AERIAL PHOTOGRAPHIC ANALYSIS OF THE BURIAL TRENCH AREA, P/S LANDFILL BARRIER, AND PRE-SITE DRAINAGES CASMALIA DISPOSAL SITE CASMALIA, CALIFORNIA

May, 2003

Prepared By: ERI

Aerial Photographic Analysis of the Burial Trench Area, P/S Landfill Barrier, and Pre-Site Drainages, Casmalia Disposal Site

Casmalia, California

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Prepared for:

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Thousand Oaks, CA 91360

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INTRODUCTION

A historical aerial photographic analysis of the Burial Trench Area and the P/S Landfill Barrier portions of the Casmalia Disposal Site, located in Casmalia, California was conducted for CH2MHill. This analysis was conducted to document historical locations of trenches and clay barriers utilizing aerial photographic analysis and image registration techniques. In addition, a surface drainage analysis was performed on the June 18, 1970 aerial photographs. The period of this analysis spans the time frame from 1970 to 1981.

Two dates of black-and-white aerial photographs, and seven dates of color aerial photographs were analyzed and reproduced for this report. Stereo coverage was not available for 1977, 1979 and 1980.

Significant features identified for this analysis were trenches, probable well locations, a clay barrier and pre-site (1970) drainage pathways. These features are annotated on overlays keyed to print enlargements for corresponding dates of aerial photographs.

Sources for all maps and aerial photographs used in this report are listed in the Reference section.

METHODOLOGY

This report was prepared using a standard methodology that includes the following steps:

- photographic analysis
- photographic registration

These steps are described in this section. A subsection to the photographic analysis addresses details related to the drainage analyses performed to identify additional environmental features relevant to this study. All steps and processes used to perform this work adhere to strict QA/QC guidelines and standard operating procedures (SOP).

Photographic Analysis

To conduct this analysis, the analyst utilized stereo diapositives (transparencies) of the historical aerial photographs when available. Diapositives are most often used for analysis instead of prints because the diapositives have superior photographic resolution. Diapositives show minute details of significant environmental features that may not be discernible on paper prints.

A photographic analyst uses a stereomicroscope to view stereopairs and monoscopic diapositives on a backlit light table. In most cases, the stereomicroscope is capable of magnifications up to 60 times the size of the feature on the diapositive. Stereoscopic viewing applies the principle of parallax (observing a feature from slightly different positions) to observe a three-dimensional representation of the area of interest. The stereomicroscope enhances the photo interpretation process by allowing the analyst to observe vertical as well as horizontal spatial relationships of natural and cultural features.

Photographic analysis involves visual examination and comparison of many components of a photographic image. These components include tone or color, shadow, height, size, shape, texture, pattern, site, association and time of individual elements of a photograph. The photo analyst identifies objects, features, and "signatures" associated with specific environmental conditions or events. The term "signature" refers to a combination of components or characteristics that indicate a specific object, condition, or pattern of environmental significance. The academic and professional training, photo interpretation experience gained through repetitive observations of similar features or activities, and deductive logic of the analyst as well as background information from collateral sources (e.g., site maps, geologic reports, soil surveys) are critical factors employed in the photographic analysis.

The analyst records the results of the analysis by using a standard set of annotations and terminology to identify objects and features observed in the diapositives. These objects, features, and activities are annotated on overlays attached to the photographs in the report.

Objects and features are identified on the print enlargements and text according to the analyst's degree of confidence in the evidence. When the analyst believes the identification is unmistakable, no qualifier is used. Probable is used when a limited number of discernible characteristics allow the analyst to be reasonably certain of a particular identification. Possible is used when only a few characteristics are discernible, and the analyst can only infer identification.

The print enlargements presented in this report have been reproduced by computer methods from the original film. The computer-produced print enlargements used in this report are generated from scans of the film at approximately 1,300 dots per inch (dpi) and printed at 600 dpi. Although the reproductions allow effective display of the interpretive annotations, they have less photographic resolution than the original film. Therefore, some of the objects and features identified on the original image and described in the text may not be clearly discernible on the prints in this report.

