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FINAL
RCRA FACILITY ASSESSMENT REPORT
FOR
ROCKWELL INTERNATIONAL CORPORATION
ROCKETDYNE DIVISION
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

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DCN: TZ4-R09015-RN-M21460

FINAL
RCRA FACILITY ASSESSMENT REPORT
FOR
ROCKWELL INTERNATIONAL CORPORATION
ROCKETDYNE DIVISION
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

TECHNICAL ENFORCEMENT SUPPORT AT HAZARDOUS WASTE SITES

TES 11

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May 1994

EPA Contract No. 68-W9-0008
EPA Work Assignment No. R09015
SAIC/TSC Project No. 06-6075-03-4383

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EXECUTIVE SUMMARY

The first step in the Resource Conservation and Recovery Act (RCRA) corrective action process is the RCRA Facility Assessment (RFA). The RFA is conducted by the U.S. Environmental Protection Agency (EPA) to assess if a release of hazardous waste or hazardous constituents has occurred from a solid waste management unit (SWMU). The main components of an RFA are to identify and gather information on releases at the RCRA facility; to evaluate SWMUs for releases to all media (groundwater, surface water, air, and soil); and to make preliminary determinations regarding releases of concern and the need for further actions and interim measures at the facility.

An RFA has been conducted for the Rockwell International Corporation, Rocketdyne Division, Santa Susana Field Laboratory, Ventura County, California. This RFA consists of the following tasks: 1) preliminary review of the Rockwell files and other information gathered from the U.S. EPA Region IX, the California Department of Health Services (DHS)/Toxic Substances Control Program (DTSC), the Regional Water Quality Control Board (RWQCB) Los Angeles Region, the Department of Energy (DOE), and the Nuclear Regulatory Commission (NRC). From the information ascertained in the files, a picture of the facility began to develop, however, more information was required in order to conclude if a release of hazardous waste had occurred from any of the SWMUs.

In order to fill in the data gaps and to verify the information found during the preliminary review, 2) a visual site inspection (VSI) of the facility was conducted from August 27 through 31, 1990. The VSI consisted of visiting all of the SWMUs identified during the preliminary review, and included a document search at the University of California, Los Angeles Library for more information related to radiological releases in Area IV. During that document search, 48 boxes of documents generated by Atomics International, a division of North American Aviation (which eventually became identified as Rockwell International) from approximately 1940 through 1970 (the contractors prior to Rockwell/Rocketdyne at this site) were reviewed. Most of the documents were periodic progress reports submitted to the Atomic Energy Commission (AEC) as part of a contractual agreement between the contractor and the AEC. Unfortunately, because the documents did not specify the location of the nuclear facilities, it could not be determined if the documents pertained to the Santa Susana Field Laboratory (SSFL). Therefore, these documents were not used for this report.

Forty-five of the Areas of Concern (AOCs) identified during the preliminary evaluation were not visited during the VSI and, therefore, could not be evaluated. Most of these areas consisted of old leachfields. The location of these leachfields (based upon the file reviews) could not be determined by the Rockwell representatives either because the areas were covered by vegetation or the facility representatives could not remember where the leachfields were located.

3) Sampling of environmental media at selected SWMUs to fill out data gaps not addressed in the Preliminary Review (PR) and VSI.

Although this is a RFA, releases from units that managed non-RCRA regulated waste (i.e., California wastes) were also evaluated, and the findings are presented in this report. (Radioactive materials are regulated by the DOE, and not by EPA or DHS.) We have also included several hazardous material product storage areas as AOCs. In addition, comments from the surrounding community were received and are included in this report.

The final results of the preliminary review and the VSI account for a total of 69 SWMUs and 55 AOCs at the Rockwell International Corporation SSFL.

In March and April 1992, and presented in a March 10, 1993 report (Reference 68), McLaren/Hart Environmental Engineering Corporation (McLaren/Hart) conducted a multimedia sampling program at the Brandeis-Bardin Institute (BBI) and the Santa Monica Mountain Conservancy (SMMC). The BBI and SMMC properties are adjacent to SSFL's north and northwest property lines. The BBI is located north of SSFL's Areas II, III and IV; and the SMMC is located north of SSFL's Area I. EPA Region IX and California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) collected split samples and blind duplicates for comparison analysis.

McLaren/Hart conducted the multimedia sampling under contract to Rockwell International Corporation, Rocketdyne Division to determine if radionuclides and/or chemicals had been deposited or had migrated to the BBI and SMMC properties. Soil/sediment samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds, priority pollutant metals and 75 naturally occurring and man-made radionuclides as a gamma scan as well as tritium, isotopic plutonium, iodine 129, and strontium 90. Surface water samples were analyzed for the same chemicals and radionuclides as well as for gross alpha and gross beta radioactivity. Groundwater was sampled and analyzed for the same analytes as surface water excluding metals. Finally, fruit samples were collected and analyzed for the full suite of radionuclides. Only detected results are included in the RFA report, i.e. results from the multimedia sampling event were nondetect unless otherwise specified.

Sampling was conducted at six watershed areas, five on BBI property and one on SMMC property. The watersheds on the BBI property are associated with some of the SWMUs and/or AOCs at the SSFL Area IV and Area II. The Area IV SWMUs and AOCs include the Radioactive Materials Disposal Facility (RMDF) (SWMU No. 7.6), the Sodium Burn (Pit) Facility (SWMU No. 7.2), Building 59, Former Space Nuclear Auxiliary Power (SNAP) Facility (AOC in Area IV); and the Sodium Reactor Experiment (SRE) Watershed, an area not associated with any SWMU previously identified. The SRE is located in Building 143 in the north central portion of Area IV (68). The RD-51 Watershed area is associated with SSFL's Area II. The RD-51 Watershed area is located in the parking lot in the north central portion of Area II and northeast of Building 206, Expendable Launch Vehicle (ELV) Final Assembly (SWMU No. 5.2).

The sampling at the SMMC, located north of the SSFL Area I, was conducted at the former Rocketdyne Employee Shooting Range (RESR), surrounding areas and groundwater beneath the SMMC. SAIC/TSC had previously identified the former RESR, the Gun Club, as a potential SWMU, in the PR report for Rockwell (SAIC/TSC 1990). The former RESR was eliminated as a SWMU as a result of the VSI conducted by SAIC/TSC in July 1990. Samples from the surrounding area were collected from the soil at the SMMC visitor center parking lot, the existing road system, from fruit in the orange groves, and from the groundwater from the Antenna Well, the Well by the House, the Well by the Gate, and A Spring. (68)

See the discussions under the respective SWMU or AOC sections for results of the sampling event. As discussed above, only detected results are included in the RFA report. Where the sampling locations are not or cannot reasonably be associated with any specific SWMUs, an additional section has been added at the end of the chapter particular to that SSFL Area (e.g., SRE Watershed for Area IV, and the RD-51 Watershed for Area II).

McLaren/Hart conducted sampling at 14 human activity areas on BBI property; seven were located downstream from the RD-51 Watershed (associated with Area II), three were located downstream from the watersheds associated with Area IV (RMDF, Sodium Burn Facility, Building 59-SNAP, and the SRE), and four were located downstream from all the sampled watersheds. The results of the sampling at the human activity areas found minor amounts of contamination in five of the 14 samples. A soil sample collected by McLaren/Hart from sample location BB-02 (the Dormitory Area) detected p-Cresol (4-methylphenol) at a concentration of 670 micrograms per kilogram (μg/kg) (68). The EPA split soil sample from sample location BB-03 (Campsite Area 1) showed acetone at a concentration of 27 μg/kg (68). The DTSC split sample from location BB-04 (Campsite Area 2) showed tritium at a concentration of 2,470 ± 197 picocuries per liter (pCi/ℓ) in the first analytical run; a second analytical rerun by DTSC showed a tritium concentration of 392 ± 153 pCi/ℓ (68). At sample location BB-07 (Counselor-In-Training), bis(2-ethylhexyl)phthalate, a plasticizer, was detected by McLaren/Hart in concentrations ranging from 370 μg/kg to 8,500 μg/kg (68). A McLaren/Hart sample from sample location BB-11 (the Vegetable Garden) showed 4,4'-DDE (dichlorodiphenyldichloroethene) at a concentration of 340 μg/kg; a McLaren/Hart field duplicate of another sample collected at BB-11 detected 4,4'-DDE at a concentration of 360 μg/kg (68). Chemicals, radionuclides and metals were not detected at or above background levels or reporting limits in any other environmental samples within the BBI property.

The sampling at the SMMC locations (other than at the former RESR) included soil and groundwater samples. Two McLaren/Hart soil samples from sample location SM-01 (SMMC Visitor Center Parking Lot) contained toluene at concentrations of 9 μg/kg and 7 μg/kg. The EPA soil split samples from the SM-01 location showed methylene chloride at concentrations of 6 μg/kg and 7 μg/kg, respectively (68). Two McLaren/Hart groundwater samples from sample location SM-07 (the Well by the Gate) showed 1,1,1-trichloroethylene (TCE) at concentrations of 10 micrograms per liter (μg/ℓ) and 9 μg/ℓ. The EPA split groundwater sample from the SM-07 location showed 13 μg/ℓ (68). Chemicals, radionuclides and metals were not detected at or above background levels or reporting limits in any other environmental samples collected by the three parties within the SMMC area.

GLOSSARY OF TERMS

AOC:	Area of Concern; an area that may not be a SWMU, but may still require investigation to determine the potential of contamination.
DHS:	California Department of Health Services, Toxic Substances Control Program; the former state agency that regulated hazardous waste under the California Health and Safety Code.
DTSC:	California Environmental Protection Agency, Department of Toxic Substances Control; the current state agency that regulates hazardous waste under the California Health and Safety Code.
EPA:	Environmental Protection Agency; the federal agency that regulates hazardous waste under the Resource Conservation and Recovery Act.
Hazardous Waste:	A waste, or combination of waste, which, because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause or significantly contribute to an increase in mortality or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed or, or otherwise managed.
RCRA:	Resource Conservation and Recovery Act; the federal law that establishes how hazardous wastes are managed and how facilities that generate, treat, store, or dispose of hazardous wastes will address any contamination.
RFA:	RCRA Facility Assessment, the first step in the RCRA corrective action program, conducted by the EPA or the state agency with the authority to implement RCRA. The RFA consists of one or more of the following tasks: 1) a preliminary review, 2) a visual site inspection, and 3) a sampling visit. The second step in the corrective action program is the RCRA Facility Investigation (RFI) in which contaminated areas of a facility are characterized and the extent of the contamination is determined. The third step is the Corrective Measures Study (CMS) in which various alternatives for remediating the problems are evaluated on several criteria including cost and effectiveness of the technology. The fourth step is the Corrective Measure Implementation where the selected remediation is implemented. The facility conducts all of the steps that follow the RFA.

RWQCB: Regional Water Quality Control Board; the state agency responsible for regulating groundwater and surface water discharges.

Solid Waste: Any solid, liquid, semisolid, or gaseous material that is discarded, abandoned, or considered to be inherently waste-like.

SWMU: Solid Waste Management Unit; Any discernible waste management unit at a RCRA facility from which hazardous constituents might migrate; irrespective of whether the unit was intended for the management of solid and/or hazardous waste. A SWMU includes containers, tanks, surface impoundments, waste piles, land treatment units, landfills, incinerators, underground injection wells, recycling units wastewater treatment units, and areas contaminated by routine, systematic, and deliberate discharges from process areas. A SWMU does not include accidental spills from production areas and releases that are permitted under other environmental programs or contamination resulting from permitted discharges.

1.0 INTRODUCTION

The 1984 Hazardous and Solid Waste Amendments to the RCRA provided EPA with the authority to require comprehensive corrective actions on all SWMUs and other AOCs where releases of hazardous constituents have occurred. This requirement applies to all facilities which currently treat, store, or dispose of hazardous waste (or have done so in the past) as regulated under RCRA. The intent of this authority is to address releases of hazardous constituents to air, surface water, groundwater and soil, and generation of subsurface gas. In order to accomplish this objective, an RFA is performed. The RFA is the first step in the RCRA corrective action program and consists of one or more of the following tasks: preliminary record review and evaluation; VSI; and, when warranted, sampling and analysis. EPA has requested that Science Applications International Corporation/Technology Services Company (SAIC/TSC), under Work Assignment No. R09015, conduct the RFA of the Rockwell Corporation, Rocketdyne Division SSFL located in Ventura County, California.

This report provides a summary of the record review, data evaluation, and VSI. Primary sources of information utilized in the review included inspection reports, correspondence, and facility records found in the files of EPA Region 9, California Department of Health Services, the Los Angeles Regional Water Quality Control Board, the DOE, the NRC, and documents obtained from the facility during the VSI.

A facility description and regulatory history are provided in Section 2.0. Information pertaining to the regional and environmental setting is presented in Section 3.0. Sections 4.0 through 7.0 consist of a discussion of the individual SWMUs identified in the review of the file materials, observations made during the VSI, and the results from the sampling visit. The discussion of each SWMU includes unit description, periods of operation, wastes managed, release controls, release history, pollutant migration pathways to soil, groundwater, surface water, air, and subsurface gas generation, and the results from the sample analyses.

This RFA includes a discussion of radiological releases (which are not regulated under RCRA) provided for information purposes only.

The Rockwell International, Santa Susana Field Laboratory site is located in southeastern Ventura County, near the crest of the Simi Hills at the western border of the San Fernando Valley, California. The geology consists of a mix of mountainous outcropping and a fracture-dominated hydrogeological system. The hydrogeological system is composed of semipermeable rock, fractures, canyons, faults and shallow alluvial soils.

This site consists of 2,668 acres which are subdivided into four administrative areas (Areas I-IV), and a Buffer Zone. Areas I, III, and the Buffer Zone are owned and operated by Rockwell International Corporation, Rocketdyne Division (Rockwell). In addition, the U.S. National Aeronautics and Space Administration (NASA) owns a 42-acre portion (formerly the U.S. Air Force Liquid Oxygen Manufacturing Plant #64) within Area I. Area II is owned by NASA and is operated by Rockwell. Area IV is owned by Rockwell. It consists of 290 acres of which 90 acres are DOE optioned-land. Rockwell conducts operations for DOE in Area IV.

The Buffer Zone occupies approximately 1,200 acres, with natural vegetation and without industrial activities located in the southern portion of the site. The NPDES discharge points (001 and 002) are located at the southern boundary of the Buffer Zone.

2.0 FACILITY DESCRIPTION

2.1 LOCATION AND OWNERSHIP

The SSFL is located 29 miles northwest of Los Angeles, California in the southeast corner of Ventura County. The facility occupies a plateau near the crest of the Simi Hills. The Simi Hills are bordered on the east by the San Fernando Valley and to the north by the Simi Valley. The nearest residential developments, Bell Canyon and Woolsey Canyon, are located within a mile of the SSFL site.

The site occupies 2,668 acres situated in rugged terrain. SSFL is divided into four operational areas (Areas I, II, III and IV) and a Buffer Zone. These areas are owned and operated as follows:

- Area I (EPA ID Number CAD 093365435) is 713 acres located in the northeast portion of the facility. The Rocketdyne Division of Rockwell operates the entire area, however, 671 acres are owned by Rockwell International and 42 acres are owned by NASA.(3)

- Area II (EPA ID Number CA 1800090010) is 410 acres located in the north central portion of the SSFL. The area is owned by NASA and operated by the Rocketdyne Division of Rockwell International.(3) The 42 acre portion of Area I used to be owned by the U.S. Air Force and included the Liquid Oxygen Plant which was operated for the Air Force by Air Products Incorporated.

- Area III (EPA ID Number CAD 093365435) is 114 acres and is owned and operated by the Rocketdyne Division of Rockwell International.(3)

- Area IV (EPA ID Number CAD 000629972 and CA 389009001) is 290 acres located in the northwest section of the facility. Rockwell operates and owns the entire area. A portion of Area IV (90 acres which houses the Energy Technology Engineering Center [ETEC]) is operated by Rockwell under an option contract with the DOE.(3)(47)

- The Buffer Zone is 1,200 acres, owned by Rockwell, and located along the southern boundary of the SSFL.(7) This naturally vegetated area excludes industrial activity. Only the two NPDES discharge points and drainage channels are located in the zone.

Figure 1 illustrates an overall view of SSFL and the boundaries of the four areas and the Buffer Zone. Figure 2 illustrates the breakdown of ownership of SSFL.

2.2 FACILITY PROCESSES AND WASTE GENERATION

The facility is engaged in research, development, and testing for rocket engines, water jet pumps, lasers, liquid metal heat exchanger components, fossil fuel projects, and related technologies.

The principal activity, however, has been the testing of large rocket engines.(14) Areas I, II and III were utilized primarily as rocket testing facilities. Waste management practices originally consisted of building surface impoundments for the cooling and flush water used in rocket testing procedures. The engines were flushed with an organic solvent, usually TCE as part of the testing procedures. TCE was also used to clean other equipment at the large-engine test areas. After the flushing operations, the TCE which did not evaporate was discharged from each test stand onto a concrete spillway which drained into an unlined channel. The unlined channel drained into an unlined skim pond and/or retention pond. The ponds could drain into the surface drainage system and eventually out into Bell Creek. Beginning in 1977, Rockwell began to reclaim the TCE at all of the large-engine test stands (Alfa, Bravo, Bowl, Canyon, Delta, and Coca). Approximately 8,000 large-engine tests were conducted at these sites between 1953 and 1961. Rocketdyne personnel have estimated that about 50 to 100 gallons of TCE were used for each engine test, therefore indicating that the total quantity of TCE used at these sites ranged from 400,000 to 800,000 gallons.(14)

From the early 1950s until 1976, smaller quantities of TCE were also used at other locations such as laboratories, test facilities, burn pits, and retention ponds that received surface drainage from these locations.(14)

Currently, all cooling wastewater from the test stands is routed to the site-wide water reclamation system, in which the water is captured in a series of ponds and reused.(V1)(V2) A schematic diagram of the water reclamation system is provided in Figure 7.

2.2.1 Area I

The principal activity at the SSFL Area I has been the testing of rocket engines at the Advanced Propulsion Test Facility (APTF), the Laser Engineering Test Facility (LETF), Canyon, and Bowl (SWMUs 4.9, 4.13, 4.14, and 4.15, respectively). Testing began in 1953. Currently, only the APTF is operational. Bowl became inactive in 1963; Canyon in 1961, and LETF in the late 1970s.

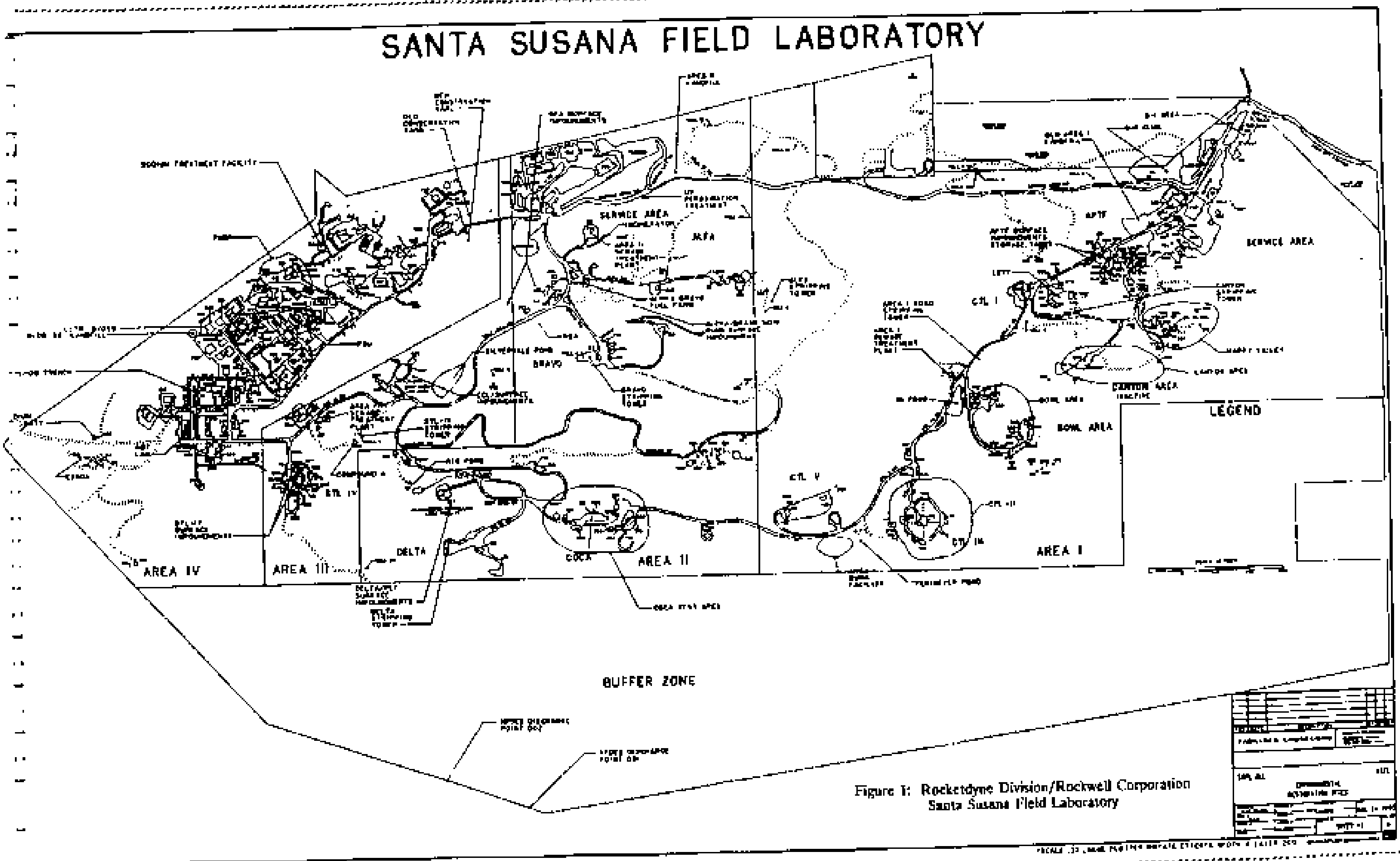


Figure 1: Rocketdyne Division/Rockwell Corporation Santa Susana Field Laboratory

SANTA SUSANA FIELD LABORATORY

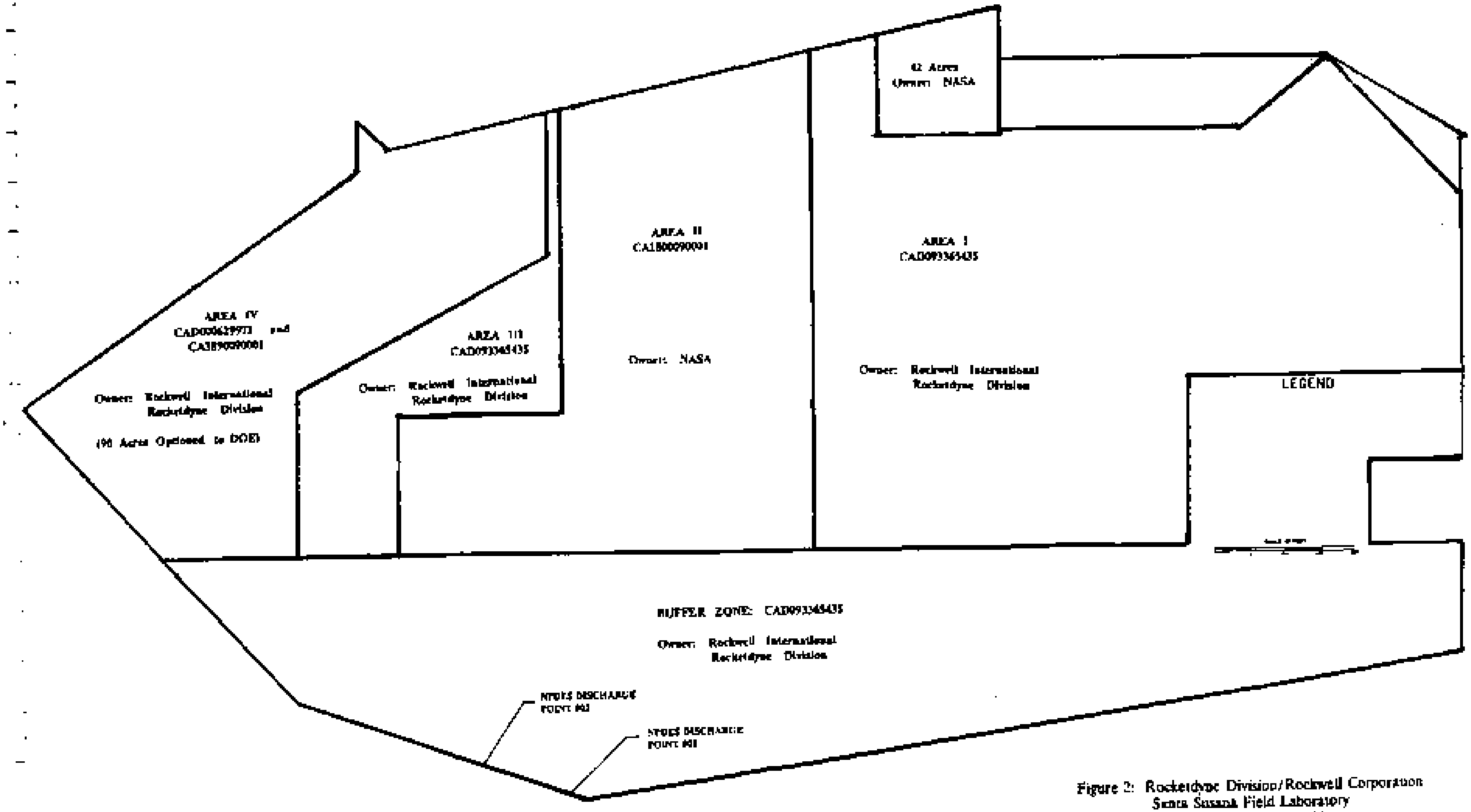


Figure 2: Rocketdyne Division/Rockwell Corporation
Santa Susana Field Laboratory
Breakdown of Ownership

Rocket engines were most often tested with one of three types of fuels: RP-1 (high grade kerosene) - liquid oxygen (LOX), LOX-hydrogen, and monomethyl hydrazine (MMH) - nitrogen tetroxide (NTO). During the engine tests, large volumes of cooling water were flushed into the spillways beneath the stands and into a chain of surface impoundments. The RP-1 engines were flushed with TCE following each test. Prior to 1961, this TCE was allowed to drain into the spillways beneath the stands. Other materials released from the test stands include spilled RP-1, MMH and NTO. The cooling wastewater and other released substances (such as fuels and/or TCE) flowed from the test stand spillways to the associated surface impoundments (i.e., APTF test stand to APTF Pond #1 or #2) to the R-1 Pond and eventually to Perimeter Pond. Some impoundments had oil skimmers or other release controls. Water in the Perimeter Pond was and still is discharged through one of the two NPDES permitted outfalls located in the Buffer Zone, or reused as reclaimed water for cooling rocket engines, or for other industrial purposes. During a site visit on February 4, 1991, Rockwell personnel stated that, in addition to rocket testing, Rockwell conducts operations for DOE in Area I, under the Steam Accumulation Blowdown Evaluation Rig (SABER) project.

2.2.2 Area II

The principal activity at the SSFL Area II has been the testing of rocket engines. Four test areas are located in Area II: Alfa, Bravo, Coca, and Delta (SWMUs 5.9, 5.13, 5.18, and 5.23, respectively). Testing began in 1953 and is still ongoing at the Alfa and Bravo areas. Delta was taken out of use in 1970 and dismantled in 1982. The Coca test stand is inactive, but is presently being remodeled for future testing of space shuttle C engines. However, according to Rockwell personnel, during the February 4, 1991 site visit, testing of shuttle space-engines occurred until November 1988 at the Coca test stand.

Rocket engines were most often tested with one of three types of fuels: RP-1-LOX and LOX-hydrogen. During the engine tests, large volumes of cooling water were flushed into the spillways beneath the stands and into a chain of surface impoundments. The RP-1 engines were flushed with TCE following each test. Prior to 1961, this TCE was allowed to drain into the spillways beneath the stands. Other materials released from the test stands include spilled RP-1, MMH, and NTO. The cooling water and other released substances (such as TCE and/or fuels) flowed through the various surface impoundments to the R-2 Discharge Ponds. Some impoundments had oil skimmers or other release controls. Water from the R-2 ponds was, and is, discharged through an NPDES permitted outfall or used as reclamation water for industrial purposes.

The major wastes generated in processes associated with small-jet engine testing are spent organic solvents used to flush the jet engine thrust chambers following each test. Solvents were also used to clean other equipment at the test areas. After the solvent was used to flush an engine, the spent solvent was allowed to drain onto a concrete spillway, through an unlined channel and into a surface impoundment. TCE began to be reclaimed at the test areas in 1961. According to Rockwell, the use of TCE was discontinued in 1977, except at the Alfa Area where the spent TCE is currently reclaimed.(14)

In addition to waste TCE, jet-engine testing operations generate coolant (wastewater), RP-1, 1,1,1-trichloroethane (TCA) and Freon wastes. Large volumes of water are used to cool the test stand during engine testing generating a wastewater.(19) This waste water is discharged to the retention ponds (SWMUs 4.14, 4.15, and 5.11).

The Area II landfill is located close to the Area II Service Road between Areas I and II. According to Rockwell, NASA plans to provide funds to Rockwell in 1992 for characterization of this unit.

2.2.3 Area III

The primary facilities in operation in Area III are the Systems Test Laboratory IV (STL-IV) Test Area, which is currently in use to test small engines with an MMH-NTO propellant, and the Engineering Chemistry Laboratory (ECL)(65) where propellant ingredients are developed. Cooling water and chemicals released from the STL-IV area flowed through two treatment ponds into the R-2 Discharge Ponds. Wastes from the ECL area were collected in a holding pond and pumped out for disposal at an off-site commercial facility, but due to spills and liner failure, wastes from this area also reached the R-2 Discharge Ponds.

Organic solvents are the major waste generated during operations associated with small jet-engine testing. These solvents were used to flush the jet engine thrust chambers following each engine test. Solvents were also used to clean other equipment at the test areas. After the solvent was used to flush an engine, the spent solvent was allowed to drain onto a concrete spillway, through an unlined channel and into a surface impoundment. According to Rockwell, TCE began to be reclaimed at the test areas in 1961. The use of TCE was reportedly discontinued in 1977.(14)

2.2.4 Area IV

Rockwell International Corporation and Atomics International, a division of North American Aviation (which later became identified as Rockwell International) have conducted programs for the DOE since the early 1950s at SSFL. During the 1950s and 1960s, SSFL conducted research and development on many nuclear reactor subsystems, including the SRE and the SNAP series of compact liquid-metal nuclear reactors. On-site reactor development was discontinued in the late 1960s and a program of radioactive decontamination and decommissioning was begun.(48) The major nuclear installations within Area IV are the RMDF (SWMU 7.6) and the Rockwell International Hot Laboratory (RIHL) (SWMU 7.7). The RIHL was used for decladding fuel elements, while the RMDF was and still is used for the storage of irradiated fuel elements, packaging radioactive wastes, and treating low-level radioactive wastes.

Area IV was utilized as a test facility for nuclear reactors and related projects. The main waste management concern in this area has been the management of radioactive wastes and control of radiological releases to environmental media. Radiological contamination of both the soil and groundwater has been detected at Area IV. The radiological contamination of groundwaters need to be investigated further by Rockwell to determine the sources of contamination (e.g., tritium contamination detected in groundwater from standpipe at Building 059). The decontamination and decommissioning of buildings once engaged in nuclear research are the only current activities related to the generation of radioactive waste.

2.2.5 Buffer Zone

No testing or waste generating processes are located within the Buffer Zone. Two natural drainages convey the reclamation system effluent through the Buffer Zone to the NPDES discharge points (001 and 002) at the southern boundary of the SSFL.(5) These drainages are part of the Bell Creek drainage system.

2.3 REGULATORY HISTORY

On November 19, 1980, Rockwell filed a RCRA Part A Application for Areas I and III as a Treatment, Storage and Disposal (TSD) facility with the DHS and the U.S. EPA. Areas I and III contained eleven hazardous waste generating facilities and five active surface impoundments. In April 1981, an Interim Status Document was issued by DHS for storage and treatment of hazardous wastes in the five surface impoundments located at Areas I and III: APTF-1 and APTF-2 (SWMUs 4.10 and 4.11), STL-IV-1 and STL-IV-2 (SWMUs 6.5, 6.6 and 6.7), and ECL (SWMU 6.1, 6.2, and 6.3). These surface impoundments are currently completing closure. DHS is in the process of reviewing the post-closure applications for the surface impoundments in Areas I and III.(3)(V2)

On January 31, 1983, Rockwell submitted a revised Part A Application to eliminate four of the five impoundments at Areas I and III, reclassify two of the impoundments as storage tanks, and eliminate waste pile storage. In response, representatives from EPA conducted a site inspection to determine if these units could be eliminated and/or reclassified. The conclusion of that inspection report was that all units should remain as originally classified.(65)

On November 13, 1983, Rockwell submitted a revised Part A Application to include thermal treatment at the Area IV Building 133 Sodium Burn Facility (SWMU 7.2) and container storage at Building 29 (SWMU 7.11). In April 1985, Rockwell submitted to DHS a Part B Permit Application for the Hazardous Waste Storage Area located in Area II (SWMU 5.8). Rockwell received a RCRA permit from DHS in December 1983 for the Building 133 Sodium Burn Facility, and, on March 31, 1986, a state hazardous waste permit for the Area II hazardous waste storage area.

In January 1990, Rockwell submitted a Part A Application to the DHS and the EPA for treatment of contaminated groundwater using activated carbon and air stripping towers. DHS plans to issue a permit for Rockwell's groundwater treatment system in the future.

In March 1990, Rockwell submitted a Part A Application for storage of mixed waste at the Area IV RIHL Building 20 (SWMU 7.7) and the RMDF (SWMU 7.6).

On March 29, 1990, Rockwell submitted to DHS a Post-Closure Plan for the nine closed surface impoundments (APTF-1, APTF-2, ABSP, Delta, SPA-1, SPA-2, ECL, STL-IV-1, STL-IV-2) located in Areas I, II, and III. A Post-Closure Permit has not yet been issued.

The facility also operates under a National Pollutant Discharge Elimination System (NPDES) permit (CA001309) issued by the Los Angeles RWQCB for discharge of runoff and wastewater from the water reclamation system to Bell Creek via two discharge points located in the Buffer Zone.(7) The Los Angeles RWQCB also issued Waste Discharge Requirements (WDRs) for the sanitary sewage treatment plants.

The NRC licenses and regulates the nuclear activities at the RIHL in Area IV.(42) The NRC does not regulate nuclear activities that were contracted to Rockwell by the DOE. The DOE is responsible for monitoring radioactive materials through DOE Orders which implement the requirements of the Atomic Energy Act of 1954 and require DOE to protect the public and the environment from radiation. DOE is also required to comply with the EPA regulatory requirements promulgated pursuant to the Clean Air Act and found in 40 CFR 61 Subpart H, "National Emission Standards for Hazardous Air Pollutants" (NESHAPs) for airborne radiation from DOE facilities.(7)

The Ventura County Air Pollution Control District (VCAPCD) enforces California's air pollution regulations. (The VCAPCD does not have authority over radioactive air emissions.) VCAPCD has issued permits to construct and operate any equipment (e.g., air stripping towers, Building 133 - sodium treatment facility) which may cause the release of air contaminants at SSFL.(7)

2.4 SOLID WASTE MANAGEMENT UNITS

The preliminary review of the file materials and observations made during the VSI have resulted in the identification of SWMUs(1)(V1)(V2). In addition to the SWMUs, AOCs have also been identified in this report. An AOC is an area that does not meet the definition of a SWMU, however, may have evidence of contamination or may still require investigation to determine the potential of contamination. An example of an AOC would be soil contaminated with heavy metals or petroleum hydrocarbons caused by accidental spills from periodic refilling of gasoline storage tanks.

