

APPENDIX V – HISTORICAL AERIAL PHOTOGRAPH REVIEW

**FINAL REMEDIAL INVESTIGATION REPORT
CASMALIA RESOURCES SUPERFUND SITE
CASMALIA, CALIFORNIA**

Prepared By: ERM and ERI

(As originally presented in RI/FS Work Plan – Appendix J; CSC, 2004)

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PHOTO PLATES (one for each photo year)

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APPENDIX J

AERIAL PHOTOGRAPH REVIEW

This appendix provides detailed descriptions of aerial photographs of the Casmalia site that were taken between 1956 and 2002. These photographs represent the best available images in terms of coverage and scale of this area within this timeframe from the following photo sources: the University of California, Santa Barbara, Map and Image Library (UCSB MIB); Pacific Western Aerial Surveys (PW), Intrasearch (Intra), Environmental Protection Agency (EPA), and Golden State Aerial Surveys (GS). Most of the images reviewed were available as 9-inch x 9-inch diapositives and the scale of the photographs varies widely.

Ten oversize photographs (from approximately 20-inches square to approximate 36-inches square) also were gathered from the site. All but one of the oversize photos (which appear to be from the 1985/1986 timeframe) had identifying information (such as date and source). The CSC obtained the 9-inch by 9-inch contact prints and diapositives of each image (with the exception of the 1985/1986 photo – source unknown) from the referenced oversize photos to complete the set of contact prints and images used to complete the aerial photograph review. The oversize prints were valuable in clearly identifying various site features during the disposal site development. Copies of each image at a uniform scale, cropped to fit an 8.5-inch x 11-inch page, are included within this appendix.

This appendix presents the objectives for the aerial photograph evaluation and describes the chronology for the various photo review tasks completed to date. The body of the appendix describes summary information gleaned from each photograph. The results of the aerial photograph review were used in conjunction with written records regarding the site history, topographic reviews (see Appendix L), and agency interviews (see Appendix M) to finalize the sampling plan described in Section 4.7 of the RI/FS Work Plan. Appendix N of this Work Plan identifies how the aerial photograph review results were used to define potential contamination sources and augment the data collection program for the RI/FS.

J.1 OBJECTIVES

The CSC completed an aerial photograph review to identify features that needed to be more clearly identified in order to complete the RI/FS. To achieve the overall goal, the CSC collected and catalogued all available photographs and prepared a summary of the features identified in the photographs. Note that documentation on the majority of the former waste management and treatment units was available in text and figures from historical reports. In some cases, the photos were used to clarify discrepancies between various written records for the site.

The CSC completed the photograph review in concert with the historical records review and information provided by former site personnel to more fully describe the operational site history in the main text of the Work Plan (see Section 2). As such, this appendix is limited to identifying the various features of interest in text format and does not describe the significance of the observations. Rather, the salient information gleaned from the review is folded back into the Work Plan in either the site history text, tables, and figures (see Section 2 of the Work Plan), the

initial site evaluation (Section 3 of the Work Plan) ,or in the sampling program text, tables, and figures (see Section 4 of the Work Plan).

The CSC's identified a number of objectives for the aerial photograph review task, including but not limited to the general objectives and specific goals listed below:

General Objectives

- Identify the presence and limits of all waste management units (WMUs) and the interaction between those WMUs including but not limited to landfills, surface impoundments, evaporation pads, waste spreading areas, injection wells, disposal trenches and other burial units.
- Identify the presence and limits of any natural and man-made physical features that may have controlled or influenced the transport of site contaminants.
- Note the occurrence and limits of all remediation activities.
- Note the occurrence and limits of other human activities that may or may not be related to waste disposal activities including those that may be mistaken for waste disposal activity.

Specific Goals

- Identify the RCRA Canyon spreading areas, ponded areas or impoundments, and the adjacent spray areas to assure that the sampling program adequately addresses the extent of these features.
- Identify the locations of tanks in the Liquids Treatment Area and the associated liquid unloading areas to ensure that these locations are represented in the sampling program.
- Locate former haul roads used during the disposal period and identify any stained areas for potential sampling.
- Confirm that excavation took place in all former ponds and pads (during the pond closure period) and that interior berms and roads also were removed during the process. (Note that Appendix L contains additional quantitative information regarding the pond closure activities.)
- Identify to the location of the P/S Landfill clay barrier to scope the additional investigations planned for the toe of the P/S Landfill.
- Identify the limits of the trenches and the locations of the wells in the Burial Trench Area.
- Identify on-site tanks or other features that may have been used to treat or store hazardous wastes or fuel.
- Trace the lineations of the former primary on-site drainage canyons to assess potential subsurface contaminant migration pathways.
- Identify the locations of off-site trenches that were excavated during the operational period to obtain off-site materials for clay barrier construction.

As part of linking the photographic review results to the investigation (see Appendix N), the CSC mapped the locations of the features identified for additional investigation. The CSC used fixed site features (such as the water tanks on the northern site hill, the Liquids Treatment Building, the 4 tanks that were historically located outside the Liquids Treatment Building, and the Maintenance Shed) to map the locations of various features of interest (such as stained soils, stacked drums and temporary tanks) using triangulation techniques. For the most part, however, the locations of various site features of interest in the sampling program were identified on available topographic maps.

For ease in reviewing details within the various study areas at the Casmalia facility, all of the following aerial photograph descriptions are organized with headings that correlate with those found in Table 2-14. Analyses of the photographs from the site's operational years including overlays are provided in the *Aerial Photographic Analysis* report, prepared by Environmental Research, Inc., dated April 27, 2001 (ERI, 2001) and the *Supplemental Aerial Photographic Analysis* report, prepared by Environmental Research, Inc., dated August 2003 (ERI, 2003b).

