAMPLE LOCATION: PIT AREA # 2

| | Location Bottom | Location Bottom | Location Bottom | Location Bottom | Location Bottom |
|---|---|---|---|---|---|
| TPH[1] | 1,230 | 3,470 | 654 | 970 | 654 |
| E.C.[2] | N / A | N / A | N / A | N / A | N / A |
| VOC[1] | N / A | N / A | N / A | N / A | N / A |
| Benzene[1] | N / D | N / D | N / D | N / D | 2 |
| Toluene[1] | N / D | N / D | N / D | N / D | N / D |
| Ethyl-Benzene[1] | N / D | N / D | N / D | N / D | N / D |
| Xylene[1] | N / D | N / D | N / D | N / D | N / D |

Temperature of sample: 72 $^{0}$F

Notes: 1. Results shown in mg / L (ppm).
2. Results shown in mmhos / cm$^{2}$


790E-LC
10 AUG 95




11 '95


Pit # 3

## PIT AREA # 3

This area is described as the northern most pit within the facility having the approximate dimensions of 125' east to west and 100' north to south. This pit was used as the final settling pit for the facility. The hydrocarbon concentrations tended to have few heavier end paraffinic and asphaltic compounds hand higher concentrations of aromatics.

The contamination tended to end at the upper vadose zone of the pit (approximately 3' below ground level) and thus rather shallow. This shallow table resulted in a rather un-aggregated sub-strait making excavation extremely difficult and also required continual vacuuming of the pit fluids into disposal trucks.

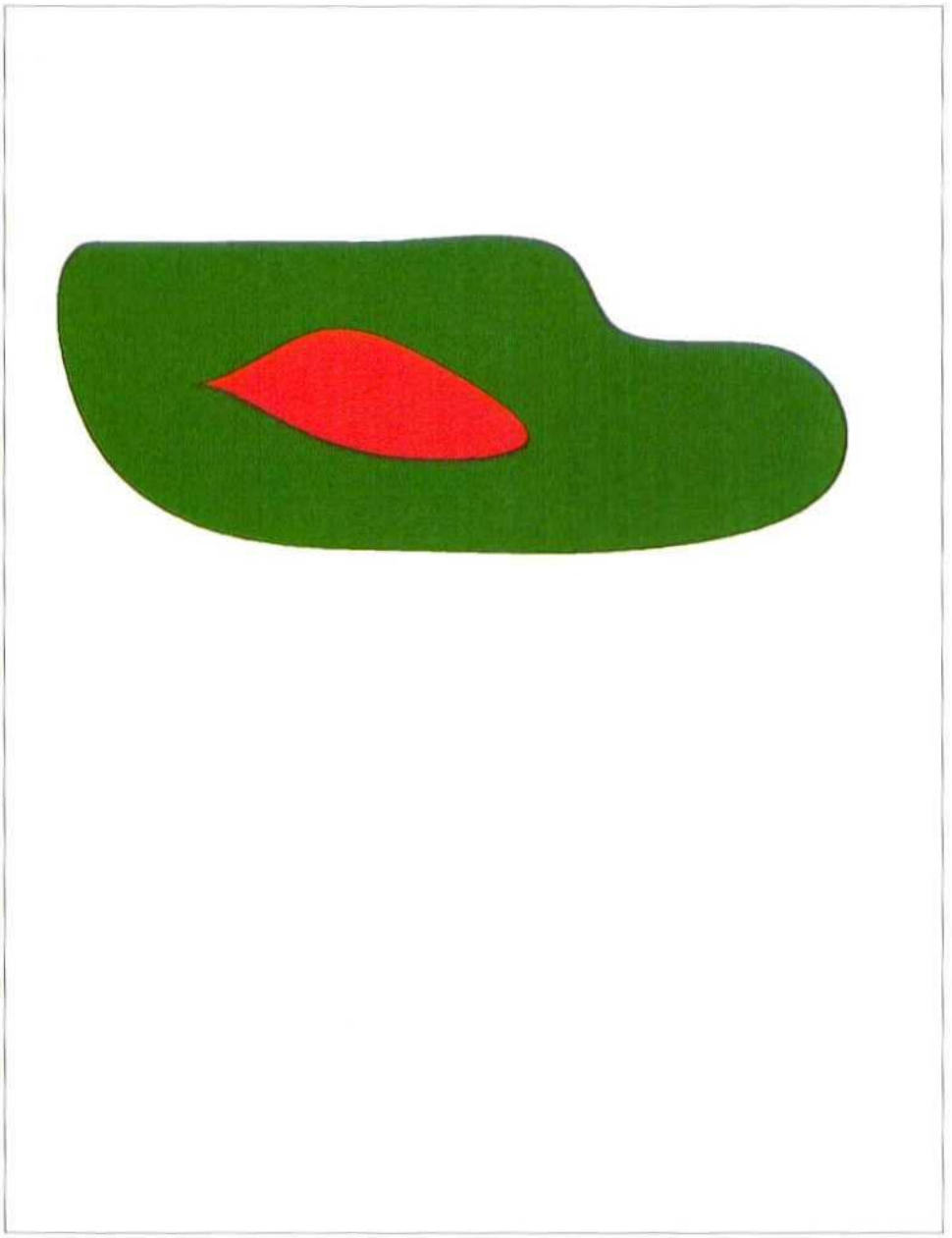
With the hydrocarbon fractions tending to the lighter ends, remediation of the contaminated soils was not at all difficult. It simply required that the excavated materials be brought to surface and dried out. Much of the excavated material from Pit # 3 was used as a surface cover for the entire location prior to the final layer of topsoil being applied.