The following SWMUs and AOCs have been identified at this facility. Numerical unit designations assigned to each of the SWMUs represents the subsection of the respective chapter which describes and evaluates the SWMUs at each administrative area.

4.0 Area I

- SWMU 4.1 Old B-1 Area
- SWMU 4.2 Old Area I Landfill
- SWMU 4.3 Building 324 Instrument Lab Hazardous Waste Tank
- SWMU 4.4 Building 301 Equipment Laboratory TCA Distillation Unit and Used Product Tank
- SWMU 4.5 LOX Plant Waste Oil Sump and Clarifier
- SWMU 4.6 Asbestos and Drum Landfill Near LOX Plant
- SWMU 4.7 Component Test Laboratory (CTL-III)
- SWMU 4.8 Burn Pit
- SWMU 4.9 Advanced Propulsion Test Facility
- SWMU 4.10 Advanced Propulsion Test Facility Pond #1 (APTF-1)
- SWMU 4.11 Advanced Propulsion Test Facility Pond #2 (APTF-2)
- SWMU 4.12 Laser Engineering Test Facility (LETF) Area
- SWMU 4.13 Laser Engineering Test Facility (LETF) Pond
- SWMU 4.14 Canyon Retention Pond, Canyon Skim Pond, and Canyon Test Area
- SWMU 4.15 Bowl Retention Pond, Bowl Skim Pond, and Bowl Test Stands
- SWMU 4.16 Area I Reservoir (R-1)
- SWMU 4.17 Perimeter Pond
- SWMU 4.18 Air Stripping Towers (Canyon Alfa and Bowl) for Groundwater Treatment
- SWMU 4.19 Areas of Concern - Area I

5.0 Area II

- SWMU 5.1 Area II Landfill
- SWMU 5.2 Building 206 - ELV Final Assembly
- SWMU 5.3 Building 231 PCB Storage Facility
- SWMU 5.4 Swimming Pool UV/H_2O_2 Treatment System
- SWMU 5.5 Building 204 Plant Service Waste Oil Tank
- SWMU 5.6 Area II Incinerator Ash Pile
- SWMU 5.7 Hazardous Waste Storage Area (HWSA) Waste Coolant Tank
- SWMU 5.8 Hazardous Waste Storage Area (HWSA) Container Storage Area
- SWMU 5.9 Alfa Test Area
- SWMU 5.10 Alfa Test Area Tanks
- SWMU 5.11 Alfa Skim Pond and Alfa Retention Pond and Associated Drainages
- SWMU 5.12 Alfa-Bravo Skim Pond (ABSP)
- SWMU 5.13 Bravo Test Area

- SWMU 5.14 Bravo Test Stand Waste Tank
- SWMU 5.15 Bravo Skim Pond and Associated Drainages
- SWMU 5.16 Storable Propellant Area Pond 1 (SPA-1) and Associated Drainages
- SWMU 5.17 Storable Propellant Area Pond 2 (SPA-2) and Associated Drainages
- SWMU 5.18 Coca Test Area
- SWMU 5.19 Coca Skim Pond and Associated Drainages
- SWMU 5.20 Propellant Load Facility (PLF) Waste Tank
- SWMU 5.21 Propellant Load Facility (PLF) Ozonator Tank
- SWMU 5.22 Propellant Load Facility (PLF) Surface Impoundment
- SWMU 5.23 Delta Test Area
- SWMU 5.24 Delta Skim Pond and Associated Drainages
- SWMU 5.25 Purge Water Tank near Delta Treatment System
- SWMU 5.26 R-2A and R-2B Discharge Ponds and Associated Drainages
- SWMU 5.27 Air Stripping Towers for Groundwater Treatment
- SWMU 5.28 Areas of Concern - Area II

6.0 Area III

- SWMU 6.1 Building 260 ECL Waste Tank, Building, and Associated Container Storage Area
- SWMU 6.2 ECL and Suspect Water Ponds
- SWMU 6.3 ECL Collection Tank
- SWMU 6.4 Building 418 Compound A Facility
- SWMU 6.5 Systems Test Laboratory IV (STL-IV) Test Area Including MMH Ozonator Tank
- SWMU 6.6 Systems Test Laboratory IV Pond #1 (STL-IV-1) and Associated Drainages
- SWMU 6.7 Systems Test Laboratory IV Pond #2 (STL-IV-2) and Associated Drainages
- SWMU 6.8 Silvernale Reservoir and Associated Drainages
- SWMU 6.9 Building 227, 224, Environmental Effects Lab
- SWMU 6.10 STL-IV Groundwater Treatment System
- SWMU 6.11 Areas of Concern - Area III

7.0 Area IV

- SWMU 7.1 Building 056 Landfill
- SWMU 7.2 Building 133 Sodium Burn Facility
- SWMU 7.3 Building 886 Former Sodium Disposal Facility
- SWMU 7.4 Container Storage Area (Old Conservation Yard)
- SWMU 7.5 Building 100 Trench
- SWMU 7.6 Radioactive Materials Disposal Facility (RMDF)
- SWMU 7.7 Rockwell International Hot Laboratory (RIHL) (Building 20)
- SWMU 7.8 New Conservation Yard

- SWMU 7.9 ESADA Chemical Storage Yard
- SWMU 7.10 Building 05 Coal Gasification
- SWMU 7.11 Building 29 Reactive Metal Storage Yard
- SWMU 7.12 Areas of Concern - Area IV

Buffer Zone

Discharge Point 001
Discharge Point 002

The location of each SWMU for each area is depicted in Figures 3, 4, 5, and 6.

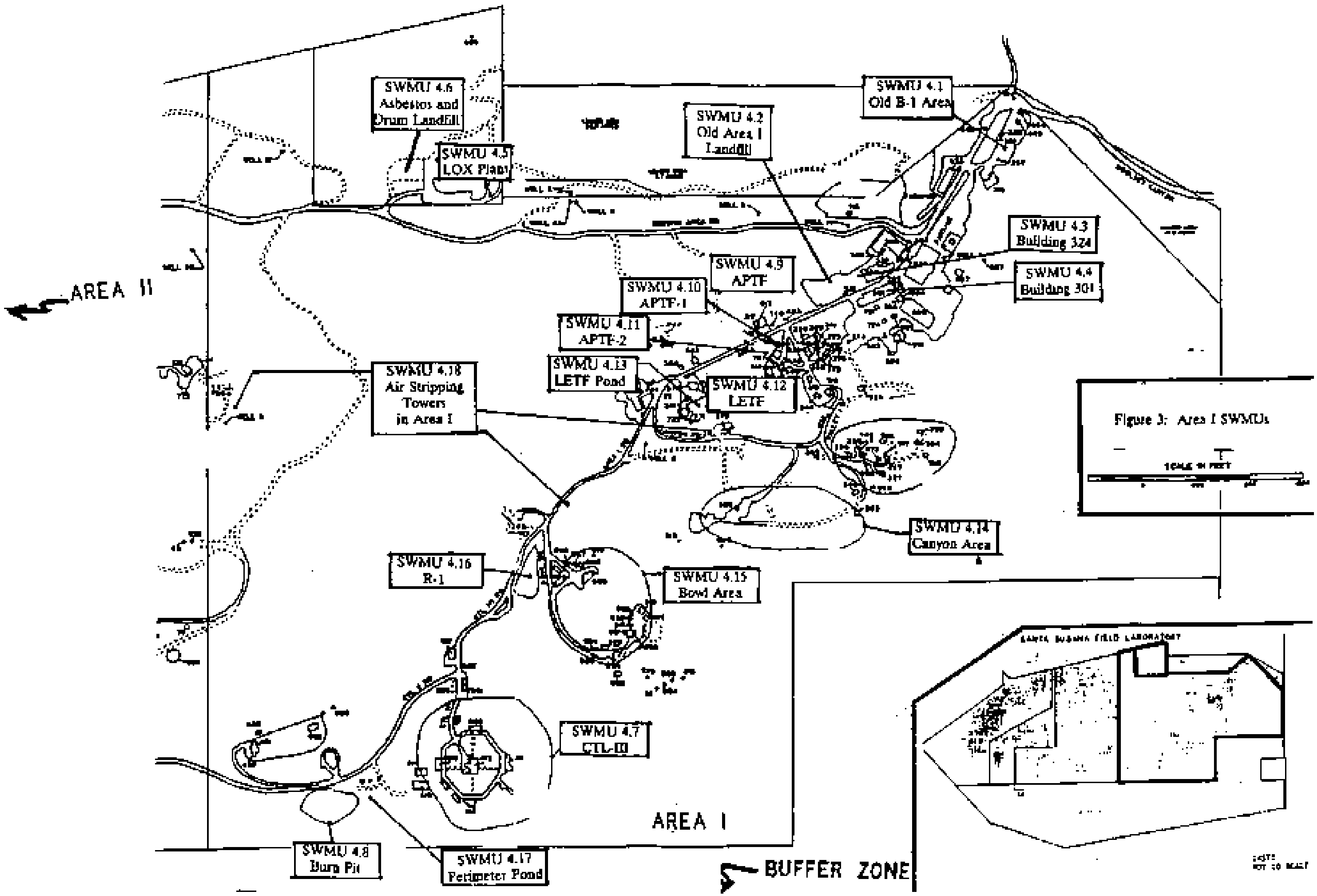
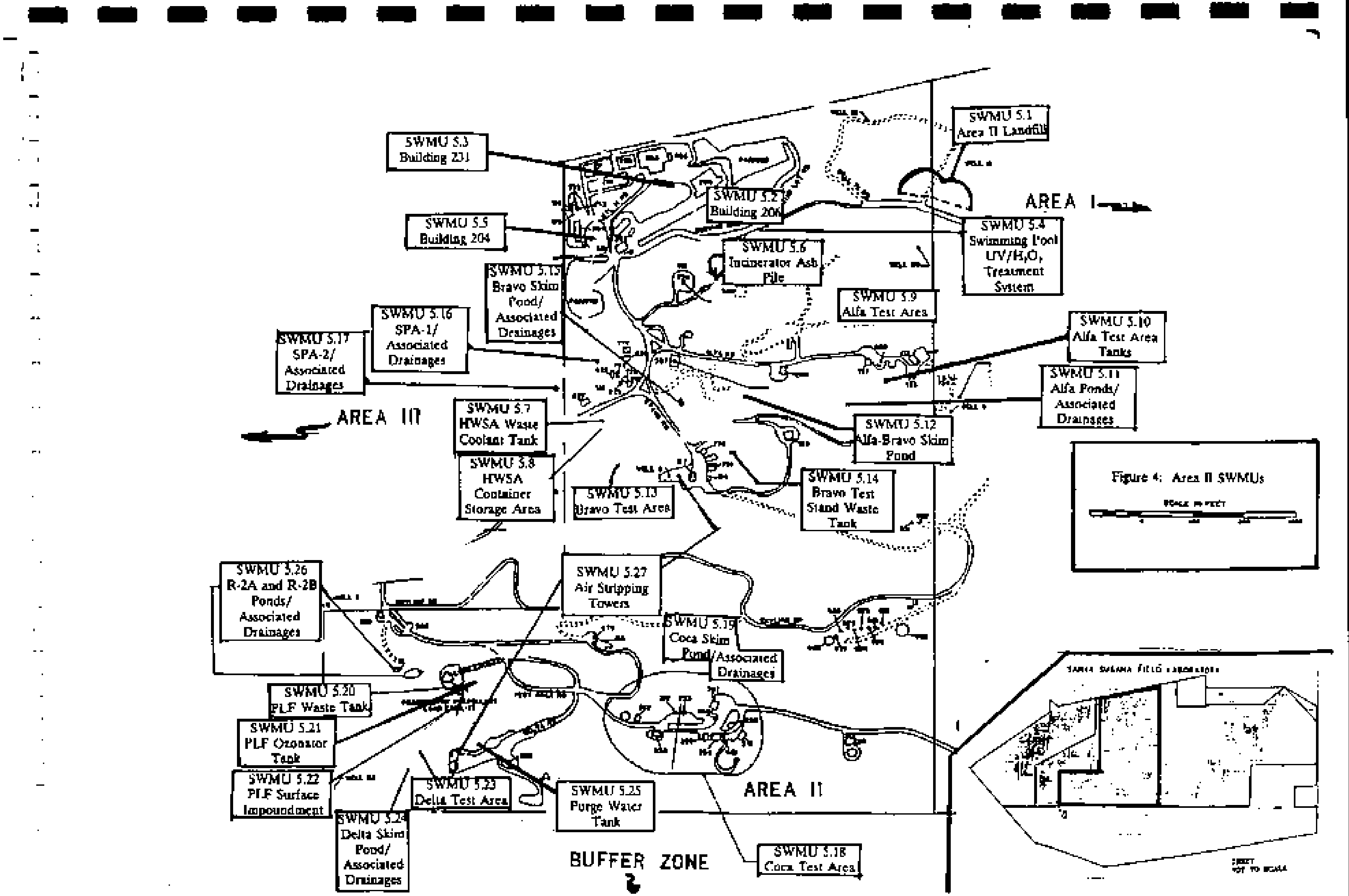


Figure 3: Area I SWMUs


SWMU 5.1
Area II Landfill
SWMU 5.3
Building 231
SWMU 5.2
Building 206
AREA I
SWMU 5.5
Building 204
SWMU 5.4
Swimming Pool
UV/H2O2
Treatment
System
SWMU 5.6
Incinerator Ash
Pile
SWMU 5.15
Bravo Skim
Pond/
Associated
Drainages
SWMU 5.9
Alfa Test Area
SWMU 5.16
SPA-1/
Associated
Drainages
SWMU 5.10
Alfa Test Area
Tanks
SWMU 5.17
SPA-2/
Associated
Drainages
SWMU 5.11
Alfa Ponds/
Associated
Drainages
AREA III
SWMU 5.7
HWSA Waste
Coolant Tank
SWMU 5.12
Alfa-Bravo Skim
Pond
SWMU 5.8
HWSA
Container
Storage Area
SWMU 5.13
Bravo Test Area
SWMU 5.14
Bravo Test
Stand Waste
Tank
Figure 4: Area II SWMUs
SWMU 5.26
R-2A and R-2B
Ponds/
Associated
Drainages
SWMU 5.27
Air Stripping
Towers
SWMU 5.19
Coca Skim
Pond/Associated
Drainages
SWMU 5.20
PLF Waste Tank
SWMU 5.21
PLF Ozonator
Tank
SWMU 5.22
PLF Surface
Impoundment
SWMU 5.23
Delta Test Area
SWMU 5.25
Purge Water
Tank
AREA II
SWMU 5.24
Delta Skim
Pond/
Associated
Drainages
BUFFER ZONE
SWMU 5.18
Coca Test Area

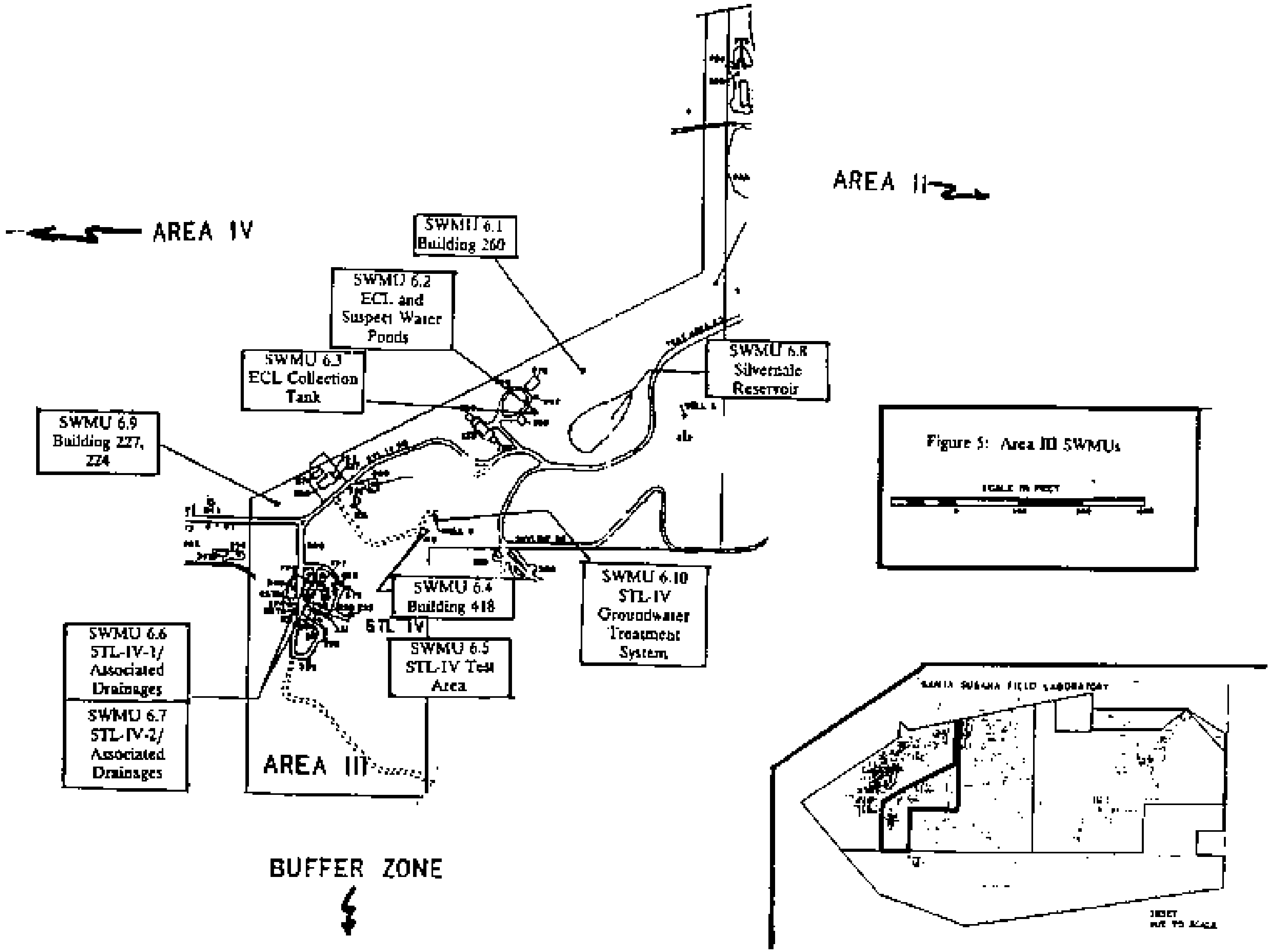


Figure 5: Area III SWMUs

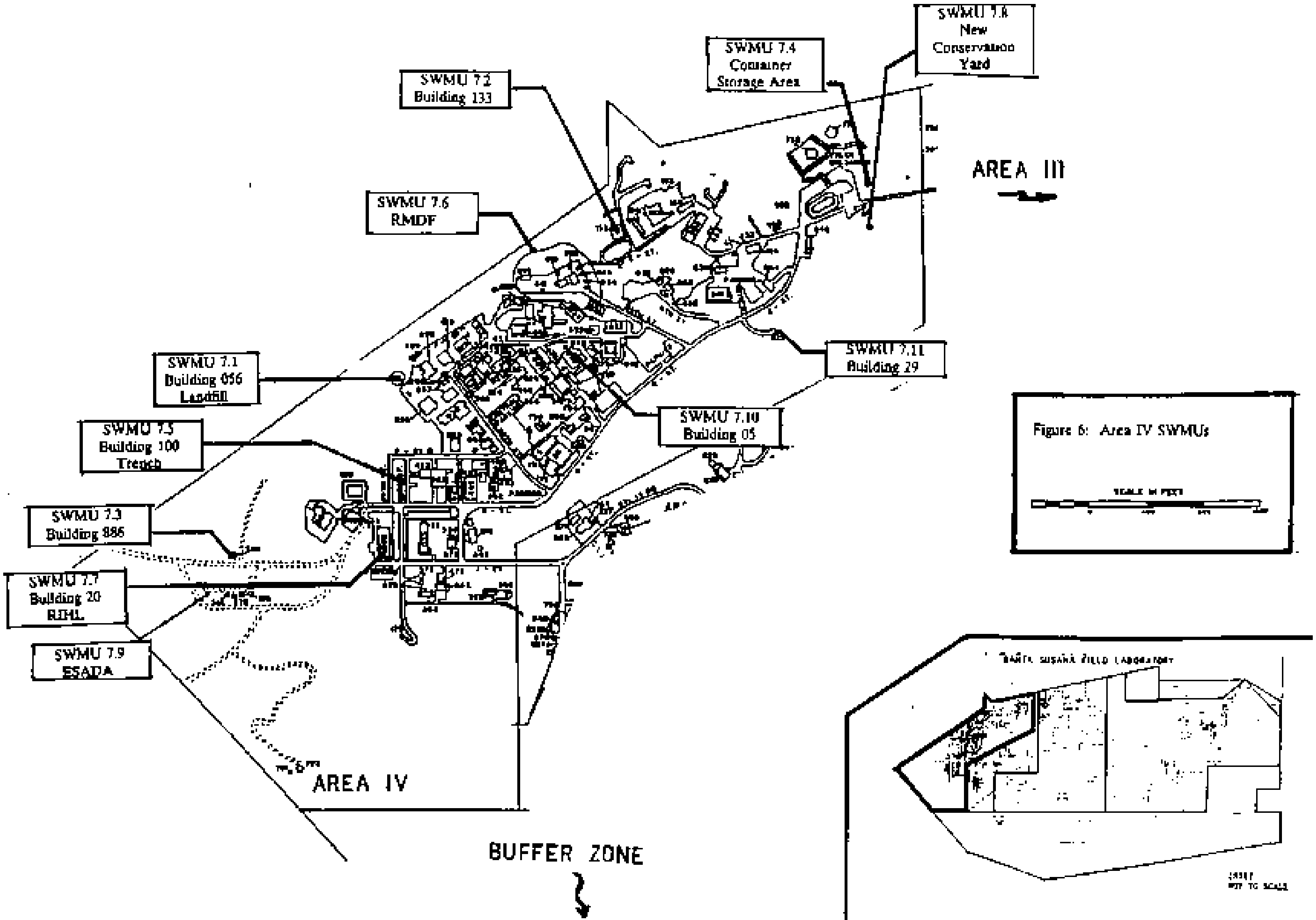


Figure 6: Area IV SWMUs

3.0 ENVIRONMENTAL SETTING

3.1 SITE LOCATION

The SSFL is located in the rugged terrain of the Simi Hills, within the Transverse Ranges physiographic province. The Simi Hills separate the Simi Valley from the western part of the San Fernando Valley. The facility occupies a plateau approximately 1,000 feet above the floor of the west San Fernando Valley and encompasses 2,668 acres. (13)

3.2 TOPOGRAPHY AND METEOROLOGY

The laboratory facilities are located in a relatively level area of the Simi Hills, however, the local relief is approximately 600 feet. The Simi Hills are part of the east-west trending structure system that comprises the Transverse Ranges of California.

The climate of the Simi Hills area falls within the Mediterranean subclassification of a subtropical-type climate. Monthly mean temperatures range from 50°F during winter months to 70°F during summer months.(13) Precipitation is measured at the U.S. Weather Station #249 located in the northeastern portion of the facility. The weather station has been in operation since 1959 and operated by a Rocketdyne meteorologist in order to collect data for on-site water management activities and rocket engine testing schedules.(45) The annual mean precipitation is 18 inches, with 95 percent of the total falling between November and April. Precipitation is normally in the form of rain, although snow has fallen during winter months. From April through October, a consistent landward wind pattern develops from the unequal heating of the land mass and adjacent ocean. These northwest daily winds range from 5 to 10 knots and occur between noon and sunset. From November to March this wind pattern is interrupted by the passage of weather fronts.(13)

3.3 SURFACE HYDROLOGY

Most of the SSFL is located within the Bell Creek drainage system, a tributary of the Los Angeles River. Most surface runoff and treated sewage effluent is discharged to Bell Creek.(13) A small portion of storm water in Area IV drains toward Meier and Runkle Creeks toward the north and west.(13) This drainage system lies within the Santa Clara River basin. Surface water runoff from this section of the facility only occurs during storm conditions through ephemeral channels.(7)

Two parallel and interconnected pond and drainage systems comprise the SSFL watershed. Twenty-four ponds were at one time included in this system, however, several of these ponds have been closed and filled. Many of the ponds and drainages are man-made features used to store water for the rocket testing facilities.(14) This system depicted in Figure 7 makes up the site-wide water reclamation system.(7)

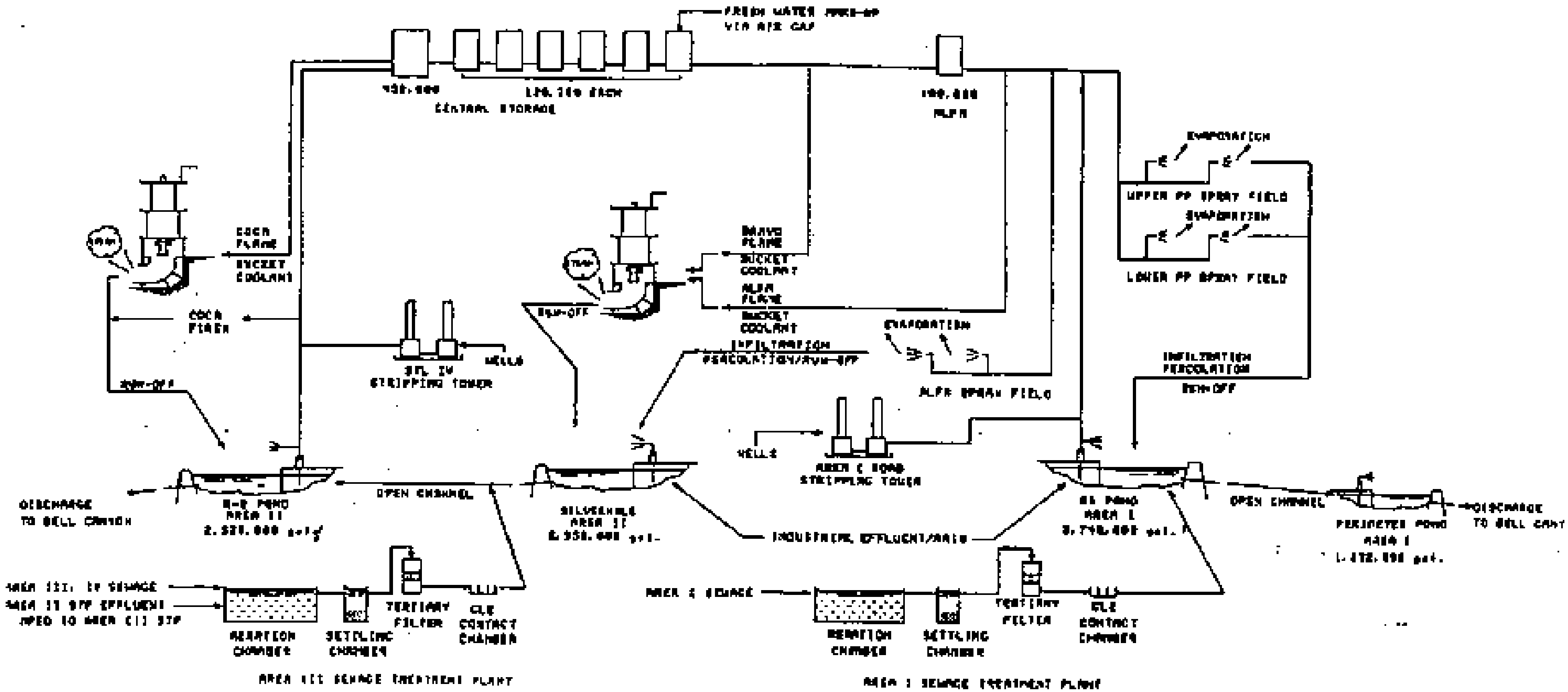


Figure 7: SSFL Water Reclaim System

A pond and channel system drains a large portion of Area I. The water reclamation system is designed to recycle settled water from the R-1 Reservoir (R-1) (SWMU 4.16). As the supply for water exceeds the demand, R-1 overflows to the Perimeter Pond (SWMU 4.17).(7)(13)(V2)

The pond and channel system for Areas II, III, and IV consists of two retention ponds, the R-2A and R-2B in Area II (SWMU 5.26) and the Silvernale Reservoir in Area III (SWMU 6.8). Area IV industrial waste water enters the system at a discharge point between the Silvernale Reservoir and R-2B.(7)(13)(V1)(V2)

Water is supplied to the facility by the Ventura County Water Works District No. 17 and from on-site wells owned by Rocketdyne. Approximately 56 million gallons are supplied by the Water District annually, and 54 million gallons are supplied by the on-site wells annually.(14) Purchased water enters via a 100,000-gallon transfer tank located at the northeast boundary of Area I. The main storage reservoir is a one million gallon tank and three 100,000-gallon tanks located in Area II. A gravity fed distribution system serves all of SSFL from this source. There is also a 500,000-gallon tank in Area IV which serves as a reserve supply for peak demands and fire protection for the DOE facilities.(13)(67)(V1)(V2)

Both the R2-A Pond (SWMU 5.26) and the Perimeter Pond (SWMU 4.17) may discharge to drainage channels which convey wastewater off-site through the Buffer Zone. Water is normally reclaimed and stored for industrial uses, however, during periods of heavy rainfall, water may be released from the R2-A Pond and Perimeter Pond to Bell Creek.(14) Several times per year, the Perimeter Pond discharges to Bell Creek from Discharge Point 001 located in the Buffer Zone, and approximately five or six times per year, R2-A discharges to Bell Creek from Discharge Point 002 in the Buffer Zone.(7)(13)(V1)(V2) Prior to the release, the pond wastewater quality is determined to ensure that all parameters are in compliance with the NPDES permit requirements.(7) The current NPDES permit is being revised by the Los Angeles RWQCB to include surface water runoff monitoring for the northern portion of Area IV. At this time, it is not known when the monitoring requirement will take effect.

Sewage treatment plant effluent provides about 15 percent of the total wastewater in the site-wide water reclamation system. Industrial effluent, from single pass cooling towers, blowdowns from recycled water cooling systems, rinses from cleaning operations and other processes, the WS5 groundwater pump system, and flame bucket coolant overflows comprise the bulk (approximately 70 percent) of the total wastewater in the reclamation system. Rainfall or water from the fresh water distribution system provides the remaining 15 percent of the total.(7)

The site topography, natural drainage and climate minimize any threat of contaminant releases to off-site due to flooding at the site. None of the SSFL facilities are located in the floodplain and all active areas are well drained to control stormwater runoff. Surface water runoff from major storm events is directed to the Perimeter Pond and the R2-A Pond with the opening of bypass culverts.(7)

3.4 GEOLOGY AND GROUNDWATER HYDROLOGY

3.4.1 Geology

The Simi Hills are a geologically complex component of the Transverse Ranges. The oldest geologic formations in this area are of Cretaceous age; the youngest, Quaternary alluvium.(23)

The principal geologic unit outcropping at SSFL is the Chatsworth Formation. This upper Cretaceous marine turbidite sequence underlies most of the facility. It is composed primarily of well-consolidated, massively bedded sandstone with interbeds of siltstone and claystone. The sandstone portion is primarily a carbonate cemented arkosic arenite. The Chatsworth is at least 6,000 feet thick at its typical location.(23)

At SSFL, the Chatsworth Formation beds dip to the northwest at approximately 20 to 30 degrees. Fractures and joints are well developed in Chatsworth Formation outcrops. Most of the fractures are believed to be vertical or near vertical. Aerial photographs have been used to map the trace of major fractures and joints in the SSFL area. A major shear zone of undetermined movement direction trends northeast-southwest along the Area I Canyon Road. The Burro Flats Fault is a major fault trending northwest-southeast across the southwestern portion of SSFL. This fault and related splay faults offset the Chatsworth Formation and the Martinez Formation in the southwestern portion of the facility.(23)

The Tertiary Martinez Formation overlies the Chatsworth Formation northwest of the SSFL boundary and south of the Burro Flats Fault in the southwestern section of the facility. It is composed of bedded marine sandstones and shales with a basal conglomerate. North of SSFL, the Martinez Formation dips to the northwest at approximately 30 to 35 degrees.(23)

The Tertiary Topanga Formation is exposed southwest of the facility's boundary. It is composed of bedded marine sandstone with a basal conglomerate.(23)

Both the Topanga and Martinez Formations weather to form slopes, while the Chatsworth Formation is a very resistant unit that erodes along fracture or fault traces.

A discontinuous layer of thin Quaternary alluvium overlies the Chatsworth Formation and Martinez Formation along ephemeral drainages and Burro Flats. The alluvium consists of unconsolidated sand, silt, and clay which may be as thick as 20 feet in some areas of the facility. The alluvium is underlaid in some places by a zone of weathered Chatsworth Formation.(23)

3.4.2 Groundwater Hydrology

Two groundwater systems exist at SSFL: 1) a shallow groundwater system in the surficial alluvium and the underlying zones of weathered sandstones and siltstones, and 2) a deeper groundwater system in the fractured Chatsworth Formation. Surface runoff may be stored and transmitted from the shallow groundwater system to the underlying Chatsworth Formation.(23)

The shallow zone is composed of unconsolidated sand, silt and clay eroded from the surrounding formations and the underlying weathered in-place portion of the Chatsworth Formation. The shallow zone is discontinuous and subject to seasonal variations throughout the SSFL. It is saturated along ephemeral channels and in the southern part of Burro Flats. The saturated portion of the shallow zone may be as thick as 10 feet at SSFL. Shallow zone water level data indicates that the piezometric surface mimics the topographic surface. Depth to water has ranged from 2 feet to a maximum of 35 feet. This variation is season and location dependent. In general, water level highs occur in late winter and early spring. Groundwater moves laterally and downward in the shallow zone.