Note that the waste management unit chronology presented in Table 2-14 of the Work Plan was generated based on the observations from the 2001 and 2003 ERI aerial photograph reviews augmented with written information regarding the operational timeline for the site.

J.2 CHRONOLOGY OF THE AERIAL PHOTOGRAPH REVIEW ACTIVITIES

The following information is useful in understanding the evolution of aerial photograph review activities for the Casmalia site:

- EPA commissioned the initial photo review report entitled *Aerial Photographic Analysis, Casmalia Disposal Site*. The work was completed by Environmental Research, Inc. (ERI), and is presented in a report dated April 27, 2001.
- The CSC reviewed the 2001 ERI report and, finding the evaluation to be comprehensive for key disposal years, prepared a summary of observations for the years that ERI initially evaluated in addition to all other photo years that were available at the time. The CSC's photo review, which was presented in the prior version of this appendix, was prepared by the CSC to specifically respond to EPA comments on the Draft RI/FS Work Plan (CSC, June 3, 2002).
- Appendix J of the revised RI/FS Work Plan (CSC, March 2003), was focused on specific aspects of the site and was not intended to be a comprehensive review such as the one completed by ERI in 2001. The relevant findings of the photo review were accounted for in preparing the sampling basemap presented on Figures 4-1 through 4-6 of the Work Plan. The photo analysis presented in the March 2003 Work Plan was completed by ERM West and qualifications of project personnel are included in Attachment J-1.
- The EPA reviewed the CSC's March 2003 RI/FS Work Plan and identified concerns on the level and quality of the analysis that was performed to interpret the aerial photos. The EPA also expressed concerns that the results of the evaluation were not clearly linked to the initial evaluation of the site and the technical approach to data collection.
- The EPA commissioned a second ERI report to specifically focus on the Burial Trench Area, P/S Landfill Barrier, and pre-site drainages. The report entitled *Aerial Photographic Analysis of the Burial Trench Area, P/S Landfill Barrier, and Pre-Site Drainages, Casmalia Disposal Site* was issued by ERI in May 2003 (ERI, 2003a). The results of this evaluation are accounted for in the plans for site investigation.
- To address USEPA comments on the March 2003 Work Plan, the CSC requested that ERI perform additional detailed photographic analysis (see ERI, 2003b) and revise Appendix J for this present version of the RI/FS Work Plan. The scope and methods ERI used to complete the additional evaluation are detailed below. Qualifications of ERI project personnel are presented in Attachment J-1.

J.3 SCOPE AND METHODS OF THE ADDITIONAL EVALUATION

To address EPA comments regarding the level and quality of the technical analysis, ERI evaluated additional photographs for the operational years (1974 through 1991). Note that photographs for seven of the site's operational years (1974, 1975, 1978, 1981, 1984, 1987 and 1989) were previously evaluated (ERI, 2001). ERI used the methods previously used in the 2001 study to assess the additional photos for the years 1977, 1979, 1980, 1981, 1982, 1983 and 1988 (ERI, 2003b).

Specifically, ERI's analyst reviewed monoscopic or stereo diapositives (depending on availability) on a backlit light table, made observations using a stereoscope capable of up to 60 times the size of the feature on the diapositive, noted observations on summary tables for each photo reviewed, and prepared acetate overlays indicating the locations of various features noted.

The CSC reviewed the summary tables and overlays in preparing the sampling plan described in the RI/FS Work Plan. Table J-1 summarizes the photographs reviewed along with additional pertinent information related to methods used and the scale of the photos reviewed. Note that ERI reviewed additional photographs (dated 6-18-81, 12-16-81, and 11-22-88); these photos not reviewed in the previous version of Appendix J.

ERI augmented the photo notations made below with observations made during their review. Because the ERI also looked at the area within a 1-mile radius of the site, the paragraphs below include notation of observations made for Zone 2.

As described earlier in this appendix, ERI identified the locations of specific features (such as the site drainages, disposal well and trenches, stained areas in the Maintenance Shed Area, ponded areas in the RCRA Canyon, etc. using photoregistration techniques. This method is believed to yield more accurate results than using georeferencing techniques as described in ERI's letter included as Attachment J-2 to this appendix.

The results of the supplemental work performed by ERI were used to locate new sampling locations and/or relocate previously scoped samples. Specifically, NAPL assessment sampling locations were adjusted to coincide with the drainages in areas where drainage tracings were adjusted. The locations of certain samples in the Burial Trench Area were moved (either to be within or beyond the trenches themselves, depending on the type of sample being collected). New sampling locations were added in the stained areas identified in the Maintenance Shed Area and new sampling locations were included in former ponded areas in the RCRA Canyon Area. Note that the results of prior ERI and CSC aerial photos reviews were used to locate many of the investigation locations in the initial sampling program. Refer to Table N-1 of Appendix N for complete details regarding how the results of all air photo reviews are accounted for in the sampling plan.

J.4 PHOTOGRAPH NOTATIONS

The CSC used the following headings to make observations regarding activities on the site (Zone 1) for the various photographs:

- Landfills

- Storage / Evaporation Ponds
- Evaporation Pads
- Oil Field Waste Spreading Areas
- Waste Disposal Wells
- Waste Disposal Trenches
- Treatment Units
- Other

ERI updated the evaluations for each year and added notations for off-site activities under the category Zone 2.

These on-site headings are consistent with those presented in Table 2-14 which chronicles historical waste management and treatment unit development and notes remediation activities completed to date. Table 2-14 was generated first based on the photograph observations. The information on that table was then cross checked with written records of site development and the CSC modified the notations, as necessary to construct an accurate representation of site development. Note that the photograph descriptions below specify the number of ponds / pads that were active, and that Table 2-14 identifies which ponds and pads were observed to be active.