Pit # 3
Hydrocarbon
Concentrations
Surface Depth

>10,000 ppm

5-10,000 ppm

<5000 ppm

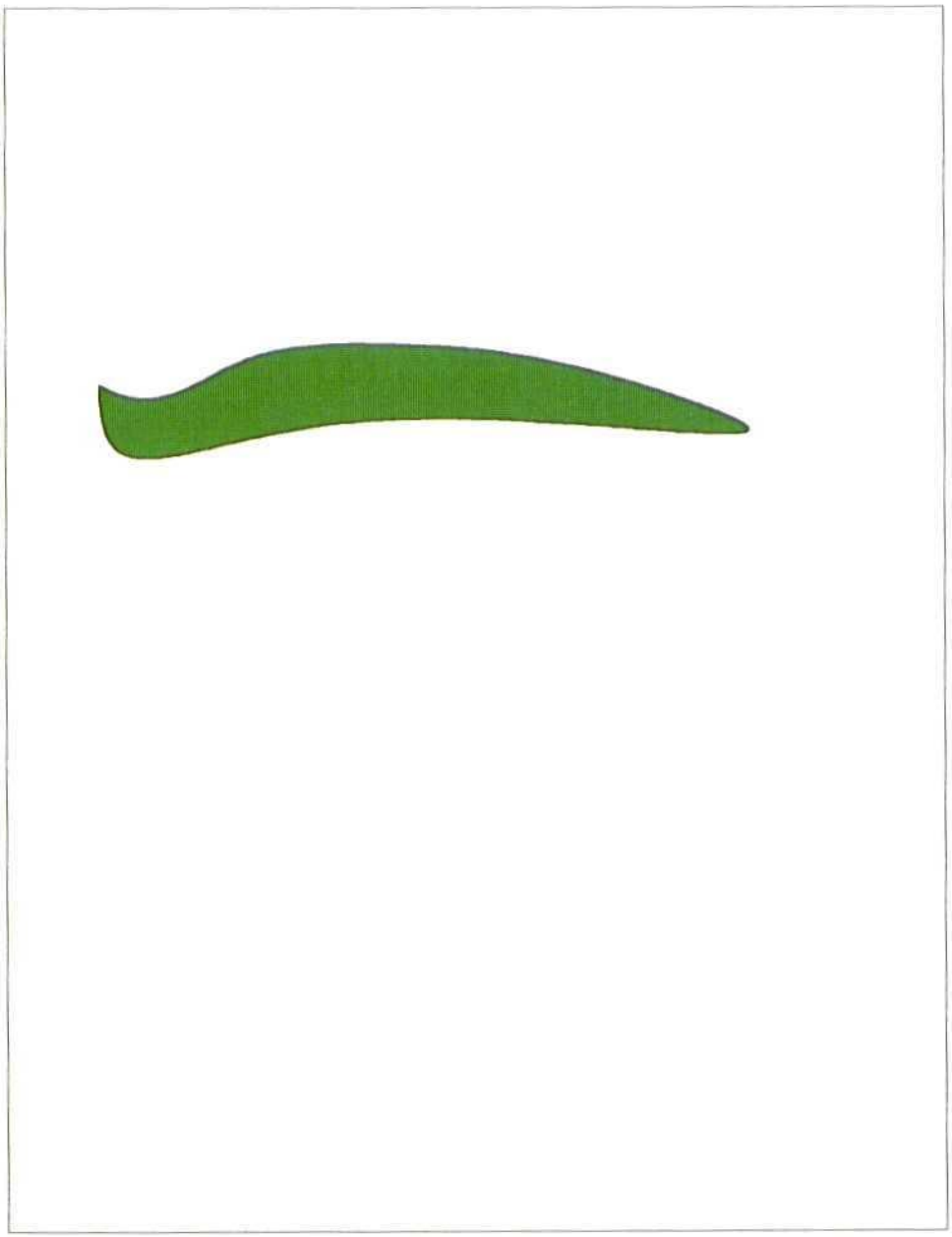


Pit # 3
Hydrocarbon
Concentrations
10' Depth

>10,000 ppm

5-10,000 ppm

<5000 ppm



WHOLE EARTH

## ANALYTICAL REPORT FORM

Well Name: Lane Salt Lake

Date of Collection: 10 / 05 / 95

Pit Type: N / A

Date of Analysis: 10 / 05 /95

Client: Tipperary Corp.

Analyst: E. Werner

TPH Analyzer S/N: 01159

VOC Analyzer S/N: N / A

Chromatograph S / N SA920043

E.C. Analyzer: 07945-A14

ANALYSIS: TPH & BTEX

ANALYTICAL METHOD: Extraction by Means of EPA 418.1 (WEQP-06),

SAMPLE LOCATION: PIT AREA # 3

| | Location EastWall | Location East Wall | Location East Wall | Location North Wall | Location North Wall |
|---|---|---|---|---|---|
| TPH[1] | 135 | 1,780 | 332 | 2,340 | 3,330 |
| E.C.[2] | N / A | N / A | N / A | N / A | N / A |
| VOC[1] | N / A | N / A | N / A | N / A | N / A |
| Benzene[1] | N / D | N / D | N / D | N / D | 3 |
| Toluene[1] | N / D | N / D | N / D | N / D | 1 |
| Ethyl-Benzene[1] | N / D | N / D | N / D | N / D | 1 |