The shallow zone aquifer appears to be separate and distinct from the Chatsworth Aquifer; however, water levels and water quality data from some sections of SSFL indicate there may be a hydraulic connection between the two systems.(14)

The Chatsworth Formation system is primarily a fracture controlled aquifer composed of bedded sandstone with interbeds of siltstones and claystone. The Chatsworth is highly fractured in the SSFL area. (The DHS believes that the formation might not be highly fractured.(65)) Aquifer tests indicate highly varying degrees of permeability of the Chatsworth Formation. This may be attributed to the fractured nature of the Chatsworth. The estimated ranges or permeabilities are from approximately 10^{-2} gallons per day per square foot (gpd/ft^2) to approximately 10^3 gpd/ft^2.(14)

Current water level contours of the Chatsworth system indicate that groundwater in the central and northeast portion of the site appears to be migrating toward the site's pumping cone of depression. This cone of depression has been maintained in the northeast quarter of the facility by the pumping of water supply wells since the late 1950s. In the northwestern section of the site, water level data suggests the presence of a northeast to southwest groundwater divide accompanied by a northwesterly groundwater flow component. A southerly component of groundwater flow is indicated by water level contours in the southwest portion of the site.(14)(24)

Groundwater pumpage has had a significant impact on water levels and groundwater movement at the site. Vertical groundwater movement may be induced by prolonged pumping with a consequent reduction in hydraulic head. In fractured systems such as the Chatsworth, this effect may be quite dramatic. In 1988, the pumping from extraction well WS-9A induced 30 feet of drawdown in an observation well 1,600 feet away.(24)

Depth to groundwater is seasonally variable in the Chatsworth system. In general, high water levels occur during winter and spring months and low water levels occur in summer and fall.(24)

3.5 SURFACE WATER, AIR, SOIL AND GROUNDWATER CONTAMINATION

3.5.1 Surface Water

Past surface water contamination occurred in Areas I, II and III due to TCE engine flushing operations in the 1950s and 1960s. Waste TCE was discharged directly to surface impoundments (SWMUs 4.14, 4.15, 5.11, 5.12, 5.15, 5.19, 5.24, 6.6, and 6.7) that were part of the SSFL surface water reclamation system. It is not known if any of this contamination migrated off-site through the Bell Creek drainage. Currently, the SSFL water reclamation system discharge is regulated by an NPDES permit granted in the late 1970s.(25)(V1)(V2) The NPDES permit requires monitoring of the discharge ponds prior to any batch discharge to off-site for the following constituents:

MAXIMUM DISCHARGE LIMITATIONS

Constituent	Concentrations	Quantity*
Total Dissolved Solids	950 mg/ℓ	1,267,680 lbs/day
BOD_5 @ 20°C	30 mg/ℓ	40,035 lbs/day
Oil and Grease	15 mg/ℓ	20,020 lbs/day
Chloride	150 mg/ℓ	200,160 lbs/day
Sulfate	300 mg/ℓ	400,320 lbs/day
Fluoride	1.0 mg/ℓ	1,340 lbs/day
Boron	1.0 mg/ℓ	1,340 lbs/day
Surfactants (as MBAS)	0.5 mg/ℓ	667 lbs/day
Residual Chlorine	0.1 mg/ℓ	—

*Based on a total waste flow of 160 million gpd.(5)

In 1987, Rockwell sampled surface runoff water that drains north of the facility and is not part of the water reclamation system. The sample results were compared to the MCLs for drinking water, although the runoff from the site is not used for drinking purposes. Samples of runoff collected in the vicinity of the Former Sodium Disposal Facility (SWMU 7.3) in 3.5.3 Area IV exceeded the MCLs for arsenic, chromium, and lead. The MCL for arsenic was exceeded at several sample locations. Methylene chloride levels exceeded the DHS action level of 40 $\mu g/\ell$ in two samples. Asbestos contamination was detected in a sample from the area behind Building 133/Sodium Burn Facility (SWMU 7.2) in Area IV. Although samples indicated contaminated surface water runoff exists in the north part of the SSFL, it is not known if these contaminants were released to any off-site surface water bodies. The drainages north of the facility are ephemeral channels; therefore, a potential exists for surface water runoff to have percolated into the soil before reaching a surface water body or to have been discharged into the channels.(25)

3.5.2 Air

The VCAPCD regulates nonradioactive air emissions from the SSFL. Most of the permitted facilities are conventional combustion units, however, a few exceptions exist.(25) One of those exceptions is the permitting of air stripping/carbon adsorption units used to remediate the TCE contaminated groundwater (SWMUs 4.18, 5.27 and 4.3). Source tests demonstrated that the stripping towers will remove detectable VOCs; greater than 90 percent of the removed VOCs are captured by charcoal canisters connected to the stripping towers.(26)(V1)(V2) The VCAPCD inspects the facility regularly and has found it to be in full compliance with its permits.(25)

TCE contaminated groundwater from Well W5-5 has been mixed with treated groundwater and used to cool rocket engines during testing. Although this water has a low TCE concentration, TCE may have been, or may still be, released to the air because of its high volatility.(25) Rockwell, however, is in the process of installing a UV/H_20_2 system at Well W5-5 to treat the groundwater before mixing with treated groundwater.

TCE has been used and is still used as a solvent flush following engine tests at the Alfa (SWMU 5.9) and APTF (SWMU 4.9) test areas. TCE may have been released to the air during these operations.(25)(V1)(V2)

Rocket fuels contained beryllium during the early days of rocket testing. Beryllium particles were released to the air and settled on the facility's soil. Based on a July 19, 1989 telephone conversation that Ecology and Environment had with the EPA, Rockwell reportedly removed the contaminated soils when the beryllium-containing fuels were discontinued.(25)

The principal source of radionuclide air emissions at SSFL is the RMDF (SWMU 7.6). The RIHL (SWMU 7.7) and the Nuclear Materials Development Facility, Building 055, also contributed to radionuclide air emissions in the past. These emissions are controlled by high efficiency particulate air (HEPA) filters; however, prior to approximately 1988, the HEPA filters had been known to fail.(13)(28)(67)(V2) The RIHL, however, is currently undergoing decommissioning and decontamination, and the Nuclear Materials Development Facility is not in operation.

Eight ambient air samplers continuously collect particulate samples for nuclear emissions. Seven samplers are located near major sources of airborne radionuclide sources. The samplers collect a sample every 24 hours on a 37-millimeter diameter filter at a flow rate of 25 cubic meters per day. In total, about 2,500 samples are collected each year. Samples are counted for gross alpha and gross beta radiation following a 120-hour delay to allow for decay of radon and thoron daughters considered to account for background radiation.(13)(V2) DOE considers releases of radioactive particulates to be low; however, an extensive study of the emissions and the potential for off-site contamination has not been completed.(13)(28)(67)(V2)

3.5.3 Soil

Chemical and radioactive soil contamination exists at SSFL. The chemical contaminants include metals, fuels, oxidizers, metal hydroxides, TCE, polychlorinated biphenyls (PCBs) and asbestos. The main sources of this contamination are surface impoundments, hazardous waste storage areas, leaking underground storage tanks, chemical spills, rocket testing areas, hazardous waste open burning areas in Area I and IV, and chemical product areas.

Contaminated soil was excavated and removed from some of the surface impoundments during closure activities. Contaminated soil beneath underground storage tanks has also been excavated and removed. The underground tank removals were conducted under the jurisdiction of the Ventura County Department of Health.(14)(V1)(V2)

Subsurface soils at the Former Sodium Disposal Facility (SWMU 7.3) in Area IV have been found to be contaminated with heavy metals and organics. In addition, areas of high pH have been detected at a depth of 5-5.5 feet.(13)

DOE operations have created radioactive contaminated soils in Area IV. The sources for this contamination include air emissions, surface water runoff, disposal activities, storage, treatment and handling of high activity and low-level radioactive waste, nuclear reactor systems research operations, radioactive materials storage and spills.

In the 1960s, after closure of the RMDF leachfield, radioactive wastewater was released to the sanitary sewage leachfield near the RMDF on two separate occasions. (SWMU 7.6). In 1978, the area was excavated and several feet of bedrock were removed. Cracks in the bedrock were sealed with asphalt and the area backfilled with clean soil to a level several feet below the original grade. Soil samples collected from the area in August 1988 detected gross beta radioactivity levels almost 200 times the background levels.(13)(31)

Background levels of radioactivity in soil and vegetation at SSFL were initially measured in 1954 prior to any on-site activity with radioactive materials. Both on-site and off-site regional soil and vegetation monitoring for radioactivity has been performed since that time. According to Rockwell, on-site and off-site values of gross alpha and gross beta have generally been the same. According to Rockwell, both on and off-site values show slow gradual increases in gross alpha and beta since the initial sampling. Rockwell believes this is due to global nuclear weapons test fallout. However, as was pointed out by members of the community, atomic testing has essentially stopped and would, therefore, not be expected to be a source for increased background radioactivity in the immediate area.(13)(67)(V2)

Slightly elevated radioactive contamination has been detected in the soils of the Old Conservation Yard (SWMU 7.4) and the Sodium Burn Facility (SWMU 7.2) during the same sampling event as discussed above. Rockwell excavated and containerized radioactive contaminated soils along the Building 64 fence line, berm and roadway in 1989.(13)

3.5.4 Groundwater

The most widespread and prevalent groundwater chemical contaminants at the site are VOCs. TCE and trans-1,2-dichloroethylene (trans-1,2-DCE) are the most frequently detected contaminants in groundwater samples. Sources for the VOCs are widely distributed throughout the site and include the engine and rocket testing areas, pavement washdown areas, laboratory solvent use areas, surface impoundments, spills, cleaning operations, and tanks used for the storage of hazardous materials and hazardous waste. Groundwater investigations indicate extensive VOC contamination in groundwater underlying these areas.(25)(23)

Rockwell initiated a hydrogeological study of the Alfa/Bravo Area in 1984. As part of that study, existing water supply wells were sampled. TCE and trans-1,2-DCE were detected in the water supply well samples. The groundwater contamination was investigated further, along with the probable sources. Surface impoundments which were used for spill containment, and hazardous waste storage and treatment were determined to be the likely sources of VOC contamination.

SSFL's groundwater monitoring system, at the time of the VSI, included approximately 163 wells and springs of which 147 are on-site wells. These wells were constructed as part of the groundwater contamination investigation that followed the discovery of VOC contamination in water supply wells. Rockwell constructed seven groundwater treatment systems to remediate VOC contaminated groundwater. Five of the treatment systems are dual air stripping towers with vapor phase carbon treatment, one is an ultraviolet/hydrogen peroxide (UV/H_2O_2) system, and one is a four tower air stripping system.(46)(65)(V1)(V2) (An additional UV/H_2O_2 treatment system is under construction at Well WS5.)(65)(V2) The systems are connected to extraction wells to treat pumped, contaminated groundwater. Each system is designed to reduce the organic contaminants in the pumped groundwater to below the DHS action levels. Treated groundwater is discharged to the site-wide water reclamation system.(7)

On- and off-site wells have shown low concentrations of toluene and other organic compounds.(7)(24) These wells are not used as a source of drinking water but for other purposes, such as irrigation.

Rockwell believes that the historical pumpage of groundwater in the northeast section of the facility has created a large cone of depression that may have prevented the migration of contaminants off-site. However, the movement of groundwater and contaminants in a highly fractured system is very difficult to predict.(24) Additional placement and monitoring of off-site wells will be necessary to confirm Rockwell's theory.

In addition to organic groundwater contamination, there is a potential for radiological contamination of groundwater. In July and August 1989, 19 monitoring wells (two shallow and 17 deep) were constructed in Area IV (RS-27 and RS-28, RD-13 through RD-25 and RD-27 through RD-30) as part of the Phase III investigation of radioactivity in Area IV. Groundwater samples collected in September and October 1989 showed tritium in the samples, especially in RD-23 near the Building 886 Former Sodium Disposal Facility (SWMU 7.3) at 589 ± 267 pCi/ℓ and in two samples collected from RD-28 near Building 59 (the SNAP reactor) at 665 ± 149 pCi/ℓ and 699 ± 236 pCi/ℓ.(40) The federal and state level for tritium in drinking water is 20,000 pCi/ℓ. The SNAP reactor facility and the RMDF leachfield may be two sources of potential radioactive groundwater contamination in Area IV.(25) Rockwell is currently implementing a monitoring program to determine the presence and extent of radioactive contamination.

3.6 MIGRATION PATHWAYS: HUMAN AND ENVIRONMENTAL RECEPTORS

3.6.1 Land Use

The SSFL is located at the west end of the San Fernando Valley. The valley has been intensely farmed since the Los Angeles Aqueduct was completed from Big Pin in 1913. The abundant irrigation water provided by the aqueduct was at first used primarily for citrus orchards and truck farms. According to a vegetation map of western Los Angeles County and southeastern Ventura County drawn in 1931 (Figure 8), the area at that time consisted of about 31% farm and urban land. It is apparent from the map that almost all this land exists in the San Fernando Valley.(16)

Residential developments, particularly after World War II, have steadily replaced farmland in the valley. Today the valley's land use is primarily residential covering about 65% of the area. Only a few truck farms remain.(16)

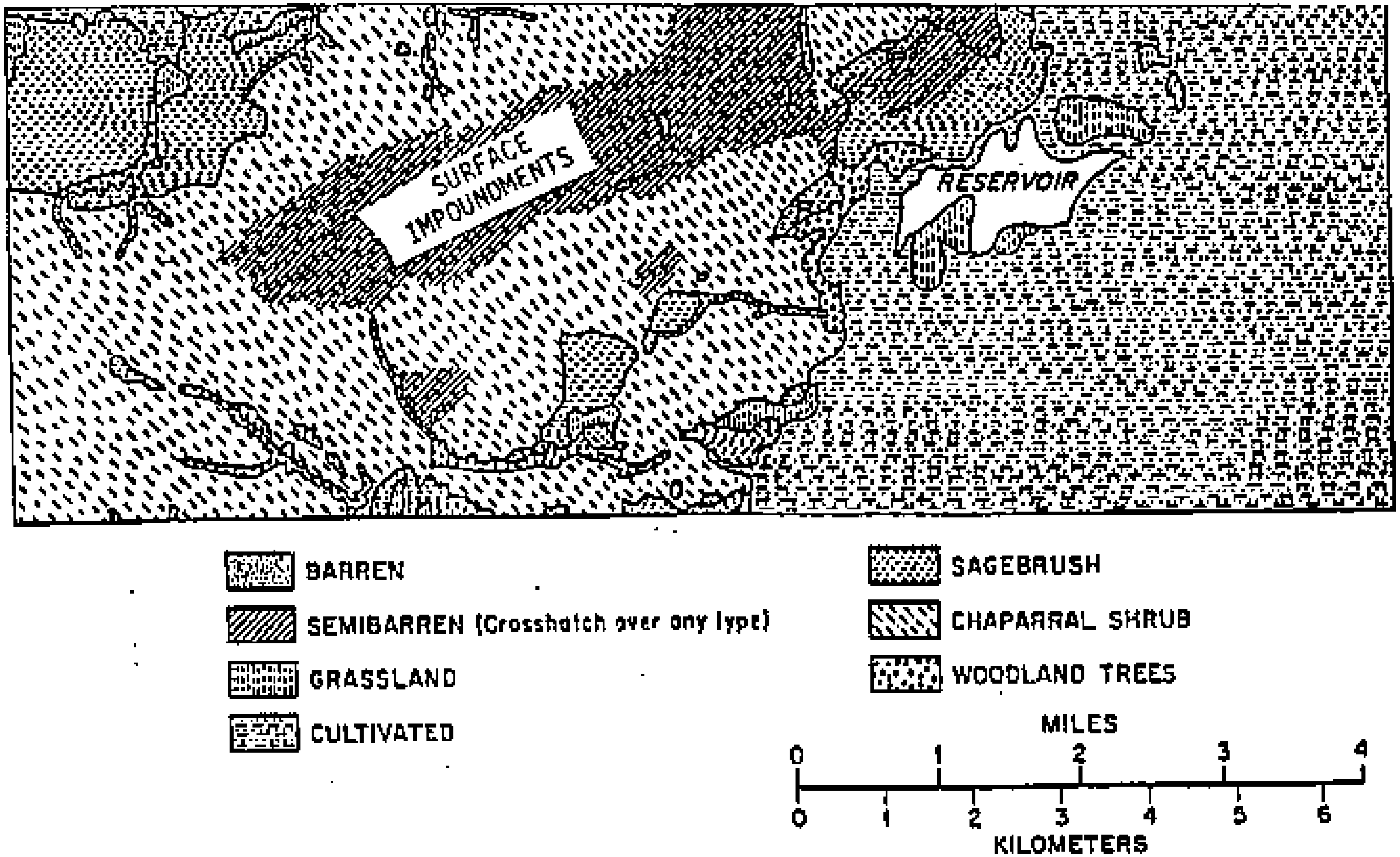


Figure 8: Vegetation Map of Area Surrounding the SSFL Facility (1931)

Source: U.S. Department of Agriculture, U.S. Forestry Service, Vegetation Types of California, Calabasas Quadrangle, Sheet 161D, Berkeley, California, 1938.

The facility is located in southeastern Ventura County near the crest of the Simi Hills at the western border of the San Fernando Valley. The Simi Hills have never supported intensive farming or development because the terrain is too rugged and rocky. Today, about 73% of the area in a 5-mile radius of the facility is undeveloped (Table 1). The closest dwellings are in Bell Canyon, more than two miles away from any of the surface impoundments. There are a few acres of avocado orchards and one apiary, both on private land immediately adjacent to the facility. Data on prime or unique farmlands in the region are not available; however, since the surface impoundments are being (or have been) closed, the region will be unaffected. Dense residential development begins in the San Fernando Valley about 3-1/2 miles away. Homes are rapidly replacing the farms located there. Sweet corn and hay for nearby pleasure horses appear to be the primary corps. Other truck farms occur in the Simi Valley, 3 miles north, and in the Thousand Oaks area, 9 miles southwest of the site.(16)

Table 1 Land Use in 5-mile Radius of SSFL

Land Use	Percent of Total Area (78.5 sq. miles)
Agriculture (including livestock and crops)	0.1
Commercial	0.4
Industrial	<0.1
Residential	26.6
Unused raw land	72.9
Total	100.0

Source: Rockwell International, Atomics International Division, Answers to "Questions Relative to Environmental Reports of Atomics International's Nuclear Fuel Facilities at Los Angeles, California," Canoga Park, California, December 1976, Question 11, Table 4.

3.6.2 Pollutant Dispersal Pathways

Migration via groundwater and leaching of surface water through contaminated soils are the major pollutant dispersal pathways for contaminants identified at the facility. Rockwell discontinued treating and managing hazardous wastes in impoundments in late 1985. VOCs were not detected in soil samples collected beneath or at the perimeter of Area II surface impoundments, with the exception of the Delta impoundment.(33) The Delta impoundment, currently not in use, is unlined. The presence of VOCs in Delta soils is likely the result of upgradient contaminated groundwater which flows through Delta soils.(49)

Surface water runoff is not a source of drinking water. Approximately 20% of facility surface water runoff occurs north of the facility and approximately 80% occurs south of the facility. Runoff through the southern boundary occurs through two NPDES discharge points. Surface water runoff from the southern boundary leaves the facility through Bell Canyon and then flows into the Los Angeles River. This water is neither detained nor diverted for any purpose until it reaches the floodwater detention basin at the Sepulveda Dam recreation area, approximately 15 miles from the SSFL. Surface water runoff is not used for drinking water or irrigation purposes. Therefore, the potential target population for surface water runoff is zero.(49)

The area of potential soil contamination at the site includes the soil associated with surface impoundments, the soil in the immediate vicinity of test stands, fuel farms and/or solvent storage facilities.(49)

3.6.3 Target Populations and Environments

Groundwater quality data collected to date indicate that groundwater contaminants have not migrated off-site. The target population potentially affected by groundwater contamination includes Rockwell employees who may contact groundwater for nondrinking-water purposes, and approximately 12,000 persons utilizing 400 domestic wells and one municipal well within 3 miles of the facility. This information is based on the assumption of 3.8 residents per domestic well and approximately 10,000 persons potentially using the municipal well. No information was available regarding the activity or status of the municipal well.(49)

Subdivisions and developments within a 3-mile radius of the SSFL are served predominately by water companies providing water imported by the Metropolitan Water District from the California Aqueduct and the Colorado River Aqueduct.(49) These settlements include Santa Susana Knolls and Simi Valley to the north, two mobile home parks and the Lakeside Park subdivision to the east, and Bell Canyon to the south. The total population of these settlements exceeds 100,000.

The total population potentially affected by hazardous constituents may be as high as 17,000. This number is based on the workers at the facility potentially being exposed to contaminated groundwater by means other than drinking water use, and an estimated 12,000 persons potentially exposed to contaminated groundwater within a 3 mile radius of the facility. Groundwater quality data collected to date, however, indicate that contaminants have not moved off-site.(49)

The facility is about 29 miles northwest of downtown Los Angeles. The nearest communities are in the Simi Valley, about 3 miles north of the site, and east of the San Fernando Valley, via Woolsey Canyon Road to the flatlands below. Approximately 30,000 people live within a 5 mile radius of the facility, and the nearest resident lives within a mile.(16)

3.6.4 Ecology

3.6.4.1 Terrestrial biota

The natural vegetation of the San Fernando Valley is believed to be California Oakwoods. Such vegetation forms a dense to open woodland dominated by several oak species (Quercus agrifolia, Q. chrysolepis, Q. douglasii, Q. englemanii, Q. lobata, Q. wislizenii) along with digger pine (Pinus sabianana). The vegetation is a matter of conjecture, however, for it has been almost entirely erased - first by irrigated agriculture, then by residential development. Today the west end of the San Fernando Valley contains an urban ornamental vegetation composed primarily of grass and Dichondra lawns, exotic shrubs, and shade and ornamental trees including Eucalyptus spp., Olea europa, Cedrus deodora, Phoenix spp., Washingtonia spp., Citrus spp., and Pinus halapensis.(16)

The fauna in the San Fernando Valley is probably similarly depauperate of nondisturbed species. Characteristic animals of coastal cismontane urban areas include the opossum (Didelphus marsupialis virginiana), southern packet gopher (Thomomys bottae), Norway rat (Rattus norvegicus), black rat (Rattus rattus), house mouse (Mus musculus), barn owl (Tyto alba), mourning dove (Zenaidura macroura), spotted dove (Streptopelia chinensis), domestic dove (Columba livia), mockingbird (Nimus polyglottos), Brewer's blackbird (Euphagus cyanocephalus), house sparrow (Passer domesticus), house finch (Carpodacus maxicanus), and brown towhee (Pipilo fuscus). In more rural, farmed areas, the opossum , striped skunk (Mephitis mephitis), coyote (Canis latrans), black-tailed jackrabbit (Lepus californicus), California ground squirrel (Citellus beecheyi), southern pocket gopher, deer mouse (Peromyscus maniculatus), house mouse, sparrow hawk (Falco sparverius), Western kingbird (Tyrannus verticalis), mourning dove, mockingbird, horned lark (Eremophila alpestris), loggerhead shroke (Lanius ludovicianus), western meadowlark (Sturnella neglecta), brown towhee, and the gopher snake (Pituophis melanoleucus) are also characteristic. Little site-specific information is available to supplement these general species lists.(16)

The natural vegetation of the Simi Hills is mapped as chaparral. This plant community forms a very dense vegetation of broad-leaved evergreen sclerophyll shrubs. It is dominated by either chamise (Adenostoma fasciculatum) or manzanita (Arctosaphylos spp.) and California lilac (Ceanothus spp.); numerous other shrub species are subdominant.(16)

Data from the U.S. Department of Agriculture indicate that much of the Simi Hills crest was semibarren (<50% vegetation cover), whereas the crest and the remaining upland areas were covered by chaparral which was dominated by (a) Adenostoma fasciculatum (chamise chaparral) or (b) Salvia apiana, S. Leucophylla, and S. Mellifera (coastal sagebrush). Open grasslands occurred primarily on the lower southeast slopes, and oak woodland (Quercus agrifolia) appeared only in the canyons near ephemeral streams (Bell Canyon, Las Virgenes Canyon).(16)

Inspection of the facility in the 1970s revealed that most of the Simi Hills area was dominated by an oak woodland (Quercus agrifolia) with undergrowth of grass or sage (Salvia) species. Canyon vegetation was dominated by shrub willow (Salix spp.), California bay (Umbellularia californica), and broom (Baccharis spp.); no oaks were evident. Apparently much of the chamise chaparral has been replaced by oak woodland since 1931. The most likely explanation for this succession is that fire suppression activities allowed the fire-tolerant chaparral vegetation to be replaced by the less fire-tolerant oaks and sages.(16)

Faunal descriptions of the Simi Hills area were rather limited. Animals of rural cismontane coastal areas listed above would likely be present at the Simi Hills site. In addition, animals characteristic of the coastal sage, chaparral, and oak woodland should be common at the SSFL site. These include the mule deer (Odocoileus hemionus), gray fox (Urocyon cinereoargenteus), bobcat (Lynx rufus), western gray squirrel (Sciurus griscus), brush rabbit (Sylvilagus bachmanni), dusky-footed woodrat (Neotoma fuscipes), nimble kangaroo rat (Dipodomys agilis), desert wood rat (Neotoma lepida), California mouse (Permomyscus californicus), California quail (Lophortyx californicus), mountain quail (Oreortyx pictus), acorn woodpecker (Melanerpes formicicorus), scrub jay (Aphelocoma coerulescens), Costa's hummingbird (Calypte costae), cactus wren (Campylorhynchus brunneicapillum), Lazuli bunting (Passerina amoena), wrentit (Chamaea fasciata), plain titmouse (Parus inoratus), common bushtit (Psaltriparus minimus), poor-will (Phalaenoptilus nuttallii), Bewick's wren (Thryomanes bewickii), black-headed grosbeak (Pheucticus melanocephalus), California thrasher (Toxostoma redivivum), rufous-sided towhee (Pipilo erythreophthalmus), orange-crowned warbler (Vermivora celata), sage sparrow (Amphispiza belli), rufous-crowned sparrow (Aimophila ruficeps), western fence lizard (Sceloporus occidentalis), southern alligator lizard (Gerrhonotres multicarinatus), coast horned lizard (Phyrnosoma coronatum), skinks (Eumeces skiltonianus, E. gilberti), striped racer (Masticophis lateralis), western rattlesnake (Crotalis viridis), and red rattlesnake (C. ruber).(16)

Endangered Species

There are 236 plant species in California classified as endangered. Examination of their geographic distributions indicates that nine of the species occur in Ventura County or adjacent Los Angeles County. These species are listed in Table 2, along with information regarding their geographic distributions and habitat preferences. Four of the species are unlikely to occur in the western San Fernando Valley or in the Simi Hills (Heminzonia minthornii, Pentachaeta lyonii, Dudleya multicaulis, Astragalus tener var. Titi) because either their habitat preferences or their geographic distributions do not coincide with the sites. Of the remaining species, three are likely to be found in the Simi Hills (Dudleya cymosa, Dioentra ochrleuca, Erigonoum coratum), one would be limited to the valley

(Chorizanthe leptoceras), and one could occur at both localities (Berberis nevinii). The latter two species are unlikely to occur in the western San Fernando Valley today because of the lack of nonurban habitat.(16)

The 25 species of terrestrial California vertebrates classified as endangered are listed with the geographic range and/or habitat preferences for each in Table 3. Of those listed, only three species (southern bald eagle, prairie falcon, American peregrine falcon) are potential residents of the SSFL area. This conclusion is based on nonspecific range descriptions, rather than on information indicative of the presence of the birds at or near the site.(16)

Table 2 Endangered Plant Species[a] of
Ventura and Los Angeles Counties, California

Family, genus, species subspecies[b]	Habitat and geography[b]
1. Astereae -Hemizonia minthornii	Chaparral zone; Santa Susana Mountains
2. Astereae - Pentachaeta lyonii (Chaetopappa lyonii)[c]	Valley grassland; coastal Los Angeles County
3. Berberidacase - (Berbaris nevinii)	Coastal sage scrub and chaparral; San Fernando Valley
4. Crassulaceae - Dudleya cymosa spp. marcescens	Chaparral; Santa Monica Mountains, southern Ventura County
5. Crassulaceae - Dudleya multicaulis	Chaparral; Los Angeles County
6. Fabaceae - Astragalus tener var. Titi	Coastal strand; coastal Los Angeles County
7. Fumaraceae - Dicentra ochroleuca (Papaveraceae)[c]	Dry disturbed places below 3000 ft in chaparral;
8. Polygonaceae - Chorizanthe leptoceras	Coastal sage scrub and San Fernando Valley
9. Polygonaceae - Eriogonum crocatum	Rocky slopes at about 500 ft, coastal sage scrub; northern base of Santa Monica Mountains, Ventura County

[a]From Smithsonian Institution, "Report on Endangered and Threatened Plant Species of the United States," Serial No. 94 A, U.S. Government Printing Office, Washington, D.C., 1975.

[b]Unless otherwise noted, nomenclature and range of habitat from P. A. Munz, "A Flora of Southern California," University of California Press, Berkeley, California, 1974.

[c]Family or genus classification from footnote a.

Table 3 Endangered Wildlife of California

Common name	Habitat and geography
Blunt-nosed lizard	Cuyama River Valley, San Joaquin Valley
San Francisco garter snake	San Francisco area
Santa Cruz long-toed salamander	Santa Cruz County, two localities
Desert slender salamander	Santa Rosa Mountains, Riverside County only
Tehachapi slender salamander	Kern County only
Limestone salamander	Mariposa County
Shasta salamander	Lake Shasta
Inyo County toad	Inyo County, only
California brown pelican	Anacapa Island, Ventura County, (40 miles SW of site)
Aleutian Canada goose	Occasional winter visitor to northern California
Tule-white-fronted goose	Winters in central California
California condor	Tehachapi Mountains and north (40 miles N of site)
Southern bald eagle	Nests in California
Prairie falcon	Nests in Baja California and possibly in southern California
American peregrine falcon	Nests in California
California clapper rail	Central California coast
Light-footed clapper rail	Santa Barbara County and south in salt marshes
Yuma clapper rail	Lower Colorado River
California least tern	Coastal California, San Francisco south to Baja California
Spotted owl	Northern California, Southern California mountains; forests only
Santa Barbara song sparrow	Not available; assumed to be in Santa Barbara County
Morro Bay kangaroo rat	San Luis Obispo County, sandy soils on southern side of Morro Bay
Salt Marsh harvest mouse	San francisco Bay region
San Joaquin kit fox	Western side of San Joaquin Valley, Kern County and north

Source: U.S. Department of the Interior, Fish and Wildlife Service, "Threatened Wildlife of the United States," Resource Publication 114, U.S. Government Printing Office, Washington, D.C., 1973.

AREA I

SOLID WASTE MANAGEMENT UNITS

4.0 AREA I

4.1 OLD B-1 AREA

Unit Characteristics

The unlined Old B-1 Area is in the northeasternmost area of the facility. It was used for testing B-1 engines.(V2) There were three underground storage tanks for JP-5 fuel.

Status

This area is no longer in use. The underground storage tanks were removed in 1984.(V2) Soil samples from this unit were analyzed and found to be contaminated with JP-5. This resulted in cleanup activities conducted under the jurisdiction of the Ventura County Health Department.(V2)

Waste Managed

JP-5 and TCE were the predominant constituents used in this area; JP-5 for ignition of engines, and TCE for cleaning the tested engines.(14) An estimation of quantities is not available.

History of Releases

There were no documented releases found for this unit during file review. However, stained soil was observed during the VSI (photo 1-E).

Pollutant Migration Pathways

Soil and Groundwater: Contamination occurred in the past, as indicated by the removal of soil in 1984. The stained soil, observed during the VSI, indicates that the potential for soil contamination is significant.

Surface Water: Since there is no surface water in close proximity of this unit, there is virtually no potential for surface water contamination.

Air: As long as the area remains inactive, the potential for releases of pollutants to the air is insignificant.

Subsurface Gas: Because contaminated soil was removed in 1984, the potential for the generation of subsurface gases has been low. However, gases could generate if the soils remain contaminated.

4.2 OLD AREA I LANDFILL

Unit Characteristics

This nonhazardous landfill is located in the northeast portion of Area I, north of the TCA distillation unit (SWMU 4.4). The unit is unlined, has steep ravines, and no leachate collection system in place. Disposed materials were deposited and covered with soil.(2) There is heavy vegetation growing at this inactive landfill.(V2)

Status

This landfill began operation in 1943; it became inactive in 1970.(2) No closure activities have been conducted.

Waste Managed

The known wastes deposited were nonhazardous materials, such as construction waste, wooden materials, pieces of test hardware that had failed or burned.(2) It is not known, however, if hazardous wastes were managed in this landfill. Wooden materials, heavy vegetation, and one empty rusty drum were observed during the VSI (photos 1-A, 1-B).(V2) There was no information regarding the original contents of the drum.

Release Controls

There have never been release controls implemented at this landfill.

History of Releases

The documents reviewed did not indicate that there were any releases. However, the file review indicated a potential for waste oils to contaminate the landfill.(1)

Pollutant Migration Pathways

Soil and Groundwater: Although there is no documentation of releases to the soil, the potential exists for contamination with waste oils.

Surface Water, Air, Subsurface Gas: There is not enough information to determine what pollutants are present or what potential exists for contamination to these media.

4.3 BUILDING 324 INSTRUMENT LAB HAZARDOUS WASTE TANK

Unit Characteristics

The location of this horizontal tank is the northern one-third portion of Area I outside Building 324. The construction is polypropylene and has a storage capacity of 500-gallons. It stores wastewater from laboratory instrument cleaning (photo 1-C).(V2)

Status

This storage unit has been operational since 1950.(V2)

Waste Managed

The tank contains approximately 80% water, 5% Freon 113, 5% isopropyl alcohol, and 5% Oxalate 32.(1) Wastes stored in this tank are emptied within 90 days of accumulation and transported to Eticam in Nevada.(V2)

Release Controls

Release controls in use at this tank are shutoff valves and a secondary containment basin.(1) Rockwell disposes of the waste solvent within 90 days of accumulation.(V2) It is not known when the release controls were put into place.

History of Releases

There was no documentation available during the file review and the VSI concerning any releases of hazardous waste or constituents.(V2)

Pollutant Migration Pathways

Soil and Groundwater: Although the tank is outside, the potential for contamination to soil is low due to the release controls in place. The contamination potential to groundwater is very low.

Surface Water: The distances to surface water, as well as the release controls in place, make the potential of contamination to surface water low.

Air: The potentials for air releases are minimal to nonexistent due to the release controls and the type of wastes handled at this unit.

Subsurface Gas: Due to the nature of this unit's construction and wastes handled, potential for subsurface gas generation is low.

4.4 BUILDING 301 EQUIPMENT LABORATORY TCA DISTILLATION UNIT AND USED PRODUCT TANK

Unit Characteristics

This unit is east of the APTF (SWMU 4.9) and southwest of Building 302. It is a distillation unit used for recycling reclaimed TCA. There are two on-line tanks located outside the distillation unit; one labeled "clean" and is used to store the reclaimed TCA. The other is labeled "dirty" and stores reclaimed waste prior to the distillation process.(V2) Their capacities are 1,265-gallons each.

The 500-gallon used product storage tank is used to store TCA prior to distillation.(V2) The TCA is conveyed through pipes between the tanks and the distillation unit.(V2) No photographs are available.

Status

This unit has been actively distilling used TCA since 1960.(V2)

Waste Managed

The distillation process generates a product TCA. The waste managed at this unit is the sludge left over from the distillation process. It is not known how the facility disposes of this sludge.(V2)

Release Controls

Shutoff valves have been installed, and chain-locked, on the containment basin of the distillation unit to control releases. The storage tank is bermed, as well. Additionally, the distillation system is a closed loop, so that all overflow lines reenter the system.

History of Releases

On January 28, 1987, 175 to 200 gallons of TCA were discovered draining across the roadway outside building 301.(59)(60) This occurred because a release valve from the distillation unit containment basin was left open after the routine discharge of standing dirty water.(62)(1) There was extensive damage to approximately 200 square feet of the roadway. Approximately eight cubic yards of affected asphalt and soils were excavated and disposed of at a hazardous waste landfill.(62)(1)

Pollutant Migration Pathways

Soil and Groundwater: Corrective action was taken soon after the above mentioned release occurred; the water separator overflow line was replumbed into the dirty TCA tank sump to provide a closed loop system.(62) This indicates a low potential for further contaminant migration to soil or groundwater.

Surface water: The existing potential for pollutant migration to surface water is extremely low because of the release controls currently in place at the unit.

Air: It is not known if this system is vented. Until information is gained about the venting of this unit, there remains a significant potential for migration to the atmosphere.

Subsurface Gas: The potential for contamination of soils and groundwater, and subsequently the generation of subsurface gas, remains low.

4.5 LOX PLANT WASTE OIL SUMP AND CLARIFIER

Unit Characteristics

The LOX Plant was listed as a SWMU in the PR report. Upon inspection during the VSI, the only SWMU identified at the LOX Plant was a waste oil sump and clarifier. The LOX Plant was used to produce LOX in the 1950s and 1960s.(1) The 42-acre property, which is currently owned by the NASA, had been owned by the U.S. Air Force and housed the Liquid Oxygen Plant #64 which was operated by Air Products, Incorporated. No blueprints or historic information were available. The original buildings and LOX tanks have been removed and only the concrete bases remain. When the buildings were dismantled by Rockwell in 1970, construction debris containing asbestos was deposited on the hillside to the west (see SWMU 4.6).(V1)

The waste oil sump and clarifier are located just north of the driveway leading to the plant. The sump is about 12' x 5' and the attached clarifier is about 10' x 2'. They are below grade and appear to be concrete lined, but, during the VSI, the liquid in them prevented an estimation of depth. The clarifier is covered with a metal grate and the sump is covered with metal plates (photo 18).(V1)

This SWMU is not regulated under RCRA, however, it is included in this RFA report because waste oil is a hazardous waste regulated by the DHS.