03/28/1956 – Source: UCSB MIB; Flight #HA-AN, Frame #6-103, Scale 1”=800’

The resolution and quality of this black and white photo is good and allowed for the determination that, although there is a structure and possible agricultural activities in the vicinity of future Ponds 2 and 3, there was no disposal site activity at this time. The main site access road (NTU Road) is visible and follows the current road alignment. There is a stand of trees in the locations of future Pond 13. The drainage patterns within the future site limits are clearly visible.

06/18/1970 – Source: UCSB MIB, Flight #HB-RF, Frame #136(print), #135-138, 141-144 (diapositives), Scale 1”=1,000’

The resolution and quality of these black and white photos is good and allowed for the determination that there was no disposal site activity at this time. The structures noted in the previous photo are gone. NTU Road is still visible.

05/20/74 – Source: UCSB MIB, Flight #AF-74-9, Frame #280 (print), 278-282, 798-802, 203-206 (diapositives), Scale 1”=1,200’

The resolution and quality of these black and white photos is good. The features at the site could be recognized with a good degree of certainty and are listed below:

Storage/Evaporation Ponds

- 13 waste ponds active
- Pond 2 is composed of several ponded areas

Evaporation Pads

- One evaporation pad active
- Pad 4A drains to Pond 2 area

Waste Disposal Trenches

- Two waste disposal trenches appear active

Other

- Area graded for the future Maintenance Building
- Minimal site activity; grading for expansion
- One water tank on northern site knob
- A trailer is noted at the former site entrance near Pond 10

Zone 2

- No significant activity is observed in this area
- A tank associated with ranching is noted west of the then site boundary

06/18/1975 – Source: Pacific Western Aerial Surveys (PW), Flight #5048, Frame #4 print and diapositive), Scale 1"=2,000'

The resolution and quality of these color photographs is good and allowed the features at the site to be recognized with a good degree of certainty and are listed below:

Storage/Evaporation Ponds

- 17 waste ponds active
- Pond 2 is composed of several ponded areas

Evaporation Pads

- One evaporation pad active
- Pad 4A drains to the Pond 2 area

Waste Disposal Trenches

- Two waste disposal trenches appear active

Other

- Active excavations to accommodate more ponds
- Maintenance Building visible
- Access road to top of future Acids Landfill; access road to the bottom of the future Caustic/Cyanide Landfill
- Liquids and staining appear off new road in vicinity of future Ponds 10 and 11

Zone 2

- Staining is visible along primary access road southeast of site

07/29/1977 – Source: PW, Flight #SM2, Frame #9 (print and diapositive), Scale 1"=2,000'

The resolution and quality of these color photographs is good and allowed the features at the site to be recognized with a good degree of certainty and are listed below:

Storage/Evaporation Ponds

- 23 waste ponds active
- Pond M is two separate ponds; upper pond is draining to Pond T
- Liquids spray noted toward Pond A
- Dark roadway along the main entrance road extending into the center of the site (near Pond M); dark roadway along the road just above Ponds 16, D and C
- Extensive excavation between Pond 13 and the main road
- Ponding noted between Ponds D, C and L (possible upper part of Pond L forming)

Evaporation Pads

- One evaporation pad noted
- Pad 4A drains to Pond 2 area

Waste Disposal Trenches

- Two waste disposal trench areas appear active

Other

- Active grading for expansion (east side of site) and into future Acids Landfill and Heavy Metals Landfill
- Lincation in the vicinity of A Drainage (possible source for B Drainage barrier material)
- Gray/brown tank (hidden in the trees) northwest of the Maintenance area and southeast of Pond P (better noted in 1978 photo)
- Two water tanks on northern site knob
- Oil Recovery Tank noted west of Pond S; a probable pipe extends to the unit from Pond B; a drainage channel north of the tank leads to Pond S
- A trailer is noted south of Pond M
- Entrance trailer moved to the east from Pond 10 location
- Three above-ground horizontal tanks noted south of the Maintenance Shed

Zone 2

- No environmentally significant activity noted in this area

03/14/1978 – Source: PW, Flight #7301, Frame #1 (print), Frames #1, 2 (diapositives), Scale 1"=1,000'

The resolution, quality and larger scale of these color photos is good. The features at the site could be identified with a good degree of certainty and are listed below:

Landfills

- Grading in southern limit of Pesticides/Solvents Landfill north of the Maintenance Shed
- Ponding in future Metals Landfill area in a bermed area noted at head of canyon drainage
- Grading / ground scars on the pad to the south of the Caustic/Cyanide Landfill
- Grading / grubbing in the Acids Landfill

Storage/Evaporation Ponds

- 29 waste ponds active

- Discolored soil along the road and roadside in the vicinity of Pond R; Pond 2 (three separate ponds here) draining along the road towards Pond 10
- Oil recovery tank noted west of Pond S; A probable pipe extends to the unit from Pond B; a drainage channel north of the tank leads to Pond S
- Ponding remains between Ponds D, C and L (possible upper part of Pond L forming)

Evaporation Pads

- One evaporation pad active
- Pad 4A drains toward Pond 2.
- Grading noted in future locations of Pads 10B and 10C

Waste Disposal Trenches

- Four waste disposal trenches appear active

Waste Disposal Wells

- Two injection wells visible

Other

- Active grading and excavations for site expansion
- Temporary roads graded in the expansion area
- Active dozing along the west side of Pond 13
- One structure (initial Administration Building) present in the entrance area
- Spread materials south of Ponds 14 and P
- Discoloration along short sections of the road in the vicinity of the Maintenance Area, liquid and staining visible north of the Maintenance Building
- Oil Recovery Tanks between ponds M, T and S visible
- Ground scars noted in RCRA Canyon area
- Graded area noted west of site near C-Drainage and future location of A-Series ponds