| Xylene[1] | N / D | N / D | N / D | N / D | N / D |

Temperature of sample: 72 °F

Notes: 1. Results shown in mg / L (ppm).
2. Results shown in mmhos / $cm^2$

WHOLE EARTH

## ANALYTICAL REPORT FORM

Well Name: Lane Salt Lake

Date of Collection: 10 / 05 / 95

Pit Type: N / A

Date of Analysis: 10 / 05 /95

Client: Tipperary Corp.

Analyst: E. Werner

TPH Analyzer S/N: 01159

VOC Analyzer S/N: N / A

Chromatograph S / N SA920043

E.C. Analyzer: 07945-A14

ANALYSIS: TPH & BTEX

ANALYTICAL METHOD: Extraction by Means of EPA 418.1 (WEQP-06),

SAMPLE LOCATION: PIT AREA # 3

| | Location WestWall | Location West Wall | Location West Wall | Location Bottom | Location Bottom |
|---|---|---|---|---|---|
| TPH[1] | 677 | 4,160 | 3,950 | 126 | 778 |
| E.C.[2] | N / A | N / A | N / A | N / A | N / A |
| VOC[1] | N / A | N / A | N / A | N / A | N / A |
| Benzene[1] | N / D | 5 | 5 | N / D | N / D |
| Toluene[1] | N / D | N / D | 3 | N / D | N / D |
| Ethyl-Benzene[1] | N / D | N / D | N / D | N / D | N / D |
| Xylene[1] | N / D | 2 | 3 | N / D | N / D |