Status

The LOX Plant has been dismantled. It is not known how recently the sump and clarifier were used.

During the VSI the waste oil sump and clarifier were observed to contain standing water and residual waste oil. Dried oil was caked on the sides of the unit and the clarifier grate. The metal plates on the sump had spaces in between them and one was slightly open. A pipe that may have been used to convey oil or water pumped from the sump remains near the unit, but no pump was present. A pile of asphalt construction debris located between the unit and the driveway was observed.(V1)

Waste Managed

There currently appears to be waste oil in the unit.(V1) No details on origin or composition were available.

Release Controls

The unit has concrete walls and probably a concrete bottom, as well. It is open to collect rainwater, and so could overflow in a heavy rain.(V1)

History of Releases

There are no releases on record, but the ground surrounding the unit was observed during the VSI to be stained with oil.(V1)

Pollutant Migration Pathways

Soil and Groundwater: Waste, or waste constituents, could migrate through any cracks in the concrete and contaminate the soil and groundwater. Waste oil has contaminated the soil around the unit and could, therefore, affect the groundwater or surface water. Further releases could occur if rainwater causes the unit to overflow.

Surface Water: If the unit overflowed during heavy rain, wastes could be washed into local drainage ditches. Constituents could also be carried from the oil stained soil outside the unit.

Air: A hydrocarbon odor was noted around the unit, indicating a release of some components of the waste oil to the air.

Subsurface Gas: Due to the types of wastes handled, subsurface gas generation is not likely.

4.6 ASBESTOS AND DRUM LANDFILL NEAR LOX PLANT

Unit Characteristics

The LOX Plant operated until some time in the 1960s or 1970s and was subsequently dismantled. During the VSI, Rockwell personnel indicated a hillside west of the LOX plant where asbestos from the demolished buildings was apparently dumped. Asbestos had recently been removed from an approximately 54,000 square foot area of the hillside and placed into roll-off boxes that were awaiting removal to USPCI in Grassy Mountain, Utah. (Some soil was removed with the asbestos.) Apparently some drums (the Rockwell representative guessed 12 or 14) were found in the area. These were empty and rusted, and the method of their disposal is unknown.(V1) The scraped-off hillside is shown in photo 28.

(Due to a confusion concerning the boundaries of Areas I and II, this SWMU was originally considered to be in Area II. Therefore, the VSI team investigating Area II inspected this SWMU and included in their DRAFT report. For that reason, the photograph of this SWMU is in the Area II Chapter of this report.)

Status

The asbestos removal was regulated by the VCAPCD. The dump is currently inactive.(V1)

Waste Managed

The only positively identified waste is asbestos, which is not regulated under RCRA, however may be considered a hazardous waste by DHS depending on its percent asbestos and whether or not it is friable. Additionally, though unconfirmed, it is possible that the drums may have contained hazardous wastes.(V1)

Release Controls

There were no apparent release controls.(V1)

History of Releases

It is unknown whether RCRA hazardous waste or hazardous constituents have been released from the unit. It is also not known if releases from the drums occurred.

Pollutant Migration Pathways

If any hazardous waste or hazardous constituents were disposed of in the area, a release to soil, groundwater, surface water, or air could have occurred and subsurface gas could have been generated since there were no apparent release controls.

4.7 COMPONENT TEST LABORATORY (CTL-III)

Unit Characteristics

The CTL-III is east of the Perimeter Pond (SWMU 4.17) and southwest of the Bowl Area (SWMU 4.15). It is a complex of buildings, tanks, and other equipment used for laser development and igniter testing, utilizing potassium hydroxide, iodine, oxygen, H_2O_2, and chlorine gas.(V2) No photographs are available due to the classified nature of the work performed here.

Status

Currently CTL-III is being used to develop the Chemical Oxygen-Iodine Laser (COIL). The process by which a laser oxygen molecule is created was described by Rockwell personnel during the VSI to be the following. H_2O_2 is mixed with KOH at very low temperatures. Chlorine inside a vapor tank reacts with the KOH/H_2O_2 mixture to form a "very basic H_2O_2." This compound is extremely reactive. The laser oxygen molecule is created when the H_2O_2 comes into contact with iodine. This laser can be tuned to a single frequency.

Waste Managed

An 80% helium gas is injected into a four-stage steam ejector at 1 lb/sec as part of a venting system for the KOH/H_2O mixture. The 45% KOH/H_2O mixture is aspirated at 1,800 gallons per minute (gpm) to four condensers and then to a caustic scrubber. At this point, there is only 5% KOH in the mixture.

At the end of the process, waste KOH is pumped to a Baker tank for reuse. KOH/H_2O_2 is mixed with the chlorine gas to form potassium chloride and H_2O.

Release Controls

The entire unit is paved and has secondary containment including the Baker tanks for storage of the waste KOH and chlorine gas mixture.(V2)

History of Releases

KOH deteriorated a plastic liner under the Baker tank in August 1988. According to the CTL-III representative, soil samples were taken under the plastic liner and found to have no contamination.(V2) In July 1989, a KOH transfer tank failed causing KOH to leak to the concrete containment.(V2) In both incidents, the KOH was contained within the facility.

Pollutant Migration Pathways

Soil and Groundwater: Based upon observations made during the VSI, it appears the potential migration of contaminants to soil or groundwater is low.

Surface Water: Based upon the observations made during the VSI, the potential migration to surface water appears to be low.

Air: There is limited information about the venting of this unit, and, therefore, the potential of any contaminants releasing to the air is extremely low.

Subsurface Gas: There is virtually no potential for generation of subsurface gases.

4.8 BURN PIT

Unit Characteristics

This Burn Pit area is in the southern portion of Area I, west of the Perimeter Pond (SWMU 4.17). It is an unlined excavated area where burning of explosives in 5-pound increments takes place (photo 1-F).(V2) The explosives were burned together with solvents. According to Rockwell, minimal amounts of solvents were used during the burning of explosives. The Ventura County Fire Department participates in demonstrations conducted as training exercises by SSFL's on-site fire department. Also, according to Rockwell, the practice of burning explosives has been discontinued.(42)

Status

This unit is currently active. In 1984, what was identified as a "waste pile" was removed under the supervision of the Los Angeles RWQCB and DHS.(V2) The pile contained heavy metals and solvents.(V2) In recent years this area has been used for detonating explosives and for burning solvents.(V2) According to facility personnel, detonation of explosives did not occur in 1990 previous to the VSI in August.(V2) However, Karen Schwinn stated that Rockwell received formal closure for their open burn/open detonation operations in 1981/1982.(44)

Waste Managed

Unknown quantities of solvents and propellants have been burned at this unit. Based upon site history and the types of substances used throughout Area I, it is likely that the substances burned at this unit were TCE and kerosene-like fuels.(V2) During the VSI, four empty 10-gallon drums and a dirty rag were observed in this unit (photo 1-G).(V2)

Release Controls

There are no apparent controls for releases, however, the detonations were supposed to occur only on Ventura County "Burn Days."(67) According to Rockwell, the practice of burning explosives has been discontinued.(42)

History of Releases

There are no documented historical releases. However, black stained topsoils and undersoils were observed during the VSI (photo 1-F).

Pollutant Migration Pathways

Soil and Groundwater: As long as the pit remains unlined, the migration of contaminants to soil is likely, especially if the "5 pound increments" of explosives with solvents are spilled. The potential pollutant migration pathway to groundwater is medium to high, assuming the volatile constituents are not completely burned.

Surface Water: The Burn Pit is near the Perimeter Pond (SWMU 4.17). Even though contaminated soil was excavated in 1984, the potential for contaminant migration to surface water remains as long as the pit is in use.

Air: During the burning of explosives with solvents there exists a high potential for contaminants to be released to the air.

Subsurface Gas: The potential for the generation of subsurface gas is low, assuming the volatile constituents are completely burned and no spillage occurs.

4.9 ADVANCED PROPULSION TEST FACILITY (APTF)

Unit Characteristics

The Advanced Propulsion Test Facility is a concrete area located in the northern third of Area I, situated north of the APTF Ponds (SWMUs 4.10 and 4.11). It is a Research and Development facility for testing engines, as well as propellants such as MMH and NTO, and RP-1. The test facility has been sporadically active since the 1950s, having been torn out and rebuilt numerous times.(V2) APTF is currently active (photos 1-I and 1-J).

The fuel lines to the test facility have an aspiration system to clear the lines after test firing. When aspirated, MMH goes to an ozonator, while NTO mixed with water discharges to a water reclamation tank downgradient from the test area (see AOCs 4.19). All wastewater from the APTF is collected in this tank and is pumped to another tank upgradient from APTF. This tank is gravity fed to APTF for use as engine cooling water. Occasionally, it is necessary to discharge untreated wastewater to R-1 (SWMU 4.16).(V2)

Status

This test facility is currently active and has been in use at various times since 1953.(V2)

Waste Managed

The predominant waste from this unit is water, used for cooling the engines during a test run, mixed with high performance test fuels.(14) The engines tested are fueled with MMH and NTO, and RP-1. There exists the capability to utilize a liquid oxygen-hydrogen (LOX/H_2) mix for fueling the engines, as well.(V2) TCE was used from the early 1950s to 1976, when the use of large quantities of TCE for cleaning purposes halted.

Release Controls

While the APTF Ponds #1 and #2 (SWMUs 4.10 and 4.11) were still active, they received runoff from the engine testing operations at the APTF area. The runoff discharge would follow an engine test, and during or after a rainfall.(33) Runoff following an engine test is now collected in the tank located downgradient from the test area, and reused for cooling engines during tests. Now that the APTF ponds #1 and #2 are closed and have diversion channels around them (photo 1-K), rain runoff from the APTF flows directly to R-1 through the original surface drainage system.(33)(V2) The aspiration lines for MMH and NTO are contained in cement lined channels (photo 1-L).(V2)

History of Releases

On April 11, 1990, a 500-gallon polypropylene tank containing MMH-contaminated water overflowed before treatment to neutralize the MMH. The wastewater required treatment because a fresh water valve to the ozonator system was left open, thereby contaminating the fresh water with MMH. Treated wastewater, destined for off-site discharge, requires a pH between 8.0 - 9.0 (NPDES limit). There was a violent chemical reaction during the addition of NaOH, to raise the pH, which resulted in a release of 10 to 15-gallons of wastewater containing MMH.(56)

Pollutant Migration Pathways

Soil and Groundwater: The potential for migration to soil and groundwater appears to be medium due to the contained piping for MMH and NTO, as well as the concrete construction of the test facility, and the use of tanks for wastewater/TCE reclamation.

Surface Water: The potential for migration to surface water appears to be high due to the incident reported on April 11, 1990. In addition, there may have been surface water contamination in the past when TCE was still in use.

Air: It is highly likely that a release to the air has occurred during the test firing of the engines.

Subsurface Gas: Although slight, there remains a potential for generation of subsurface gas from any TCE contaminants in the underlying groundwater or soil.

4.10 ADVANCED PROPULSION TEST FACILITY POND #1 (APTF-1)

Unit Characteristics

APTF-1 is south of APTF (SWMU 4.9) and northeast of LETF (SWMU 4.12), in the northeast corner of the facility. Before closure, the pond had a Gunite liner, and a storage capacity of 40,600-gallons.(33) While it was active, APTF-1 contained overflow or runoff from APTF (SWMU 4.9), as well as aspirated water contaminated with fuels. Water originally contaminated with fuels was oxidized with H_2O_2 or calcium hypochlorite to form nitrogen, carbon dioxide and water. Water discharged to the Area 1 Reservoir (R-1) (SWMU 4.16) and was used in the cooling system. Portions of the channels leading from the pond to R-1 had concrete lining.(33) It is unknown how far down the drainage channel the concrete lining extended. No photographs are available of this SWMU.

Status

APTF-1 was first used in 1960 and became inactive in November 1985. In 1985, Rockwell submitted a closure plan to DHS. After removal of the concrete liner, the impoundment was backfilled with clean soil and covered with a concrete slab. The closure activities were completed in December 1988. Rockwell submitted closure certification on September 30, 1989.(9) Rockwell submitted a post-closure plan to DHS on March 29, 1990.(34)(65)

APTF-1 is in a natural drainage pathway. Diversion channels constructed during closure prevent water from entering or ponding on the surface impoundment area.(9)

Waste Managed

APTF-1 may have contained fluorine, Inhibited Red Fuming Nitric Acid (IRFNA), H_2O_2, MMH, NTO, nitrogen dioxide (NO_2), isopropyl alcohol, Freon 113, kerosene-based fuels like RP-1, JP-4 and RJ-1, nitric acid (HNO_3), hydrazine, TCE, vinyl chloride, trans-1,2-DCE, formaldehyde, acetone, unsymmetrical dimethyl hydrazine (UDMH), hydrogen fluoride, methyl ethyl ketone (MEK), tetrachloroethene (PCE), methylene chloride, carbon tetrachloride, trichlorofluoromethane, and trichlorofluoroethane.(33)

Release Controls

Gunite lined the pond; a grate around the edge of the pond controlled the flow from this pond through channels to R-1 (SWMU 4.16).(33) Before closure, water flowed from the test stand at the APTF (SWMU 4.9) to R-1 (SWMU 4.16). Ultimately, the water flowed to the Perimeter Pond (SWMU 4.17).(33)

Currently, there is a facility-wide system for TCE and water reclamation. One closed-loop ozonator tank for wastewater storage (see AOCs 4.19) is located downgradient of the APTF area, and is used to receive runoff from the test area. Rockwell representatives stated that occasionally the water is released from the downgradient tank and flows directly to R-1.(V2) However, in the comments to the draft RFA received from Rockwell, no effluents are discharged to R-1 (SWMU 4.16).(42)

History of Releases

Runoff from APTF (SWMU 4.9) flowed to APTF-1, discharged to R-1 (SWMU 4.16) and finally to the Perimeter Pond (SWMU 4.17).

On June 3, 1983, Rockwell detected an MMH concentration of 1,043 parts per million (ppm) at APTF-1 (SWMU 4.9). Before treatment to reduce the MMH concentration, this contaminated water was released to R-1 (SWMU 4.16) on June 10, 1983. MMH, a strong oxidizer, caused the oxygen levels in R-1 to drop, killing fish in R-1.(50)

On November 22, 1985, three pounds of MMH were released to the environment.(20) No further information regarding this release was available.

Pollutant Migration Pathways

Soil and Groundwater: Soil sampling conducted in 1987 showed considerable levels of fluoride, however, soil sampling in 1988 showed significantly lower levels.(34) Groundwater sampling conducted from 1987 to 1989 indicated the presence of significant levels of VOCs.(34)(65) Since this impoundment is closed, the potential for releases to soil and groundwater is low.

Surface Water: Due to the proximity to other surface water bodies and because the water was channeled directly to R-1 (SWMU 4.16), it is unlikely that other releases to surface water occurred. Since this impoundment is closed and the water reclamation system tanks are in place, the potential for migration of pollutants to surface water is extremely low.

Air: It is possible that migration to air occurred during this pond's active period. However, there is no further potential for pollutants to migrate to the atmosphere, since this unit is closed.

Subsurface Gas: The information known about this unit indicates there is a low potential for the generation of subsurface gas.

4.11 ADVANCED PROPULSION TEST FACILITY POND #2 (APTF-2)

Unit Characteristics

APTF-2 is south of APTF (SWMU 4.9) and northeast of LETF (SWMU 4.12), in the northeast corner of the facility. Before closure, the pond had a Gunite liner, and a storage capacity of 131,000-gallons.(33) While it was active, APTF-2 contained overflow or runoff from APTF (SWMU 4.9), as well as aspirated water contaminated with fuels. Wastewater contaminated with fuels was oxidized with H_2O_2 or calcium hypochlorite to form nitrogen, carbon dioxide and water. Wastewater discharged to R-1 (SWMU 4.16) was used in the cooling system for the test stands. Portions of the channels leading from the APTF-2 to R-1 had concrete lining.(33) It is unknown how far down the drainage channel the concrete lining extended (photo 1-M).

Status

APTF-2 was first used in 1960 and became inactive in November 1985. Rockwell submitted a closure plan to DHS in 1985. After removal of the concrete liner, backfilling with clean soil and covering with vegetated topsoil, Rockwell submitted closure certification on September 30, 1989 and a post-closure plan on March 29, 1990.(9)(34) Additionally, a Gunite rainwater bypass channel was installed so the filled pond area would have surface water runoff.(9)

Since APTF-2 is located in a natural drainage pathway, diversion channels were constructed during closure activities to prevent water from entering or ponding in the surface impoundment area.(9)

Waste Managed

APTF-2 may have contained fluorine, IFRNA, H_2O_2, MMH, NTO, NO_2, isopropyl alcohol, Freon 113, kerosene-based fuels like RP-1, JP-4 and RJ-1, HNO_3, hydrazine, TCE, vinyl chloride, trans-1,2-DCE, formaldehyde, acetone, UDMH, hydrogen fluoride, MEK, PCE, methylene chloride, carbon tetrachloride, trichlorofluoromethane, trichlorofluoroethane, and miscellaneous chlorinated solvents.(33)

Release Controls

Gunite lined the pond; a grate around the edge of the pond controlled the flow from this pond through channels to R-1 (SWMU 4.16).(33) Before closure, water flowed from the test stand APTF (SWMU 4.9) to R-1 (SWMU 4.16). Ultimately, the water flowed to the Perimeter Pond (SWMU 4.17).(33)

Currently, there is a facility-wide system for TCE and water reclamation. One closed-loop ozonator tank for wastewater storage (see AOCs 4.19) is located downgradient of the APTF area, and is used to receive runoff from the test area. Another tank, located upgradient of the APTF area, is used as a source of cooling water. Occasionally, the water is released from the downgradient tank, flowing directly to R-1.(V2) Rockwell stated, however, that no effluents are discharged to R-1 (SWMU 4.16).(42)

History of Releases

There was no available documentation regarding releases from this unit at the time of the file review and the VSI.

Pollutant Migration Pathways

Soil and Groundwater: Soil sampling conducted in 1987 showed considerable levels of fluoride, however, soil sampling in 1988 showed significantly lower levels.(34) Groundwater sampling conducted from 1987 to 1989 indicated the presence of significant levels of VOCs.(34)(65) Since this impoundment is closed, the potential for releases to soil and groundwater is not likely.

Surface Water: Due to the proximity to other surface water bodies and because the water was channeled directly to R-1 (SWMU 4.16), it is unlikely that releases to surface water occurred. Since this impoundment is closed and the water reclamation system tanks are in place, the potential for migration of pollutants to surface water is extremely low.

Air: It is possible that migration to air occurred during this pond's active period. However, there is no further potential for pollutants to migrate to the atmosphere, since this unit is now closed.

Subsurface Gas: The information known about this unit indicates there is a low potential for the generation of subsurface gas.

4.12 LASER ENGINEERING TEST FACILITY (LETF AREA)

Unit Characteristics

The LETF Area is adjacent to the LETF Pond (SWMU 4.13), near the center of Area I. This area was used for testing high energy compounds such as fluorine and fluorine containing compounds such as chlorine pentafluoride and nitrogen trifluoride.(1) It is not known whether this unit was ever lined. No photographs are available.

Status

This unit was active from the early 1950s until 1964.(14) No documentation of closure activities was available during the file review and the VSI. It is unknown whether contamination is present or not in the soil and groundwater.

Waste Managed

Fluorine and fluorine containing compounds such as chlorine pentafluoride and nitrogen trifluoride.(1)

Release Controls

No information regarding release controls was obtained.

History of Releases

There is no clear documentation of releases from this unit.

Pollutant Migration Pathways

So little is known about this unit that the potential for pollutant migration, to any of the media, can not be adequately assessed.

4.13 LASER ENGINEERING TEST FACILITY POND (LETF POND)

Unit Characteristics

The LETF Pond was located approximately in the center of Area I, north of the Canyon Area (SWMU 4.14), and south of APTF-1 and -2 (SWMUs 4.10 and 4.11, respectively). LETF Pond was a 50,000-gallon concrete-lined impoundment used for storage and treatment of waste streams discharged from the LETF (SWMU 4.12).(14) The impoundment was replaced with a 14,000-gallon tank designed to contain fluorine and caustic solutions so as to form the salt sodium fluoride (NaF). It was pumped empty once a year. The surface drainage channels carried the pond discharge to R-1 (SWMU 4.16) and ultimately to the Perimeter Pond (SWMU 4.17) (photo 1-N).

Status

Operation of the LETF Pond began in 1950 and ended in the late 1970s. Contaminated soil was excavated in 1984 and disposed of at a Class I landfill.(1)(14) According to DHS, the LETF Pond was certified clean-closed on November 30, 1984.(65) The Rockwell representative present during the VSI stated that the 14,000-gallon tank has never been used for waste storage.(V2)

Waste Managed

Wastes received by this impoundment were from the LETF (SWMU 4.12). LETF Pond was known to routinely contain hazardous waste.(14) The probable constituents were corrosive liquids, TCE and fluoride.(51) The total volume of TCE used at LETF is estimated at 100 gallons over the course of approximately 14 years.(14) The source of fluoride was also the LETF, however no estimates of total volume used are available.(14)

Release Controls

It is unknown whether there were release controls in use, other than the concrete lining of the pond.

History of Releases

On May 14, 1981, 400 pounds of NaF were released from the LETF Pond as a result of a hose being left on and unattended for about 16 hours. The NaF was released to R-1 (SWMU 4.16) and raised the fluoride concentration in R-1 to 13 ppm.(57)(1)

On March 3, 1983, a fluoride concentration of 4.4 ppm (exceeds NPDES permit allowable concentration of 1.0 ppm fluoride) was noted at the Perimeter Pond (SWMU 4.17), which discharges off-site. The source was discovered to be the LETF Pond where a pump leaked and released to R-1 (SWMU 4.16) before reaching the Perimeter Pond. An estimated 1,000 gallons of scrubber solution, with a fluoride concentration of 4,600 ppm, was released from LETF.(51)(1)

On March 21, 1983, routine sample analysis discovered that the fluoride concentration in the Perimeter Pond (SWMU 4.17) was 8.5 ppm, while the discharge off-site into Bell Creek was 1.6 ppm. (The NPDES permitted allowable discharge limit for fluoride is 1.0 ppm.) The source was found to be the LETF fluorine scrubber sump, a concrete hazardous waste storage tank. (Rockwell uses the terms "sump," "tank" and "surface impoundment" interchangeably.)(V2) The net effect of this release on the Area I water reclamation system was the elevation of the fluoride concentration in R-1 (SWMU 4.16).(58)

Pollutant Migration Pathways

Soil and Groundwater: It is possible contamination occurred in the past. However, since the pond is certified clean-closed, there is no further potential for pollutant migration.

Surface Water: Surface water contamination has occurred in the past. However, since the pond is certified clean-closed, there is no further potential for pollutant migration.

Air: With the limited amount of historical information available, it appears that the potential for pollutant migration to the atmosphere existed, but the extent is unknown. There is no further potential for contamination to the atmosphere since the pond is certified clean-closed.

Subsurface Gas: With the limited amount of historical information available, it appears that the potential for pollutant migration to subsurface gas does exist, but to what extent is unknown.

4.14 CANYON AREA (CANYON RETENTION POND, CANYON SKIM POND, AND CANYON TEST AREA)

Unit Characteristics

The Canyon Area is in the northeast area of the facility. It is situated west of Happy Valley, south of LETF (SWMU 4.12) and northeast of the Bowl Area (SWMU 4.15). The Canyon Area consists of the Canyon Retention Pond, Canyon Skim Pond, and the Canyon Test Area. No photographs are available.

Testing of large rocket engines occurred at the concrete-lined Canyon Test Area between 1953 and 1961. After each engine was test fired, TCE was used for flushing hardware and engine thrust chambers.(14) Each engine test required flushing with 50 to 100 gallons of TCE. Any TCE which did not evaporate was discharged onto a concrete spillway that directed the flow of waste into an unlined channel leading to the unlined earthen Canyon Skim Pond and/or the unlined earthen Canyon Retention Pond.(14) Ultimate destination of the waters from these ponds was through lined and unlined drainage channels into R-1 (SWMU 4.16)(14), and then on to the Perimeter Pond (SWMU 4.17) in the southern portion of Area I.

Status

Engine testing at Canyon Area ceased in 1961.(14) The Skim Pond was the first receptacle for fuel-contaminated water. After skimming, kerosene-contaminated water from the Canyon Skim Pond was piped to the Canyon Retention Pond. From the Canyon Retention Pond it was discharged to R-1 (SWMU 4.16) for reuse. Currently, the ponds are inactive.(14) No closure activities have been conducted.(V2) Limited information was available regarding the current conditions and/or closure activities for this unit.(V2)

Waste Managed

At the test area, TCE was used after each firing test; RP-1 was used for ignition. The ponds were used as catchments for routine test activities at the Canyon Test Area, as well as for emergency containment of spills. In the event of a spill, the ponds were used for treatment.(14)

Release Controls

Limited information was available from background documents or from the Rockwell representatives present during the VSI. Therefore, it is not apparent if release controls, other than concrete liners, had been implemented at the test area. The skim and retention ponds were unlined, and had no release controls except for overflow to R-1 (SWMU 4.16).(14)

History of Releases

There are no known releases documented from this now inactive unit. No data analyses were found for this unit, however, TCE was detected in groundwater surrounding the Canyon Area.(14)(42)

Pollutant Migration Pathways

Soil and Groundwater: Although there are no recorded releases from this unit, the potential for contamination to soil and groundwater is extremely high. This is due especially to the unlined construction of the skim and retention ponds and the unlined channels between the test area and the ponds, and the ponds and R-1 (SWMU 4.16).

Surface Water: As long as the present contaminant level at the test area and ponds remains unaddressed, the migration to surface water (such as during a rain) continues to be high.

Air: The pollutants of interest in the Canyon Area are VOCs which could volatilize from the surface of the water, especially if the water is exposed to heat, such as exposure to sunlight.

Subsurface Gas: Since the ponds are inactive, immediate generation of subsurface gas is unlikely. However, if VOCs are present in the soil and water accumulates in the pond and seeps through the soil, subsurface gas may be generated.

4.15 BOWL AREA (BOWL RETENTION POND, BOWL SKIM POND, AND BOWL TEST STANDS)

Unit Characteristics

The Bowl Area is east of Area I Reservoir (SWMU 4.16) in the approximate southern third of Area I. The Bowl Area is comprised of the three Bowl Area test stands (photo 1-D), the Bowl Retention Pond, the Bowl Skim Pond, and two coal gasification systems left from DOE programs of the 1970s.(1) The process equipment remaining at this SWMU contains a variety of unconfirmed types of waste oils.(V2)

The Bowl Test Area was the first of its kind constructed at the facility. It was concrete lined and actively used for testing large rocket engines from 1948 to 1963.(14) The fuels utilized were kerosene-based. TCE was used to flush the rocket hardware and engine thrust chambers after each firing. Between 50 to 100 gallons were used for each flushing activity.(14) Waste TCE and water runoff discharged to the unlined Bowl Skim Pond (capacity 200,000-gallons). The wastewater was piped from the Skim Pond to the unlined Bowl Retention Pond (capacity 3,000,000-gallons). When it was necessary to remove accumulating scum from the surface of the Skim Pond, Rockwell would burn the fuels layered on the Skim Pond.(V2) As in the case of all other surface impoundments, these ponds discharged to R-1 (SWMU 4.16) and ultimately to the Perimeter Pond (SWMU 4.17).(14)

Status

All components of the Bowl Area are inactive: the test stands since 1963, and the ponds since the early 1960s.(14) It is not known when the coal gasification units became inactive. The Bowl Retention Pond has been covered with concrete, while the Skim Pond remains unlined and uncovered.(V2) There is no information obtainable regarding formal closure activities for this unit. The uncovered pond was dry at the time of the VSI.

Waste Managed

TCE was used at the test area for flushing engines and rockets after each test performance. Kerosene-like fuels were used for ignition. The ponds were used as catchments for the routine Bowl Test Area runoff as well as for emergency spill containments. Therefore, the type of wastes managed at the ponds were likely to be TCE and RP-1 or JP-4.(14)

Release Controls

The piping from the Skim Pond to the Retention Pond acted as a release control for the Skim Pond.(V2) It is not known what release controls, if any, were used for the unlined Retention Pond. The ponds were the only implemented release controls for the test area.(14) There is insufficient information to discuss release controls for the coal gasification unit.

History of Releases

Although there are no documented releases, a Rockwell representative, present during the VSI, stated that soil and surface water contamination from the coal gasification unit has occurred.(V2) Since this test area was used for firing engines and because the fuels accumulating on the Skim Pond were occasionally burned, it can be reasonably assumed that fuels or volatile compounds have been released to the atmosphere.(14) Also, TCE and trans-1,2-DCE have been detected in the groundwater.(14)(42)

Pollutant Migration Pathways

Soil and Groundwater: There are no records of releases to soil and groundwater from this SWMU. However, the potential for contamination to soil and groundwater is extremely high due, especially, to the unlined construction of the skim and retention ponds, as well as the types of wastes handled in these ponds.

Surface Water: As long as the present levels of contaminants at the test area and ponds remains unknown, migration potential to surface water remains high.

Air: The pollutants of interest in the Bowl Area are fuels and VOCs. The unburned fuels pose little or no threat of contaminating the air. However, VOCs could release to the air if water accumulates in the Skim Pond.

Subsurface Gas: If water accumulates in the unlined pond, the potential for generation of subsurface gases, and subsequently pollutant migration, is highly likely to occur.

4.16 AREA I RESERVOIR (R-1)

Unit Characteristics

The Area I Reservoir (R-1) is in the southern third portion of Area I, east of the Bowl Area (SWMU 4.15) and south of the Area I Sewage Treatment Plant. It is an unlined water storage unit with a capacity of 3 million gallons.(14) This reservoir has been active since 1948 and receives effluent from Area I Sewage Treatment Plant, drainage water from upgradient Area I, and rain runoff.(V2) In the past, it received discharge from the containment ponds APTF-1 (SWMU 4.10), APTF-2 (SWMU 4.11), Canyon Retention and Skim Ponds (SWMU 4.14), and LETF Pond (4.13). These ponds sent discharge to R-1 until the time of their inactivity and/or closure. Water stored in R-1 is typically pumped back to two tanks located uphill on Skyline Drive (SWMUs 4.10, 4.11 and 4.9) to be reused as cooling water at the engine test areas.(V2) No photographs are available.

R-1 is currently receiving wastewater discharged from the above mentioned active areas and occasionally wastewater is pumped from the Perimeter Pond (SWMU 4.17).

Except in the event of extreme upgradient volumes, such as heavy rainfall, wastewater is not typically discharged to the Perimeter Pond, which is the next point of flow for discharged wastewaters (SWMU 4.17).(14)

Status

R-1 has been active since 1948.

Waste Managed

The impoundments which have historically discharged to R-1 are APTF-1 (SWMU 4.10), APTF-2 (SWMU 4.11), Canyon Area ponds (SWMU 4.14), and LETF Pond (SWMU 4.13). Therefore, the probable chemical constituents to be found in R-1 are RP-1, HNO_3, MMH, corrosive liquids, TCE, TCA, and Freon.(14)

Release Controls

A flood control dam is used to control the flow frequency and volume from R-1 to the Perimeter Pond (SWMU 4.17).

History of Releases

Heavy rainfall on March 3, 1983, resulted in fluoride contamination of the Perimeter Pond (SWMU 4.17).(50)

Pollutant Migration Pathway

Soil and Groundwater: If highly concentrated releases from upgradient areas occur, the unlined earthen construction of this impoundment makes the potential migration of contaminants to soil and groundwater extremely high.

Surface Water: Since some of the likely chemical constituents that could be found in R-1 are insoluble and lighter than water (kerosene fuels, TCE, TCA), it is likely that surface water contamination could occur if an influx of upgradient waters occurred, causing any contaminants layered on the upper portion of the contained water to overflow to soils and then to any surface waters downgradient of R-1.

Air: Some of the constituents of the R-1 contained wastewater are TCE and TCA which readily volatilize. Since R-1 is not covered, the potential for releases to air may be high.

Subsurface Gas: If groundwater or soil becomes contaminated with VOCs, the generation of subsurface gas could occur.

4.17 PERIMETER POND

Unit Characteristics

The Perimeter Pond is an unlined, earthen structure in the southernmost region of Area I. Flow from upstream ponds ultimately ends up in the Perimeter Pond. This pond discharges to Bell Creek through discharge point #001, in the Buffer Zone. Discharge from this unit is regulated by an NPDES permit. Discharge limits for domestic and wastewater effluents include total dissolved solids at 950 milligrams per liter (mg/ℓ), oil and grease at 15 mg/ℓ, fluoride at 1 mg/ℓ, boron at 1 mg/ℓ and residual chlorine at 0.1 mg/ℓ. Even though this unit is regulated by an NPDES permit, this pond is considered a SWMU due to the types of wastewater the unit has handled in the past and the potential for releases to on-site soils and groundwater.

This pond is approximately 0.6 of an acre in size, with a storage capacity of 2 million gallons.(14) The effluent from R-1 (SWMU 4.16) enters the pond at its northern end. The Perimeter Pond effluent is discharged off-site through a weir. No photographs are available.

Status

This unit is currently active and has an NPDES permit to control the off-site discharge of wastewaters. It has received wastewater from upgradient regions of Area I since 1950.(V2)

Waste Managed

The Perimeter Pond has historically received wastewater from all upgradient containment ponds including APTF-1 (SWMU 4.10), APTF-2 (SWMU 4.11), Canyon Area ponds (SWMU 4.14), LETF Pond (SWMU 4.13) and R-1 (SWMU 4.16). Therefore, the potential chemical constituents of the pond are kerosene-like fuels, MMH, TCE, TCA, fluoride, Freon, and NTO.(14)

Release Controls

Discharge from this unit is regulated by the Los Angeles RWQCB which issues the NPDES permit. According to Rockwell, discharge off-site does not occur if the concentration of constituents exceeds that allowed by the NPDES permit. Most of the wastewater contained in the Perimeter Pond is pumped back to R-1 (SWMU 4.16) for reuse in the water reclamation system.(V2) Water from R-1 is pumped uphill to tanks on Skyline Drive for use in the cooling systems of the test areas.(42) Additionally, a manually controlled weir at the off-site outlet controls the volume discharged and at which frequency.(V2)

History of Releases

There are no documented releases to on-site locations. However, during routine sampling by Rockwell, on March 21, 1983, high levels of fluoride were discovered in the Perimeter Pond. The source of the fluoride was determined to be the LETF Pond (SWMU 4.13). The water from the Perimeter Pond was released through the NPDES discharge point #001, in the Buffer Zone. Rockwell documentation indicated that the off-site discharge was immediately halted when the contamination was discovered.(58)

Pollutant Migration Pathway

Soil and Groundwater: The unlined construction of the pond, as well as the types of wastes the Perimeter Pond has historically received, indicate that soil and groundwater contamination may have occurred in the past and could occur in the future.

Surface Water: Releases to other surface water ponds may have occurred in the past, especially during periods of above average rainfall. Since this unit remains active, there could be releases to surface water in the future, although the potential is low.

Air: If volatiles (TCE, TCA) are received by the Perimeter Pond, there will be volatilization to the air. The probability of air releases is low, since the Perimeter Pond is the last of many containments, and any wastewater with VOCs present would have traveled through the Area I drainage system and have more than likely already volatilized.