Zone 2

- No environmentally significant activity noted in this area

07/18/1979 – Source: PW, Flight #9118, Frame #1 (print and diapositive), Enlargement Scale 1”=130’, Scale diapositive 1”=500’

This is good quality, enlarged, color photo, approximately 3’X4’, with good resolution. ERI examined this print as well as the diapositive. The resolution of the diapositive was excellent. The features were very clearly identified and are listed below:

Landfills

- Excavation and possible waste disposal in PCB, Pesticides/Solvents, Metals, Acids, and Caustic/Cyanides Landfills
- Grading in northern and southern Pesticides/Solvents Landfill
- Drums visible in PCB Landfill

Storage/Evaporation Ponds

- 29 waste ponds active
- Minor ponding between Ponds A, S and 7

Evaporation Pads

- One sludge pond active
- Pad 4A drains toward Pond 2
- Construction (excavation/grading) activity continues for several pads (10A, 10B, 10C, 10E, 10F, and 10G)

Waste Disposal Wells

- Four injection wells visible

Waste Disposal Trenches

- One waste disposal trench appears active

Other

- Minor dozing in and around Pond 13
- One scale in entrance area adjacent to the initial Administration Building
- Outer perimeter roads being graded
- Piping route for water supply being excavated and pipes laid out along eastern perimeter road
- Two additional Oil Recovery Tanks between ponds M, T and S
- Pipe and hose lead to Pond B and possibly Pond A
- Trailer noted south of Administration Building in this year only
- Erosion gullies noted in RCRA Canyon area
- Graded area noted west of site near future location of A-series ponds expanded
- Asphalt mix noted in are of current fuel USTs north of the Maintenance Shed

Zone 2

- No environmentally significant activity noted in this area

09/15/1980 – Source: PW, Flight #10708, Frame #1 (print and diapositive), Scale 1”=800’

The resolution, quality and larger scale of this color photo is good. ERI examined the diapositive for this year as well. The resolution of the diapositive was excellent. The features at the site could be identified, with a high degree of certainty and are listed below:

Landfills

- Drums visible in the Pesticides/Solvents Landfill
- Waste disposal in the PCB, Metals, Acids, and Caustics/Cyanides Landfills
- Spray / liquids management in future pads between landfills
- Ponding at toe of Metals Landfill

Storage/Evaporation Ponds

- 30 waste ponds active
- Pond 16 is draining to Pond D, which is draining to Pond L

- Pad 4A is draining to Pond 2 (two separate ponds here)
- Material spread out around Pond R
- Significant spreading / earthwork within Pond T

Evaporation Pads

- Five evaporation pads appear active
- One sludge pond active

Waste Disposal Wells

- Eight injection wells visible; active grading in the same vicinity

Oil Field Waste Spreading Areas

- Spreading Area 1 is visible east and west of Pond 6
- Two excavated areas are noted in the future Spreading Area 6

Waste Disposal Trenches

- One waste disposal trench appears active

Other

- Material spread along the west side of Pond 6 (coincident with Spreading Area 1)
- Two lineations in the vicinity of A Drainage barrier
- Truckers' waiting trailer added to initial Administration Building; new trailer present in entrance area
- Initial construction of the road around RCRA canyon visible
- Trailer addition to the north side of the Maintenance Shed
- Ponding / possible excavation north of the Maintenance Shed in location of future underground fuel tanks
- Possible test pit excavations in RCRA Canyon and off-site area north of the site
- Regrading in Liquids Treatment Area

Zone 2

- Graded area noted west of site near C-Drainage is now vegetated
- Two graded areas are noted east of the Administration Building Area

06/18/1981 – Source: USDA, Flight 615070, Frame: 1480: 61, 62 (diapositives), Scale: 1"=3,333'

Although the scale of this black and white photography is small and the resolution fair, most of the features site could be identified, to some extent, and are listed below:

Landfills

- A pit with liquid in it and a probable tanker truck backed up to it is noted in Pesticides/Solvents Landfill
- An impoundment noted previously at the Heavy Metals Landfill no longer contains liquid and possibly contains light-toned material
- Continued excavation northward noted in the Caustics/Cyanide Landfill

Storage/Evaporation Ponds

- 33 ponds visible
- Pond 16 drains to Pond D
- Drainage near oil recovery tanks leads to Pond S

Evaporation Pads

- Six evaporation pads are active
- One sludge pond active
- Pad 4A drains to Pond 2

Oil Field Waste Spreading Areas

- Two excavated areas noted previously in Spreading Area 6 remain visible
- Spreading Area 3 is visible and a ponded area is noted within the area
- Spreading Area 1 remains visible west and east of Pond 6

Waste Disposal Wells

- Cannot determine activity in this area

Other

- Erosion gullies remain visible in the RCRA Canyon Area
- Larger administration / truckers' waiting facility, trailer gone and a new structure / shed in the Administration Building Area
- Staining noted on road west of Pond J and on both roads on either side of Pond 10

Zone 2

- No significant activity visible.