Temperature of sample: 72 °F

Notes: 1. Results shown in mg / L (ppm).
2. Results shown in mmhos / $cm^2$

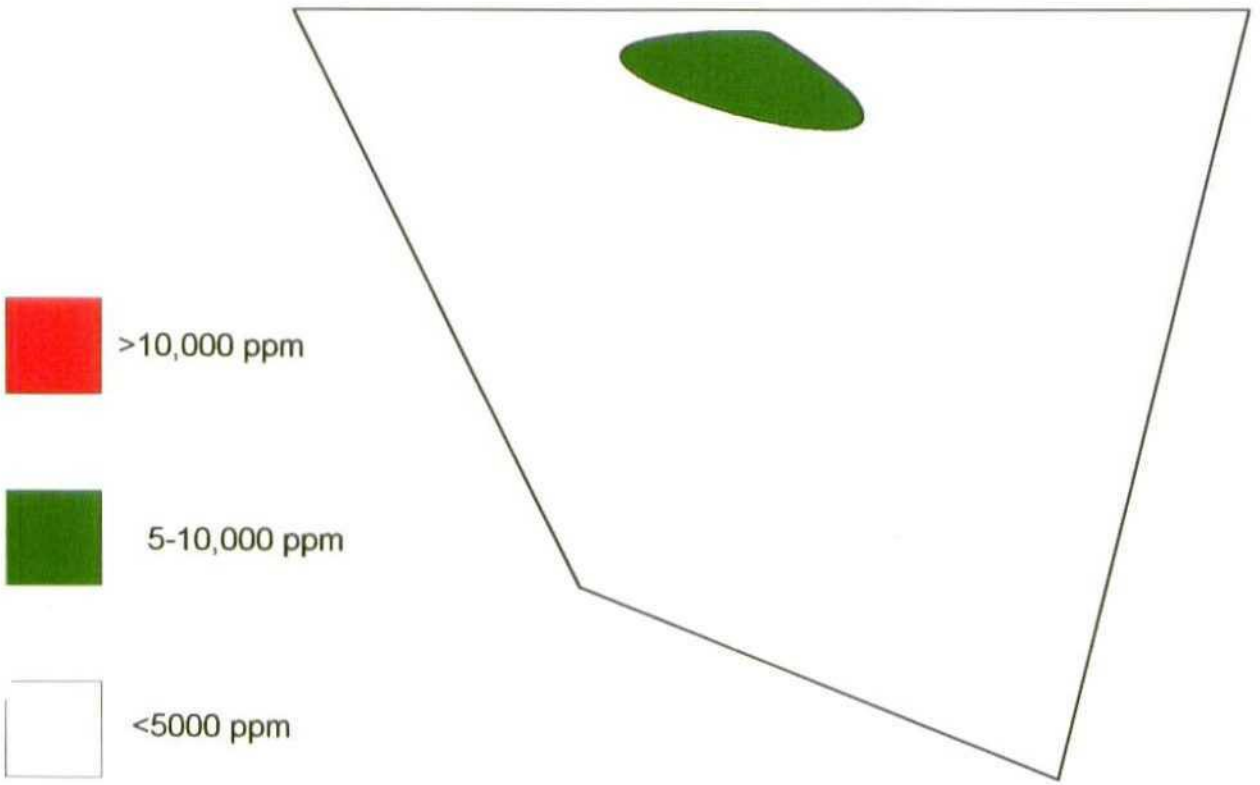
Pit # 4

## PIT AREA # 4

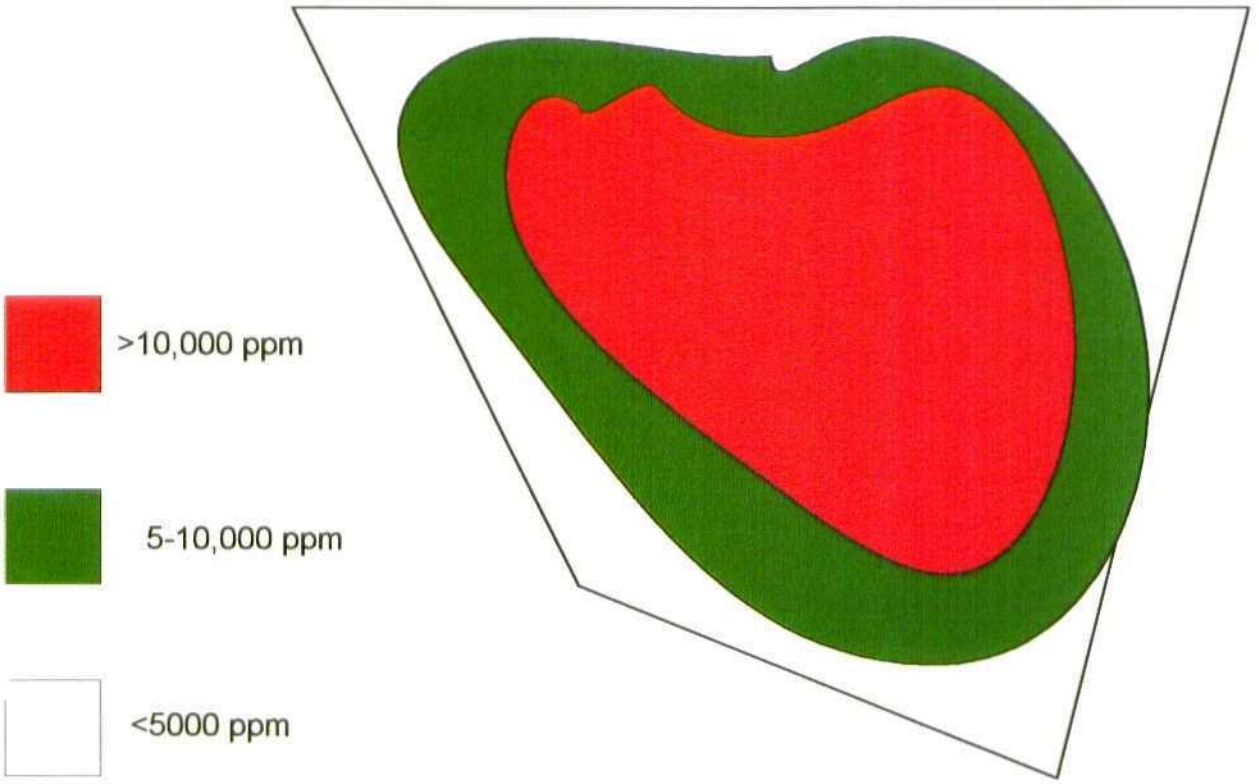
This area is described as a triangular shaped area extending from the southeastern corner of Pit # 1 toward toe tanks for a distance of approximately 50'. This pit was apparently operated for a short period of time during or before the erection of Pit # 1 and was excavated to a depth of approximately 20' below ground level.