Subsurface Gas: The generation of subsurface gas is not likely to occur, however, if there is sludge on the bottom of the Perimeter Pond, contaminants may get trapped and generate gas.

4.18 AIR STRIPPING TOWERS (CANYON, ALFA AND BOWL) FOR GROUNDWATER TREATMENT

Unit Characteristics

These towers are part of the facility-wide Groundwater Reclamation System, constructed to remedy contaminated groundwater underlying SSFL.(21) The Canyon and Bowl Area systems are in the Canyon and Bowl Areas (SWMUs 4.14 and 4.15, respectively). The Alfa system is in Area I, proximal to the Alfa test area in Area II. Each system consists of two or more air stripping towers connected to canisters containing activated carbon (photos 1-H and 1-O). Groundwater is pumped through the first tower where heated air causes volatilization, thereby allowing the adsorption of a portion of the VOCs onto the activated carbon. The groundwater then goes through a secondary tower for further stripping. Air from the secondary tower is released without carbon filtration.(37)(V2) The effluent is discharged to the site-wide water reclamation system for industrial uses.(21)(V2) When the first carbon canister is saturated with VOCs, it is removed and the second canister becomes the first. The removed canister is replaced with a fresh canister. The saturated carbon is disposed of off-site by incineration.(20)(42)(V2)

Status

Rockwell currently has a permit from the VCAPCD to operate the systems. Because the groundwater remediation is linked to the closure of the RCRA regulated surface impoundments, the DHS now has authority over these units.(V2) A Part A Permit Application for treatment of groundwater was submitted to DHS in January 1990.(37) A Part B Permit Application was submitted to DHS in May 1990.(65)

Waste Managed

Groundwater contaminated with VOCs is treated by these units.

Release Controls

The systems are within concrete secondary containment. The air, both entering and leaving the carbon canisters, is monitored for organic vapor contamination. Originally, the effluent from these units was monitored daily for VOCs, but now is tested weekly.(V2)

History of Releases

There are no recorded releases.

Pollutant Migration Pathways

Soil, Groundwater, and Surface Water: The units have secondary containment that should prevent release to these media, thus the potential for a release is low.

Air: The treatment process can result in releases of organic vapors to the air. Because the emissions are regulated by the VCAPCD and are monitored weekly, the potential for a release exceeding permitted emissions limits is low.

4.19 AREAS OF CONCERN - AREA I

During the evaluation of Rockwell International's waste management and release data, the areas identified as AOCs in Area I were:

Happy Valley

Happy Valley is a research area used to process gun propellants and solid pyrotechnics. The waste generated here is collected in 10-gallon drums and taken to the Burn Pit (SWMU 4.8) for disposal, where it is burned in 5-gallon increments.

Leachfields for Area I

Active and inactive sanitary leachfields exist within Area I. The active leachfield is located at the Engine Test Facility-Building 312. Inactive sanitary leachfields are located in the following areas:

Engineering Building - Building 324
Research Center - Building 300
Service Building - Building 741
008 Warehouse
CTL1 - Building 309
Solid Propellants - Building 259
Loading Building - Building 376
Test Area - Control Center - Building 317
Test Area -Pretest - Building 382
Research - Storage Yard - Building 423
Bowl Area - Control Center - Building 905
Bowl Area - Pretest - Building 900
CTL III - Control Building - Building 411
CTL III - Shop Building - Building 412
CTL V - Building 439

The exact location of these leachfields could not be verified by Rockwell personnel during the VSI.

APTF Aboveground Storage Tanks

There are several storage tanks in the APTF area, most of which contain products. However, there is one storage tank within the APTF area that could be an AOC. It is the polypropylene ozonator wastewater tank. It has a capacity of 1,000 gallons and is bermed. Low levels of MMH have, at times, been measured in the water.(1) During the VSI, this tank was observed in good condition. There are no further recommendations.

Storage Underground Tanks - Area 1

One Joors Plasteel double-walled gasoline product tank, 10,000-gallon capacity, was installed in 1988. This tank replaced a 10,000-gallon metal gasoline tank which was removed in 1988.

One metal diesel tank, 4,000-gallon capacity, was removed in 1988.

During the VSI, these tank areas were observed in good condition. There are no further recommendations for these AOCs.

4.20 FORMER ROCKETDYNE EMPLOYEE SHOOTING RANGE (GUN CLUB)

The former RESR is located approximately 1,700 feet west of the main Rocketdyne gate in Area I and borders the SSFL property line on the north (68). This site was previously identified as a potential SWMU, the Gun Club, in the PR report for Rockwell (SAIC/TSC 1990), but eliminated as a SWMU as a result of the VSI conducted by SAIC/TSC in July 1990. Any additional data presented herein is a result of the 1992 sampling conducted by McLaren/Hart, and not from an ongoing evaluation by SAIC/TSC at this site.

On March 11, 1992, five soil samples were collected by McLaren/Hart from the former RESR and the surrounding area (on SMMC property). EPA collected a split sample. Lead, ranging from 59 milligrams per kilogram (mg/kg) to 280 mg/kg, was detected in all five McLaren/Hart samples. These levels are above the levels detected in background samples. The lead level detected in the EPA split sample was 225 mg/kg. Also detected in the EPA sample was acetone at 23 $\mu g/kg$. (68)

AREA II

SOLID WASTE MANAGEMENT UNITS

5.0 AREA II

5.1 AREA II LANDFILL

Unit Characteristics

This landfill is located in a steep canyon in the far northeast corner of Area II, close to the Area II Service Road, however, the landfill extends to the far northwest corner of Area I close to the Area II Service Road. The landfill was used to dispose of unwanted fill material, vegetation, drums and construction refuse. The unit measured 500 feet wide x 150 feet deep x 50 feet across. Soil cover was added occasionally, but the steep slope precluded total coverage of the debris.(2) During the VSI, the canyon was observed to be heavily vegetated with native brush and the unit boundaries could not be clearly distinguished. Obvious construction debris remains on the canyon perimeter and on the slope. Several rusted and empty drums were observed at the surface (photos 1-3).(V1) During the VSI, only the Area II landfill portion that is located in Area I was observed.

Status

The landfill was opened in approximately 1955 and received waste through 1980 (1)(2), but is currently abandoned.(1) Rockwell indicated that waste was removed, but could not provide any record of what was removed or where it was taken.(V1)

Waste Managed

The landfill is known to have received unwanted fill materials, vegetation, some drums of unknown contents, and construction debris such as concrete, timber, and steel.(1)(2)

The visible waste appears to be construction debris: asphalt pieces, piping, cement, glass, and steel. The original content of the rusted drums is unknown. Wastes in the unit have never been sampled, and it is still unknown whether hazardous waste or hazardous constituents were disposed of in the unit.(V1)

Release Controls

There is no evidence of release controls. Runoff can flow over and through the waste, down the canyon, and off Rockwell's property to the north.

History of Releases

No information is available concerning releases from this unit.

Pollutant Migration Pathways

Soil and Groundwater: Any constituents leachable from the waste could migrate into the soil and groundwater. There is no monitoring well downgradient of the unit.

Surface Water: The canyon was dry during the VSI in August, but apparently water flows in the canyon in the spring. The Rockwell representative stated that spring runoff from the canyon has been sampled under Proposition 65, and that none of the applicable constituents were found.

Air: Not enough is known about the nature of the waste to determine if air releases are occurring or are likely to occur. There is a possibility that asbestos debris exists, since this is an old construction debris landfill.

Subsurface Gas: Not enough is known about the nature of the waste to determine if subsurface gas generation is likely to be a problem. The only biodegradable material verified to be present in the fill is wood which could produce methane gas.

5.2 BUILDING 206 ELV FINAL ASSEMBLY

Unit Characteristics

This building was previously the Component Test Laboratory mentioned in the PR as a potential SWMU. Building 206 is a metal and concrete building with a concrete floor. A portion of the building is currently in use for engine assembly. The unused area is currently empty. TCE was apparently used in the area and TCE and oil were stored there. During the VSI, concrete sumps in the empty portion of the building contained scummy water. A long sump ran the length of the building along one wall and contained dried oily residue. Outside the building on the south side, drums of product chemicals were being stored. The Rockwell representative stated that the drums had been there for about six months and had previously been stored in the building. A number of these drums were observed to be dripping into drip pans or sorbent during the VSI. A vertical corrugated steel tank with an opening on the top.(V1) No photographs were taken in this area.

Status

The portion of the building containing hydrocarbon residues is inactive. The product drum storage area is currently in use.(V1)

Waste Managed

It is known that TCE and oil were stored in the building, but the nature of the remaining residue is unknown. The contents of the leaking product drums were not identified although some appeared to contain oil.(V1)

Release Controls

Unless the concrete is cracked, the wastes within the empty area of the building should be contained. The product drum area is uncovered and has no secondary containment. Although drip pans are used, a heavy rain could cause spilled materials to overflow the pans and leave the area.

History of Releases

A review of Rockwell files revealed a spill of six quarts of hydraulic fluid on the floor at the east end of Building 206 on April 19, 1990. The spill was the result of a broken hydraulic line on a forklift, and was cleaned up.(64) No other spills or releases from the building were documented, although residues were visible during the VSI.

Pollutant Migration Pathways

Soil, Groundwater, and Surface Water: Releases could occur if spilled products were washed from the drum area during a rain, or if wastes in the building were able to seep through cracks in the concrete.

Air: Wastes in the building appeared to be oil and no odors were noted, so an air release appeared unlikely. Depending on the nature of the spilled products, air releases from the drum area are possible.

Subsurface Gas: Since TCE was used at this SWMU, potential releases to the soil and groundwater could generate a subsurface gas.

5.3 BUILDING 231 PCB STORAGE FACILITY

Unit Characteristics

The building containing the PCB storage area was listed in the Preliminary report as Building 206. Building 231 is not on the map (Figure 4) but is adjacent to Building 206. The PCB storage facility is a bermed area within the concrete floor of the metal building. The building also contains a large metal turbine or generator and is being used to store bags of sorbent.(V1) No photograph was taken during the VSI.

This SWMU is not regulated under RCRA, however, it is included in this RFA because PCB is defined as a hazardous waste by the DHS.

Status

The unit has a non-RCRA permit issued by the DHS on March 31, 1986. Rockwell is attempting to eliminate on-site PCB storage, and hopes to discontinue the use of PCBs. Rockwell personnel stated that the facility is scheduled for closure in 1990 and a closure plan was submitted to the DHS.(V1)

During the VSI, the area contained only two 5-gallon PVC containers holding PCB-soaked rags. The floor of the building, including the PCB area, is painted grey. There were no visible cracks. The unit was not photographed.(V1)

Waste Managed

Waste PCBs, usually contained in capacitors, are stored in this area prior to off-site disposal (incineration).(V1)

Release Controls

The storage area has a concrete berm and is located inside a locked building.(V1)

History of Releases

Rockwell personnel maintained that there have been no known releases from this unit.(V1)

Pollutant Migration Pathways

Soil, Groundwater, Surface Water, and Subsurface Gas: Releases to soil, groundwater, surface water, and subsurface gas generation are unlikely since the storage area is concrete lined and bermed.

Air: PCBs are not volatile and are not likely to be released to the air.

5.4 SWIMMING POOL UV/H_2O_2 TREATMENT SYSTEM

Unit Characteristics

This system is part of the facility-wide Groundwater Reclamation System constructed to remediate contaminated groundwater underlying SSFL.(21) It consists of a 35 gpm capacity UV/H_2O_2 treatment unit located at the old ranch swimming pool. Contaminated groundwater is trucked to the unit and stored in two white fiberglass tanks. The groundwater is treated in a reaction vessel by exposure to intense ultraviolet radiation and H_2O_2 and then pumped into two other fiberglass tanks. The principal end products of the process are carbon dioxide and water.(21) The treatment system is designed to reduce the organic contaminants in the effluent stream to below the California DHS action levels. The treated effluent is then discharged to the site-wide water reclamation system for nondrinking water use.(7)(V1)

Status

The unit was in operation at the time of the VSI. Rockwell submitted a RCRA Part A Permit Application for this unit to the DHS in January 1990, and a Part B Application in May 1990.(37)(65)

The unit was observed during the VSI (photo 23). Water was dripping from a treatment unit into the secondary containment.(V1)

Waste Managed

Groundwater contaminated with VOCs is treated by this unit. Groundwater presently being treated comes from the ECL Collection Tank (SWMU 6.3), the ECL Runoff Tanks (AOC in Area III), the Purge Water Tank (SWMU 5.25) near the Delta treatment system, and the STL-IV Treatment System Tank (the STL-IV air stripping system is not yet operational; see SWMU 6.10).(V1)

Release Controls

The treatment system and contaminated water storage tanks are located within bermed concrete areas.(V1)

History of Releases

There have been no known releases from this unit.

Pollutant Migration Pathways

Soil, Groundwater, Surface Water, and Subsurface Gas: The unit has secondary containment that should prevent releases to the above media. The purpose of this system is to treat contaminated groundwater.

Air: Contaminants are not likely to be released to the air in this treatment process.

5.5 BUILDING 204 PLANT SERVICES WASTE OIL TANK

Unit Characteristics

This underground 1,500-gallon capacity metal tank was used to store waste oil. It was located at the far end of the parking lot near Building 204.(8) The startup date for this tank is unknown. No photograph was taken of this unit or the area where it was located during the VSI.(V1)

Status

The tank was removed in November 1988 and the excavation backfilled and capped with asphalt.(1)(8) Only the asphalt parking lot is currently visible, therefore no photograph was taken.(V1) Contaminated soils were found during closure. Groundwater near the tank does not appear to be contaminated with waste oil, but the Ventura County Health Department has requested further groundwater monitoring and is handling approval of the closure.(V1)

Waste Managed

The origin, type, and volume of waste oils managed during the active life of the unit are unknown. The only waste present now may be some residual contaminated bedrock. According to Rockwell representatives, the Ventura County Health Department mentioned that remediation of contaminated bedrock was not necessary.

Release Controls

There is no available information on release controls for the tank when it was in use. No waste, except residual contaminated bedrock, remains.

History of Releases

In September 1988, during the removal of the tank, Rocketdyne staff observed staining of soil beneath the tank. In addition, an organic odor was reported. These observations led to the removal of additional subsurface material from the area of excavation. All subsurface materials were removed to a depth of 12 feet. An area extending approximately one foot beyond the outer walls of the steel tank was excavated. The excavation was backfilled with pea gravel and capped at the surface with asphalt.(8) Rockwell performed an assessment of the bedrock and groundwater beneath the site in the fall of 1989. According to Rockwell representatives, a soil boring drilled in the center of the former site of the waste oil tank showed no evidence of contamination. A groundwater monitoring well (RD-26) constructed approximately 30 feet from the site of the former waste oil tank has exhibited no evidence of waste oil contamination. Low levels of TCE were detected in this well, but, because they fall within the range of TCE concentrations detected in the groundwater beneath the SSFL, they may be attributed to past rocket engine testing operations at the facility.(8)

Pollutant Migration Pathways

Soil and Groundwater: Waste oil had migrated into the soil, but there is no evidence so far of waste oil in the groundwater. Apparently the water level in nearby well RD-26 is over 100 feet below the ground level (no shallow alluvial aquifer in this area). The Ventura County Health Department has requested further monitoring.(V1)

Surface Water: There is little likelihood that the remaining contamination at depth could impact surface water. Wastes would have to impact the groundwater and be carried to a distant groundwater discharge point.

Air: There is little probability of an air release; the remaining waste residues are buried and capped.

Subsurface Gas: There is little probability of the generation of subsurface gas due to a release from this unit. To date, monitoring has not identified any waste oil.

5.6 AREA II INCINERATOR - ASH PILE

Unit Characteristics

This unit is located on Incinerator Road near the Alfa Test Stand (SWMU 5.9).(1) The incinerator is a brick structure approximately 10 feet long by 8 feet wide by 10 feet high, with a metal smokestack about 30 feet high (photo 4). A chute leads from the incinerator's door to a cinder-block storage pad with a metal roof.(V1)

Status

The incinerator is inactive. No date was available for the start of operations, but it was taken out of service in the 1970s.(1)

Waste Managed

According to Rockwell, the incinerator was used to burn nonhazardous wastes, primarily trash.(1) Rockwell representatives stated that there is no record of ash disposal, but it was noted during the VSI that a large volume of ash had been dumped on the ground around the incinerator (photo 5). The ash pile continued under leaves and vegetation, so the overall dimensions could not be determined.(V1) Rockwell provided an analysis of an ash sample for 17 hazardous heavy metals (California Code of Regulations, Title 22) and total solids.(38) The results of the analyses indicated that lead and silver exceeded the total threshold limit concentration thereby making the ash a hazardous waste according by California state regulations.

Release Controls

There were apparently no emission controls on the incinerator when it was operational. There do not appear to be any release controls for the ash pile.(V1)

History of Releases

There is no information on what was released to the air during operation of the incinerator. The ash contains hazardous constituents, as stated in the "Wastes Managed" section, and has been removed from the incinerator and placed on the ground. It is not known whether hazardous waste or hazardous constituents have been released from the ash pile into the soil.

Pollutant Migration Pathways

Soil and Groundwater: Any leachable constituents in the ash could migrate into the soil and groundwater.

Surface Water: Rainfall runoff could potentially transport leachable constituents to surface water. Drainage pathways were not investigated during the VSI.

Air: Wind could disperse the exposed ash.

Subsurface Gas: Based on the wastes managed at this SWMU, subsurface gas generation should not be a concern.

5.7 HAZARDOUS WASTE STORAGE AREA (HWSA) WASTE COOLANT TANK

Unit Characteristics

This 600-gallon tank is used to contain non-RCRA hazardous waste cutting oil used as a coolant from various tooling shops. The aboveground tank has concrete secondary containment with approximately 18-inch berms (photo 19).(37)(V1)

This SWMU is not regulated under RCRA, however, it is included in this RFA because waste oil is defined as a hazardous waste by the DHS.

Status

The tank was labeled "hazardous waste" but Rockwell personnel maintained that the waste was not actually hazardous. The coolant is transported off-site for disposal after water is evaporated from it. It is removed every 90 days.(37)(V1)

Waste Managed

The waste is a non-RCRA hazardous waste cutting oil used as a coolant.(37)(V1)

Release Controls

The unit is aboveground and surrounded by concrete secondary containment.(V1)

History of Releases

No information is available concerning past releases from this unit.

Pollutant Migration Pathways

Soil, Groundwater, Surface Water, Air, and Subsurface Gas: Releases of hazardous waste or hazardous constituents are unlikely as the waste is contained in an aboveground tank with secondary containment.

5.8 HAZARDOUS WASTE STORAGE AREA (HWSA) CONTAINER STORAGE AREA

Unit Characteristics

This RCRA-regulated unit is located near the Bravo Test Area (Unit 5.13). Drummed wastes are stored on concrete pads with 3 inch to 1 foot high sidewalls. The area is divided into two separate pads, one for acids and oxidizers and the other for fuels. Trucks can drive into the area but must go up a ramp over the side wall and then down into the area.(V1)

Status

The unit began operation in January of 1982. Rockwell submitted a Part B Permit Application in April 1985. A California-only hazardous waste permit was issued by DHS on March 31, 1986. Prior to the construction of this area, hazardous waste was stored in the Storable Propellant Area (SPA).(37) Rockwell does not plan to apply for renewal of this permit which expired on March 31, 1991.(67)

During the VSI, there were a variety of metal and plastic drums in the area resting on wooden pallets (photo 20). The area looked clean. The concrete appeared to be new, but some cracks were noted in the concrete. There were some large plastic overpack containers stored on pallets on the ground outside the concrete area (photo 21). Rockwell personnel stated that these contained crushed empty drums. They were labeled "hazardous waste."(V1)

Waste Managed

Wastes stored in the drums include TCA and Freon used in metal and tank cleaning operations, alcohol, kerosene, oil, paint, thinner, turco descalent, and lab packs.(7) The wastes are usually shipped to Oil and Solvent Company in Azusa, California for recycling.(67)

Release Controls

The area is concrete lined with berms. It is not covered. Each of the two storage areas has a sump.(V1)

History of Releases

The files contain no information about past releases.(7)

<u>Pollutant Migration Pathways</u>

<u>Soil, Groundwater, Surface Water, and Subsurface Gas</u>: Releases are unlikely since the drums of waste are stored in concrete secondary containment.

<u>Air</u>: If a drum of a volatile waste were to leak into the secondary containment, a release to air would be possible.

5.9 ALFA TEST AREA

Unit Characteristics

The Alfa Test Area is used to test large rocket engines. The Alfa Test Area began operations in 1953. Three test stands were originally located in the Alfa Test Area; currently, only two remain.

Expendable Delta engines, manufactured by McDonnell Douglas, are tested at Alfa 3 test stand. The Alfa 1 test stand is used to test expendable Atlas engines manufactured by General Dynamics.

The engines are positioned vertically in the test stand. A flame deflector below the test stand deflects the flame, cooling water and exhaust. Approximately 40-50,000 gallons of cooling water are used per test, but about half of the water evaporates. Therefore, only 20-25,000 gallons drains down the spillway. One or two days after the test, TCE is used to flush the engine of residual fuel, LOX and carbon. TCE is stored in a tank next to the site. It is pumped through permanent piping to the test stand. After flushing, it drains from the engine into a pan installed beneath the engine. The pan drains through permanent piping to the Alfa TCE reclamation tank (SWMU 5.10). Approximately 50 gallons of TCE are used to flush an engine following each test.(V1)

Status

Alfa 2 has been dismantled. Alfa test stands 1 and 3 are currently active. The Alfa Test Area was observed during the VSI.(V1)(V2) The Alfa test stands can be seen in the background of photo 11.

Waste Managed

From 1953 until 1961, TCE which did not evaporate during the flushing operation was reportedly discharged from each test stand onto a concrete spillway that drained into an unlined channel. Rockwell personnel stated that TCE is the only solvent used in the engine tests as specified by the Air Force. See SWMU 5.11 (Alfa Ponds) for more information on wastes released.(V1)

Release Controls

There were no release controls for this unit from 1953 to 1961. TCE is currently captured and stored in two of the Alfa Test Area tanks (SWMU 5.10).(V1)

History of Releases

See History of Releases section of SWMU 5.11 (Alfa Ponds).

Pollutant Migration Pathways

Soil, Groundwater, Surface Water, and Subsurface Gas: This unit, as defined in this report, cannot directly release hazardous wastes or constituents to soil, groundwater or surface water. Wastes released from the Alfa test stands immediately enter spillways and drainages which are part of the SWMU 5.11 (Alfa Skim and Retention Ponds).

Air: TCE is volatile and could be released to air during and after use on the test stands, before it reaches the storage tank.

5.10 ALFA TEST AREA TANKS

Unit Characteristics

Wastes generated during engine testing at the Alfa Test Area (SWMU 5.9) are contained in three tanks located between Alfa test stands 1 and 3. Two of the tanks are grey 1,500-gallon tanks (although Reference 1 indicates the tanks are 1,000-gallons each) used to store waste TCE. The third is a yellow 4,775-gallon tank used to store waste RP-1 fuel (a high grade kerosene). The three tanks are surrounded by concrete secondary containment (berm). The Rockwell representative on site indicated that the tanks are double-walled, however, in comments received by Rockwell to the draft VSI report, Rockwell stated the tanks are not double-walled.(42) The spent materials gravity flow from the test stands to the tanks through aboveground piping. The spent TCE and RP-1 are removed from the tanks every 60 days by certified hazardous waste haulers and recycled off-site. The current tanks were placed in use in 1983 following several releases from the previous TCE tank. TCE reclamation began at the Alfa Test Area (SWMU 5.9) in 1961. No photograph was taken during the VSI.(V1)

Status

These tanks are currently in use, and are regulated as hazardous waste accumulation tanks.(V1)

Waste Managed

The spent TCE contains approximately 95% TCE, 3% RP-1, and 2% water. The spent RP-1 contains approximately 95% RP-1, 3% water, and 2% oil.(1)

Release Controls

The three tanks are surrounded by concrete secondary containment. The walls are about 6 inches thick, and vary from 4 feet high on the downhill end to about 1-1/2 feet high on the uphill end. The Rockwell representative stated that the containment was checked for cracks every day. The loading area, where trucks pump out the contents of the tanks, is lined with concrete. If a spill occurred while loading, the material would be collected in a concrete drainage area with a closed valve at the end.(V1)

History of Releases

TCE was released from an old tank in this area several times, most recently in 1983. Rockwell files mention one release in February 1978 caused by ruptured tubing, another release (1,500-2,000 gallons) between December 1982 and January 1983 caused by shrinkage of a Tygon sight gauge, and another release in August 1983 due to overfilling the tank.

Following the last 1983 release, the existing TCE tank was replaced by the present two and the secondary containment built. There have been no known releases since then.

When released, TCE could flow into the Alfa area spillway and drainage channel (the spillway is lined; the drainage channel is not), and possibly from there into the Alfa Skim and Retention Ponds (SWMU 5.11) and Alfa-Bravo Skim Pond (SWMU 5.12). A significant portion of the 1982-1983 release was recovered from the Alfa area spillway. In the August 1983 release, contaminated soil and water were removed from the concrete-lined Alfa II spillway; apparently none of the TCE went beyond the spillway.

Pollutant Migration Pathways

Soil, Surface Water, and Groundwater: Past releases from the old TCE tank flowed down the spillway and drainage channel, possibly reaching the Alfa Skim and Retention Ponds and the Alfa/Bravo Skim Pond (SWMUs 5.11 and 5.12). However, there is little potential for a release from the tanks currently in use.

Air: TCE and RP-1 are currently transferred to tanks in pipes; there is little chance for an air release except when materials are in use on the test stand.

Subsurface Gas: Due to the nature and the construction of this SWMU and the concrete-lined spillways, there is little chance for any generation of subsurface gas.

5.11 ALFA SKIM AND ALFA RETENTION PONDS AND ASSOCIATED DRAINAGES

Unit Characteristics

The unlined Alfa Skim and Alfa Retention Ponds are located in the Alfa Test Area (SWMU 5.9), between the Alfa test stands and the Alfa-Bravo Skim Pond (SWMU 5.12). The Alfa Skim Pond, Alfa Retention Pond and associated drainages between these ponds, the Alfa test stands (SWMU 5.9), and the Alfa-Bravo Skim Pond (SWMU 5.12) are considered one SWMU. The 500,000-gallon capacity ponds were used as catchment basins for cooling water and emergency spill containment for the Alfa Test Area. From 1953 to the present, the Alfa Test Area used TCE to wash down equipment and flush hardware and engine thrust chambers following large engine tests. Prior to 1961, the TCE was released to the spillways leading to these ponds.(V1)

Status

The units are not closed but no longer receive hazardous waste or constituents. These ponds currently receive cooling water from the Alfa area test stands. At some point in the Alfa Retention or Alfa Skim Pond, the cooling water enters a pipe that channels it under the closed Alfa-Bravo Skim Pond (SWMU 5.12).(V1)

These ponds are in a narrow gully currently hidden by a thick clump of trees. The investigators did not enter the area during the VSI. The tree-filled gully can be seen on the far side of the Alfa-Bravo Skim Pond (SWMU 5.12) in photo 11. The area beneath the Alfa 2 test stand and a short stretch of the gully is concrete lined.(V1)

Waste Managed

These ponds received water containing TCE, RP-1, TCA, Freon, and oil in the event of a spill.(14) Attachment 5 is a list of wastes received by the Alfa-Bravo Skim Pond (SWMU 5.12). Some of these may have come from the Alfa area although no distinction between Alfa and Bravo sources is made.

Prior to 1961, when the TCE reclamation system was installed, TCE containing residual RP-1 fuel from the engine tests (approximately 50 gallons of TCE for each engine test) was released to the ponds. After 1961, the ponds should only have received spill residues. According to Rockwell personnel, there was approximately one day between the engine testing and flushing the engines with TCE. Rockwell personnel maintain that most of the TCE, prior to reclamation, would have evaporated or soaked into the drainage near the test stand, rather than be washed into the ponds.(37)(V1)

US EPA ARCHIVE DOCUMENT

Release Controls

The ponds are unlined. Prior to closure of the Alfa-Bravo Skim Pond (SWMU 5.12) water flowed from the test stands through the Alfa Skim Pond, the Retention Pond and then into the Alfa-Bravo Skim Pond. Currently runoff from the test area is piped under the closed Alfa-Bravo Skim Pond (SWMU 5.12).(V1)

History of Releases

Water and any wastes contained in the Alfa Ponds would flow into the Alfa-Bravo Skim Pond (SWMU 5.12) prior to its closure. A portion of both light and heavy waste constituents were probably retained in the Alfa-Bravo Skim Pond. From there, liquid flowed to Silvernale Reservoir (SWMU 6.8), through the R-2 Discharge Ponds (SWMUs 5.26) and out the NPDES permitted outfall. TCE detected in the Alfa-Bravo Skim Pond, (February 1979 and January 1983), the Silvernale Reservoir (January 1983), and the R-2A Discharge Pond (February 1978) probably originated from spills in the Alfa Test Area (more TCE was used at Alfa than at Bravo).(37).

A review of Rockwell files revealed reports of 16 spills of TCE, RP-1, and oil at the Alfa Test Area between February 1978 and June 1990.(64) These ranged in quantity from one pint to over 2,000 gallons TCE. The reports give cleanup details for some, but not all, of these spills. The first four reported spills are the most noteworthy, and the results of soil samples collected following these spills are listed in the History of Releases section below.

- In February of 1978, approximately 1,500 gallons of TCE were spilled from a tank at the Alfa 2 test stand. TCE was detected in bottom water in the Alfa 2 spillway at 100 mg/ℓ and in the Alfa-Bravo Skim Pond (SWMU 5.12) at 0.063 mg/ℓ and also in the R-2A Discharge Pond (SWMU 5.26). Cleanup efforts are not described in the report.

- A spill of approximately 2,000 gallons of TCE from a tank occurred over the 1982-1983 Christmas holidays. In response, Rockwell removed 20,000 gallons of TCE contaminated water from the "Alfa Area drainage channel." Sample results indicated TCE was present in both the Alfa 2 and 3 spillways. It could not be determined in this review whether the TCE contaminated water was treated and disposed.

- Approximately 300 gallons of TCE were released from a tank at the Alfa Test Area (SWMU 5.12) in August of 1983 (this and the previous release prompted the installation of the new Alfa Test Area Tanks - SWMU 5.10). Some contaminated soil and water were removed from the Alfa 2 spillway.

- In May of 1986, 60-100 gallons of TCE were spilled and according to the report "almost all was contained in the Alfa 2 trench pond." Some contaminated soil was excavated.

It is worth noting here that soil samples collected from the "Alfa Pond" in June of 1986 contained acetone, trans-1,2-DCE, isopropanol, Freon, chloroform, bromomethane, toluene, and TCA. Soil samples were collected in the Alfa spillways and ponds following several of the major spills. This data indicates releases to soil.

- Samples collected in January 1983 following the large TCE spill showed 0.06 mg/kg TCE at the "Alfa Pond Outlet," 0.17 mg/kg at "Alfa Pond 20' east of outlet," 0.17 mg/kg at "Alfa Pond 80' east of outlet," 0.23 mg/kg "Alfa Pond Inlet." TCE was also detected in soil at the Alfa-Bravo Skim Pond (SWMU 5.12) inlet, outlet, and south side.(33)

- In May of 1983, 26 soil samples were collected from the Alfa Retention Pond; 23 contained TCE, up to 620 μg/kg at 1/2' depth, and up to 100 μg/kg at 2' depth.(33)

- Two borings were installed near the edge of the "Alfa Pond" in October of 1983. One contained TCE at various depth intervals, the maximum being 220-450 μg/kg between 34' and 34' 4". The other contained TCE at 4-5 μg/kg between 9' and 19.2' depth.(33)

- Three sediment samples were collected at 1' depths within the "Alfa Pond" in October of 1983. All three contained TCE between 3 and 12 μg/kg.(33)

- In May of 1986, one soil sample from the "Alfa Pond" contained 1.0 mg/kg acetone, 0.22 mg/kg trans-1,2-DCE and traces of isopropanol, Freon, and bromomethane. Another sample collected in June of 1986 contained 2.4 mg/kg acetone, 0.34 mg/kg trans-1,2-DCE, 2.1 mg/kg Freon-TF, 1.8 mg/kg isopropanol, 2.8 mg/kg TCE, and traces of chloroform, toluene, and TCA.(64)

The groundwater in the area of the Alfa Ponds and drainages is contaminated, although from the maps in Reference 33 it is impossible to tell whether the affected wells (HAR-20 and HAR 11) are up or downgradient of the Alfa Ponds. Well HAR-20 (a Chatsworth Formation well) contains TCE, vinyl chloride, and trans-1,2-DCE. Well HAR-11 (a shallow zone well) contains TCE, vinyl chloride, trans-1,2-DCE and MEK.(33)

Pollutant Migration Pathways

Soil and Groundwater: Releases to soil and groundwater have occurred; further releases can still occur if spills in the test area are not cleaned up, or if soil contamination remains that could serve as a source for groundwater contamination.

Surface Water: Surface water releases occurred in the past. They could continue to occur if soil contamination remains at the surface or if spills occur at the test stands that are not cleaned up.

Air: Air releases may have occurred in the past. Air releases could occur in the future if contaminated soil remains that is exposed to the air.

Subsurface Gas: Due to the presence of VOCs in the soil and groundwater, subsurface gas generation is likely.

5.12 ALFA-BRAVO SKIM POND (ABSP)

Unit Characteristics

The 200,000-gallon capacity, earthen-lined Alfa-Bravo Skim Pond was used to collect cooling water and rinsate from engine testing at the Alfa and Bravo test stands (Units 5.9 and 5.13).(14) Reference 33 gives the capacity as 295,000 gallons and the dimensions as 75′ by 295′, according to the 1985 closure plan. Rocket engine testing operations began here in 1953. TCE was and still is used at Alfa to clean the thrust chambers of rocket engines, and historically also at Bravo to clean components. Following each test the waste TCE (prior to 1961), cooling waters, and any other materials spilled at the test stands were discharged to the spillways leading to the Bravo Skim Pond (SWMU 5.15) and the Alfa Skim and Retention Ponds (SWMU 5.11). From there, TCE and cooling water flowed through these ponds and into the unlined Alfa-Bravo Skim Pond.(V1)

Status

This pond came into operation in 1957 (33) and its use ended in November 1985(9); however, surface water continued to collect in the unit from natural surface drainage.(9) Prior to and during closure activities, the collected water was drained from the pond and discharged into the SSFL reclaimed water system [Silvernale Reservoir (SWMU 6.8) and the R-2 Discharge Ponds (SWMUs 5.26)].(V1) DHS approved Rockwell's closure plan for this unit (with modifications) in September 1988. Closure activities began in January 1988 with the drainage of the impoundment.

Surface water was collected and sampled by Rockwell on a quarterly basis. Contaminants detected above 10 $\mu g/\ell$ included hydrazine (1,000 $\mu g/\ell$), formaldehyde (2,000 $\mu g/\ell$, mercaptans (700 $\mu g/\ell$), methylene chloride (13 $\mu g/\ell$), Freon (41$\mu g/\ell$), trans-1,2-DCE (120 $\mu g/\ell$), TCE (390 $\mu g/\ell$), acetone (1,800 $\mu g/\ell$), and isopropanol (5,000 $\mu g/\ell$).(33)

Three soil samples were collected on June 3, 1987 from three borings with a maximum depth of 1 foot (samples with a maximum depth of 1.8 feet were analyzed for acid extractable organics).(9) The soil samples contained low levels of phthalates and, according to Rockwell, may have been introduced during sample collection, transport, and/or analysis.(34) One sample contained n-nitrosodiphenylamine. Two samples contained 140 and 17 mg/kg unknown hydrocarbons.(9)

Samples from a 43′ 2" soil boring near the edge of the ABSP in October of 1983 showed 8-12 $\mu g/kg$ TCE in the 20′-20′2" depth interval and 1 $\mu g/kg$ in the 30′-30′2" depth internal. No TCE was detected in a second 37′8" soil boring or three 2′ deep sediment samples collected within the impoundment the same month. No soil was removed from the impoundment.(33)

"Burro Flats" area soil was used to backfill the impoundment.(9) One of three samples collected in October 1988 of the Burro Flats soil (which was used to backfill most of the impoundments) contained detectable levels of acetone (90 μg/kg), carbon disulfide (18 μg/kg), MEK (15 μg/kg), and TCE (5 μg/kg).(33).