08/25/1981 – Source: PW, Flight #SM3, Frame #108 (print), 107-109 (diapositive) Scale 1"=2,000'

Although the scale of this photo is small, the quality and resolution is good and allowed the features at the site to be recognized with a good degree of certainty. ERI also examined the diapositives for this year. The findings are listed below:

Landfills

- Refuse with probable drums and an excavation in the PCB Landfill
- No ponding in Metals Landfill
- Waste placement continues in landfills identified in previous photo

Storage/Evaporation Ponds

- 29 waste ponds active
- Pond 16 draining across the berm to Pond D
- Pond D drains to Pond L via a pipe under the berm
- Excavations in the future A-series pond locations
- Stained soil along main entrance road up to Pond 3
- Stained soil along road winding around Pad 10B and Pond 19
- Pond A drains to Pond S
- Three trenches are noted north of Pond 12, grading is noted east of this area

Evaporation Pads

- Six evaporation pads active
- One sludge pond active
- Pad 4A draining to Pond 2

Waste Disposal Wells

- Eight injection wells visible; vegetated and graded

Oil and Waste Field Spreading areas

- Spreading Area 1 remains active
- Two excavated areas remain in Spreading Area 6
- Grading and fill activity noted in Spreading Area 2
- Light-toned material or light-toned liquid or sludge noted in Spreading Area 3
- Light-toned material noted in Spreading Area 4
- ASTs south of the Maintenance Shed gone (replaced by USTs north of the Maintenance Shed)

Other

- Grading / grubbing in the RCRA Canyon Drainage in future Pond A-5 location
- Excavation / borrow activities in the A Drainage
- Lineation of the C Drainage Barrier (barrier reportedly constructed of clay material excavated adjacent to the site boundary and A Drainage)
- Dark gray lineation in the vicinity of the P/S Clay Barrier; active dozing in the same area
- An area of erosion gullies with light-toned material at the top of the hill is noted in the RCRA Canyon Area
- Objects noted on a pad at the Drum Loading Dock

Zone 2

- No significant activity noted in this area.

12/16/81 – Source: EPA, Flight #82009, Frame #1-7, Scale 1"=600'

The resolution, quality and large scale of this color photo is excellent. The features at the site could be identified with a high degree of certainty and are listed below:

Landfills

- Drums are noted in all but the PCB Landfill

Storage/Evaporation Ponds

- Construction continues in future A-Series ponds location

Evaporation Pads

- Six evaporation pads active
- One sludge pond active
- Pad 4A draining to Pond 2

Treatment Units

- Grading continues in the Liquids Treatment Area

Oil and Waste Field Spreading Areas

- Spreading Area 1 remains active
- Two small impoundments noted in Spreading Area 6
- Liquid is noted in Spreading Area 2
- Liquid and/or staining is noted in Spreading Area 3, liquids or materials from Spreading Area 3 runs off downgradient to the southeast along an access road

Other

- An area of erosion gullies remains visible in the RCRA Canyon Area
- Staining is noted in the Maintenance Shed Area
- Grading is noted in the future transportation yard
- Ponding is noted south of Sludges 1, in the future Pad 7A area
- Two excavations remain in the northern RCRA Canyon Area
- Grading is noted northeast of Pond A-5, in the future West Canyon Spray Area

Zone 2

- No significant activity is noted in this area

06/02/1982 – Source: PW, Flight #13449, Frame #3, 4 and 5 (prints) #1-15 (diapositives), Scale 1"=500'

The resolution, quality and large scale of these color photos is excellent. The features at the site could be identified with a high degree of certainty and are listed below:

Landfills

- Drums in the Caustic/Cyanide Landfill
- Drums in the Pesticides/Solvents Landfill
- Drums in the Acids Landfill
- Waste placement continues in other landfills identified in previous photo

Storage/Evaporation Ponds

- 36 waste ponds active
- Staining on the road and roadsides next to Pond 5, emanating from a pipe that leads to it from the north
- Two pipes lead into Pond 19

Evaporation Pads

- Six evaporation pads active
- One sludge pond active

Oil Field Waste Spreading Areas

- Waste in Spreading Areas 2, 3 and 4
- Spreading Area 1 remains active
- Ponding in Spreading Area 2
- Grading in area of Spreading Areas 5 and 6 (northern RCRA Canyon Area)
- Grading noted south of Sludges 1 in future Pad 7A

Waste Disposal Wells

- Five injection wells visible; vegetated and graded

Treatment Units

- Liquids Treatment Area graded
- 4-pack area graded
- Grading in the CNS Area

Other

- Grading in area of future transportation yard
- Stacked drums stored in Maintenance Shed Area

Zone 2

- An excavated area is noted south of site near newly constructed access roads south of Pond 13
- Graded area east of site is vegetated

10/06/1983 – Source: PW, Flight #16566, Frame #1 (print and diapositive), Scale 1”=600’

The resolution, quality and larger scale of this color photo is good. ERI examined the diapositive for this year. The resolution of the diapositive is excellent. The features at the site could be identified with a high degree of certainty and are listed below:

Landfills

- Possible excavation in RCRA Landfill (difficult to distinguish because of the spreading activities in RCRA Canyon)
- Access road to RCRA Landfill area
- Waste placement continues in the landfills identified in the previous photo; drums noted in the Heavy Metals, PCB, Caustics/Cyanide and Acids landfills
- Spray activity in future pad areas between landfills dozed

Storage/Evaporation Ponds

- 38 waste ponds active
- Small square pond between Ponds 17 and 18
- Pond near Pond T
- Waste is trailed onto the roads from Ponds 16, D, C, B and A
- Discolored soil along the road around Ponds 14 and P

Evaporation Pads

- Five evaporation pads active
- One sludge pond active
- Grading at Pad 4A

Oil Field Waste Spreading Areas

- Waste in Spreading Areas 1, 2, 3, 5 and 6

- Terraces in Spreading Areas 5 and 6 located in the RCRA Canyon Area; the southernmost terrace in Spreading Area 6 is an impoundment
- Ponding noted in Spreading Area 5 and at base of RCRA Canyon

Waste Disposal Wells

- Two injection wells visible; area graded

Treatment Units

- Liquids Treatment Area contains a building, Zimpro WAO unit and paved area
- 4-pack structure visible
- Single tank north of Liquids Treatment Building visible

Other

- Radial spraying in the western portion of RCRA Canyon North and in Pad 18 area
- No change to the Administration Area from the previous photo
- Tank lying on its side just north of the Maintenance Shed Area (possibly the gray/brown tank previously identified)
- Discolored soil along sidewall west of water tanks – possible seep or concentrate from RO unit associated with water supply tanks on hill (noted also in subsequent photos)
- Drums are noted in the Maintenance Shed Area

Zone 2

No significant activity noted in this area.