The contamination consisted of significant concentrations of paraffins with few light ends remaining. Because of the relatively small horizontal spread of the pit, the water table did not present a significant problem as all excavated areas could be immediatly back-filled. However, remediation of the contaminated soils proved to be extremely difficult and was accomplished primarily through dilution with soils obtained from within the facility.

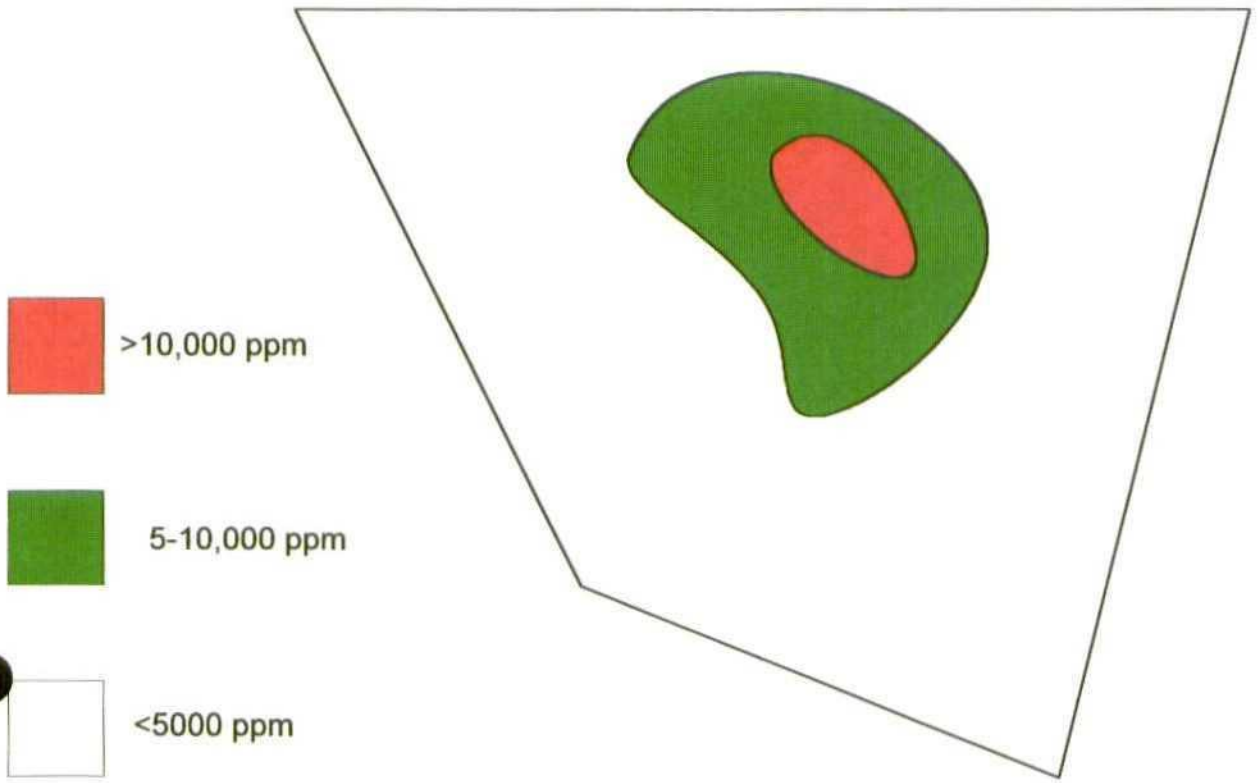
Pit # 4
Hydrocarbon
Concentrations
Surface Depth