Closure activities were completed in February 1989. In September 1989, Rockwell submitted a closure report for this unit (and nine others at SSFL). Upon reviewing the closure report, DHS notified SSFL that since the groundwater beneath the impoundment was contaminated, they needed to submit a Post Closure Plan.(11)(65) A Post-Closure Plan was submitted on March 29, 1990 for DHS review.(65)(V1)

During the VSI, the unit was observed to be closed and capped (photo 11). A small tank at the downstream end of the ABSP is marked "suction skimmer." It appears to still have fluid in it.(V1)

Waste Managed

This unit received cooling water and rinsate from rocket engine testing at the Alfa and Bravo test stands. Miscellaneous spills from the test stands may also have entered the impoundment. Attachment 4 lists wastes released to the Alfa-Bravo Skim Pond.(33) At the Alfa Test Area (SWMU 5.9) about 50 gallons of TCE are used to flush the engine after each test.(V1) Prior to 1961, the spent TCE (containing residual RP-1) was released directly to the spillway beneath the test area. According to Rockwell personnel, at least a day lapsed after testing an engine and flushing the engine with TCE. More TCE was used at Alfa than at Bravo.(37)(V1)

At various times between 1974 and 1987, water in the impoundment was found to contain UDMH, hydrazine, "decomposition products as formaldehyde," mercaptans, methylene chloride, trichlorotrifluoroethane, trans-1,2-DCE, TCE, acetone, and isopropyl alcohol.(33) Hydrazine fuels were reportedly not used at the Alfa or Bravo Test Areas.(33)

For additional information on materials spilled at the Alfa and Bravo Test Areas (SWMUs 5.9, 5.13) that may have reached the ABSP, see the Waste Managed sections for the Bravo Skim Pond (SWMU 5.15) and Alfa Skim and Retention Ponds (SWMU 5.11).

Release Controls

When the unit was in operation, an oil skimmer prevented the discharge of floating oil or fuel to the Silvernale Reservoir (SWMU 6.8).(7) The pond was apparently also designed to prevent TCE from discharging to Silvernale.(37) The impoundment was unlined during use. It has now been filled and closed. Surface water runoff is channeled around the cap in a concrete ditch. Cooling water and runoff from the Alfa and Bravo Test Areas drains into pipes above the ABSP which channel it below the ABSP to the drainage on the other side (and from there to Silvernale Reservoir).(V1)

History of Releases

Liquid from the Alfa-Bravo Skim Pond was released regularly to a drainage leading to Silvernale Reservoir (SWMU 6.8). From there, surface water flowed to the R-2 Discharge Ponds (SWMU 5.26) and out the NPDES permitted outfall.(V1)

Widespread TCE-contaminated groundwater underlies SSFL. The Alfa-Bravo Skim Pond is one of several unlined surface impoundments which probably contributed to this contamination. Groundwater downgradient of the ABSP contains trans-1,2-DCE, vinyl chloride, TCE, MEK, and toluene (wells RS-8, HAR-21, and HAR-9). Wells near the upgradient drainages contain the same constituents with the exception of toluene.(33) Upgradient concentrations of contaminants are generally higher than downgradient concentrations.

For additional information on releases to and from the ABSP in February of 1979 and January 1983, see the History of Releases section for the Alfa Skim and Retention Ponds (SWMU 5.11).

Pollutant Migration Pathways

Soil and Groundwater: A release to the soil of TCE (Attachment 5), n-nitrosodiphenylamine and unknown hydrocarbons has occurred.(15) The contaminated soil remains in place. This unit has probably contributed to local groundwater contamination. It has not been determined whether the soil remaining in the pond could continue to be a source of groundwater contamination. The drainages and areas leading to the ABSP may have been (and may still be) a significant source, but are covered under SWMUs 5.15 and 5.11.

Surface Water: Surface water releases may have occurred in the past. Since the unit has been capped, future surface water contamination is unlikely.

Air: There may have been releases to air from this unit in the past. Since the unit is capped, future releases to air are unlikely.

Subsurface Gas: The generation of subsurface gas may have been possible during the operation of this unit, however, it is unlikely to continue since the unit has closed.

5.13 BRAVO TEST AREA

Unit Characteristics

The Bravo Test Area consists of two test stands with three test positions that have been used to test rocket engines since 1953. Currently, the Bravo Test Area is only used to test the small Vernier engine and components such as the Turbo Pump. The Turbo Pump is used as a fuel pump for rocket engines and is tested with LOX and water at the Bravo test stand 2.(V1) No photographs of the stands were taken during the VSI.

Status

The test position at Bravo test stand 1 is currently used to test Vernier Engines (a small engine used to change rocket direction). Bravo test stand 2 is used to test the Turbo Pump.(V1) Two active rocket positions are available for use at this test stand.

Waste Managed

Various materials were spilled from the Bravo Test Area over the years (see SWMU 5.15, the Bravo Skim Pond).

Waste TCE was discharged from the test stands to concrete spillways which drained to the Bravo Skim Pond (5.15). Rockwell personnel maintain that only small quantities of TCE were used at Bravo; parts were washed using squeeze bottles. Parts washing is now done elsewhere.(37)(V1)

Release Controls

There were no release controls for this unit from 1953 to 1961.(14) A TCE reclamation system was in use from 1961 until 1971.(37)

History of Releases

See Waste Characteristic section of SWMU 5.15 (Bravo Skim Pond).

Pollutant Migration Pathways

Soil, Groundwater, Surface Water or Air: Waste TCE from the Bravo Test Area was released to a series of ponds beginning with the Bravo Skim Pond (SWMU 5.15). Releases to soil, groundwater, surface water or air would be from these ponds and associated drainages. Since TCE is no longer used in this area and Rockwell has implemented more stringent spill control procedures, releases from the test area are less likely than they were in the past.

5.14 BRAVO TEST STAND WASTE TANK

Unit Characteristics

This is a 3,000-gallon aboveground RP-1 waste tank located below the Bravo test stand (photo 6).(1) The startup date is unknown. A pipe is attached to the tank that leads to an area above where trucks can pump out the tank.(V1)

Status

The tank is currently in use. It was labeled "hazardous waste" at the time of the VSI, and according to Rockwell personnel operates under the 90-day storage exclusion from RCRA permitting.(V1)

Waste Managed

RP-1 is a high-grade kerosene.

Release Controls

The tank is resting in the concrete catch area beneath the Bravo test stand. This area is concrete lined, but a spill would flow or could be washed down a lined concrete spillway and then into an unlined drainage channel leading to the Bravo Skim Pond (SWMU 5.15).(V1) The concrete area and drainage are considered part of SWMU 5.15.

History of Releases

There have been no documented releases from this tank. No spillage was observed around the tank during the VSI.(V1)

Pollutant Migration Pathways

Soil, Groundwater, and Surface Water: Releases from this tank could flow into the unlined drainage to the Bravo Skim Pond (SWMU 5.15). Currently runoff from the concrete area around the tank enters an underground pipe in the area of the Bravo Skim Pond and flows under the closed Alfa-Bravo Skim Pond (SWMU 5.12) and into the unlined drainage leading to Silvernale Pond (SWMU 6.8). From Silvernale, water flows to the R-2 discharge ponds (SWMU 5.26) and ultimately out of Rockwell's NPDES permitted outfall located in the Buffer Zone. Releases to soil and groundwater could occur from surface water infiltration anywhere along the path.

<u>Air</u>: Releases to air are unlikely, but possible if a spill occurs.

<u>Subsurface Gas</u>: The generation of subsurface gas is not likely to occur as a result of a release from this unit.

5.15 BRAVO SKIM POND AND ASSOCIATED DRAINAGES

Unit Characteristics

This unlined pond has an estimated capacity of 150,000 gallons. It is located in the Bravo Test Area (SWMU 5.13) where it was used as a catchment basin and emergency spill containment. Rocket engine tests have been conducted at the Bravo Test Area (SWMU 5.13) since 1953. Currently the Bravo Area is only used to test the small Vernier engine and components such as the Turbo Pump. Discharges from the test area flowed to the Bravo Skim Pond. Bravo Skim Pond liquids would either drain to the Alfa-Bravo Skim Pond (SWMU 5.12) prior to its closure, percolate into the ground or evaporate.(14) Currently, runoff from this area is piped under the closed Alfa-Bravo Skim Pond (SWMU 5.12).(V1)

This SWMU includes the lined and unlined drainage leading from the Bravo test stands to the Bravo Skim Pond, (including the Gunite pad beneath the Bravo 2 test stand), and the unlined drainage leading from the Bravo Skim Pond (SWMU 5.12) to the Alfa-Bravo Skim Pond (SWMU 5.12). This latter drainage may have been lined prior to closure of the Alfa-Bravo Skim Pond; it is shown lined in a figure in Reference 33.

Status

The SWMU is inactive but receives rainfall runoff and any spills from the test stands that are not contained.

There was some standing water in the Bravo Skim Pond area and the lined portion of the spillway (photos 12 and 13). Also in the pond area is a pipe which channels water from the pond (running underneath the ABSP) to a drainage leading to the Silvernale Reservoir (SWMU 6.8).(V1)

During the VSI, investigators noticed that the test stand had been painted, and paint had run down the concrete walls to the pad beneath the stand and into the concrete drainage (photo 14). The stand was apparently painted 4 years ago for the first time. Also beneath the stand was an accumulation of nuts and bolts, metal paint flakes and sand. A broken fire water line was dripping water onto the concrete spillway beneath the stand. There was a white residue encrusting the ground surface along the edges of the unlined portion of the spillway (photo 15) and in the dry area of the Bravo Skim Pond.(V1)

Waste Managed

The impoundment would have received any spills from the test area. According to Rockwell personnel, TCE at the Bravo Area was only used to clean components, and was dispensed from squeeze bottles.(V1) Some of the wastes received by the Alfa-Bravo Skim Pond may have come from the Bravo Area (SWMU 5.13) although no distinction between Alfa and Bravo sources is made.(33)

Release Controls

The Gunite area beneath the Bravo test stand drains into a concrete or Gunite-lined spillway, then into an unlined spillway, and then into the Bravo Skim Pond. The Bravo Skim Pond and a significant portion of the associated drainage channels are unlined. Prior to closure of the Alfa-Bravo Skim Pond (SWMU 5.12), the Bravo Skim Pond apparently had a dam and an oil/fuel skimmer. These are no longer present, and all runoff flows through this pond area and into the pipe leading under the Alfa-Bravo Skim Pond (SWMU 5.12).(V1) Better spill prevention and cleanup procedures at the test area currently prevent hazardous wastes or constituents from being released from the stands.

History of Releases

A review of Rockwell files revealed 16 spill reports at the Bravo 2 test stand between August of 1976 and May of 1990.(64) The materials spilled were RP-1 fuel, gear case lube (90-95% RP-1, 5-10% Oronite), lube oil, a Freon/isopropyl alcohol mixture, and hydraulic oil. Quantities ranged from 40 ounces to 80-gallons. The reports either stated that the spill had been cleaned up or that cleanup operations had been initiated. Details were not always available.

Two borings were installed at the edge of the Bravo Skim Pond in October of 1983. Two $\mu g/kg$ TCE were detected in the 42′ 6"-42′ 9" depth interval in boring B-1, which was located beyond the dam that formed the pond. No TCE was detected in three 1-foot-deep sediment samples collected from the interior of the pond in October of 1983.(33)

Cooling water and other wastes released from the test stands would flow into the Bravo Skim Pond and then, prior to its closure, into the Alfa-Bravo Skim Pond (SWMU 5.12). A portion of both light and heavy waste constituents may have been retained in the pond, however, water released from the pond probably contained some contaminants . The water released from the Alfa-Bravo Skim Pond (SWMU 5.12) would flow to Silvernale Reservoir, (SWMU 6.8), onto the R-2 Discharge Ponds (SWMU 5.26) and ultimately out the NPDES permitted outfall.(V1)

Releases to groundwater from the Bravo Skim Pond and/or associated drainages have occurred. Groundwater downgradient of the pond (HAR-19, a Chatsworth Formation well) contains TCE, trans-1,2-DCE and vinyl chloride.

Pollutant Migration Pathways

Soil and Groundwater: Soil contamination appears to have occurred, and groundwater contamination has occurred at least downgradient of the pond. The only detected soil contamination was at the 42′ depth, but the drainages above the pond have not been investigated. No groundwater data is available upgradient of the pond. If significant contaminated soil remains, or if spills from the test stands are washed into the unit, further releases could occur.

Surface Water: Releases to surface water probably occurred in the past. If significant soil contamination remains, or if spills occur on the test stand that are not cleaned up, releases to surface water could still occur.

Air: Air releases may have occurred in the past, but are currently unlikely as significant quantities of VOCs probably no longer remain at the surface.

Subsurface Gas: Due to the presence of TCE in deep soil samples, subsurface gas generation is likely.

5.16 STORABLE PROPELLANT AREA POND 1 (SPA-1) AND ASSOCIATED DRAINAGES

Unit Characteristics

This unit, located at the Storable Propellant Area, was a Gunite-lined surface impoundment (photo 7) with an estimated capacity of 41,300 gallons.(33) Rockwell representatives stated that the unit probably began use in the 1960s. Prior to 1985, this impoundment was used primarily for the containment and treatment of hypergolic propellant spills. In addition, it received rinsate from container rinsing operations. Empty MMH and oxidizer containers were sprayed with water followed by a H_2O_2 rinse. After November 1985, use of the impoundment was discontinued. During this nonoperational period, the only discharges to the impoundment were rainfall runoff. This RCRA regulated surface impoundment was included in Rockwell's Part A Application.(1) This SWMU includes the concrete-lined drainage leading to the surface impoundment.

Status

DHS approved Rockwell's closure plan for this unit (with modifications) in September 1988. Closure activities began in April 1988 with the capping of the discharge lines leading to the impoundment. Both the liner and removed soil were transported to a Class III disposal facility.(15) Six samples were collected from four soil borings with a maximum depth of 2.5 feet. The samples contained no detectable priority pollutant VOCs or base neutral and acid extractable organics (BNAs).(15)

The unit was backfilled with soil from the "Burro Flats Area IV" borrow site. One of three samples of the Burro Flats soil (which was used to backfill most of the impoundments) contained detectable levels of acetone, carbon disulfide, MEK, and TCE.(15) Physical closure activities were completed in June 1989. In September 1989, Rockwell submitted a closure report for this unit and nine others at SSFL. Upon reviewing the closure report, DHS notified SSFL in a December 28, 1989 letter that the impoundment had not been adequately closed.(11) A Post-Closure Plan was submitted on March 29, 1990 for DHS review.

Waste Managed

A table of wastes managed in SPA-1 from Reference 33 is included as Attachment 1. Between 1969 and 1986, samples were collected weekly from SPA-1 and analyzed for "routine organic and inorganic parameters based on waste characteristics." On various occasions, the impoundment water contained hydrazine, MMH, UDMH, and "decomposition products such as formaldehyde."(33)

Release Controls

The pond was Gunite-lined during its period of operation. The pond has been backfilled and capped with soil. An attempt was made to hydroseed the cap, but it was sparsely vegetated during the VSI (photo 7).(V1) According to Reference 33, Rockwell's internal policy was not to release water from SPA-1 to the R-2 Ponds unless it met the NPDES permit limitations. According to Rockwell, the pond was treated with H_2O_2 if the concentration of hydrazine reached 1 ppm. Also, according to Reference 33, if NTO was detected in the pond, the water would also be treated prior to release.(33) NTO, however, would not be expected to be detected in the pond because it reacts extremely quickly to form HNO_3 on contact with water. Therefore, in order to detect a release of NTO, the pH would be monitored, and if it decreased (the pond water becoming more acidic), then it could be determined that NTO was probably released to the pond. However, the pH would not be expected to change noticeably due to the dilution effect of the NTO with over 41,000 gallons of water in the pond. Therefore, it would not be probable that a release of NTO from the test stand to the pond could be detected.

History of Releases

The contents of SPA-1 were released to a drainage channel leading to the Silvernale Reservoir (SWMU 6.8) and from there to the R-2 Discharge Ponds (SWMU 5.26) and ultimately out the NPDES permitted discharge points located in the Buffer Zone.(V1)

Wells completed in the alluvium both up and downgradient of SPA-1 are contaminated. The pond itself may have contributed, but additional sources are likely, such as the drainages leading to and from the pond, and general use of various chemicals in the area. Upgradient contaminants (well HAR-13) include chloroform, TCA, carbon tetrachloride, and TCE. Downgradient contaminants (wells HAR-12 and HAR-14) include MEK, 1,1-dichloroethylene (1,1-DCE), 1,1-dichloroethane (DCA), chloroform, TCA, carbon tetrachloride, and TCE.(33) Downgradient concentrations appear generally higher than upgradient concentrations.

Pollutant Migration Pathways

Soil and Groundwater: Contaminants could have impacted the soil and groundwater if the Gunite liner was cracked. However, during closure no contaminants were detected in soil samples from 2.5 feet beneath the pond.(33) It is possible that groundwater contamination could have occurred without leaving detectable residues in the soil, as water in the pond over time could have flushed out the soil. It is unlikely that the unit is currently contributing to groundwater or soil contamination since it has been backfilled and capped. The extent of the apparent contamination of the "Burro Flats" soil used as backfill has not been determined.

Surface Water: Releases to surface water may have occurred while the unit was operational but are not likely to occur presently.

Air: Releases to air may have occurred from the pond in the past, but are not likely to occur presently.

Subsurface Gas: The generation of subsurface gas may have been possible during the operational period. However, by backfilling the area with soil contaminated with VOCs, it is still probable that subsurface gas can be generated.

5.17 STORABLE PROPELLANT AREA POND 2 (SPA-2) AND ASSOCIATED DRAINAGES

Unit Characteristics

This RCRA regulated unit was included in Rockwell's Part A Application for CA1800090010.(1) This 18,000-gallon capacity Gunite-lined pond was located at the Storable Propellant Area.(33) Rockwell representatives indicated that the unit probably began use in the 1960s.(V1) The pond was used primarily for emergency spill containment and treatment of hypergolic propellants although it also received rinsate from container rinsing operations. In the rinse process, empty MMH and oxidizer containers were sprayed with water and followed by a H_2O_2 rinse.(7) This SWMU includes the concrete lined drainage leading to the pond.

Status

After November 1985, this surface impoundment received only runoff from precipitation.(15) DHS approved Rockwell's closure plan for this unit (with modifications) in September 1988. Closure activities began in April 1988 with the capping of the discharge lines leading to the impoundment. The concrete liner was determined to be nonhazardous and was removed and disposed of in a Class III disposal facility. In addition, soil excavated during the liner removal was determined to be nonhazardous and was also disposed of at the Class III disposal facility.(15) Six soil samples were collected from four borings with a maximum depth of about 2 feet. Several of the soil samples contained low levels of phthalates (plasticizers) and, according to Rockwell, may have been introduced during sample collection, transport, and/or analysis.(34).

The excavation was backfilled with soil from the "Burro Flats Area IV" borrow site area and hydroseeded.(15) One of three samples of the Burro Flats soil (which was used to backfill most of the impoundments) contained detectable levels of acetone, carbon disulfide, MEK and TCE. All physical closure activities were completed in June 1989 and the closure report was submitted to DHS in September 1989.(1) Upon reviewing the closure report, DHS notified SSFL in a December 28, 1989 letter that the impoundment had not been adequately closed.(11) A Post-Closure Plan was submitted on March 29, 1990 for DHS review.

Waste Managed

A table of wastes managed in SPA-2 from Reference 33 is included as Attachment 2.

Between 1969 and 1972 and between 1978 and 1986, samples were collected weekly from SPA-2 and analyzed for "routine organic and inorganic parameters based on waste characteristics." On various occasions, the impoundment water contained traces of hydrazine, "decomposition products as formaldehyde," MMH, mercaptans, and phenols (one occurrence).(33)

Release Controls

The pond was Gunite-lined during its period of operation. Currently, the pond has been backfilled and capped with soil. Rockwell attempted to hydroseed the cap, however, it was sparsely vegetated during the VSI (photo 8).(V1) According to Reference 33, water was not released from SPA-2 unless it met the NPDES permit limitations. If NTO was detected in the pond, the water was treated prior to release (NTO reacts to form HNO_3 on contact with water).(33) A drainage channel had been dug around the cap, but at the time of the VSI was not concrete lined.(V1)

History of Releases

The contents of SPA-2 were released to a drainage channel leading to the Silvernale Reservoir (SWMU 6.8) and from there to the R-2 Discharge Ponds (SWMUs 5.26) and ultimately out the NPDES permitted outfall.(V1)

Wells completed in the alluvium both up and downgradient of SPA-2 are contaminated. The pond itself may have contributed, but additional sources are likely, such as the drainages leading to and from the pond, and general use of various chemicals in the area. Upgradient contaminants (well HAR-31) include trans-1,2-DCE and TCE. Downgradient (or lateral gradient) contaminants (wells HAR-15 and HAR-30) include 1,2-DCE, 2-butanone, MEK, and TCE.(33)

Pollutant Migration Pathways

Soil and Groundwater: Contaminants could have impacted the soil and groundwater if the Gunite liner was cracked. It is possible that groundwater contamination could have occurred without leaving detectable residues in the soil, as water in the pond over time could have flushed out the soil. It is unlikely that the unit is currently contributing to groundwater or soil contamination since it has been backfilled and capped. The extent of the apparent contamination of the "Burro Flats" soil used as backfill has not been determined.

Surface Water: Releases to surface water may have occurred while the unit was operational, but are not likely to occur presently.

Air: Releases to air may have occurred from the pond in the past, but are not likely to occur presently.

Subsurface Gas: The generation of subsurface gas may have been possible during the operational period. However, with the removal of soils, and backfilling with soil contaminated with VOCs, it is likely that subsurface gas can be generated at this time.

5.18 COCA TEST AREA

Unit Characteristics

The Coca Test Area was used to test large rocket engines from 1953 to 1962. However, the Coca Test Area was used until November 1988 to test the main engine for the space shuttle.(V1)

Status

The Coca Test Area became inactive in 1962.(14)

During the VSI, Coca test stand was under renovation. Rockwell personnel did not permit the investigators to enter the Coca Test Area for safety reasons.(V1) The condition of the drainage leading to the Coca Skim Pond (SWMU 5.19) was not observed.

Waste Managed

According to Rockwell personnel, the Coca Test Area was most recently used to test the main engine for the Space Shuttle, which used a LOX-hydrogen fuel mixture. Reference 14 states that the Coca Skim Pond (SWMU 5.19) may have received TCE, RP-1, TCA and Freon in the event of a spill. During the VSI, a Rockwell representative stated that TCE had been used historically at the Coca Test Area.(V1) Over the telephone in October of 1990, another Rockwell representative maintained that only LOX/hydrogen propellants were used at the Coca Test Area, and, therefore, TCE and RP-1 were not used.(37) However, Rockwell indicates in Reference 58 that both TCE and RP-1 were used at the Coca Test Area.(42)

According to Rockwell, a water sample collected from the Coca Skim Pond (SWMU 5.19) on March 23, 1976 contained "decomposition products as formaldehyde"(33) which suggested that MMH may have entered the pond and may therefore have been used in this area.

Release Controls

If hazardous waste or hazardous constituents were released from the Coca test stands, they would have traveled down a drainage to the Coca Skim Pond (SWMU 5.19). The drainages are considered part of SWMU 5.19.

History of Releases

If hazardous waste or constituents were used during tests at Coca, they were released to the drainage repeatedly. The released materials would have flowed to the Coca Skim Pond (see SWMU 5.19).

Pollutant Migration Pathways

Air: TCE may have been released to the air during flushing of the test engines.

Any releases from the test stand to soil, groundwater, and surface water could have entered the spillway and the Coca Skim Pond. Pollutant migration is discussed under SWMU 5.19.

5.19 COCA SKIM POND AND ASSOCIATED DRAINAGES

Unit Characteristics

The Coca Skim Pond is located in the Coca Test Area (SWMU 5.18). This unit has a capacity of approximately 300,000-gallons. The pond is encircled by a concrete ski:. but according to Rockwell personnel, the bottom is probably unlined. It began operation in 1953 and was used until 1962 as a catchment basin and emergency spill containment for the Coca Test Area (SWMU 5.18).(14) Discharges to the pond would either drain to the R-2A Discharge Pond (SWMU 5.26), percolate into the ground or evaporate.(14) This SWMU includes all drainage areas and spillways from the base of the Coca test stands to the pond.

Status

The unit began operation in 1953, however, it has been inactive since 1962. Rockwell personnel stated that the pond may be refurbished and used again.(V1)

During the VSI, the pond was observed to contain stagnant water with thick brown algal growth (photo 16). Cattails were growing at the waters edge, within the concrete portion.(V1) Drainages leading from the test area to the Coca Skim Pond and from the Coca Skim Pond to the R-2B Pond (SWMU 5.26) were not observed.

Waste Managed

Reference 14 states that this unit may have received TCE, RP-1, TCA, and/or Freon in the event of a spill. During the VSI, a Rockwell representative stated that TCE had been used historically at the Coca Test Area (SWMU 5.18).(V1) Over the telephone in October of 1990, another Rockwell representative maintained that only LOX/hydrogen propellants were used at the Coca Test Area, and, therefore, TCE and RP-1 were not used.(37) Rockwell states in Reference 58 that TCE and RP-1 were used at the Coca Test Area.

A water sample collected from the Coca Skim Pond on March 23, 1976 contained "decomposition products as formaldehyde," which suggests that MMH may have entered the pond.(33)

Release Controls

The pond appeared, during the VSI, to have cement around the edges, but it could not be determined whether the bottom was also lined.(V1) No other information on release controls during the time of operation was available.

History of Releases

No information was located concerning releases from this unit, although water in the pond was probably released regularly to the R-2 Discharge Ponds (SWMU 5.26). There are no groundwater monitoring wells in the Coca Area.

Pollutant Migration Pathways

Soil, Groundwater, Surface Water, Air, or Subsurface Gas: It cannot be determined if hazardous waste or hazardous constituents were conveyed to this unit. If they were, a release could have occurred to soil or groundwater if the pond bottom is unlined or if the lining has been damaged. A release to surface water could have occurred when the pond was discharged to R-2B pond. It is unknown if the water presently in the unit contains contaminants. Depending on the nature of any contaminants, air releases and subsurface gas generation could have occurred in the past.

5.20 PROPELLANT LOAD FACILITY (PLF) WASTE TANK

Unit Characteristics

When the Propellant Load Facility (PLF) surface impoundment (SWMU 5.22) was closed, a 6,500-gallon tank was installed to take its place in late 1985. If propellants, such as MMH and NTO were spilled in the PLF building, they would have been flushed into a drain and carried by piping to the tank (photo 24). The tank does not have secondary containment.(V1)

Status

This tank is operational but has never been used.(V1)

Waste Managed

MMH and NTO are loaded into the fourth stage of the Peacekeeper Missile at the PLF facility. The waste tank would be used to contain any released material, probably mixed with water.(V1)

Release Controls

No release controls were observed other than the tank itself.(V1)

History of Releases

There have been no releases from this tank, as it has never been used.(V1)

Pollutant Migration Pathways

There is little probability of releases from this unit since, according to Rockwell, it will rarely be used.

5.21 PROPELLANT LOAD FACILITY (PLF) OZONATOR TANK

Unit Characteristics

This 1,000-gallon polypropylene tank located northeast of the Delta Skim Pond (SWMU 5.24) is used to treat water that occasionally contains low levels of MMH generated at the Propellant Load Facility (PLF).(V1)

Status

The tank is currently operational. A pump within the secondary containment was observed to be dripping oil. A Rockwell representative stated that water is never released from secondary containment areas without sampling.(V1) No photograph was taken of the unit.

Waste Characteristics

This tank is used to treat water that occasionally contains MMH propellant.(V1)

Release Controls

The tank is surrounded by concrete secondary containment.(V1) Treated water is reused at the PLF facility.(37)

History of Releases

There have been no known releases from this unit.(V1)

Pollutant Migration Pathways

Soil, Groundwater, Surface Water, Air, or Subsurface: Releases are unlikely as the tank has secondary containment. However, if the tank were to leak from the secondary containment, a release to soil, groundwater, surface water, or air could occur.

5.22 PROPELLANT LOAD FACILITY (PLF) SURFACE IMPOUNDMENT

Unit Characteristics

This RCRA-regulated concrete-lined unit provided emergency spill containment for the Propellant Load Facility (PLF). MMH and NTO are used at the Propellant Load Facility under an Air Force contract. The estimated capacity of this pond was 12,000 gallons.(14) (Reference 33 gives 20,000 gallons). In the event of a fuel or oxidizer spill, a water deluge system would have been activated to direct the spilled substance through a spillway to the impoundment.(7) The unit was constructed in April 1983.(1) According to the closure report (9), no spills to the impoundment ever occurred.

Status

The unit was not used from November 8, 1985 to closure.(9) Closure activities were completed in July 1987. The concrete liner was removed in June 1987 and disposed of at a Class III disposal facility. Soil sampling confirmed that adjacent soils were not contaminated by hazardous constituents. The impoundment was backfilled with soil initially excavated from the impoundment.(9) A closure report was submitted to DHS in September 1989.(1) DHS certified the impoundment as clean-closed on December 28, 1989.(11) Prior to RCRA closure, the impoundment was closed under the Toxic Pits Cleanup Act (TPCA).(V1)

The PLF Impoundment is no longer visible; the road around the Delta Skim Pond (SWMU 5.24) replaced it. The area is in the background of photo 9.(V1)

Waste Managed

MMH or NTO could have been released in the event of a spill. If released, these wastes would have been treated with H_2O_2 to form nitrogen gas, carbon dioxide and water.(14)(33)

Release Controls

The files did not contain any information on release controls when the unit was active. There is no probability of a release from this unit now, as it has been clean closed.

The area is currently used as a roadway and was graded to promote runoff. Engines are tested in the PLF building in enclosed rooms with concrete floors. If propellants were spilled, they would be flushed into a drain in the floor and carried by piping to a tank down the hill (SWMU 5.20).(V1)

History of Releases

According to Rockwell, the impoundment never received emergency spills. The only continuous discharges to the impoundment have been from precipitation runoff.(1) However, groundwater in the vicinity of the PLF impoundment (wells HAR-28 and HAR-29) contains trans-1,2-DCE, and TCE.(33) It is possible that these constituents were detected due to the general use of TCE at Rockwell. (Formaldehyde, nitrate, and amines would be expected in the groundwater if the PLF impoundment had been used and had leaked.)

Pollutant Migration Pathways

No hazardous waste or hazardous constituents are likely to migrate from the unit, as it has been clean closed. The possibility for releases to the environment from the PLF facility is small, since spills would be contained in the waste tank (SWMU 5.20) and removed.

5.23 DELTA TEST AREA

Unit Characteristics

The Delta Test Area was the site of large rocket engine testing. Three engine test stands were located at the Delta Test Area. The area operated from 1953 to 1970. The test stands were dismantled in 1982. The concrete areas under the stands and associated spillways are part of SWMU 5.24 (Delta Skim Pond). The location of one of the dismantled test stands is in the background of photo 10.(V1)

Status

The Delta Test Area is inactive and the test stands have been dismantled. The concrete lined spillways remain.(V1) Pursuant to a DHS request, Rockwell submitted a plan for sampling the concrete spillways in late fall of 1989.(37)

Waste Managed

Rocket engines were flushed with an organic solvent as part of the testing procedures. TCE was the principal organic solvent used for flushing hardware and engine thrust chambers, and for cleaning other equipment. The TCE which did not evaporate during the flushing operation was reportedly discharged from each test stand onto a concrete spillway that drained into Delta Skim Pond (SWMU 5.24). This waste TCE management practice was in operation from 1953 to 1961. From 1961 to 1970 TCE was reclaimed at the Delta Test Area.(14). An estimated 8,000 pounds of TCE were sent to this impoundment over 25 years.(33) Rockwell personnel stated that TCE is the only solvent used for the engine tests as specified by the Air Force.(V1)

For additional details on wastes released from the Delta Test Area, see SWMU 5.24.

Release Controls

The only major release controls for the test stands were the spillways, drainages, and pond (see SWMU 5.24).

History of Releases

See Waste Managed section of SWMU 5.24.

Pollutant Migration Pathways

See SWMU 5.24.

5.24 DELTA SKIM POND AND ASSOCIATED DRAINAGES

Unit Characteristics

The Delta Skim Pond was an earthen surface impoundment at the Delta Test Area (SWMU 5.23) used to retain cooling water from rocket engine testing.(1) Reference 14 gives an estimated capacity of 723,000 gallons for this pond. Reference 33 gives an estimated capacity of 572,000 (according to the 1985 closure plan). According to Reference 33, the dimensions were approximately 85' by 90'. The pond began receiving wastes in 1953 when rocket engine testing commenced.(14) This SWMU includes the concrete-lined drainage leading to the pond from the Delta test stands, and the concrete spillways beneath the stands (discussed under SWMU 5.23).

Status

The Delta Skim Pond received wastes from rocket engine testing until 1970. After 1970, only precipitation and associated runoff collected in the impoundment.(1) The Delta test stands were dismantled in 1982.(35) Closure activities began in early 1988. Six initial soil samples were collected from 4 borings. Results indicated elevated levels of TCE, ethylbenzene and xylene in one boring at a depth of 3 feet below the impoundment bottom. The soil was excavated to a depth of 3 feet and two samples were collected that did not contain detectable levels of constituents of concern. It is unclear as to the final disposition of the excavated soil. The removed soil was either sent to Cal Mat Dump, a nonhazardous waste Class III landfill or used at SSFL as fill material.(9) (Information regarding the locations at SSFL where this fill material may have been used could not be obtained from Rockwell personnel.)(V1)

The Delta Skim Pond was backfilled with soil from the "Burro Flats Area IV" borrow site. One of three samples of the Burro Flats soil (which was used to backfill most of the impoundments) contained detectable levels of acetone, carbon disulfide, MEK, and TCE.(9) In February of 1989, closure activities were completed and a closure report was submitted in September 1989.(9) Upon reviewing the closure report, DHS notified SSFL in a December 18, 1989 letter that the impoundment had not been adequately clean closed and required Rockwell to submit a Post Closure Plan for monitoring the groundwater affected by the pond.(11) Rockwell submitted a Post Closure Plan on March 29, 1990 for DHS's review.(34)

At the time of the VSI, the Delta Skim Pond was observed to be capped and well vegetated (photo 9). Vegetation was growing through cracks in the concrete of the spillway (photos 9 and 10). Rusty water was dripping from a pipe up the hill by the test stands and had been for some time, as there was a rusty stain on the concrete spillway. Rockwell personnel stated that the dripping water was treated overflow from the groundwater treatment system by the Delta Test Area (SWMU 5.23).(V1)

Waste Managed

This unit received wastes from the Delta Test Area (SWMU 5.23) associated with rocket testing operations. These wastes included TCE, other solvents, Freon, RP-1, MMH,(7) and also fluorides, nitrates, and amines.(35) A table of wastes managed in the Delta Skim Pond from Reference 33 is included as Attachment 3.

