



39189

SAMPLING ACTIVITIES REPORT  
FOR  
ALLIED CHEMICAL TAILINGS POND  
BOULDER, COLORADO

TDD R8-8501-02

EPA REGIONAL SITE PROJECT OFFICER: DAVID SCHALLER

FIT PROJECT OFFICER: JOHN HADLEY

SUBMITTED TO: KEITH SCHWAB, FIT-RPO  
JUDY WONG, REM-RPO

DATE SUBMITTED: MARCH 25, 1985

PROPERTY AND THE ADJACENT AREA (within 5/8 mile) CONT.

Map ID

6

VISTA Address*:	HENDRICKS MINING MILLING 3000 N 63RD ST E VALMONT RD BOULDER, CO 80302	VISTA ID#:	192224
		Distance/Direction:	0.29 Mi / W
		Plotted as:	Point

NFRAP / SRC# 18	EPA ID:	COD078348737
	Agency ID:	0800156

Agency Address:	HENDRICKS MINING MILLIN 3000 N 63RD ST E VALMONT RD BOULDER, CO 80302
EPA Region:	8
Congressional District:	0
Federal Facility:	NOT A FEDERAL FACILITY
Facility Ownership:	NOT AVAILABLE
Site Incident Category:	MINES/TAILINGS
Federal Facility Docket:	Agency Code ( )
NPL Status:	NOT ON NPL
Incident Type:	Unknown
Proposed NPL Update #:	0
Final NPL Update #:	0
Financial Management System ID:	0825
Latitude:	0
Longitude:	0
Lat/Long Source:	Agency Code ( )
Lat/Long Accuracy:	Unknown
Dioxin Tier:	Unknown
USGS Hydro Unit:	10190005
RCRA Indicator:	Unknown

Type:	DISCOVERY	Lead Agency:	EPA FUND-FINANCED
Qualifier:	UNKNOWN	Category:	Unknown
Name:	NOT REPORTED	Actual Start Date:	NOT REPORTED
Plan Status:	Unknown	Actual Completion Date:	SEPTEMBER 1, 1980

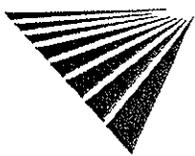
Type:	UNKNOWN	Lead Agency:	EPA FUND-FINANCED
Qualifier:	UNKNOWN	Category:	Unknown
Name:	NOT REPORTED	Actual Start Date:	NOT REPORTED
Plan Status:	Unknown	Actual Completion Date:	DECEMBER 1, 1982

Type:	PRELIMINARY ASSESSMENT	Lead Agency:	EPA FUND-FINANCED
Qualifier:	LOWER PRIORITY	Category:	Unknown
Name:	NOT REPORTED	Actual Start Date:	NOT REPORTED
Plan Status:	Unknown	Actual Completion Date:	AUGUST 1, 1982

Type:	UNKNOWN	Lead Agency:	EPA FUND-FINANCED
Qualifier:	UNKNOWN	Category:	Unknown
Name:	NOT REPORTED	Actual Start Date:	NOT REPORTED
Plan Status:	Unknown	Actual Completion Date:	SEPTEMBER 1, 1982

Site Description: HAZARDOUS MATERIAL GENERATED: UNSTABLE MINE TAILINGS WITH RADIUM RADON. BEGAN OPERATION ON AN UNKNOWN DATE AS A FACILITY MILLING VARIOUS ORES. ONLY GOLD SLIVER HAVE BEEN PROCESSED RECENTLY. WAS STILL ACTIVE IN 9/82.

Alias Name: ALLIED PILE



\* VISTA address includes enhanced city and ZIP.

For more information call VISTA Information Solutions, Inc. at 1 - 800 - 767 - 0403.

Report ID: 000808204

Date of Report: August 29, 2000

Version 2.6.1

Page #16

2

SAMPLING REPORT  
ALLIED CHEMICAL TAILINGS  
BOULDER COUNTY, COLORADO  
TDD R8-8501-02

I. INTRODUCTION

This report has been prepared to satisfy the requirements of Technical Directive Document (TDD) R8-8501-02 issued to Ecology and Environment's Field Investigation Team (E&E FIT) by the Region VIII U.S. Environmental Protection Agency (EPA). Sampling of Allied Chemical Tailings located in Boulder County (Figure 1) was conducting this investigation were Ken Moll, drilling supervisor; Karl Ford, sampler; and John Hadley, Project Officer. FIT was accompanied by Phil Nyberg, EPA Radiation Group as a radiation monitor.