Surface Drainage

The surface drainage analysis produced for this report identifies the direction and path that surface runoff would follow based on the topography of the terrain and the presence of discernible obstacles to surface flow. The analyst determines the direction of surface drainage by stereoscopic analysis of the aerial photographs and by examining USGS topographic maps.

Photographic Registration

Registration is the process of making an image conform to another image. This process was used to align the specific areas of interest of the photographs for the Burial Trench Area and the P/S Landfill Barrier. Features common to the separate images are selected as control points to be used to register the images to one another. Accuracies associated with this process vary depending on such things as photographic parallax, scale, and resolution, as well as the degree of change from one date to the next. Accuracies specific to this analysis are estimated to be in the 6-12 foot range. One exception being the 1978 photograph, with accuracies estimated to be in the 12-20 foot range.

PHOTO ANALYSIS

Eight dates of aerial photography spanning the time frame from 1974 to 1981, along with two maps (Figures 4-1 and 4-2) were relationally registered to assess the location of disposal trenches and a clay barrier over the various time periods. These feature findings are presented on clear overlays to each year of aerial photography at a scale of (1 inch equals 225 feet).

A composite overlay containing eight years of findings for both the Burial Trench Area and the P/S Landfill Barrier was produced and overlaid to the Figure 4-1 map at a scale of (1 inch equals 225 feet). A composite overlay containing all eight years of findings, for the trench area only, was produced and overlaid to the Figure 4-2 map at a scale of (1 inch equals 100 feet).

BURIAL TRENCH AREA

Trenches were noted on all dates except December 16, 1981. Wellheads within the burial trench area were visible from July 18, 1979 to December 16, 1981.

P/S LANDFILL BARRIER

The clay barrier is visible on August 25, 1981 and December 16, 1981 aerial photographs only.

SURFACE DRAINAGE

A surface drainage analysis was performed and is illustrated on the June 18, 1970 aerial photographs to document the pre-site drainage patterns. This information, extracted from the 1970 aerial photographs, is also depicted on the Figure 4-1 map. Due to the large area analyzed for the drainage pathways and the lack of common control points in the location of the Casmalia Disposal site between the 1970 aerial photographs and the base map, no accuracy statement is possible.

REFERENCES

AERIAL PHOTOGRAPHS

Photo Source[1]	Photo Date	Original Scale	Film Type[2]	Coverage Type[3]	Mission I.D.	Frame #
USCB	06/18/70	1:12,000	B&W	FS	HB-RF	135-138, 141-144
UCSB	05/20/74	1:14,400	B&W	FS	AF 74-9	203-206,278-282,798-802
PWAS	06-18-75	1:24,000	CC	FS	5048-4	4,5
PWAS	07/29/77	1:24,000	CC	FM	PW SM2	9
PWAS	03-14-78	1:12,000	CC	FS	7301-1	1,2
PWAS	07/18/79	1:6,000	CC	PM	PW 9118	1
PWAS	09/15/80	1:9,600	CC	PM	PW10708	1
PWAS	08/25/81	1:24,000	CC	FS	SM3	107-109
EPA	12/16/81	1:7,200	CC	PS	95-103	1-7