Release Controls

The impoundment was a natural earth-lined pond with a constructed earthen dam separating it from the R-2A Pond (SWMU 5.26).(33) A skimmer may have been present to remove fuel from the surface of the water as in the Alfa Skim and Bravo Skim Ponds (SWMUs 5.11 and 5.15). The pond has currently been backfilled and capped. A sprinkler system is used to water the vegetative cover of the cap. A concrete-lined drainage ditch channels runoff around the cap and ultimately to the R-2 Discharge Ponds (SWMU 5.26).(V1)

According to Rockwell personnel, the area under the test stands and the spillway leading to the Delta Skim Pond were concrete lined in 1958 to prevent erosion.(V1)

History of Releases

Water from the Delta Skim Pond was probably discharged to the R-2 Discharge Ponds (SWMU 5.26). Water from the R-2 Discharge Ponds (SWMUs 5.26) was released through the NPDES permitted outfall. Contaminants were released to the soil (see Status section).

The impoundment (and associated drainages) may have contributed to the widespread TCE contamination found in groundwater underlying SSFL, (1) although existing data is not sufficient to verify this. Upgradient well HAR-7 contains trans-1,2-DCE and TCE. Downgradient wells (HAR-28 and HAR-27) contain trans-1,2-DCE, TCE, and vinyl chloride. Groundwater appears to be moving west toward the R-2 ponds and may be discharging into the R-2 ponds.(33) (DHS, on the other hand, has concluded that this SWMU has released hazardous constituents to soil and groundwater(65), and has required that this be included in post-closure activities.(11)

Pollutant Migration Pathways

Soil and Groundwater: Soil and probably groundwater were impacted by this unit while it was in operation. It is unlikely that the pond area is currently a source of contamination, as the contaminated soil has been removed and the pond has been backfilled and capped. The extent of the apparent contamination of the Burro Flats soil has not been determined. The drainages from the Delta test stands to the pond have not been investigated for the presence of residual contamination, but in response to a DHS request, Rockwell submitted a plan to investigate the drainages in late 1989.(35) The investigation of the drainages is being conducted under the post-closure activities.(34)

Surface Water: Surface water releases from this impoundment probably occurred in the past but are unlikely now that the pond has been backfilled and capped. Groundwater contaminated by this SWMU may be discharging to surface water in the R-2 Discharge Ponds.(33)

Air: Air releases may have occurred in the past, but are not likely now as the unit has been backfilled and capped.

Subsurface Gas: The generation of subsurface gas may have been possible during the operation of this unit, however, since the backfill is contaminated with VOCs, subsurface gas generation is still likely.

5.25 PURGE WATER TANK NEAR DELTA TREATMENT SYSTEM

Unit Characteristics

A black 6,500-gallon fiberglass Baker tank is used to hold water purged during the sampling of wells. The water is sent to the UV/H_2O_2 (Swimming Pool) Treatment System (SWMU 5.4).(V1) No photograph was taken of the tank.

Status

The tank is currently in use.(V1)

Waste Managed

Groundwater contaminated with VOCs is stored in this tank prior to treatment.(V1)

Release Controls

No release controls other than the tank itself were observed.(V1)

History of Releases

There have been no known releases from this unit.(V1)

Pollutant Migration Pathways

If the tank were to leak, contaminated groundwater could be released to the soil, surface water, air, and possibly to groundwater.

Subsurface Gas: Based upon the waste managed at this SWMU, subsurface gas generation is unlikely.

5.26 R-2A AND R-2B DISCHARGE PONDS AND ASSOCIATED DRAINAGES

Unit Characteristics

The R-2A and R-2B Discharge Ponds are two adjacent unlined surface impoundments that serve as the final collection ponds for drainage from Areas II, III, and a portion of IV. Water from these ponds is Rockwell's "reclaim" water, used as cooling water for the engine tests, and for emergency fire protection.(V1) R-2B has a capacity of 500,000 gallons, and R-2A has a capacity of 3,000,000 gallons.(14) R-2B flows into R-2A. If R-2A's capacity is exceeded, a valve can be opened to release water to Rockwell's NPDES permitted outfall through an unlined channel which drains to Bell Creek through the discharge points located in the Buffer Zone.(14) Currently, water is discharged once a month or whenever capacity of the ponds is exceeded. This SWMU includes all drainages leading to the R-2 ponds from other SWMUs.(V1)

Status

R-2A began operation in 1958. It is assumed that R-2B began use at the same time. Both are currently active. During the VSI, the water in R-2A was being aerated (photo 17). The water was green with algae.(V1)

Waste Managed

The R-2 Discharge Ponds receive drainage from the Alfa, Bravo, and Storable Propellant Areas (SPA) via Silvernale Reservoir (SWMU 6.8) and from the Coca, Delta, STL-IV and ECL areas directly. They also receive treated effluent from the Area III Sewage Treatment Plant (SWMU 4.3.5) (which receives sewage from Areas II, III, and IV). The R-2 ponds also receives runoff from a portion of Area IV.(V1) The R-2 ponds could possibly have received anything released in the above listed areas. Some of the most likely wastes to have reached the R-2 Ponds include TCE, RP-1, MMH, TCA, Freon, isopropyl alcohol, and H_2O_2.(14)

Release Controls

Releases to Bell Creek through the NPDES outfall are controlled by a gate. According to Rockwell personnel, water is currently discharged once a month and the water is sampled prior to discharge. Sample results were not available during this review. An aerator currently operating may remove or strip VOCs reaching R-2A, although Rockwell personnel stated that its purpose was to oxygenate the pond water.(V1)

History of Releases

A review of Rockwell's records revealed reports of a number of releases from "upstream" areas that entered the R-2 ponds (64):

- In February 1978, a TCE spill at the Alfa Test Area (SWMU 5.9) resulted in 0.02 ppm TCE in R-2A.
- In March 1978, an oil sheen was observed on the water in R-2A; it was described as "kerosene-like."
- From May 1976 through August 1978, four releases of fluoride from the ECL Area occurred; at least one resulted in elevated fluorides in R-2A. (See History of Releases section for SWMUs 6.1, 6.2, 6.3.)
- On October 26, 1978, water "strongly contaminated with TATB (triamino-trinitro benzene)" was discharged from the ECL Area to drainage channels leading to R-2A; it was diverted, and the report did not indicate whether any reached R-2A.
- On June 12, 1981, an overflow at the STL-IV Area (SWMU 6.5) resulted in 12 ppm hydrazine in R-2A.
- On November 4, 1981, 75 gallons of Dowanol were released to R-2A from Building 059.
- A May 1981 report refers to a "number of pollution episodes" that occurred during the month of May that resulted in contamination of the "R-2" pond and caused a fish kill. Analyses showed mercaptans in the water.
- On June 12, 1981 the STL-IV impoundments (SWMUs 6.6, 6.7) overflowed, resulting in elevated hydrazine and formaldehyde in R-2A. The pond was treated with H_2O_2 which should have broken the wastes to hydrogen, water, and nitrogen. No hydrazine was detected on June 22, 1981.
- On January 26, 1982, isopropanol was released into the STL-IV ponds (SWMUs 6.6, 6.7); it was diluted to an "acceptable level" and discharged to the R-2 ponds.
- On April 15, 1983, low pH water (containing HNO_3) was released from STL-IV (SWMU 6.5). The pH of "R-2" was not noticeably impacted.
- Water samples collected from "R-2" ("R-2A") between 1970 and 1984 at various times contained hydrazine, "decomposition products as formaldehyde," oil and grease, UDMH, mercaptans, and phenols. At various times between 1977 and 1978, R-2B contained oil and grease.(33)

Releases to off-site surface water of constituents not covered by the NPDES permit could have occurred in the past. Eight sediment samples were collected from the "R-2" pond in May 1990 from four locations (2 near the inflow and 2 near the outflow) to a maximum depth of 1.5 feet. All samples contained total extractable hydrocarbons between 30 and 100 mg/kg, and all samples also contained semiquantifiable aliphatic hydrocarbons. One influent sample contained 230 mg/kg total petroleum hydrocarbons. Three influent samples and three effluent samples contained polynuclear aromatics. One effluent sample contained 0.08 mg/kg TCE.(36) Metals and radioactivity data are also available in Reference 36.

There is not enough information to determine if the R-2 ponds have contributed to groundwater contamination. Upgradient shallow groundwater is contaminated with trans-1,2-DCE, TCE, and vinyl chloride (HAR-28 and HAR-27).(33) There are no wells immediately downgradient of the R-2 ponds. Wells WS-9A and RS-13 may be downgradient of the R-2 ponds; they are approximately 1,000 feet downstream in the surface drainage. Shallow well RS-13 appears to be uncontaminated, but Chatsworth well WS-9A is shown on Figure 10 of Reference 33 to contain TCE.(33) Other areas of the facility could be the source.

Pollutant Migration Pathways

Soil, Groundwater, Surface Water, or Air: Contaminants have been released from the R-2 ponds to soil, surface water, groundwater, or air in the past. Releases could still occur if spilled wastes reach the R-2 ponds. Due to spill prevention and remediation activities undertaken at Rockwell in the past decade, releases are much less likely to occur now than they were in the past.

Subsurface Gas: Due to the presence of VOCs in the groundwater and soil, subsurface gas generation is likely.

5.27 AIR STRIPPING TOWERS FOR GROUNDWATER TREATMENT

Unit Characteristics

These two systems are part of the facility-wide Groundwater Reclamation System constructed to remediate contaminated groundwater underlying SSFL.(21) The systems are located in the Bravo and Delta areas. Each system consists of two air stripping towers connected to carbon canisters. Recovered groundwater is pumped through a tower containing activated carbon which allows a portion of the VOCs to volatilize. The air then goes through the carbon canisters which remove the vaporized contaminants. The water goes through a secondary tower. Air from the secondary tower is released without carbon filtration.(37)(V1) When a carbon canister is saturated with VOCs, it is replaced with a fresh canister and the saturated carbon is either steam regenerated or incinerated off-site.(20) The treated groundwater is used on-site for domestic purposes other than drinking.(V1)

The Delta treatment system consists of a primary tower, 36 feet high x 36 inches in diameter, a secondary tower 28 feet high x 36 inches in diameter, and eight carbon canisters operated in parallel.(12) The system is designed to handle a 175 gpm inflow. This system receives water from well WS-9A.

The Bravo treatment system is designed to manage 70 gpm and treats water from wells WS-9 and RD-4.(20) Dimensions of the system components were not obtained.

Status

The Bravo and Delta systems are currently operational. Rockwell has a permit from the VCAPCD to operate the systems. Because the groundwater remediation is linked to the closure of the RCRA-regulated surface impoundments, the DHS now has authority over these units.(V1) A RCRA Part A Permit Application was submitted in January 1990.(37) The Part B Application was submitted in May 1990.

The air stripping systems appeared to be new and in good condition during the VSI. The sump within the secondary containment of the Bravo treatment system was filled with water and dirt.(V1) The Delta treatment system is shown in the background of photo 10.

Waste Managed

Groundwater contaminated with VOCs is treated by these units.

Release Controls

Both treatment systems are within concrete secondary containment. The air both entering and leaving the carbon canisters is monitored. Liquid effluent was tested every day initially, but now is tested weekly.(V1)

History of Releases

Except for possible releases to air as part of the treatment process, there have been no known releases of hazardous waste or hazardous constituents.

Pollutant Migration Pathways

Soil, Groundwater, Surface Water, and Subsurface Gas: The units have secondary containment that should prevent releases to the above media. The purpose of these systems is to treat contaminated groundwater.

Air: The treatment process can result in air releases. The releases are regulated under permits by the VCAPCD.

5.28 AREAS OF CONCERN - AREA II

During the evaluation of Rockwell International's waste management and release data, a number of areas were identified as potential SWMUs and/or AOCs. The following areas still remain potential SWMUs/AOCs after the VSI.

Leachfields for Area II

Active and inactive sanitary leachfields exist within Area II.(18) Active sanitary leachfields are located in the following areas:

BRAVO AREA - CONTROL CENTER - Building 213
DELTA AREA - CONTROL CENTER - Building 224
DELTA AREA - PRETEST - Building 223
COCA AREA - CONTROL BUILDING - Building 216

Inactive sanitary leachfields are located in the following areas:

SERVICE AREA - OPERATIONS BUILDING - Building 211
ALFA AREA - CONTROL CENTER - Building 208
ALFA AREA - PRETEST - Building 212
BRAVO AREA - PRETEST - Building 217
COCA AREA - PRETEST - Building 222

The only leachfield visited during the VSI was the Delta Area - Pretest - Building 223. The only thing visible was a pipe leading out to a field.(V2)

Building 207 Underground Diesel Tank

This area of concern is the former site of a 1,500-gallon metal diesel tank. Prior to its removal in July 1988, the tank was located in the vicinity of Building 207.(1) All that could be observed during the VSI was the parking lot.(V1)

Underground Tank Across From Alfa-Bravo Fuel Farm Area

A Joors Pasteel, double-walled gasoline tank with a 12,000-gallon capacity was installed at this site in August 1988. This tank was not visited during the VSI.(V1)

Building 206 Metal Diesel Tank

A metal diesel tank was removed from this Building 206 location in August 1987. This tank was not located during the VSI.(V1) Building 206, however, is listed as SWMU 5.2 due to hydrocarbon residues.

Building 204 Two Metal Underground Gasoline Tanks at Plant Services

Two underground metal gasoline tanks, 1,200- and 10,000-gallon capacity, were located near the plant services building. The 10,000-gallon tank occupied a concrete vault. The 10,000-gallon fuel tank was placed in operation in the 1960s.(8)

The 10,000-gallon fuel tank was excavated and removed in November 1988.(8) The 1,200-gallon fuel tank was excavated and removed in July 1986.(1)

During the removal of the 10,000-gallon fuel tank and concrete vault, Rockwell personnel reported fuel odor in the backfill material around the tank and observed staining of the concrete vault. The area of the concrete vault and an area extending 2 to 5 feet beyond the outer wall of the vault was excavated to bedrock (an approximate depth of 13 feet). The subsurface materials excavated included tank backfill gravel/soil and weathered sandstone bedrock. The excavation was backfilled with clean pea gravel and capped at the surface with asphalt.

In the autumn of 1989, Rockwell began an assessment of bedrock and groundwater beneath the former site of the tank. A section of the core sample collected from the site in the 15- to 20-foot interval contained elevated levels of fuel hydrocarbons, benzene, toluene, ethylbenzene, and xylenes. A deeper sample contained 3 mg/kg petroleum hydrocarbons. Groundwater sampled from a monitoring well constructed at the former fuel tank site exhibited no evidence of fuel contamination; however, low levels of TCE were detected in the groundwater samples. These concentrations are within the range of TCE concentrations found beneath the SSFL. All that was visible during the VSI was the parking lot.

ALFA-BRAVO FUEL FARM STORMWATER BASIN

The Alfa-Bravo Fuel Farm consists of five metal tanks used for product fuel storage (three are shown in photo 25). Three 8,000-gallon tanks were used for RJ-1 fuel (similar to kerosene). The RJ-1 tanks have apparently been empty for two years but may be used again. Two 33,000-gallon tanks are currently used to store RP-1 fuel. The two different types of tanks are surrounded by separate, unlined, secondary containment with berms varying from 2 to 5 feet high depending on the grade. Outside the secondary containment, pipes lead from a truck unloading area to the tanks. During the VSI, a valve on one of these pipes leading to the RJ-1 tanks was leaking (photo 26). There was a hydrocarbon stain on the asphalt beneath. Runoff from this area would flow into a concrete lined basin. During the VSI, water in this basin was observed to have an oily sheen (photo 27).(V1) A valve controlled pipe leads from the basin to an unlined drainage.(V1)

A list of "significant spills" from 1975 to 1990 lists a release of 100 gallons of RP-1 fuel from the Alfa-Bravo Fuel Farm on November 4, 1976.(64) No information on the disposition of the spilled fuel was provided. A release to the stormwater basin had recently occurred prior to the VSI and further release could occur with the next rain. According to Karen Schwinn at EPA, Rockwell submitted a work plan to DHS to investigate contamination resulting form the spills.(44)

STORABLE PROPELLANT AREA (SPA)

The SPA area is primarily a product storage area with drums of MMH stored on a covered concrete pad. During the VSI, a group of pressure cylinders was observed nearby. Rockwell personnel stated that they were being held for off-site disposal and that the contents was unknown.(V1) No photographs of this area were taken.

This is an active product storage area, probably temporarily being used for storage of the cylinders.(V1) Apparently hazardous wastes were stored in this area prior to the creation of the Hazardous Waste Storage Area (SWMU 5.8) in 1982.(37)

No note was made during the VSI as to whether the cylinders were on a concrete pad or on the ground.

DRAINAGE PIPES UNDER ALFA-BRAVO SKIM POND

Piping underneath the closed Alfa-Bravo Skim Pond (SWMU 5.12) is currently being used to carry cooling water and runoff from the Alfa and Bravo Test Areas (SWMUs 5.9, 5.13) and into the drainage on the other side. They are considered a separate SWMU because, unlike the other SWMUs in the area, they were not in use when most of the hazardous wastes and constituents were released from the test areas. These pipes are currently active, and were installed in 1988 as part of the closure of the Alfa-Bravo Skim Pond. The pipes are meant to convey runoff and cooling water from one unlined drainage to another. The closure report (9) does not describe the construction of the pipes. (SWMU 5.12).(V1)

Since used TCE is being recaptured at the test stands, only water should flow through the pipes. However, any spilled materials at the test stands that are not completely cleaned up may make their way into the piping.

There is no information concerning releases from the piping. If the water entering the pipe were to contain hazardous waste or hazardous constituents as the result of a spill, or if it were to leak, the material would contaminate the soil, groundwater, or surface water in the drainage ways, which are considered part of SWMUs 5.15 and 5.11. There remains a minute potential for contaminating soil or groundwater beneath the closed Alfa-Bravo Skim Pond (SWMU 5.12).

BUILDING 515 SEWAGE TREATMENT PLANT

This inactive unit is located west of the Alfa area, off of Incinerator Road. It has not been used as a sewage treatment plant since 1987, but during the VSI it was being used as a "pump station." The unit is below grade and concrete lined. The sewage treatment plant received both sanitary sewage and cooling water discharges.(1) Rockwell, however, stated that cooling water was not received.(42) Cooling water discharges may have contained traces of solvents and rocket fuel. What appeared to be domestic sewage was flowing through portions of the unit.(V1) It is a small package activated sludge plant which received an average flow of approximately 4,000 gpd from Area II during active periods. The plant was designed to treat 50,000 gpd. The wastewater received by the plant included both sanitary sewage and cooling water discharges. Treated water was then discharged to a drainage ditch which conveyed the secondary effluent to the Silvernale Reservoir (SWMU 6.8). The facility consists of a comminutor, source aeration unit, clarifier and chlorine contact chamber.(1) The unit is partially below grade.(V1) No photograph of this unit was taken.

5.29 RD-51 WATERSHED

Following is a summary of sampling results from an April 1992 sampling event at the RD-51 Watershed. SAIC/TSC had not included this watershed and any buildings which may be closely related to any contamination that may be found in this area in the RFA report prior to the May 1994 revision.

The RD-51 Watershed is 200 to 400 feet north of the parking lot located on Parking Lot Road on Rockwell property. Cluster wells RD-51 (A,B, and C) are also located in the parking lot. On April 22, 1992, samples were collected off-site (off the SSFL) in a narrow creek bed that connects to the main ravine draining the north end of Area II. Five sediment samples were collected by McLaren/Hart from the creek bed; EPA, DTSC, and the BBI consultant each collected a single split sediment sample. Plutonium 238 was detected by McLaren/Hart at 0.22 ± 0.07 picocuries per gram (pCi/g)(dry). No other radionuclides or chemicals were detected by any of the parties that exceeded background levels (metals and radionuclides) or reporting limits (organics). (68)

AREA III

SOLID WASTE MANAGEMENT UNITS

6.0 AREA III

6.1 BUILDING 260 ECL WASTE TANK, BUILDING, AND ASSOCIATED CONTAINER STORAGE AREA

Unit Characteristics

Propellant ingredients are developed in the ECL. The ECL area was built in 1963-1964. The laboratory is on the northwest side of a concrete pad. The southeast side of the concrete pad is used to store containers of product, and the ECL Waste Tank (photos 29 and 30). The northwest corner of the pad contains a portion of a pilot plant with reactor vessels (photo 31). Fluorinated compounds were manufactured in this area.(42) On the northeast side of the pad is a distillation unit for recycling methylene chloride. The main portion of the building is an enclosed laboratory, however along the northwest side of the building there are open laboratory areas used to conduct "explosives research." In the north corner of the pad, some pallets hold containers labeled "Hazardous Waste" (photo 32). A small building located just off the concrete to the northeast is being used for solvent storage. Four yellow cabinets labeled "flammable" are located off the pad nearby.(V1)

The ECL Waste Tank is a double-walled polypropylene tank that holds 4,500- to 5,000-gallons of hazardous waste (design capacity is 6,000 gallons (1)). It is used to store aqueous wastes from the pilot plant prior to shipment off-site for incineration. Wastes are transferred to the tank by piping. During the VSI, eight pipes were observed leading into the top of the tank. Rockwell personnel also indicated that waste chemicals from the lab are placed in a 5-gallon bucket which is emptied into the tank once a day.(V1)

Status

The Tank and Container Storage Area are active. The tank is emptied by vacuum truck every 90 days. The tank was installed in 1984 when the ECL Pond (SWMU 6.2) was closed.(V1)

Waste Managed

Hazardous wastes or hazardous constituents managed in the ECL Waste Tank include methanol, acetone, isopropyl alcohol, sodium oxide and sodium azide.(1) Hazardous waste drums at the north corner of the pad were labeled acetone, halogens, liquids, and solids. Product drums stored on the southeast side of the pad during the VSI contained 15% ferric chloride, 54% sulfuric acid, nitroform, 35% H_2O_2, HNO_3, and acetic anhydride. (This is not a comprehensive list). There were helium gas cylinders, and a large (estimated 5,000 gallons) rusty and dented tank labeled "caustic 5%." Another large tank (estimated 4,000 gallons) was labeled "98% nitric acid."(V1)

Release Controls

The southeast and southwest sides of the concrete pad have 6-inch berms. The pad is sloped to drain to a sump in the south corner. Runoff from the southeast and southwest portions of the pad enters the sump and flows through pipes to two holding tanks (See Building 260 in AOC). The concrete pad was observed to be cracked during the VSI. Some attempt had been made to seal the cracks. The drain leading from the pad was observed to be full of leaves.(V1)

The northwest and northeast sides of the concrete pad have a narrow drainage trench rather than berms (photo 32). Similar drainage trenches lead from the open "explosive research" areas on the northwest side of the building to the main trench. The hazardous waste containers on the north corner of the pad sit on pallets over the drainage trench. The trench bottom was covered with dirt during the VSI, but Rockwell personnel maintained that the bottom was concrete. According to Rockwell personnel, the trench system leads to an underground pipeline which runs down the hill to the south, under the parking lot, along the southwest side of the closed ECL Pond (SWMU 6.2) and ends in a valve at the west end of the french drain. Apparently, if the pipe (constructed of PVC) is intact, the water stays in the pipe and can be pumped out at the valve. In heavy rains, water has apparently backed up in the trenches on the concrete pad and spilled over the sides.(V1)

The sink in the laboratory building drains to a pipeline that empties out into the parking lot (photos 33 and 34). Rockwell personnel stated that the sink is used only for washing glassware with soap and water. A plastic 5-gallon hazardous waste container is located next to the sink for the disposal of hazardous lab waste. This container is emptied daily into the ECL waste tank.(V1)

History of Releases

Prior to 1984, the wastes currently stored in the tank were sent to the ECL Pond, and runoff from the pad was sent to the Suspect Water Pond (both SWMU 6.2). A review of Rockwell files identified a number of releases from the ECL laboratory area between 1975 and 1990.(64)

- On July 12, 1976, the fluoride scrubber lost power. A seal failed and water with a high concentration of fluoride flowed to the "Area II Reservoir" (the R-2 Discharge Ponds, SWMU 5.26).

- On March 10, 1978, an unrecorded amount of fluorine (5 mg/ℓ) and chrome (0.039 mg/ℓ) were released to the R-2 Discharge Ponds (SWMU 5.26).

- August 28, 1978: Unrecorded amount of fluoride solution was released from the "ECL Scrubber Line" (no further information available).

- October 26, 1978: Water strongly contaminated with TATB (triamino-trinitro benzene) was discharged to a drainage leading to the R-2 Discharge Ponds (SWMU 5.26).

- October 13, 1980: 2,000 gallons of 98% HNO_3 leaked from a tank and drained to the newly lined "waste retention pond" (probably the Suspect Water Pond (SWMU 6.2), as the spill occurred on the concrete pad). The spill was neutralized with 50% caustic in the pond.

- January 25, 1984: 20 gallons of acetic acid were spilled - no further information available.

- May 23, 1989: The spill log says "Firex Overflow" - no further information available.

Pollutant Migration Pathways

Soil, Groundwater, Surface Water, and Subsurface Gas: Spills from the ECL Waste Tank or product containers on the southeast side of the concrete pad would flow to the ECL Runoff Tanks (See AOCs), therefore, releases to soil, groundwater or surface water, and subsurface gas generation are unlikely. Any spills from activities on the northwest side of the pad would be washed into the apparently closed underground pipe. If the pipe is damaged, the material could be released to the soil and groundwater. If the pipe is intact, spilled material or rainwater could back up into the trench system and spill off the concrete pad. It would then run down across the parking lot and into the unlined drainage leading to the R-2 Discharge Ponds (SWMU 5.26).

Air: Any spills or releases in the concrete pad area could result in releases to the air if they contain volatile constituents.

6.2 ECL POND AND SUSPECT WATER POND

Unit Characteristics

The ECL Pond was constructed in the late 1960s (17) and was taken out of service in 1984. The pond was closed in 1989. The waste is now sent to the ECL Waste Tank (SWMU 6.1). Originally, the ECL Pond was constructed with a 4-inch concrete liner. Over the years, the pond was relined three times with applications of 4 inches of pneumatically placed concrete. The resultant liner was 16 inches thick, creating a "bowl" about 50 feet by 25 feet, and with a depression of about 5 feet deep. The pond had a capacity of approximately 20,000 gallons. The ECL Pond was used to temporarily store hazardous waste discharges from the ECL. Material from the pond was periodically removed by vacuum truck and transported to a Class I hazardous waste landfill.(17)

The Suspect Water Pond was located to the southwest of the ECL Pond, and received runoff from the ECL building concrete pad. (The runoff is now piped to the ECL Runoff Tanks - See AOCs.) Rockwell representatives stated in a February 4, 1991 meeting with EPA that the pond was concrete lined.(V1)

Status

Both ponds are closed. In September 1984, a closure plan for the ECL Pond was submitted to the DHS. The ECL Pond liner was removed in October 1984 along with the liquid. The surrounding soil was excavated down to the Chatsworth Formation, approximately 5 feet below the bottom of the pond.(17) These materials were sent to a Class I disposal facility.(9)

After the excavation of the ECL Pond was completed, water was observed seeping into the excavated pit. The water from the pit was sampled and found to contain various chlorinated hydrocarbons including carbon tetrachloride ($430\mu/\ell$), chloroform ($200\mu/\ell$), methylene chloride ($1,500\mu/\ell$), and Freon TF ($63\mu/\ell$).(17) Soil samples collected near the edges of the pond area in December of 1984 (after the excavation of the liner and some soil) contained 2-6 mg/kg methylene chloride and 0.3-1 mg/kg trichlorofluoromethane.(9)

In 1989, water in the ECL Pond was removed prior to additional closure activities. The water consisted of rainfall and groundwater, as the bottom of the pond was below the water table. A sample of the water contained benzene, chloroform, 1,1-DCA, trans-1,2-DCE, Freon TF, isopropanol, TCE, and traces of acetone, 1,1-DCE, and trichlorofluoromethane. The water was run through a carbon canister prior to being discharged to the water reclamation system (the R-2 Discharge Ponds, SWMU 5.26).(9)

The ECL Pond was then backfilled with soil from the Burro Flats Area IV borrow site. One of three samples of the Burro Flats soil (which was used to backfill most of the impoundments) contained detectable levels of acetone, carbon disulfide, MEK, and TCE. Clean gravel was placed under the fill.(9)

The ECL Pond was then covered with a concrete pad, graded to channel runoff across the surface of the closed pond and into the unlined drainage leading to the R-2 Discharge Ponds (SWMU 5.26). A cut off wall and french drain dewatering system were installed to intercept groundwater flowing through the fill.(34) The recovered groundwater is pumped into the ECL Collection Tank (SWMU 6.3).(V1)

No closure details for the Suspect Water Pond were available in the references. According to Rockwell personnel on-site, the pond was excavated and backfilled "about a year ago" (probably along with the ECL Pond closure).(V1)

Due to the presence of contamination in the groundwater, Rockwell submitted a Post Closure Plan for Areas I and III to DHS on March 29, 1990.(65) The plan has been approved and there are currently approximately 30 groundwater monitoring wells surrounding the area.(67)

Waste Managed

Hazardous wastes stored in the ECL Pond included methylene chloride, sodium azide, sodium hydroxide, fluoride, epichlorohydrin, formaldehyde, and dimethyl sulfoxide.(7) If the pond received wastes similar to those currently stored in the ECL Waste Tank (SWMU 6.1), the pond may also have received acetone, methanol, and isopropyl alcohol.(1) Little information was available concerning wastes that may have gone into the Suspect Water Pond, as it received runoff from the pad surrounding the ECL building and the product storage area. A Rockwell spill report states that 2,000 gallons of spilled HNO_3 (October 13, 1980) drained into the "newly lined waste retention pond," and were neutralized with 50% caustic in the pond.(64) Other spills that may have impacted the ponds are discussed under SWMU 6.1.

Release Controls

The ECL Pond was concrete lined when operational, and the contents of the pond were periodically pumped out and disposed of off-site. The pond is now capped with concrete to direct surface runoff (photos 33-36) and a french drain has been installed to collect groundwater flowing through the fill. Water collected in the french drain is pumped to the ECL Collection Tank (SWMU 6.3). No information on the disposition of the water in the Suspect Water Pond during use was obtained. During the VSI, the Suspect Water Pond was observed to be capped with earth and surrounded by a cinder block wall on the east and north sides. The pond cover meets a low hill on the west side and adjoins the land surface to the south which ends in a low bluff above the french drain area (photo 35).(V1)

History of Releases

Shallow groundwater is contaminated in the ECL area both up and downgradient of the ponds. Some of the major contaminants include carbon tetrachloride, chloroform, 1,2-dichloroethane (1,2-DCA), methylene chloride, TCA, TCE, acetone, and toluene. Deeper Chatsworth formation wells in the area contain TCE and toluene.(34)

It appears likely that the ponds contributed to the contamination, as contaminant concentrations are generally higher immediately downgradient of the impoundments than further downgradient or upgradient.(34)

A release to soil from the ECL Pond has occurred; as mentioned under the Status section above, soil beneath the liner contained methylene chloride and trichlorofluoromethane.(9)

A review of Rockwell files revealed a report, dated May 7, 1986, of a release from the ECL Pond. The pond had developed cracks and liquid had leaked out, resulting in elevated fluoride levels in the R-2A Discharge Pond (SWMU 5.26). The report maintains that the cracks were temporarily plugged and a sump was installed downstream of the pond to drain the soil and collect any continued seepage. Permanent repair of the pond was scheduled for June of 1986 and all closure activities were completed by August 1, 1989.(1)

Pollutant Migration Pathways

Soil, Groundwater, and Surface Water: Releases to soil, groundwater, and surface water have occurred in the past at least from the ECL Pond as discussed in the History of Releases section. Although the ponds have been closed, contaminants may remain in the soil, which could have a continued impact on the groundwater.

Air: Releases to air of VOCs stored in the ponds may also have occurred.

Subsurface Gas: Presence of VOCs in the soil and groundwater may pose a potential for subsurface gas generation.

6.3 ECL COLLECTION TANK

Unit Characteristics

A 4,800-gallon vertical fiberglass tank (photo 36) is used to hold contaminated groundwater pumped from beneath the closed ECL Pond (SWMU 6.2). The groundwater is pumped from a shallow "dug" well and from the french drain at the downhill end of the closed pond (see SWMU 6.2).(V1) Water from this tank is sent to the UV/H_2O_2 treatment system (SWMU 5.4).

Status

The tank is currently in use.(V1)

Waste Managed

Groundwater in the ECL Pond area is contaminated with VOCs.(33)

Release Controls

The tank has concrete secondary containment with approximately 2 to 3-foot berms.(V1)

History of Releases

There is no documentation concerning releases from this unit.

Pollutant Migration Pathways

Soil, Groundwater, and Surface Water: Releases are unlikely, as the tank has secondary containment.

Air: A release of VOCs could occur if the tank were to leak.

Subsurface Gas: Subsurface gas generation is likely resulting from the contaminated groundwater.

6.4 BUILDING 418 COMPOUND A FACILITY

Unit Characteristics

This unit was used in the 1960s for the manufacture and testing of Compound A (chlorine pentafluoride, ClF_5) and for the generation of fluorine gas for use at the ECL area. The facility is located near STL-IV (SWMU 6.5). An unlined earthen pond at the unit was cleaned and closed.(1)

Status

The Compound A Facility has been inactive since the late 1960s(1) and appears to be in disrepair (photo 38). According to Rockwell personnel, piping at the Compound A Facility and between the facility and the ECL may still contain fluorine gas (photo 39). Apparently the equipment is most easily reactivated if fluorine has remained in contact with the lining of the pipes and containers.(V1)

There is some disagreement as to whether the impoundment was used to contain wastes: Reference 7 states that it was used to control wastewater from proprietary material research products, while Rockwell personnel on-site maintained that the pond was "primarily" a holding pond for caustic solution used in the scrubber, mainly sodium hydroxide, bisulfite, and metabisulfite. The sludge remaining in the pond was manifested off-site in 1984. The pond was backfilled with construction debris in 1988. The surface of the pond area is shown in photo 40.(V1)

Waste Managed

Rockwell personnel stated that wastes generated at the Compound A Facility would have included fluoride salts and corrosion products (iron fluorides, etc.).(V1) Reference 7 states that hydrofluoric acid was managed in this area.

Release Controls

The Compound A Facility rests on a concrete pad which is bermed on the uphill side (photo 38). Rockwell personnel assumed that wastes probably just washed off the concrete pad and onto the dirt downhill of the facility. The impoundment was unlined, and Rockwell personnel did not think that it had been diked. The pond has now been backfilled with construction debris.(V1)

History of Releases

Reference 7 notes that a soil analysis indicated a pH of 8 and high levels of fluoride. Caustic and fluoride contamination of the soil downhill of the facility and the impoundment are likely.

Pollutant Migration Pathways

Soil, Groundwater, Surface Water, and Subsurface Gas: Releases from the unit are not likely to occur now that it is inactive, unless nongaseous material still remains in the piping or containers. Contaminated soil (fluorides and caustic) may exist in the general area and beneath the impoundment, which could still impact groundwater or surface water.

Air: Fluorine gas may remain in the piping that could be released to the air in the event of a pipe failure.

6.5 SYSTEMS TEST LABORATORY IV (STL-IV) TEST AREA, INCLUDING MMH OZONATOR TANK

Unit Characteristics

The STL-IV Test Area is a small rocket engine test facility. Two test stands are located in this area. Currently, the area is used to test the Axial engine for the Peacekeeper Missile. The engines are performance tested under simulated altitude and ambient conditions.(V1) These engines are primarily propelled by exotic storable propellants, such as MMH, (fuel), and NTO, an oxidizer. In the past, fuel components have included other hydrazine derivatives, and oxidizers have included IFRNA. Also in the past, solvents were used to flush the engines following each test.(1)(33) Discharges from the test area drain to the STL-IV-1 Pond or the STL-IV-2 Pond (SWMUs 6.6 and 6.7). All drainages leading from the test stand to the ponds are included with the ponds as part of those SWMUs. Waste MMH is treated on-site in a polypropylene ozonator tank. Incoming MMH is transferred by pipeline to a 4,000-gallon metal "MMH Vent Tank."(V1) No photographs were taken of the Test Area, the ozonator tank or the vent tank.