The scope of work included conducting a geophysical study, installing four monitoring wells, and sampling ground water, surface water, soils and sediments. Two holes were drilled and found to be dry. Consequently the holes were not completed as wells. Samples were taken from the borings.

II. OBJECTIVES

The objective of this investigation was to determine the existence and extent of contamination resulting from disposal of radioactive and precious metal tailings from a mill to the west of the site (Figure 2). This investigation was tasked to determine ground water characteristics of the site. Because previous sampling activities failed to generate this information. FIT was tasked to install four wells to determine the presence and extent of ground water contamination, in addition to sampling surface water, soil, and sediment.

### III. SITE DESCRIPTION

The Allied Chemical tailings pond is located in the southwest 1/4 of the southwest 1/4 of Section 23, Township 1 North, Range 70 West, of the 6th Principal Meridian (Figure 1). The tailings pond is adjacent to a mill located northeast of Boulder near the intersection of Valmont Road and 63rd Road. Access to the area is gained through the Hendricks Mill gate on 63rd Road.

The Cretaceous Pierre Shale underlies the site and is exposed in some areas. The facility is located near the top of this formation. The shale may be in excess of 4,000 feet thick at this location and dips locally at 8° to the east (Scott & Cobban, 1965). Other areas of the site are mantled with the Slocum Alluvium, consisting of coarse gravel with some boulder-size fragments. The Valmont dike, a basaltic intrusive, forms the northern site boundary for the pond. The shale adjacent to the dike was baked during intrusion. The dike may act as a semi-permeable barrier to ground water flow.

The facility began operation in 1936 when St. Joe's Mineral Corporation completed construction of the mill. St. Joe's processed locally mined fluorspar at the mill. Fluorspar ( $\text{CaF}_2$ ) is the mineralogical name for calcium fluoride. This compound was used to produce hydrofluoric acid. Allied Chemical bought the mill and surrounding land in 1941. They continued to process fluorspar ore. Allied's ore was 50 percent rich in fluorspar with associated uranium and radium. Milling of the ore produced tailings containing radioactive wastes. Allied processed about 100 tons of ore per day. When Allied owned the tailings pond, a spill occurred in which wave action carried tailings over a low spot in Valmont Dike. The spill was cleaned up, but traces are still in evidence.

Filling of the tailings pond must have begun shortly after the mill was constructed. Current operators speculate that some excavation into the Pierre Shale took place before disposal of mill waste began. The tailings pond contains approximately 41,000 cubic

yards of tailings and covers nearly 20 acres. It is located on the southern slope of Valmont Dike. The dike stabilizes this flank of the tailings. An earthen berm approximately 40 feet high contains the tailings on the east end of the pond. A second berm approximately 20 feet high is constructed about 1,000 feet east of the major berm. The area behind the second berm serves as a catchment basin in case of failure of the primary berm. Within this area are several smaller areas showing evidence of disturbance to the topsoil.

During milling operations, Allied Chemical produced more water than could be contained in the tailings pond. According to Mr. Hendricks, an arrangement between Allied Chemical and the Public Service Company provided for the excess water to be pumped from the pond over the ridge and into Valmont Reservoir. An intermediate holding pond was located atop the ridge. This pond probably served as a settling pond prior to delivery of water to the reservoir (Figure 1).

The mill and property were sold in 1974 to Tusco, a firm based in Commerce City, Colorado. Tusco leases the mill and facilities to Hendricks Milling Company, owned by Mr. Thomas Hendricks. Hendricks Milling Company currently uses the mill to process small amounts of gold and silver ore.

Public Service Company has placed an undetermined amount of coal fly ash in the area immediately east of the mill property. The ash is uncovered, and there is a potential for ash to be transported onto mill property by surface runoff and wind erosion. Both Hendricks and Tusco have expressed concern that contaminants possibly emanating from the ash piles might be attributed to the mill operation. Sampling activities in this area must attempt to differentiate between the two potential sources for contamination.

### III. FIELD OPERATIONS

#### A. GEOPHYSICAL STUDY

On Friday, February 8, 1985, FIT members Marc Gesink, Ken Moll, and John Hadley, conducted a geophysical survey of the Allied Chemical tailings site. A Geonics EM-34 Terrain Conductivity Meter was used for the survey. Five tranverses were surveyed with the EM-34, three below the first tailings berm and two below the second tailings berm. Conductivity data were generated, plotted, and contoured to determine the best location for the placement of monitoring wells. Contours of these lines are shown in Figure 3 through Figure 6.