07/06/84– Source: PW, Flight #18505, Frame #1 (print), Enlargement Approximate Scale 1"=300' (print); Diapositive 1"=1,000

The resolution, quality and large scale of this color photo is good. ERI examined the diapositive for this year. The resolution of the diapositive is excellent. The features at the site could be identified with a high degree of certainty and are listed below:

Landfills

- Waste placement continues in the landfills identified in the previous photo (drums visible in all landfills)
- Probable grading in RCRA Landfill

Storage/Evaporation Ponds

- 39 waste ponds active
- Spray evaporation evident along sidewalls of Ponds A-1, A-2, A-3, A-4, A-6, Ponds 9, V and 8
- Pond 15 draining to 17
- Pond 16 drains to Pond D, Pond D drains to Pond L

Evaporation Pads

- 4 evaporation pads active
- One sludge pond active
- Pad 4A graded and removed

Oil Field Waste Spreading Areas

- Waste in Spreading Areas 5 and 6
- Ponding in Spreading Area 6
- Two areas of ponding in Spreading Area 5
- Ponding in RCRA Canyon to the southeast of Spreading Area 5 in the vicinity of the WCCB

Treatment Units

- Two tanks now visible north of the Liquids Treatment Area
- Staining noted in the Maintenance Shed Area

Other

- No change to the Administration area from the previous photo
- Gray/brown tank northwest of in Maintenance Shed gone (possibly moved to water tank hill)
- Staining noted on road east of Pond 8

Zone 2

- Dark staining on entrance road
- Graded light-colored material noted west of the site
- Disturbed ground and probable liquid or staining is noted near entrance

1985/1986 – Source unknown, Enlargement Approximate Scale 1”=120’

The resolution and quality of this enlarged, mounted photo was excellent. The characteristics of the disposal site could be positively identified, and are listed below:

Landfills

- RCRA Landfill remained as it was in the previous photo but now partly vegetated
- Waste disposal continues in landfills identified in previous photo (drums noted in PCB, Pesticides/Solvents, and Acids Landfills)

Storage/Evaporation Ponds

- 39 waste ponds active
- Pond 14 waste draining across berm to Pond P
- Staining along roads adjacent to Ponds 16, D, C, B and A

Evaporation Pads

- 9 evaporation pads active
- Both sludge ponds active
- Liquids draining from Pad 18 to Pond 18
- Pond 7 gone; now in its place there is a road and Pads 9A & 9B

Oil Field Waste Spreading Areas

- Waste in Spreading Areas 5 and 6; dark waste draining down slope in Spreading Area 6
- Grading activities on all other spreading areas
- WCCB impoundment contains liquid

Treatment Units

- Grading in the vicinity of the CNS
- No other changes to the Liquids Treatment Area from the previous photo

Other

- Transportation yard surfaced / possibly paved
- Above-ground diesel fuel tank on concrete pad in transportation yard
- Darkened soil along the outer perimeter road from Sludges 1 to the top of the P/S Landfill and again from the bottom of the PCB Landfill, around RCRA Canyon down to Pond A-5
- Drums (approximately 80) are stored at the Drum Loading Dock
- A new parking area (the transportation yard) is visible south of Pond A-1

Zone 2

- No significant activity noted in this portion of the site

**04/06/1987 – Source: PW, Flight #26570, Frame #9, Scale 1”=2,000’ Enlargement
Approximate Scale 1”=200’, Diapositive Scale 1”=2,000’**

There were two copies of this color photo: one was from the source listed above and the other was an enlargement. The quality and resolution was excellent at both scales and allowed for the site features to be clearly identified as listed below:

Landfills

- Waste placement continues in landfills previously noted in other photos
- Grading and dozing activities in the RCRA Canyon area
- Vegetation noted in PCB landfill

Storage/Evaporation Ponds

- 41 waste ponds active
- Aeration units are used in Ponds 3, 4, 6, 10 and 19

Evaporation Pads

- 9 evaporation pads active
- Both sludge ponds active, grading in Sludge Pond 1
- Pad 4A active, with liquid draining to Pond 2

Oil Field Waste Spreading Areas

- Waste on Spreading Area 6 ponding also noted in Spreading Area 6
- Grading activities on all spreading areas
- WCCB pond visible

Treatment Units

- CNS structure visible
- No other changes to the Liquids Treatment Area from the previous photo
- H₂O₂ system visible (two short white tanks located near the rim above Pond 3)

Zone 2

- No significant activity noted in this portion of the site

**11/11/1988 – Source: PW, Flight #32356, Frame #1, Enlargement
Approximate Scale 1"=300', Diapositive Scale 1'=625'**

The resolution and quality of this enlarged, color photo was excellent and allowed for the site features to be clearly identified as listed below. ERI examined the diapositive for this year.