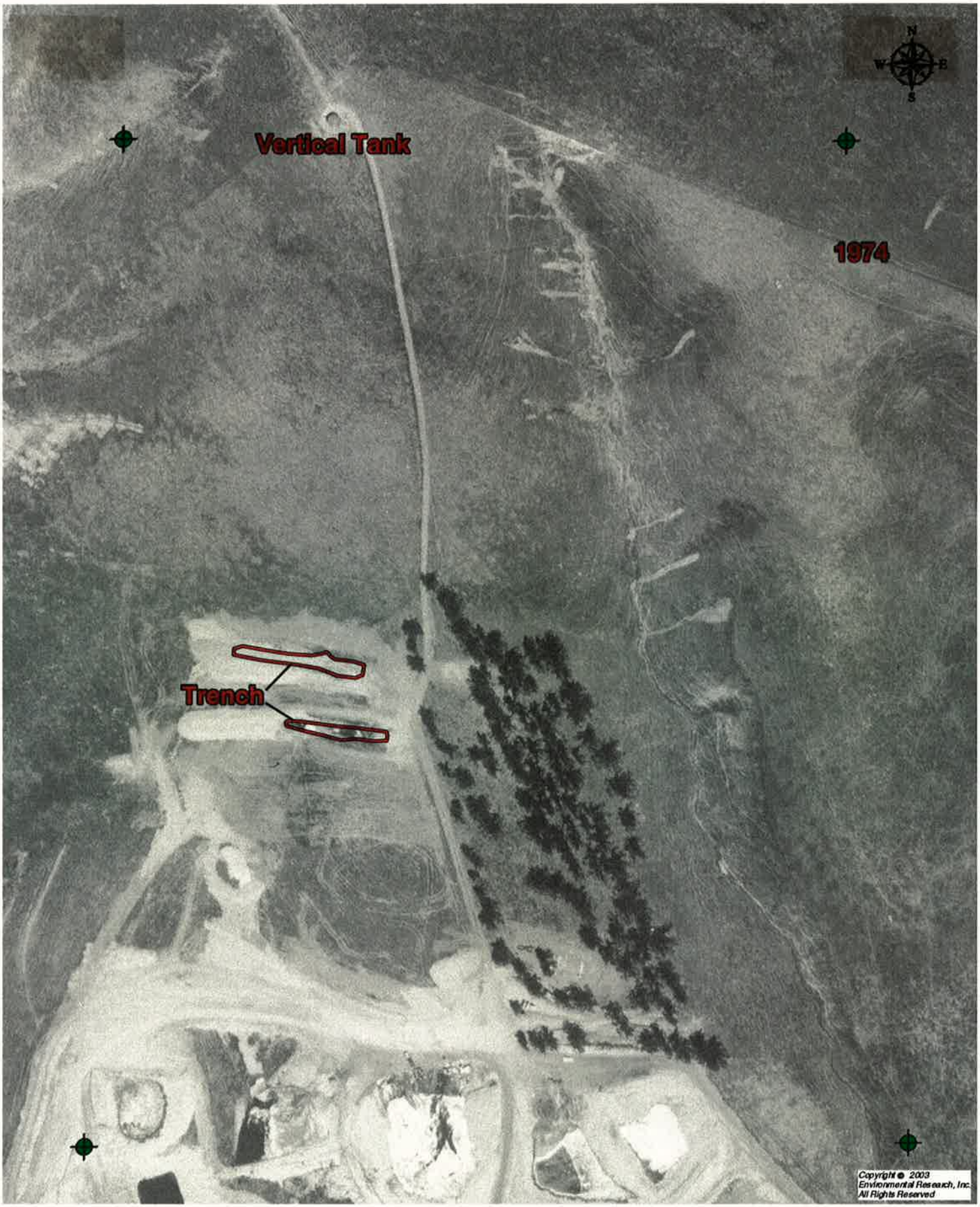
MAPS

Source	Figure	Name	Scale	Date
CH2MHill	4-1	Proposed Soil & Sediment Sampling Locations	1 = 200'	03-27-03
CH2MHill	4-2	Proposed Soil & Sediment Sampling Locations Burial Trench Area	1 = 100'	03-24-03

[1] UCSB University of California, Santa Barbara, California
PWAS Pacific Western Aerial Surveys of Santa Barbara, Santa Barbara, California
EPA Environmental Protection Agency, Las Vegas, Nevada

[2] B&W Black-and-White
CC Conventional Color

[3] Note: Coverage is based on a one-mile radius from the disposal area.
F Full
M Monoscopic
P Partial
S Stereo