#### B. DRILLING ACTIVITIES

The drilling phase followed the one day geophysical investigation on Monday, February 11, 1985. FIT members Ken Moll, Karl Ford, and John Hadley, met at the Allied Chemical Tailings site with members of the drilling subcontractor, Eldorado Exploration Co. FIT was accompanied by Phil Nyberg, EPA Radiation Branch, who served as radiation monitor for the project. FIT conducted a safety meeting with the drilling team and proceeded with the drilling activities.

The first well drilled (AC-MW#1) was to be used as the background well. It was drilled in the southwest corner of Section 23. The boring was drilled to a depth of 45 feet, penetrating 10 feet into unweathered Pierre Shale (Table 1 ). The final depth was reached without encountering any water. The hole was backfilled and abandoned because it was dry, although samples were taken from the drill cuttings.

The second well was drilled to a depth of 30 feet, 10 feet into unweathered Pierre Shale (Table 2 ). Water was not encountered in this hole either. After samples were taken from the cuttings, the hole was backfilled and abandoned.

Once the data are received, a decision can be made about further work.

#### D. SAMPLE DOCUMENTATION

All samples collected were handled in strict accordance with Chain of Custody procedures as prescribed by the NEIC. Chain of Custody record numbers, sample tag numbers, and other pertinent data are contained in Table 3. Samples were hand delivered to the EPA Region VIII Laboratory.

#### IV. CONCLUSIONS AND RECOMMENDATIONS

Geophysics, drilling, and sampling activities were conducted at Allied Chemical in Boulder, Colorado. Two dry holes were drilled into Pierre Shale. The major purpose of the investigation was to collect ground water samples, but such was not possible. Soil samples were collected. Lab analyses may show whether contamination exists from past ground water movement. Further drilling and sampling were deemed unnecessary at this time due to lack of ground water data generated. Further work may be necessary once sample data is received. Until soil data are reviewed, a recommendation of further work at the site cannot be made.

#### V. REFERENCES

Scott, G.R. and Cobb, W.A., 1965, Geologic and Biostratigraphic Map of the Pierre Shale between Jarre Creek and Loveland, Colorado. USGS Misc. Geol. Inv. Map I-439.

On the basis of the two dry holes, FIT decided not to drill any of the other scheduled wells. It was hypothesized that if no water was found in the downgradient well, migration of contaminants was very limited in the area. Soil samples taken from the cuttings should give information to confirm this theory.

### C. SAMPLING ACTIVITIES

A total of three composited soil samples were taken from the two holes. Two samples were taken from the background well, one of which was a duplicate. One sample was prepared from cuttings generated during the drilling of the downgradient well.

All three samples were composited from the intervals 0 to 5 feet, 5 to 10 feet, 10 to 15 feet, and 15 to 20 feet. All were prepared according to E&E Standard Operating Procedure.

Split samples were given to Dennis Sheehan of Tusco, and all Chain of Custody procedures were followed as stated in the Standard Operating Procedures.

One drum sample was also collected by FIT. Mr. Hendricks, mill operator, told FIT that the drum contained trona, a sodium carbonate mineral used for pH control. The sample was collected, field checked, and found to be trona. Consequently, the sample was not submitted for analysis.

Additional samples were not collected at this site, for two reasons. No ground water data were generated from the drilling activities. Second, FIT decided sampling activities were not cost effective if ground water samples could not be collected. Without ground water data, the HRS score would remain unchanged. Consequently, sampling activities were postponed until soil sample analyses are available.

Once the data are received, a decision can be made about further work.