Pit # 4
Hydrocarbon
Concentrations
10' Depth



Pit # 4
Hydrocarbon
Concentrations
20' Depth



WHOLE EARTH

## ANALYTICAL REPORT FORM

Well Name: Lane Salt Lake — Date of Collection: 10 / 05 / 95

Pit Type: N / A — Date of Analysis: 10 / 05 /95

Client: Tipperary Corp. — Analyst: E. Werner

TPH Analyzer S/N: 01159 — VOC Analyzer S/N: N / A

Chromatograph S / N SA920043 — E.C. Analyzer: 07945-A14

ANALYSIS: TPH & BTEX

ANALYTICAL METHOD: Extraction by Means of EPA 418.1 (WEQP-06),

SAMPLE LOCATION: PIT AREA # 4

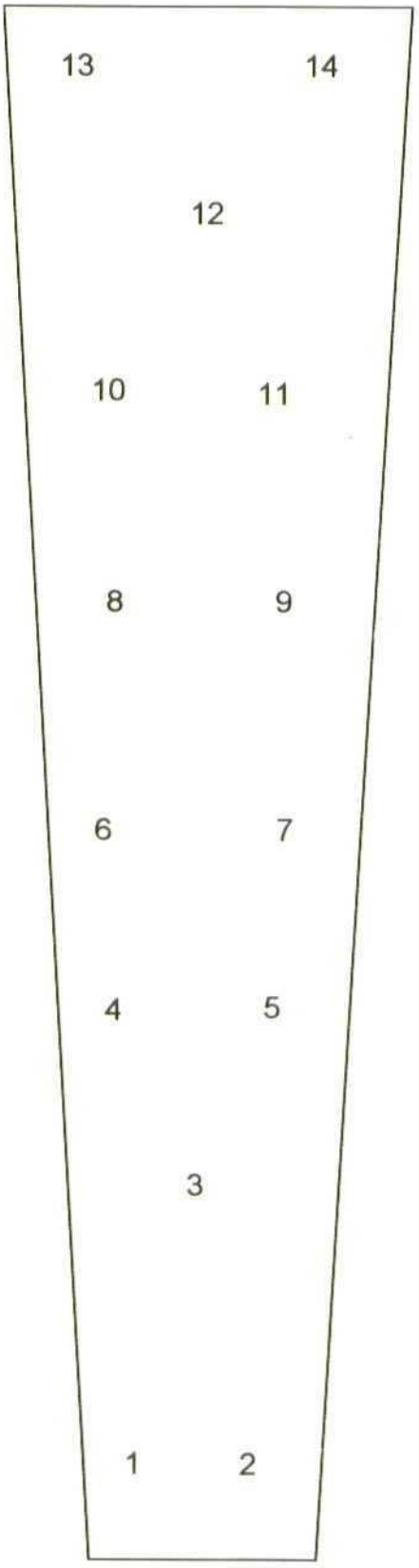
| | Location WestWall | Location East Wall | Location Bottom | | |
|---|---|---|---|---|---|
| TPH[1] | 4,660 | 3,250 | 26 | | |
| E.C.[2] | N / A | N / A | N / A | | |
| VOC[1] | N / A | N / A | N / A | | |
| Benzene[1] | N / D | 1 | N / D | | |
| Toluene[1] | N / D | N / D | N / D | | |
| Ethyl-Benzene[1] | N / D | N / D | N / D | | |
| Xylene[1] | N / D | N / D | N / D | | |