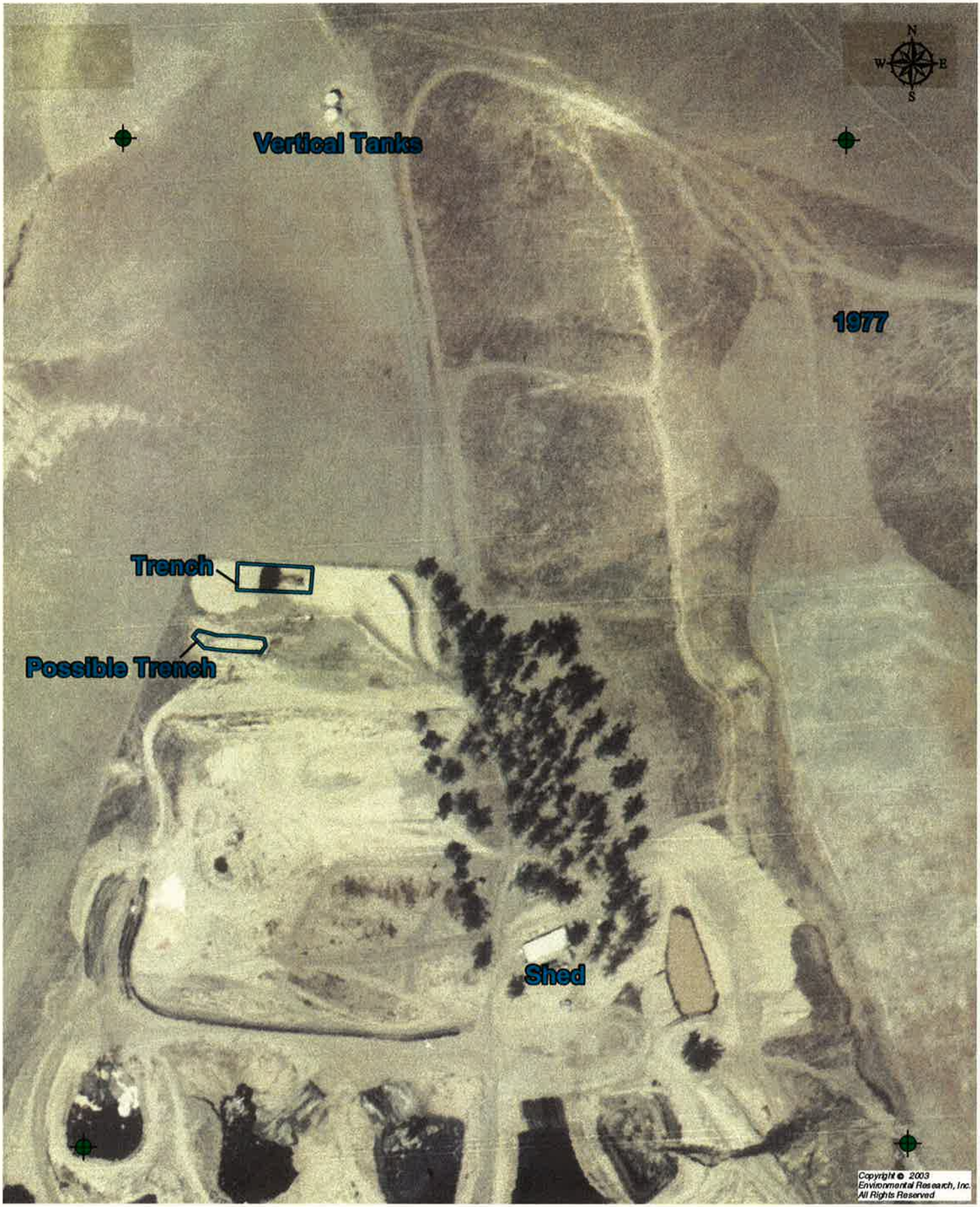


Casmalia Disposal Site

Date: May 20,1974 **Casmalia, California** **1 inch equals 225 feet**

Casmalia Disposal Site

Date: June 18,1975 **Casmalia, California** **1 inch equals 225 feet**



Casmalia Disposal Site

Date: July 29,1977 **Casmalia, California** **1 inch equals 225 feet**