#### D. SAMPLE DOCUMENTATION

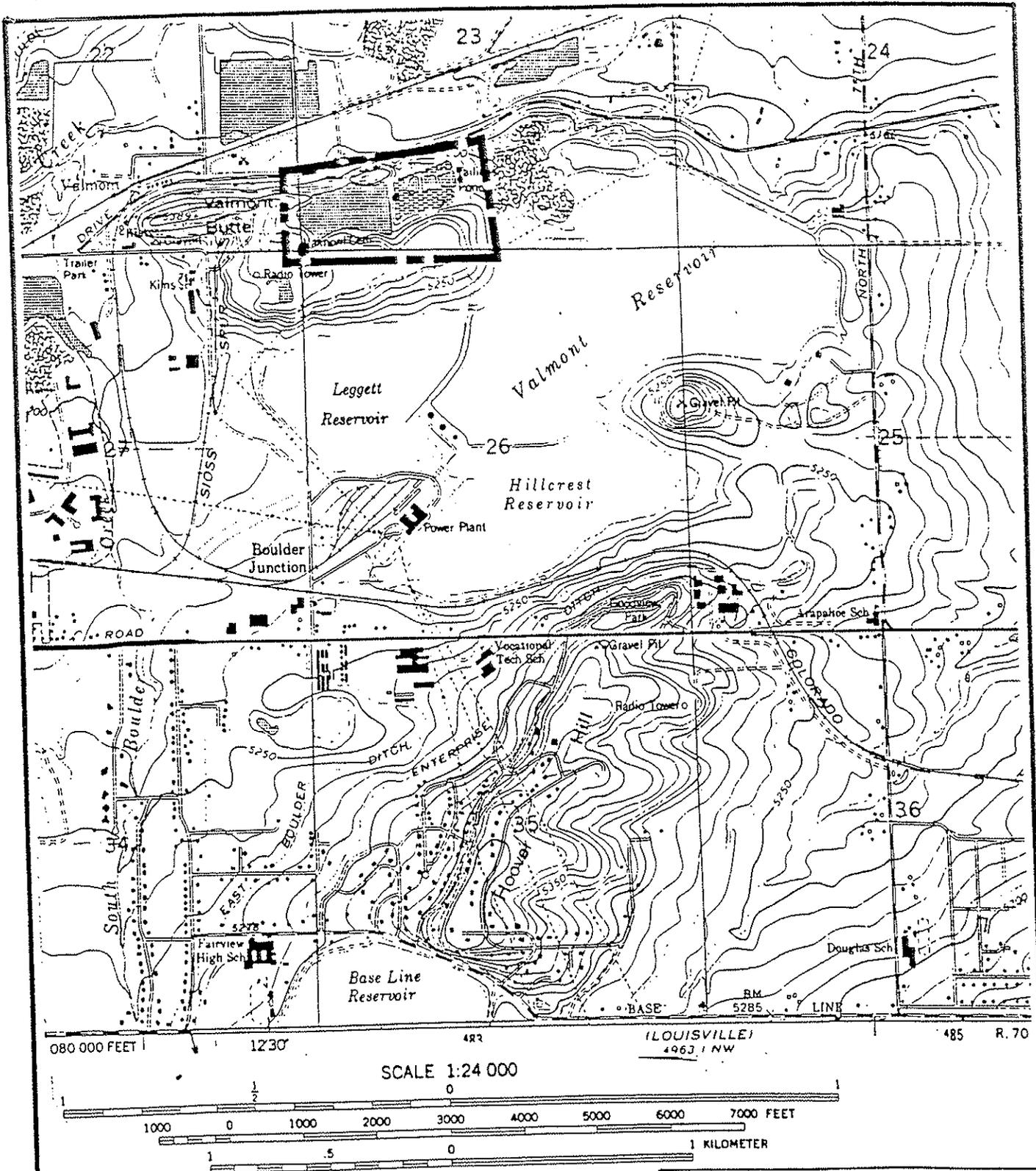
All samples collected were handled in strict accordance with Chain of Custody procedures as prescribed by the NEIC. Chain of Custody record numbers, sample tag numbers, and other pertinent data are contained in Table 3. Samples were hand delivered to the EPA Region VIII Laboratory.

#### IV. CONCLUSIONS AND RECOMMENDATIONS

Geophysics, drilling, and sampling activities were conducted at Allied Chemical in Boulder, Colorado. Two dry holes were drilled into Pierre Shale. The major purpose of the investigation was to collect ground water samples, but such was not possible. Soil samples were collected. Lab analyses may show whether contamination exists from past ground water movement. Further drilling and sampling were deemed unnecessary at this time due to lack of ground water data generated. Further work may be necessary once sample data is received. Until soil data are reviewed, a recommendation of further work at the site cannot be made.

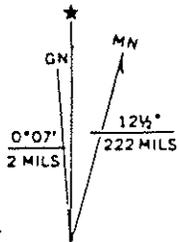
#### V. REFERENCES

Scott, G.R. and Cobb, W.A., 1965, Geologic and Biostratigraphic Map of the Pierre Shale between Jarre Creek and Loveland, Colorado. USGS Misc. Geol. Inv. Map I-439.