Temperature of sample: 72 °F

Notes: 1. Results shown in mg / L (ppm).
2. Results shown in mmhos / $cm^2$

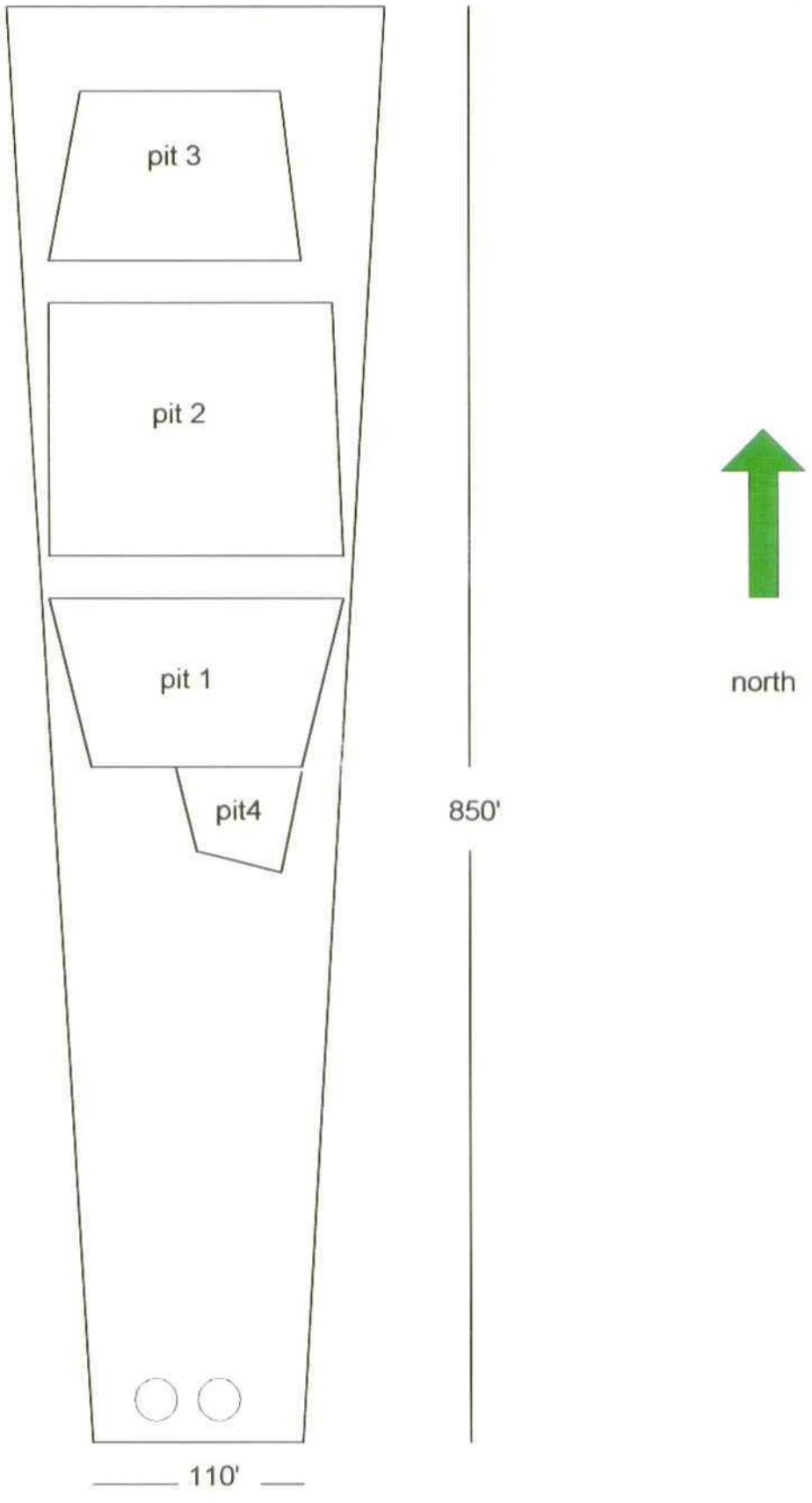
## FINAL REMEDIATION & SITE RESTORATION

At the conclusion of the excavation of the four pits, the entire location was leveled, (with a slight crown to the center so as to insure positive drainage). Additional topsoils from outside the site perimeter were used to cover the entire location. A new fence was erected and the area will be re-seeded by the landowner in the spring.