Casmalia Disposal Site

Date: March 14,1978 **Casmalia, California** **1 inch equals 225 feet**

Casmalia Disposal Site

Date: July 18,1979 **Casmalia, California** **1 inch equals 225 feet**

Casmalia Disposal Site

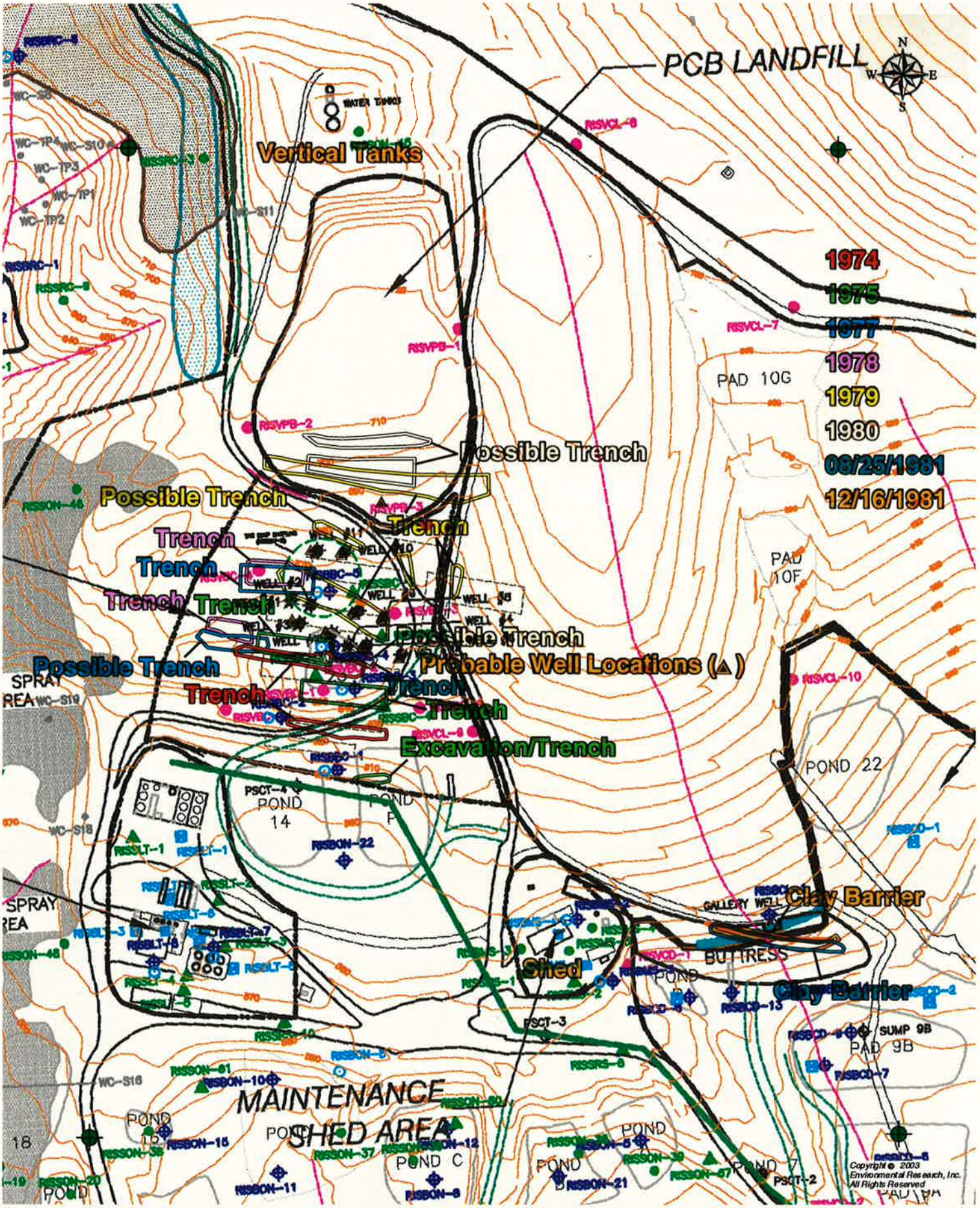
Date: September 15,1980 **Casmalia, California** **1 inch equals 225 feet**