CONTOUR INTERVAL 10 FEET  
 NATIONAL GEODETIC VERTICAL DATUM OF 1929

Source: NIWOT QUAD, USGS



FIELD INVESTIGATIONS OF UNCONTROLLED  
 HAZARDOUS WASTE SITES  
 TASK REPORT TO THE E.P.A.

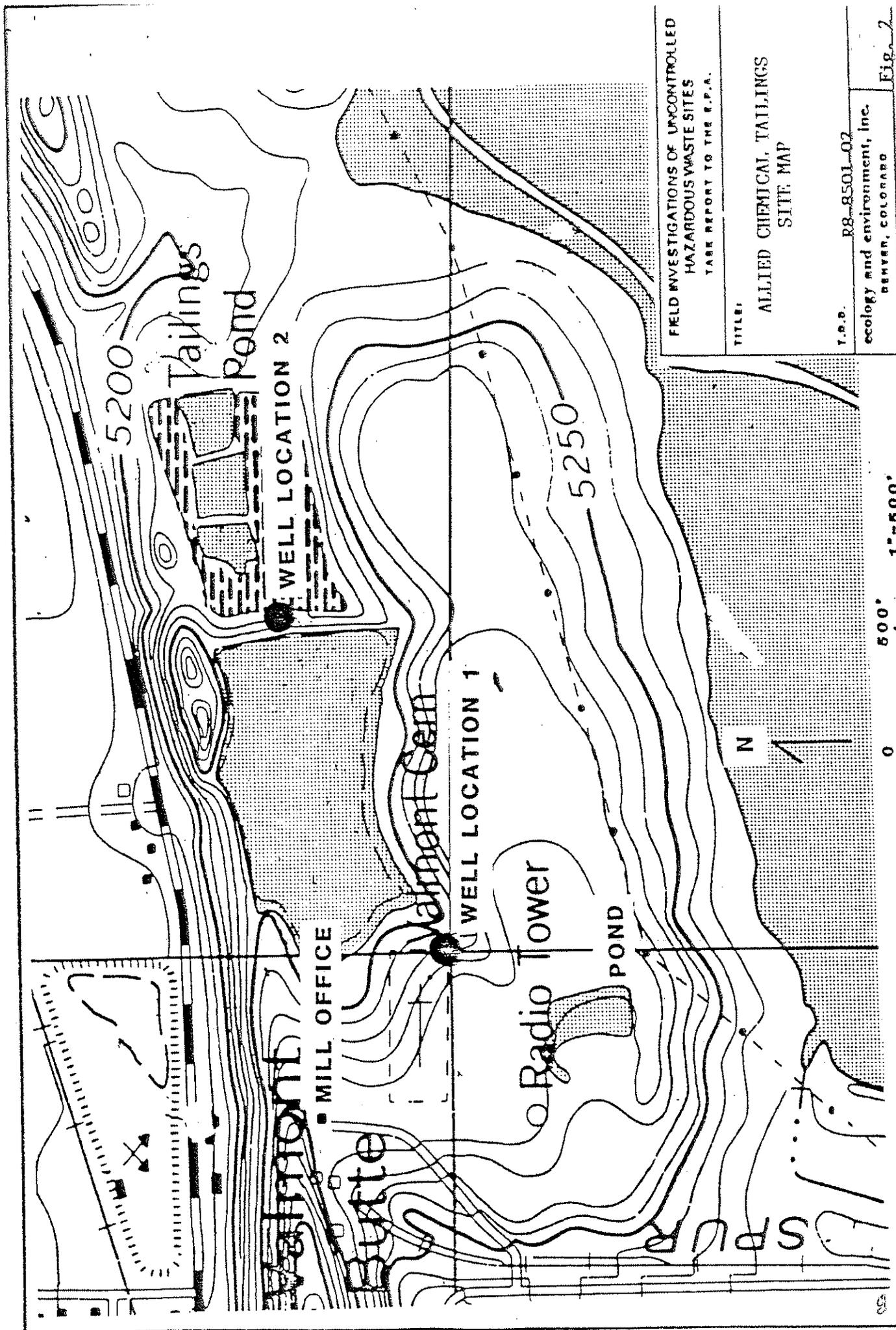
TITLE: ALLIED CHEMICAL TAILINGS  
 SITE LOCATION MAP

T.B.D. R8-8501-02

ecology and environment, inc.  
 DENVER, COLORADO

Fig. 1

Date 3/85 Drawn by USGS Scale 1:24000



FIELD INVESTIGATIONS OF UNCONTROLLED  
HAZARDOUS WASTE SITES  
TASK REPORT TO THE E.P.A.