Final Spread Zone
Sample Locations

Lane Salt Lake
Brine Disposal
Facility



WHOLE EARTH

## ANALYTICAL REPORT FORM

**Well Name:** Lane Salt Lake — **Date of Collection:** 10 / 05 / 95

**Pit Type:** N / A — **Date of Analysis:** 10 / 05 /95

**Client:** Tipperary Corp. — **Analyst:** E. Werner

**TPH Analyzer S/N:** 01159 — **VOC Analyzer S/N:** N / A

**Chromatograph S / N** SA920043 — **E.C. Analyzer:** 07945-A14

**ANALYSIS:** TPH & BTEX

**ANALYTICAL METHOD:** Extraction by Means of EPA 418.1 (WEQP-06),

**SAMPLE LOCATION:** FINAL SPREAD

| | Location #1 | Location #2 | Location #3 | Location #4 | Location #5 |
|---|---|---|---|---|---|
| TPH[1] | 4,380 | 4,230 | 4,280 | 2,960 | 4,560 |
| E.C.[2] | N / A | N / A | N / A | N / A | N / A |
| VOC[1] | N / A | N / A | N / A | N / A | N / A |
| Benzene[1] | N / D | N / D | N / D | 2 | N / D |
| Toluene[1] | N / D | N / D | N / D | N / D | N / D |
| Ethyl-Benzene[1] | N / D | N / D | N / D | N / D | N / D |
| Xylene[1] | N / D | N / D | N / D | N / D | N / D |

**Temperature of sample:** 72 $^{0}$F

**Notes:** 1. Results shown in mg / L (ppm).
2. Results shown in mmhos / cm$^{2}$

WHOLE EARTH

## ANALYTICAL REPORT FORM

Well Name: Lane Salt Lake — Date of Collection: 10 / 05 / 95

Pit Type: N / A — Date of Analysis: 10 / 05 /95

Client: Tipperary Corp. — Analyst: E. Werner

TPH Analyzer S/N: 01159 — VOC Analyzer S/N: N / A

Chromatograph S / N SA920043 — E.C. Analyzer: 07945-A14

ANALYSIS: TPH & BTEX

ANALYTICAL METHOD: Extraction by Means of EPA 418.1 (WEQP-06),

SAMPLE LOCATION: FINAL SPREAD

| | Location #6 | Location #7 | Location #8 | Location #9 | Location #10 |
|---|---|---|---|---|---|
| TPH[1] | 4,820 | 3,150 | 4,730 | 3,930 | 4,750 |
| E.C.[2] | N / A | N / A | N / A | N / A | N / A |
| VOC[1] | N / A | N / A | N / A | N / A | N / A |
| Benzene[1] | 3 | N / D | N / D | N / D | N / D |
| Toluene[1] | N / D | N / D | 1 | N / D | N / D |
| Ethyl-Benzene[1] | 1 | N / D | N / D | N / D | 1 |
| Xylene[1] | N / D | N / D | N / D | N / D | N / D |

Temperature of sample: 72 $^{0}$F

Notes: 1. Results shown in mg / L (ppm).
2. Results shown in mmhos / cm$^{2}$

WHOLE EARTH

## ANALYTICAL REPORT FORM

Well Name: Lane Salt Lake — Date of Collection: 10 / 05 / 95

Pit Type: N / A — Date of Analysis: 10 / 05 /95

Client: Tipperary Corp. — Analyst: E. Werner

TPH Analyzer S/N: 01159 — VOC Analyzer S/N: N / A

Chromatograph S / N SA920043 — E.C. Analyzer: 07945-A14

ANALYSIS: TPH & BTEX

ANALYTICAL METHOD: Extraction by Means of EPA 418.1 (WEQP-06),

SAMPLE LOCATION: FINAL SPREAD

| | Location #11 | Location #12 | Location #13 | Location #14 | |
|---|---|---|---|---|---|
| TPH[1] | 2,840 | 4,150 | 4,850 | 4,700 | |
| E.C.[2] | N / A | N / A | N / A | N / A | |
| VOC[1] | N / A | N / A | N / A | N / A | |
| Benzene[1] | N / D | N / D | N / D | N / D | |
| Toluene[1] | N / D | N / D | N / D | N / D | |
| Ethyl-Benzene[1] | N / D | N / D | N / D | N / D | |
| Xylene[1] | N / D | N / D | N / D | N / D | |

Temperature of sample: 72 $^{0}$F

Notes: 1. Results shown in mg / L (ppm).
2. Results shown in mmhos / cm$^{2}$