Casmalia Disposal Site

Date: August 25,1981 **Casmalia, California** **1 inch equals 225 feet**

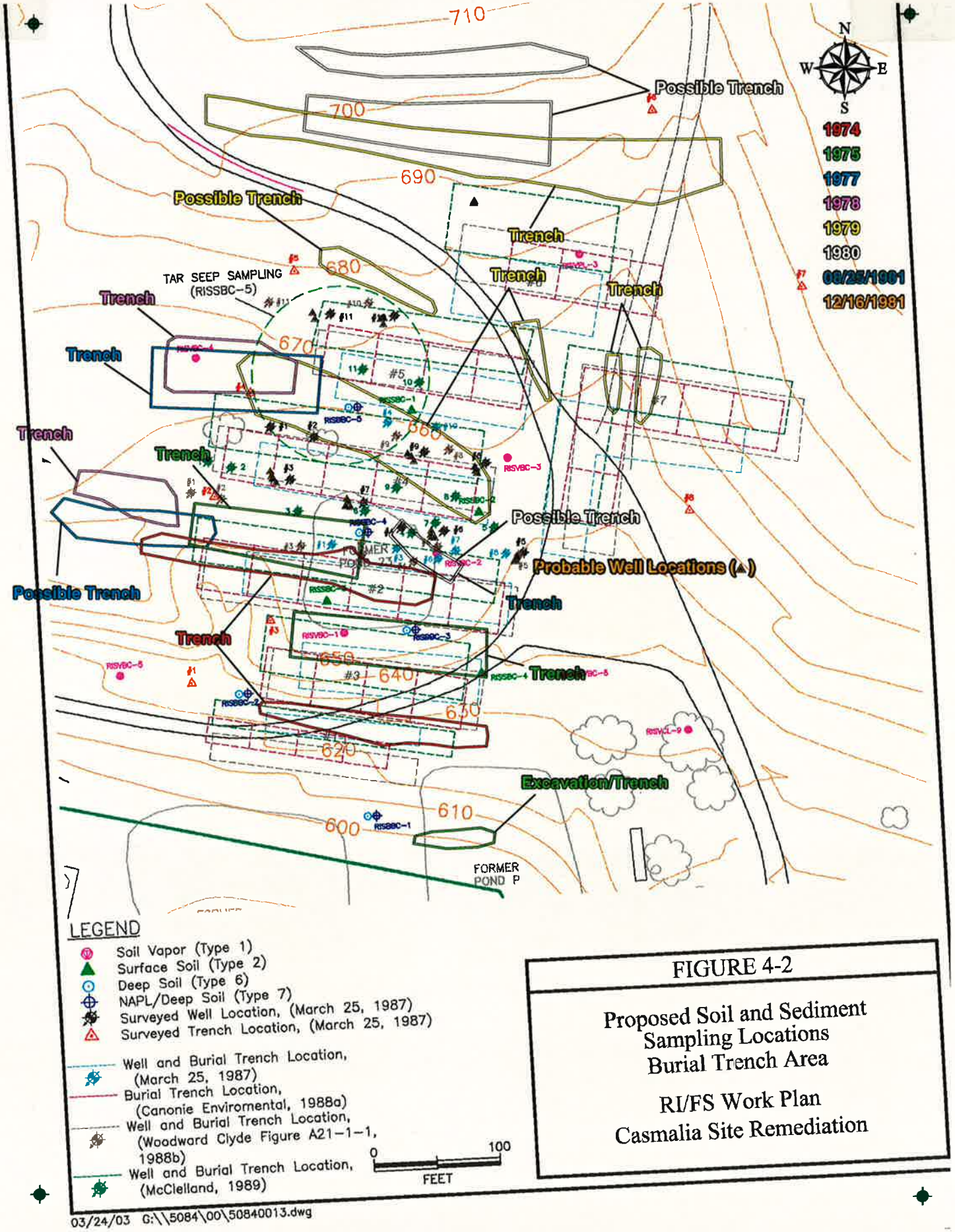
Casmalia Disposal Site

Date: December 16, 1981 **Casmalia, California** **1 inch equals 225 feet**



Casmalia Disposal Site

Figure 4-1 **Casmalia, California** **1 inch equals 225 feet**



Casmalia Disposal Site

Figure 4-2 **Casmalia, California** **1 inch equals 100 feet**

CASMALIA DISPOSAL SITE
CASMALIA, CALIFORNIA

JUNE 10, 1970 FRAME: 136
DRAINAGE ANALYSIS

APPROX. SCALE 1:6,500
1"=542'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CASMALIA DISPOSAL SITE
CASMALIA, CALIFORNIA