TITLE:

ALLIED CHEMICAL TAILINGS  
SITTE MAP

T.R.B. R8-8501-02

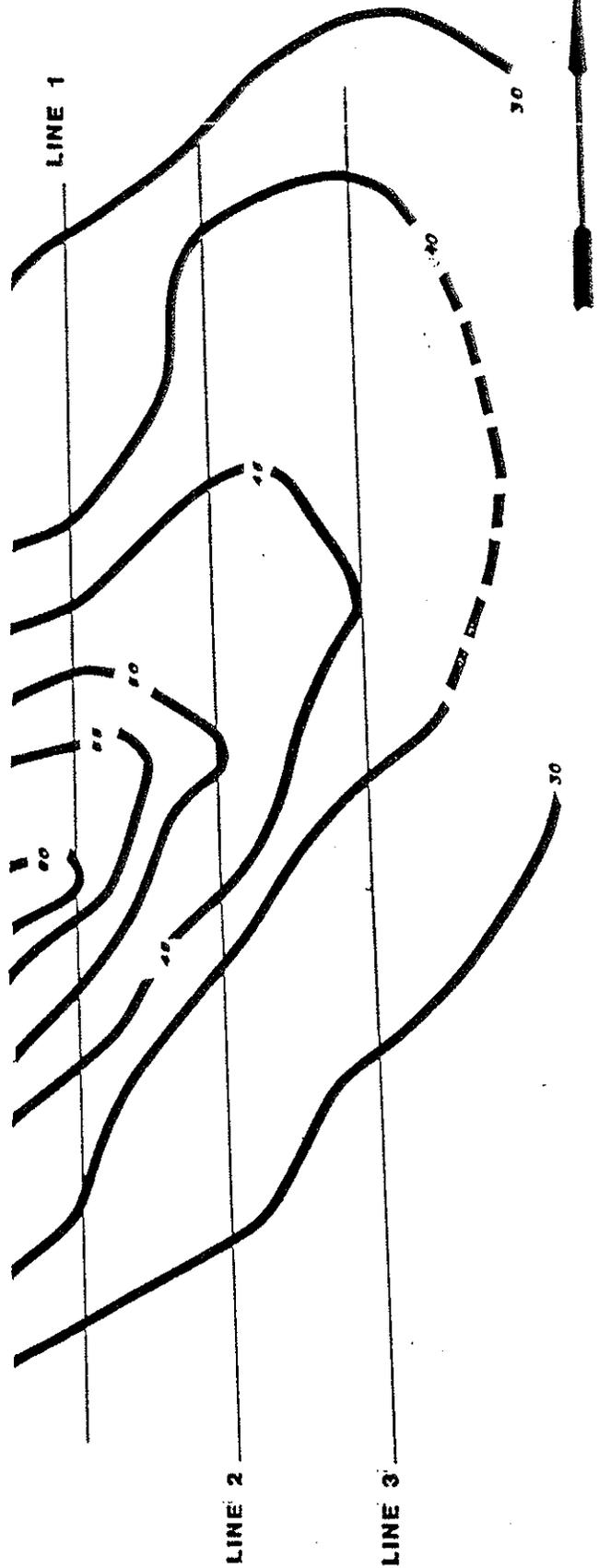
ecology and environment, inc.  
DENVER, COLORADO

Fig. 2

DATE 3/85 DRAWN BY USGS SCALE 1"=500'

SOURCE: NIWOT QUAD, USGS.

DIKE 1



CONTOUR METERS/METER  
DASHED WERE INFERRED  
CONTOUR INTERVAL VARIABLE.