Landfills

- Drums in the Pesticides/Solvents Landfill
- Possible waste placement in Acids Landfill with dark-toned material or staining graded on top of it
- Fill placement in Pesticides/Solvents, Metals, Caustic/Cyanide, and Acids Landfills
- Grading in the PCB Landfill
- Dark-toned material or staining and drums noted in the Heavy Metals Landfill

Storage/Evaporation Ponds

- All ponds excavated with the exception of the WCCB at the base of RCRA Canyon
- Active excavation noted in most ponds, areas of ponding and staining noted in several ponds, large trenches noted in Ponds 2 and 11

Evaporation Pads

- All evaporation pads being excavated / graded
- Both sludge ponds being graded
- Clay liner test pads in Pad 1A area

Oil Field Waste Spreading Areas

- Grading activities on all spreading areas

Treatment Units

- 6-pack structure
- 4 tanks north of Liquids Treatment Building
- 1 tank northeast of Liquids Treatment Building
- No other changes to the Liquids Treatment and CNS area
- Oil Recovery Tanks are gone; small square structure stands in their place
- H₂O₂ system at Pond 3 now gone

Other

- Initial Administration trailers replaced by a smaller truckers' lounge and computer center building, new (current) Administration Building
- Two tanks between WAO and CNS relocated to expand 4-pack to 6-pack
- Discolored soil along road between the Liquids Treatment building and the CNS
- Discolored soil along road from Liquids Treatment building down to former Pond 2
- New concrete containment feature south of liquids treatment area, with graded dark-toned material or stained soil noted adjacent to it
- Stored drums noted at Drum Loading Dock
- Drums in open trailer trucks south of Pond 11 and southwest of the Administration Building Area

- Vertical tank for staging PCT liquids located east of former Pond 13

Zone 2

- Two trench excavations are noted south of the site
- Several new partially constructed roads are visible south of the site
- Graded area and new roads are noted east and north of the site
- Two excavated areas north of site along access road contains a dark colored object

11/22/88 – Source: Intrasearch, Flight #3537, Frame #172, 173 (diapositive), Scale 1"=2000'

Landfills

- Fill placement with possible drums noted in Pesticides/Solvents Landfill
- Fill placement with possible drums noted in Heavy Metals and Acids Landfill
- Grading is noted in the RCRA landfill

Evaporation Pads

- All pads excavated

Oil Field Waste Spreading Areas

- All areas are graded

Treatment Units

- CNS structure visible
- 6-pack structure visible
- Two horizontal tanks and vehicles (one with staining adjacent to it) are noted east of the CNS in former Ponds 14 and P
- Flow staining noted south of CNS, continues south towards the Liquids Treatment Building
- 4 tanks north of Liquids Treatment Building
- 1 tank northeast of Liquids Treatment Building
- 1 tank noted east of former Pond 13

Zone 2

- Trenches noted south of the site remain as excavations

**07/06/1989 – Source: PW, Flight #SB7, Frame #329(print) 328, 329 (Diapositive),
Enlargement Scale 1"=2517', Scale Diapositive Scale: 1"=2,000'**

The quality and resolution of these color photographs is good and allowed the features at the site to be recognized with a good degree of certainty and are listed below. ERI analyzed the diapositive for this year. The resolution of the diapositives is excellent. The following site features were visible:

Landfills

- Fill placement in the Pesticides/Solvents Landfill
- Darker soils graded / filled in the Metals Landfill
- Fill placement in the Caustic/Cyanide Landfill

- Fill placement in the Acids Landfill
- Grading activities in the PCB Landfill
- Grading noted at the RCRA Landfill

Storage/Evaporation Ponds

- One waste pond (Pond A-5) with some liquids during pond closure activities
- All others ponds excavated
- Possible stormwater along a drainage that runs through former Ponds 6, 8 and 10
- Discolored soil along the northern perimeter road from Sludges 2 to the P/S Landfill

Evaporation Pads

- 6 evaporation pads excavated / graded
- Both sludge ponds graded
- Light-toned material is spread around a pit in the Pad 9A and 9B area

Oil Field Waste Spreading Areas

- All spreading areas graded or undisturbed from the previous year

Treatment Units

- No change to the Liquids Treatment, CNS and 6-Pack areas

Other

- Two horizontal tanks are noted east of former Pond 13

Zone 2

- Excavations noted directly south of former Pond 13

5/25/90 – Source: UCSB MIB, Flight #90-084, Frame #55, Scale 1”=2,708’

Although the scale of this black and white photo is small and the resolution is fair, some of the features at the site could still be identified and are listed below:

Landfills

- Grading / filling dark soil in the Pesticides/Solvents Landfill
- Other landfills graded
- Discolored soil extends from the former Pond 9 location to the Pesticides/Solvents Landfill

Storage/Evaporation Ponds

- Former Ponds A-2 and A-3 joined (A-Series Pond) and active
- Probable liquid is visible in Pond A-5
- Grading in current RCF Pond location

Evaporation Pads

- All evaporation pads and sludge ponds graded

Oil Field Waste Spreading Areas

- No activities apparent

Treatment Units

- No other changes to the Liquids Treatment and CNS area
- Probable staining noted north of CNS building

Zone 2

- No significant activity noted in this portion of the site

1991 – Source: UCSB MIB, Flight #91-022, Frame #1546 (diapositive), Scale 1”=5,417’

The scale of this black and white photo is too small and the resolution is poor. Site features could not be identified; therefore most site features could not be identified

Treatment Units

- Six-pack structure noted
- CNS structure visible

11/30/1992 – Source: PW, Flight #C4896-19, Frame #04 (print), 3-5 (diapositive) Scale 1”=4,500’

Although the scale of this color photo is small and the resolution is fair. ERI analyzed the diapositives for this year. The resolution of the diapositives is also good. Most of the features at the site could be identified, to some extent, and are listed below:

Landfills

- Vegetation on all site landfills
- Possible filling / grading in limited portion of the Metals Landfill
- Concrete ditch in Heavy Metals Landfill
- Light-toned mounded material noted on PCB Landfill

Storage/Evaporation Ponds

- Former Ponds 4, 9, 10 and 11 are joined as one (current RCF Pond) and active; former Ponds A-1 and A-4 joined into the active A-Series Pond; Pond A-5 active

Evaporation Pads

- All evaporation pads vegetated or otherwise inactive
- Both sludge ponds vegetated

Oil Field Waste Spreading Areas

- Vegetation on all spreading areas

Treatment Units

- No change to the Liquids Treatment, CNS and 6-pack structure etc. from previous photo

Other

- Lineation in the vicinity of PCT-C
- Probable horizontal tank east of Pond 13

Zone 2

- Area south of Pond 13 graded

09/15/1994 – Source: UCSB MIB, Flight #NAPP-2nd cycle, Frame #6928-93 (print) 93, 94 (diapositive), Scale 1"=3,333'

The scale of this black and white photo is small and the resolution is poor. Only large site features could be identified. ERI examined the diapositives for this year. The resolution of the diapositives is good.

Landfills

- All landfills vegetated
- Ground scars noted in RCRA Canyon

Storage/Evaporation Ponds

- Former Ponds 3 and 12 joined into the active RCF Pond
- A-Series, Pond A-5, Pond 18 and Pond 13 active
- Probable impoundment noted in Pond D area

Evaporation Pads

- Grading for possible drainage improvement on vegetated evaporation pads
- Sludge ponds vegetated

Treatment Units

- No change in the Liquids Treatment area from the previous photo
- Tanks north and northeast of Liquids Treatment building removed

Zone 2

- No significant activity is noted in this area

07/05/1997 – Source: PW, Flight #SB10, Frame #401 (print), 401, 402 (diapositives), Enlargement Scale 1"=300', Diapositive Scale 1"=2,000'

The resolution and quality of this enlarged, color photo and the diapositives were excellent and allowed for the site features to be clearly identified as listed below:

Landfills

- Landfills vegetated
- Concrete ditch at southwest corner of Pesticides/Solvents Landfill
- Concrete ditch on Metals Landfill
- Access road leads to an area of light-toned material noted in PCB Landfill

Storage/Evaporation Ponds

- No change to the ponds from the previous photo

Evaporation Pads

- Evaporation pads vegetated

Oil Field Waste Spreading Areas

- All spreading areas are vegetated

Treatment Units

- 2 Frac tanks for PACT system immediately north of Liquids Treatment Building
- Carbon units northeast of Liquids Treatment Building
- 4 Frac tanks between the Liquids Treatment Building and CNS
- CNS structure and drums visible

Other

- Concrete ditch in central drainage area; new ditch links drainage from Metals and Pesticides Landfills to RCF Pond

01/05/1998 – Source: GS, Flight #3335-1, Enlargement Approximate Scale 1”=300’

The resolution and quality of this enlarged, color photo was excellent and allowed for the site features to be clearly identified as listed below:

Landfills

- Landfills are vegetated

Storage/Evaporation Ponds

- No change to the ponds from the previous photo

Evaporation Pads

- Pads and sludge ponds vegetated

Oil Field Waste Spreading Areas

- Spreading areas vegetated

Treatment Units

- 6 new carbon treatment cylinders
- No other change to the Liquid Treatment area and CNS from the previous photo

Other

- Road in central drainage area removed and concrete ditch from the Pesticides/Solvents Landfill to the central drainage area ditch joined
- Pavement in truck loading facility south of the 6-pack tanks

12/17/1999 – Source: GS, Flight #4116-S, Scale 1”=1,000’

The resolution and quality of this color photo was excellent and allowed for the site features to be clearly identified, most as listed below:

Landfills

- Pesticides/Solvents Landfill capped; erosion mat and silt fence downgradient from landfill benches
- Other landfills vegetated

Storage/Evaporation Ponds

- Enhanced evaporation / irrigation system north of RCF pond
- No other changes to the ponds from the previous photo

Evaporation Pads

- No change to the evaporation pads and sludge ponds from the previous photo

Treatment Units

- 1 new vapor phase GAC unit located between the Liquids Treatment Building and the 6-Pack
- 2 Frac tanks between the Liquids Treatment Building and the CNS (2 are missing from previous photo)

Other

- Temporary access road to the Pesticides/Solvents Landfill and buttress area
- Erosion mat on Pesticides/Solvents landfill buttress
- Erosion Mat on borrow area northwest of the Pesticides/Solvents Landfill

02/12/2002 – Source: GS, Flight #4850-S, Scale 1”=1,000’

The resolution and quality of this color photo was excellent and allowed for the site features to be clearly identified as listed below:

Landfills

- Pesticides/Solvents Landfill top deck is regraded
- Heavy Metals Landfill is capped and has silt fence placed
- Grading on crest of Caustics/Cyanides Landfill and much of landfill is grubbed
- Acids Landfill vegetated
- New road loops through the PCB Landfill

Storage/Evaporation Ponds

- Former Pond A-6 joined into the active A-Series Pond; no other changes to the ponds from the previous photo

Evaporation Pads

- Evaporation Pad 10A, 10F and 10G are capped
- Sludge 2 used for geosynthetics storage
- No other changes to the evaporation pads and sludge ponds from the previous photo

Treatment Units

- Line of ATS vessels plus one ATS-regenerate tank located between the Liquids Treatment Building and the 6-Pack
- 1 new frac tank

- Line of 6 GAC vessels
- No other changes to the Liquids Treatment and CNS area

Other

- Northern borrow area expanded