JUNE 10, 1970 FRAME: 136
DRAINAGE ANALYSIS

APPROX. SCALE 1:6,500
1"=542'

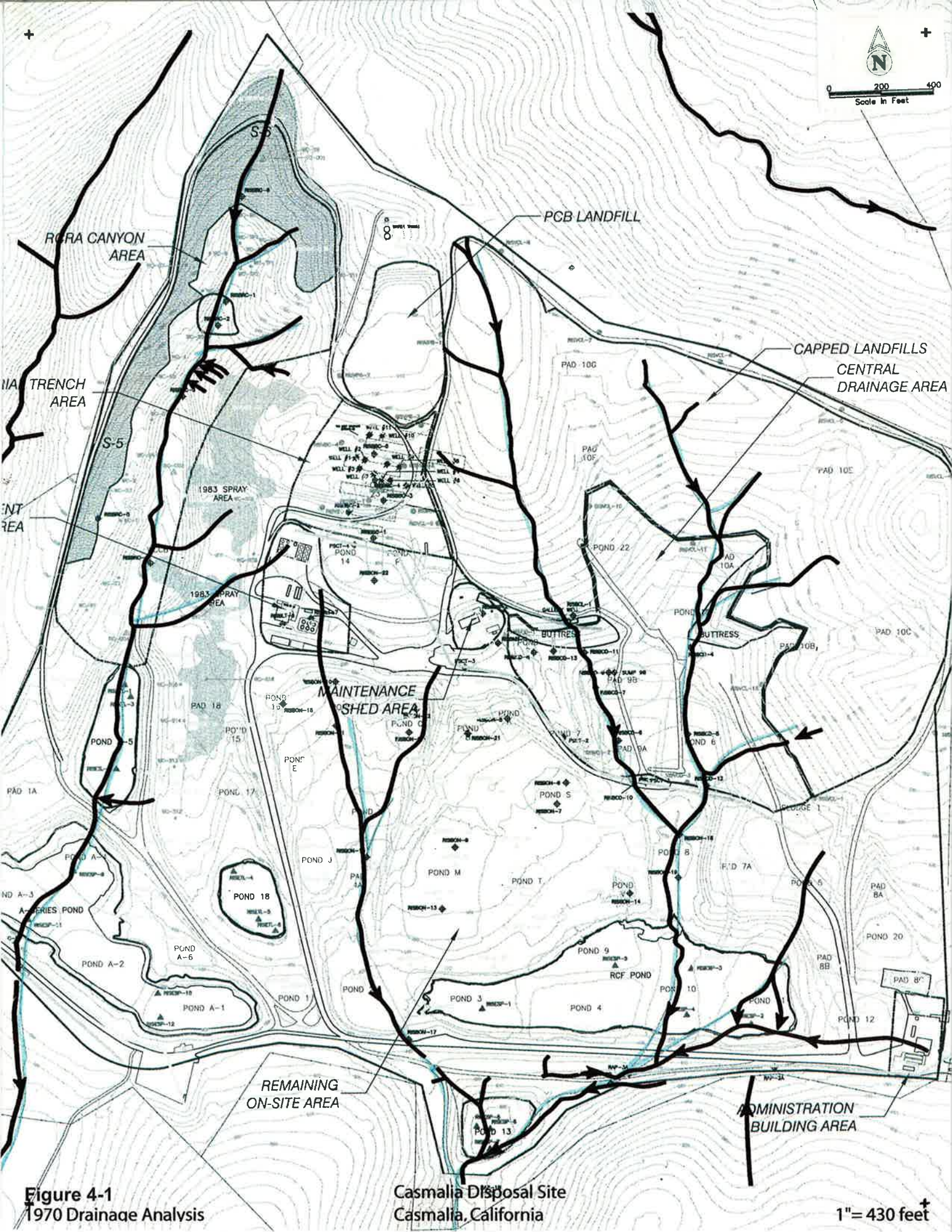

Figure 4-1
1970 Drainage Analysis

Casmalia Disposal Site
Casmalia, California

1"= 430 feet