7.5 METER DEPTH

FIELD INVESTIGATIONS OF UNCONTROLLED  
HAZARDOUS WASTE SITES  
TAGH REPORT TO THE EPA

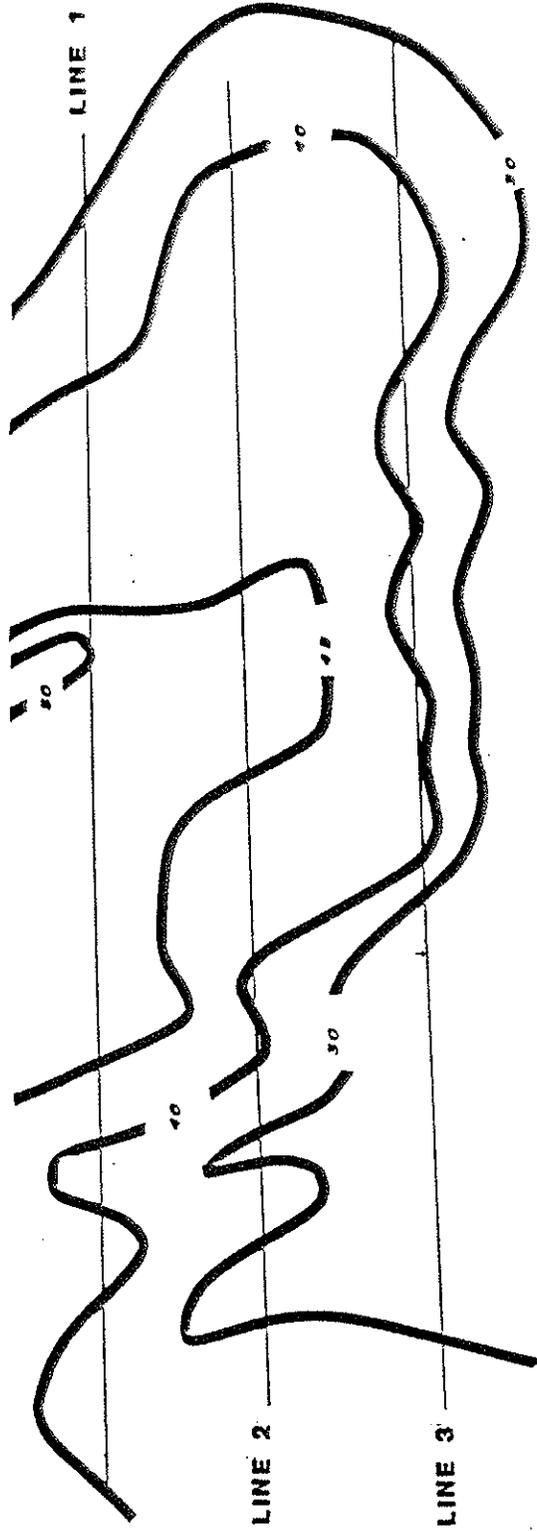
ALLIED CHEMICAL TAILINGS  
GEOPHYSICAL STUDY  
EAST OF DIKE 1

100 R8-8501-02  
enclings and environment, inc.  
DENVER, COLORADO

3/85 JIL 100' = 100'

FIG 3

DIKE 1



CONTOURS IN METERS/METER  
DASHED WHERE INFERRED  
CONTOUR INTERVAL VARIABLE.

15 METER DEPTH

FIELD INVESTIGATIONS IN UNCONTROLLED  
HAZARDOUS WASTE SITES  
YOUR REPORT TO THE E.P.A.

ALLIED CHEMICAL TAILINGS  
GEOPHYSICAL STUDY  
EAST OF DIKE 1

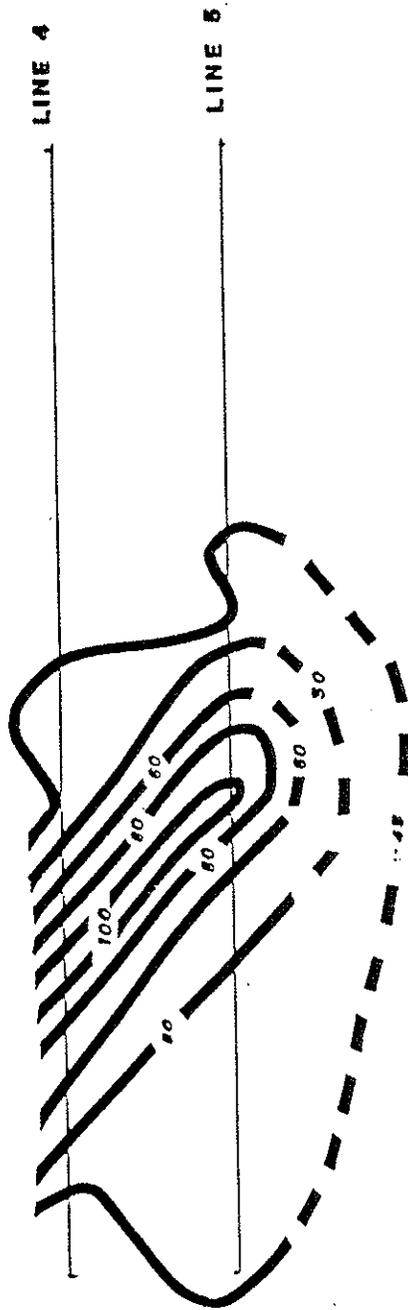
I.D. # R8-8501-02

Ecology and Environment, Inc.  
DENVER, COLORADO

FIG 4

DATE: 3/85 SCALE: 1" = 100'

DIKE 2



CONTOUR IN METERS/METER  
DASHED WHERE INFERRED  
CONTOUR INTERVAL VARIABLE.

7.5 METER DEPTH



FIELD INVESTIGATIONS OF UNCLIMBING  
HAZARDOUS WASTE SITES  
TASK REPORT TO THE EPA

TITLE ALLEED CHEMICAL TAILINGS  
GEOPHYSICAL STUDY  
EAST OF DIKE 2

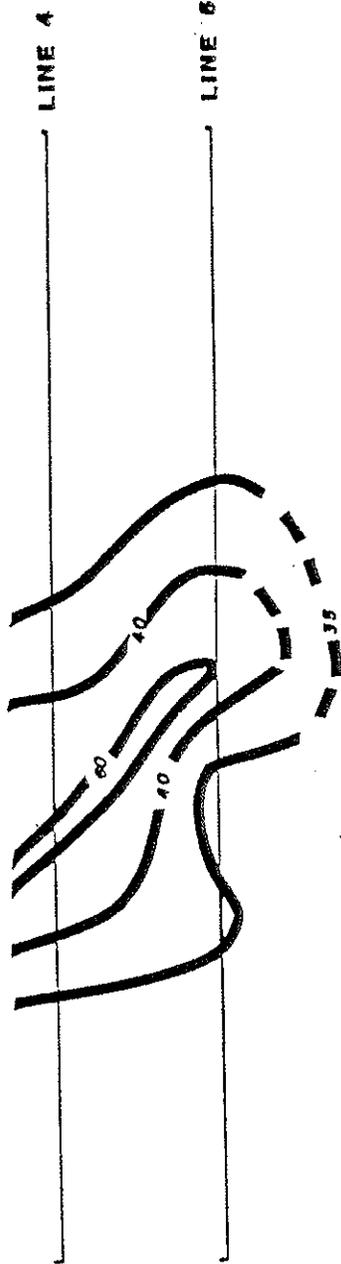
NO. R8-8501-02

Geology and Environment, Inc.  
DENVER, COLORADO

DATE 3/85 SCALE 1" = 100'

FIG 5

DIKE 2



CONTOURS IN MMHOS/METER  
DASHED WERE INFERRED  
CONTOUR INTERVAL VARIABLE\*

15 METER DEPTH

FIELD INVESTIGATIONS OF UNIDENTIFIED  
HAZARDOUS WASTE SITES  
TASK REPORT TO THE EPA

TITLE ALLIED CHEMICAL TAILINGS  
GEOPHYSICAL STUDY  
EAST OF DIKE 2

LOG R8-8501-02

ecology and environment, inc.  
DENVER, COLORADO

FIG 6

DATE 3/85 DRAWN BY JH SCALE 1" = 100'

TABLE 1  
WELL LOG FOR BACKGROUND WELL AC-GW-1

<u>DEPTH</u>	<u>DESCRIPTION</u>
0	Topsoil Snow Cover
0 - 5	Fine Sand, Small Amounts of Quartz Sand
5 - 10	Fine to Very Fine Light Brown Quartz Sand
10 - 20	Brown Silty Sand with Some Gravel to 1"
20 - 25	Brown Silt
25 - 35	Light Brown Silt
35	Weathered Gray Clay
35 - 45	Dark Grey Marine Shale of Pierre Shale
45	Total Depth in Pierre Shale

TABLE 2  
WELL LOG FOR WELL AC-GW-2

<u>DEPTH</u>	<u>DESCRIPTION</u>
0	Topsoil Snow Cover
0 - 5	Brown Silt
5 - 10	Brown Silt with Small Amount of Clay
10 - 20	Weathered Grey Marine Shale of the Pierre
20 - 30	Grey Marine Shale of the Pierre
30	Total Depth in Peirre Shale