Status

The test area is currently operational. Air releases of NTO are permitted by the VCAPCD.(V1)

Waste Managed

After a rocket test, unused MMH is routed to an ozonator tank where it is broken down with ozone to carbon monoxide and carbon dioxide. The NTO used to be aspirated to the STL-IV Ponds (SWMUs 6.6, 6.7). After pond closure, it was aspirated to the drainage leading to the R-2 Discharge Ponds (SWMU 5.26). When NTO comes in contact with water, it reacts to form HNO_3.(V1)

In the past, solvents used to clean the engines were probably flushed into the drainages, as at the other test areas at Rockwell. A number of additional hazardous constituents were probably released from the test stands as the result of spills. For a more complete list, see the Waste Managed sections for SWMUs 6.6 and 6.7, the STL-IV ponds. Any additional contaminants found in the soil and groundwater beneath the ponds (see History of Releases Section for SWMUs 6.6 and 6.7) could have been released from the test area or may be breakdown products of the listed chemicals.

Release Controls

The MMH is normally sent to the ozonator tank where it is converted to nonhazardous gases. If the MMH concentration builds up in the ozonator tank, it is disposed of as hazardous waste. The ozonator tank is located within secondary containment.(V1)

Rockwell plans to stop releasing the HNO_3 generated upon aspiration of NTO with water to the site-wide water reclamation system. Rockwell originally planned to mix the NTO with water in a tank and neutralize the resulting HNO_3. But since the NTO is a listed hazardous waste (D078 is NO_2, which, according to the EPA representative, is in equilibrium with NTO), the neutralization tank would require a hazardous waste permit from DHS. Rockwell now plans to vent the NTO to the atmosphere pursuant to a VCAPCD permit.(V1)

There may be local release controls, such as drip pans and alarm systems in local areas of chemical use, but these were not investigated during the VSI. Prior to 1985, any spills able to escape the test stands would have gone to one of the STL-IV ponds (SWMUs 6.6 and 6.7). Currently any wastes could flow around the closed ponds and into the R-2 Discharge Ponds (SWMU 5.26).

History of Releases

The STL-IV Test Area may have released TCE or other solvents in the past along with the cooling water during testing. NTO was also regularly released. A review of Rockwell files revealed seven releases from the STL area between 1975 and 1990.(64)

- On November 12, 1981, 110 gallons of Freon were released.
- On November 19, 1981, carbon monoxide was emitted at a rate of 958 lb/hr for 599 seconds.
- On February 8, 1982, 3,300 gallons of EDTA and formic acid were spilled in an open field west of STL-IV.
- On July 6, 1989, 500 gallons of MMH wastewater were released from the ozonator.
- On July 12,1989, NTO was "Vented".
- On December 8, 1989, 5 gallons of isopropyl alcohol were released.
- On March 17, 1990, approximately 3 gallons alcohol were released.

This is not a comprehensive list, given the list of contaminants found in the STL-IV Ponds (SWMUs 6.6 and 6.7).

According to Rockwell personnel, the MMH vent tank containing product MMH has been venting MMH to the atmosphere for two to three years. Some MMH emissions are covered under the VCAPCD Permit.(V1)

Pollutant Migration Pathways

Soil, Groundwater, and Surface Water: Releases from the test stands immediately enter the drainages originally leading to the STL-IV Ponds (SWMUs 6.6, 6.7) and now leading directly to the R-2 Discharge Ponds (SWMU 5.26). Releases to soil, groundwater, or surface water would occur through these drainages and ponds.

Air: Releases to air of NTO and MMH are permitted by the VCAPCD.

Subsurface Gas: Subsurface gas generation would be unlikely given the nature of the fuels used at this SWMU.

6.6 SYSTEMS TEST LABORATORY IV POND #1 (STL-IV-1) AND ASSOCIATED DRAINAGES

Unit Characteristics

This 278,000-gallon capacity surface impoundment is located at the STL-IV Test Area (SWMU 6.5).(14) The unit was used for the collection of cooling water, aspiration water, area wash-down water, site runoff, and emergency spill containment and treatment. Prior to the late 1960s, the unit was an unlined, walled impoundment. In August 1983 the pond was deepened and lined. This SWMU includes the drainages leading from the test stands to the STL-IV-1 pond.

Status

The unit was taken out of use in 1985.(1) Closure activities were completed in 1988. Four soil samples were collected from three borings in the pond bottom with a maximum depth of 1.8 feet. Contaminants were found in the soil samples (see History of Releases section).

The concrete liner and surrounding soils were excavated and disposed of at a Class III disposal facility. The unit was backfilled with soil from the "Burro Flats Area IV" borrow site. One of three samples of the Burro Flats soil (which was used to backfill most of the impoundments) contained detectable levels of acetone, carbon disulfide, MEK, and TCE.(9)

Following a review of Rockwell's closure report submitted in September 1989 and the determination that groundwater contamination existed due to releases from this surface impoundment, DHS determined that the unit had not been clean closed. Therefore, Rockwell submitted a Post Closure Plan on March 29, 1990 for DHS review.(65)(V1)

Waste Managed

The impoundment received cooling water and other releases from the STL-IV Test Area (see SWMU 6.5). Attachment 6 is a list of contaminants which might have entered STL-IV-1 due to releases (from Reference 33).

The following compounds have been detected in water in the impoundment: Hydrazine, UDMH, MMH decomposition products as formaldehyde, acetone, chloroform, isopropanol, TCA, mercaptans, 1,1-DCA, TCE, trans-1,2-DCE, and carbon tetrachloride. The maximum concentrations of fuel products, by-products and VOCs occurred between 1975 and 1982. According to Rockwell, the mercaptans may have been a laboratory error.(33) Rockwell personnel stated that the pond may have received runoff from Area IV and that the acetone may have come from Area IV.(V1)

Release Controls

STL-IV-1 was lined in 1983 with a 3-inch Gunite liner.(33) The pond bottom was apparently below the water table at least during certain times of the year. Water leaked into and out of the pond depending on the relative levels of the pond water and the groundwater.(33) Presumably this was prior to lining, however, cracks were observed in the pond liner prior to closure that were damp at the time of soil sampling, indicating groundwater seepage into the pond.(33) The extent to which the drainages from the test area to STL-IV-1 were lined was not determined during the VSI, although it appears that they were lined in an illustration in Reference 33. During use, water in the ponds was sampled weekly, and released to the drainages leading to the R-2 Discharge Ponds (SWMU 5.26) if water quality was "acceptable." If hydrazines were detected, H_2O_2 was added to oxidize it.(33)

Currently, the impoundment has been closed and capped entirely with concrete (photo 41). A concrete or Gunite diversion channel carries runoff from the test area to the drainage leading to the R-2 Discharge Ponds (SWMU 5.26).(V1)

History of Releases

Water from the STL-IV-1 impoundment was released regularly to the STL-IV-2 impoundment (SWMU 6.7) and then to the R-2A Discharge Ponds (SWMU 5.26). According to Reference 33, if hydrazine was found in the impoundment it was treated with H_2O_2. A review of Rockwell files revealed several releases from the STL-IV Ponds (STL-IV-1 is not distinguished from STL-IV-2). On June 12, 1981, the ponds overflowed, resulting in the detection of 12 ppm hydrazine in R-2A Discharge Ponds. On January 26, 1982, a release of 50 gallons of isopropyl alcohol occurred; it is not clear whether it was released from or to the pond (pond 1 is specified). On April 15, 1983, a greater than normal amount of low pH water was released to the STL-IV ponds resulting in pHs of 2.7 and 3.1 in the pond. The low pH water was released to the R-2 ponds for dilution.(64)

Releases to soil have occurred; soil samples collected during closure from three borings in the pond bottom with a maximum depth of 1.8 feet contained acenaphthene, di-n-butyl phthalate, fluoranthene, N-nitrosodiphenylamine, phenanthrene, pyrene, bis(2-ethylhexyl)phthalate, and kerosene. A number of additional compounds were detected in both the samples and the laboratory blank. According to Rockwell, the source of the kerosene and base/neutral compounds is unknown.(33)

Releases to groundwater from STL-IV-1 probably have occurred. Groundwater in shallow zone wells downgradient contains TCE, trans-1,2-DCE, 1,1-DCE, TCA, 1,1-DCA, and vinyl chloride. Wells upgradient and lateral-gradient contain TCE, trans-1,2-DCE, and kerosene.(33) Reference 33 suggests that the upgradient and lateral gradient contamination could be the result of "solvent and fuel spills and the resulting wash-down of paved areas."

Apparently the shallow zone and the Chatsworth Formation groundwater systems are indistinguishable in this area.(33)

Pollutant Migration Pathway:

Soil, Groundwater, and Surface Water: Releases from the pond to all three media occurred while the pond was in operation. Further releases to surface water are unlikely, as the impoundment has been backfilled and capped. They may still be possible if runoff can leach contaminants from the drainages, or if contaminated groundwater discharges to surface water. Soil contamination may remain in the drainages and beneath the closed impoundment which could contribute to further groundwater contamination.

Air: Releases to air may have occurred in the past as the wastes were exposed to air, but are unlikely to occur presently unless spills from the test stands reach the drainages.

Subsurface Gas: Subsurface gas generation is likely as a result of the soil and groundwater contamination with VOCs.

6.7 SYSTEMS TEST LABORATORY IV POND #2 (STL-IV-2) AND ASSOCIATED DRAINAGES

Unit Characteristics

This 441,000-gallon capacity surface impoundment is located at the STL-IV Test Area (SWMU 6.5).(14) The unlined unit was used for the collection of cooling water, aspiration water, area wash-down water, site runoff, emergency spill containment and treatment, and overflow from the STL-IV-1 Pond (unit 6.6).(7) The unit began operation about 1960. Approximately 120 cubic yards of contaminated soil were removed from the bottom and sides of the impoundment.(33) This SWMU includes the drainage from the STL-IV-1 pond to the STL-IV-2 pond, which appears in a figure in Reference 33 to have been a pipe running under a dirt road between the two ponds.

Status

The unit was taken out of use in November 1985 and closure activities were completed in February 1989.(9) Closure activities included diversion channel construction, surface water removal, defoliation of the interior of the impoundment, backfilling, construction of a Gunite bypass channel, and installation of vegetated topsoil. Three soil samples were collected from three pond bottom borings with a maximum depth of 1.0 foot.(33) Contaminants were found in the soil samples (see History of Releases section). Apparently the water level in the pond at times (at least during the investigation in 1987), has been below the local water table so that groundwater probably discharged into the pond.(33) Because standing water was present at the time of soil sampling, the samples were collected around the perimeter of the saturated area.(33) The unit was backfilled with soil from the Burro Flats Area IV borrow site. One of three samples of the Burro Flats soil (which was used to backfill most of the impoundments) contained detectable levels of acetone, carbon disulfide, MEK, and TCE.(9)

Following a review of Rockwell's closure report submitted in September 1989, DHS determined that the pond had not been clean closed. Therefore, DHS required Rockwell to submit a Post Closure Plan. It was submitted on March 29, 1990 for DHS review.(V1)

Waste Managed

For a list of hazardous constituents that potentially entered STL-IV-1, see the Waste Managed sections of SWMU 6.5 and 6.6, and Attachment 6. The following compounds have been detected in the impoundment: UDMH, hydrazine, MMH "decomposition products as formaldehyde", chloroform, TCA, isopropanol, 1,1-DCA, TCE, trichlorotrifluoromethane, acetone, carbon tetrachloride, trans-1,2-DCE, and semiquantified amounts of 1,2-dichloro-1,1,2-trifluoroethane, oxygenated hydrocarbon C4, and trichlorotrifluoroethane.(33) The impoundment may have received runoff from Area IV, and Rockwell personnel stated that the acetone may have originated from Area IV.(V1)

Release Controls

STL-IV-2 was unlined. Water from the impoundment was discharged weekly from the impoundment to the drainage leading to the R-2 Discharge Ponds (SWMU 5.26) Reference 33 states that "water in the ponds was sampled weekly" and released if water quality was acceptable. It is not clear whether the samples were collected from STL-IV-1 or STL-IV-2. The impoundment has now been backfilled, capped, and vegetated (photo 42). A Gunite channel carries runoff from the test area around the closed pond and into the drainage leading to the R-2 Discharge Ponds (SWMU 5.26).(V1)

History of Releases

Waste from the impoundment was released regularly to the R-2 Discharge Ponds (SWMU 5.26). A review of Rockwell files revealed several releases from the STL-IV ponds. These are discussed in the History of Releases section for the STL-IV-1 pond (SWMU 6.6) as the record did not distinguish between STL-IV-1 and STL-IV-2.

Releases to soil have occurred (although the possibility must be considered that groundwater transported the contaminants from some upgradient source into the soil). The soil samples collected during closure contained TCE below the detection limit, diethyl phthalate, di-n-butyl phthalate, n-nitrosodiphenylamine and several additional compounds that were also detected in the laboratory blanks.(33)

It is not known whether releases to groundwater have occurred from this unit, as there are no downgradient wells. Groundwater upgradient of STL-IV-2 is contaminated (see list of contaminants under SWMU 6.6).(33)

Pollutant Migration Pathways

Soil, Groundwater, Surface Water, and Subsurface Gas: Releases from the impoundment to soil and surface water probably occurred while the pond was in operation. In addition, it is likely that releases to groundwater occurred also. Further releases to surface water are unlikely as the impoundment has been backfilled and capped. Soil contamination may remain beneath the closed impoundment which could contribute to groundwater contamination (the soil may at times be below the water table and so may be regularly flushed by the groundwater) and subsurface gas generation.

Air: Releases to air could have occurred in the past as the wastes were exposed to air, but are unlikely to occur presently unless spills from the test stands reach the drainages.

6.8 SILVERNALE RESERVOIR AND ASSOCIATED DRAINAGES

Unit Characteristics

This 6,000,000-gallon capacity unlined surface impoundment has been used for water storage and treatment.(14) The first date of operation for Silvernale was not determined, but it has probably been in use since the 1950s along with most of the other ponds. Silvernale receives runoff and cooling water from the Alfa and Bravo Test Areas (SWMUs 5.9 and 5.13) via the Alfa-Bravo Skim Pond (SWMU 5.12) prior to its closure, and currently from the Alfa Skim and Retention Ponds (SWMU 5.11) and the Bravo Skim Pond (SWMU 5.15) and associated drainages. Silvernale also received discharges from the Storable Propellant Area (SPA) Ponds 1 and 2 (SWMUs 5.16 and 5.17), and the Building 515 Sewage Treatment Plant when it was active. Silvernale probably receives additional runoff from a few smaller natural drainages. Water released from Silvernale flows to the R-2 Discharge Ponds (SWMU 5.26).(V1) This SWMU includes the drainages leading to Silvernale from the other impoundments.

Status

Silvernale Reservoir is currently active. During the VSI an aerator was in operation and the water was greenish-brown (photo 43).(V1)

Waste Managed

For wastes and constituents released or potentially released to Silvernale, see SWMUs 5.16, 5.9, 5.11, 5.12, 5.13, 5.15 and 5.17. Routine analyses of the water in Silvernale revealed low levels of hydrazine between 1971 and 1977, and on various occasions, "decomposition products as formaldehyde," acetone, chloroform, chloromethane, trans-1,2-DCE, methylene chloride, TCE, and trichlorotrifluoroethane.(33)

Release Controls

Silvernale Reservoir is unlined, but releases to the drainage leading to the R-2 Discharge Ponds (SWMU 5.26) are controlled by a gate.(V1)

There is an overflow spillway above the gate. The main spillway above and below the gate is concrete lined, but the extent to which the drainage between Silvernale and the R-2 Discharge Ponds (SWMU 5.26) is lined was not investigated during the VSI.(V1)

History of Releases

Water was released regularly from Silvernale Reservoir to the R-2 Discharge Ponds (SWMU 5.26). There may have been releases to soil or groundwater from Silvernale, but the existing data is insufficient to verify this. There are no wells immediately upgradient or downgradient of Silvernale. The groundwater beneath the upstream impoundments is contaminated. (For information regarding the groundwater contamination beneath the upstream impoundments, see the History of Release and Pollutant Migration Pathway sections for SWMUs 5.9, 5.11, 5.12, 5.13, 5.15, 5.16, and 5.17.)

Pollutant Migration Pathways

Soil, Groundwater, and Subsurface Gas: Contaminants entering the pond could infiltrate into the soil and groundwater, and generate a subsurface gas. Hazardous waste or hazardous constituents are less likely to enter the reservoir now than they were in the past, as better release controls have been implemented in the test areas.

Surface Water: Wastes and water entering Silvernale were and are regularly released to the R-2 Discharge Ponds and ultimately out the NPDES permitted outfall located in the Buffer Zone.

Air: Any VOCs reaching Silvernale could have been released to the air.

6.9 BUILDING 227, 224 ENVIRONMENTAL EFFECTS LABORATORY

Unit Characteristics

High pressure hydrogen tests are conducted in this laboratory. The building sits on a concrete pad which is also used to store drums of hazardous waste. The facility has been in operation since 1966.(V1) The unit was not photographed.

Status

The lab is in operation and a hazardous waste drum storage area is in use.(V1)

Waste Managed

Hazardous waste drums of oil, acetone, and TCA, and product oil drums were being stored in the area. Rockwell personnel stated that acetone and Freon were used to clean vessels in this area.(V1)

Release controls

The concrete pad has a drain that apparently leads to a ditch. The ditch was not investigated. The drums are stored on wooden pallets. Product oil tanks had drip pans, but an oil stain was observed on the concrete near one drip pan.(V1)

History of releases

No information was obtained regarding releases from this area.

Pollutant Migration Pathways

Soil, Groundwater, or Surface Water: Spills or leaks from hazardous waste drums could enter the drain and flow to the ditch. The ditch would have to be investigated to determine the potential for a release to soil, groundwater or surface water.

Air: The drums were covered, but a release to air could occur in the event of a leak or spill.

Subsurface Gas: Based on the release controls of this SWMU and the wastes in storage, subsurface gas generation would be unlikely.

6.10 STL-IV GROUNDWATER TREATMENT SYSTEM

Unit Characteristics

Rockwell personnel stated that groundwater is collected from ten shallow wells in the area but because of the drought they collectively produce less than 1 gpm. The treatment system apparently needs a flow of 2-10 gpm to operate. Water is currently being held in a fiberglass tank and trucked to the UV/H_2O_2 (swimming pool) Treatment System (SWMU 5.4).(V1) The design capacity and dimensions of this unit were not obtained. The STL-IV treatment system is shown in photo 22.

(This SWMU was included with the Area II SWMUs during the first iteration of this report. For that reason, the photograph associated with this SWMU is in the Area II chapter.)

Status

The STL-IV treatment system is not currently in use.

Waste Managed

Groundwater contaminated with VOCs is treated by this unit.

Release Controls

The treatment system is within concrete secondary containment.

History of Releases

No releases from this unit have been documented.

Pollutant Migration Pathways

Soil, Groundwater, Surface Water, and Subsurface Gas: This SWMU has secondary containment that should prevent any releases to the above media. However, if a spill occurs while the groundwater was being transferred to the fiberglass tank, releases to all of the above media would be possible.

Air: The treatment process could result in a release to air if it did not function properly or if a leak were to occur while the groundwater was being transferred to the fiberglass tank.

6.11 AREAS OF CONCERN - AREA III

Leachfields for Area III

One active leachfield is located at the ECL (Building 270). It should be determined if any hazardous waste or hazardous constituents exist at these sanitary leachfields.

The Area III leachfields were not investigated during the VSI.

BUILDING 260 ECL RUNOFF TANKS

Two polyethylene tanks are used to contain runoff from the southeast side of the concrete pad surrounding the ECL building, the ECL waste tank, and the product storage tanks and containers (SWMU 6.1) (photo 33). The runoff could contain hazardous constituents from the ECL waste tank (SWMU 6.1) or spillage from any of the product containers and tanks on the pad. For a description of some of the chemicals stored on the pad and the wastes stored in the waste tank, see SWMU 6.1. According to Rockwell personnel, the tanks have capacities of approximately 3,000-gallons each, but together can actually hold less than 5,000 gallons, as the pipes coming from the pad enter the tanks below their tops. Water collected in these tanks is sent to the UV/H_2O_2 treatment system (SWMU 5.4). Before the installation of these tanks, runoff went to the Suspect Water Pond (SWMU 6.2).(V1)

The tanks themselves are release controls for SWMU 6.1. They do not have secondary containment. If they were to overfill, water would back up and flood the concrete pad (SWMU 6.1).(V1) There is no documentation concerning releases from this unit.

The tanks ordinarily contain only rainwater, however, they would receive hazardous wastes or hazardous constituents only in the event of a spill on the concrete pad. Releases of hazardous wastes or constituents from the tanks could only occur in the event that the tanks leaked following a spill on the concrete pad.

AREA III SEWAGE TREATMENT PLANT

This unit is a small package activated sludge plant which receives an average flow of approximately 20,000 gpd from Areas II, III,(1) and IV (photo 37).(V1) The plant is designed to process 35,000 gpd. Both sanitary sewage and cooling water discharges are received and treated by the unit. The facility consists of a comminutor, source aeration unit, clarifier, an activated charcoal filter and a chlorine contact chamber. The secondary effluent is discharged from the plant to the R-2A Discharge Pond (SWMU 5.26).(1) According to Rockwell personnel during the EPA site visit of February 4, 1991, the plant began operation in the late 1950s.(V1)

The unit receives sanitary sewage and discharges from cooling towers. According to Rockwell personnel, the cooling tower effluent is treated with DOW Biocide, rather than chromium. Treated groundwater from Rockwell's groundwater recovery and treatment systems also ends up in the Area III Sewage Treatment Plant, as it is used for nondrinking domestic purposes such as toilet flushing.(V1)

Since effluent from Area IV is received at the Area III Sewage Treatment Plant, the effluent is monitored for radioactivity before it is discharged. According to Rockwell personnel, the results of this monitoring are submitted to the DOE in an Annual report.(V1) According to Rockwell personnel, the radioactivity monitor has not detected radioactivity at the Area III Sewage Treatment Plant. (EPA site visit of 2/4/91).

The treatment tanks are below grade, approximately 10 feet, and made of metal. Approximately six inches stick up above the ground surface. From the tanks, effluent flows to a concrete below grade chlorine contact chamber. If the filters clog and sewage backs up in the system, an alarm will sound and the sewage will overflow into two below grade concrete lined holding pits. There are two large plastic Baker tanks nearby to store sewage when parts of the system are being cleaned.(V1)

Beyond the Sewage Treatment Plant is an unlined surface impoundment that, according to Rockwell personnel, would be used to contain sewage effluent if significant radioactivity were detected. The impoundment was empty during the VSI and apparently has never been used.(V1)

On January 11, 1989 approximately 50 gallons of partially treated water were released at the unit. The release was contained in the bermed overflow area and there were no releases to the SSFL water reclamation system. The alarm system and holding pits were installed as a result of this release.(V1)

Releases of untreated sewage are unlikely as the system consists of lined tanks, an alarm and a backup system. Treated effluent is discharged to an unlined creek which drains to the R-2A Discharge Pond (SWMU 5.26). If an increased level of radioactivity were detected, however, the water would be discharged to an unlined impoundment which could result in releases to soil, groundwater, or surface water of radioactivity.

There are no release controls for air; a release could occur if VOCs were in the sewage waste stream.

AREA IV

SOLID WASTE MANAGEMENT UNITS

7.0 AREA IV

7.1 BUILDING 056 LANDFILL

Unit Characteristics

The Building 056 Landfill occupies an area less than a quarter acre on the northwestern edge of the SSFL, approximately 300 feet west of Building 059 (photo 44). Drums were stored on top of the landfill. In 1980 and 1981, 89 drums were removed. These drums were found to contain oils, alcohols, sodium and sodium reaction products, grease, phosphoric acid, and asbestos.(28) Because of the potential for groundwater contamination at the landfill, a groundwater monitoring well was installed in 1985 south of the landfill. The well (RD-7) was found to be contaminated with up to 130 parts per billion (ppb) of TCE (photo 45). Soil samples taken showed oil and grease up to 1,100 mg/kg.(2)(45)(V2) (See below in Wastes Managed, Release Controls and History of Releases.) Soil from the excavation of the planned Building 056 SNAP Facility, which was never built, and soil from the SCTI facility was deposited here to cover the landfill in 1969. The landfill is immediately northwest of the large hole that was excavated for the Building 056 SNAP facility. The excavation has sheer vertical rock sides, is surrounded by a chain link fence, and has approximately 10 feet of water (photo 46).(2)(V2) The DOE Phase II report indicates that this site qualifies as a potential CERCLA site under DOE Order 5400.4 (which supersedes 5480.14 and 5480.1A).(13)(28)(42)

Status

The landfill was created in the early 1960s and covered in 1969 with Building 056 excavated soil.(V2)(2)

Wastes Managed

It is unknown if hazardous wastes were disposed in this landfill, however, it is known that 55-gallon containers of oils, alcohols, sodium, sodium reaction products, grease, phosphoric acid, and asbestos were stored on top of the landfill. Soil samples from the landfill indicate elevated levels of oil and grease.(2)(V2) This would suggest that Rockwell disposed of waste oil in the landfill, probably during the 1960s when this practice was common.

Release Controls

No information is available regarding the release controls employed at this SWMU (if any) during its active life. Groundwater is being monitored to determine the presence of contamination.

History of Releases

A potential source of groundwater contamination was present due to the placement of 89 drums of hazardous waste on the landfill. These drums were removed in 1980-81. Groundwater samples from deep well RD-7 indicate VOCs, mainly TCE, are present. It is not anticipated that the TCE contamination is originating from the landfill, since the whole facility shows widespread TCE contamination resulting from rocket engine testing during the 1950s. Soil samples taken showed oil and grease concentrations up to 1,100 mg/kg.(2) No other record of hazardous waste release is available for the Building 056 Landfill.(28)

Pollutant Migration Pathways

Soil, Groundwater, and Air: Although it is unclear if the TCE contamination found in the groundwater was released from this SWMU, it still presents a pollutant migration pathway for continuous releases for the generation of subsurface gas. Soil contaminated with petroleum hydrocarbons was more than likely released from this SWMU, therefore becoming a continued source of contamination to groundwater and a potential source of releases to air.

Surface Water: This landfill is located on a steep ravine that leads toward one of the drainage ditches which eventually would discharge through one of the R-2 Discharge Ponds (SWMU 5.26) and then out to Bell Canyon Creek. If contamination is present in the surface soil, erosion could lead to a release to surface water.

Subsurface Gas: Due to the presence of VOCs in groundwater, subsurface gas generation is probable.

7.2 BUILDING 133 SODIUM BURN FACILITY

Unit Characteristics

This facility was built in 1978, and according to DOE representatives, was originally a drum storage yard. A RCRA permit was issued by DHS in December 1983, allowing for the treatment and storage of sodium wastes. The facility is located in the northeast section of Area IV. Equipment was stored in this area during the 1960s and 1970s. The DOE Phase II report indicates that this site qualifies as a potential CERCLA site under DOE Order 5400.4.(13)(28)

The SWMU was designed for reaction of waste materials containing metallic sodium as well as wastes containing impurities such as sodium-potassium (NaK) alloys and hydrides of alkali metals.(47) The treatment process occurs via oxidation of the sodium to produce sodium oxide. The sodium oxide fumes are absorbed by a liquid Venturi scrubbing system to produce sodium hydroxide. Waste liquid sodium hydroxide is disposed of off-site, however, if the pH is between 12-13, it is transported to other Rocketdyne facilities "as a product." (28)(V2) Drainage from the scrubber went to an underground storage tank which was removed in 1987.(V2)(28) The tank was replaced with a double-lined, vaulted, underground tank (see photo 71).

Status

The RCRA permit for this facility is still active. This facility has been inactive since 1987; however, the sodium burn facility is activated when wastes need to be treated.(1)(42) Soil samples collected in 1988 showed gross beta radioactivity up to 51.6 $\pm$ 8.0 pCi/g, sodium up to 6,900 mg/kg and potassium up to 11,000 mg/kg in the soil. According to a study completed by Groundwater Resources Consultants and reported June 1, 1990, the latter two contaminants are at least an order of magnitude above background.(40)(41) The gross beta activity levels were almost twice as high as background, according to another Groundwater Resources Consultants' report dated March 23, 1990.(31)

Waste Managed

Scrubber rinse water is stored in a double-lined tank (actually a sump) labeled "Caustic," installed approximately two years ago (see photo 71).(V2) According to DOE representatives, the pH of the scrubber liquid is not controlled.(V2) The sump has two alarms, one is a "local" alarm, and the other sounds when liquid is detected between the liners.(V2)

The Building 133 Sodium Burn Facility area is a source of soil and potential groundwater contamination. Soil analysis indicates a pH of 10-11 at this site, probably due to the use of a liquid scrubbing system that absorbed the sodium oxide and generated sodium hydroxide that leaked from an underground storage tank. In addition, Freon and chlorinated solvents, 3,100 mg/kg.(13)(28) The pH of the soil has been as high as 9.5 at the surface and 10.4 at a depth of 5-5.5 feet.(13)(47) In addition, PCB and PCT have been detected at 2.6 mg/kg and 1.4 mg/kg, respectively, and oil and grease at 3,600 mg/kg. Also some transport of arsenic, chromium and lead (all between 0.14 and 0.35 mg/ℓ) were detected in surface water runoff.(13)

During the 1980-81 clean-up activities, radiation surveys, soil sampling and soil excavations were conducted. Contamination was detected in a layer 8 inches below the surface in a "block [sic] tar type substance." The soil was excavated down to 2 feet after first removing a piece of pipe-like materials that appeared to be the source of a greater than 3,000 μgR/hr reading. On December 4, 1980, after a 1-inch rainfall, the excavated area filled and the dam between the upper and lower ponds washed out, allowing the runoff from the upper pond to run across the lower pond and out onto the road. According to this same report, background radioactivity (5-10 μR/hr) was detected in residual water.(13)

On January 19 and 25, 1990, representatives of the Regional Water Quality Control Board took soil and groundwater samples and determined that the lower pond area is subject to the requirements under the Toxic Pits Cleanup Act. The results of the samples showed that the lower pond area was contaminated with DCA at 1,500 ppb, methyl isobutyl ketone at 1,300 ppb, toluene at 3,000 ppb, and TCE at 4,100 ppb.(63)

Pollutant Migration Pathways

Soil and Groundwater: Releases have occurred in the past as discussed above. Future releases to soil and groundwater are low since this SWMU is inactive, however, soil contamination could be a source of contamination to the groundwater. Cattle were observed drinking water from puddles of water formed several feet away from the unit due to a leaking water faucet.(V2) In addition cattle feces were observed inside the unit's pond areas. Therefore, cattle have been exposed to contaminated soil.(V2)

Surface Water: The potential for releases to surface water is likely from poor run-on and runoff controls causing erosion of the contaminated soils.(13)

Air: A potential for continued releases to air exists from soil contaminated with VOCs, heavy metals, and radioactivity.

Subsurface Gas: Due to the presence of VOCs in groundwater, a potential for subsurface gas generation exists.

7.4 CONTAINER STORAGE AREA (OLD CONSERVATION YARD)

Unit Characteristics

The Old Conservation Yard is located in the northeast section of SSFL Area IV and covers an area of approximately 300 feet by 400 feet.(2) It was operational from the early 1960s through the early 1980s.(13)(27)(V2) The DOE Phase II report indicates that this site qualifies as a potential CERCLA site under DOE Order 5400.4.(13)(28)

Status

The SWMU is currently inactive. It is an unlined, noncontained area on which hundreds of drums of unknown contents were stored during the 1970s.(31) Soil samples collected in 1988 showed up to 4,000 mg/kg hydrocarbons, 6 mg/kg methylene chloride and 7.1 mg/kg vinyl chloride in the soil.(V2)(31) According to a study conducted by Groundwater Resources Consultants, radioactive contamination was detected to be at background levels (7.3 ± 9.6 pCi/g to 29.6 ± 6.3 pCi/g gross alpha; and 22.5 ± 6.4 pCi/g to 45.0 ± 7.0 pCi/g gross beta contamination). Average background concentrations for gross alpha and beta in soil have been measured to be 25 ± 7 pCi/g and 25 ± 2 pCi/g, respectively. However, during a Rockwell survey to assess radioactive contamination, ^{137}Cs was found to be up to 200 pCi/g.(7) In 1989, four metal containers of radioactively contaminated dirt were excavated and are currently awaiting transport and disposal off-site.

In addition, piping from a 1.25 million gallon diesel product tank was removed (photos 54 and 55). The underlying soil was found to be contaminated with total petroleum hydrocarbons. In 1988, a GRC/Rocketdyne report indicated that soil contamination due to petroleum hydrocarbons occurred at 4,000 ppm of hydrocarbons in the C-22 range.(7) During the tank removal, 100 cubic yards of soil was excavated (photo 53). The EPA requested Rockwell to halt clean-up activities until a work plan for the site characterization was completed and approved by DHS.(65)(V2)

Waste Managed

Aerial photographs indicate that hundreds of drums and pieces of equipment were stored in this area during the 1960s and 1970s. No analytical or inventory information is available on the contents of the drums.(2)(V2)

Release Control:

No record of methods used to prevent releases of hazardous waste or constituents was found. The soil is composed of sandy silt and the depth to bedrock is not known.(17)(V2)

History of Releases

Hydrocarbon and radiological contamination has been detected in the soil. A survey in 1988 found low levels of ^{137}Cs in Rockwell soil that had accumulated on the surface of a paved area. The radioactivity and hydrocarbon contaminated soils were removed from the Old Conservation Yard in July 1989.(V2)

Pollutant Migration Pathways

Soil, Groundwater, and Surface Water: Releases to soil have occurred in the past as discussed above and could be a source of releases to groundwater and surface water from erosion.

Air: Due to the presence of contamination on the soil surface, releases of radioactive airborne particulates may have occurred before the contaminated soil was removed and/or during removal. Currently, it is not known if radioactive contamination still remains in the soils.

Subsurface Gas: Some subsurface gas generation is likely due to the presence of VOCs in the soil.

7.5 BUILDING 100 TRENCH

Unit Characteristics

The Building 100 Trench is located in the west-central portion of Area IV. The trench was visible in aerial photographs from 1961-1967.(7) The trench is estimated to be an oval approximately 75 feet long and 25 feet wide at its widest point (photo 56). From 1960 through 1966 the trench was used for the burning and disposal of construction debris and possibly hazardous substances.(V2) The site was paved over in 1971, and Buildings 462 and 463 were constructed at this location. The DOE Phase II report indicates that this site qualifies as a potential CERCLA site under DOE Order 5400.4.(13)(28)

Status

Rockwell submitted to DOE the "Assessment of Subsurface Soils at the SSFL Area IV Old Conservation Yard and B 100 Trench" to assess the extent of contamination in soil and groundwater. The work plan is currently undergoing National Environmental Policy Act (NEPA) review. Monitor well RD-7 is located downgradient (and adjacent to the Building 056 landfill, SWMU 7.1) and has detected TCE up to 130 ppb. It is currently unknown if the source of the TCE is from this unit or the landfill.(13)(V2) A concrete-lined ditch is used to collect surface water that runs off from Building 100. The water is analyzed for VOCs, heavy metals and hydrocarbons (photo 57).(V2)

Waste Managed

No file information was available on the inventory of wastes disposed in the Building 100 trench.

Release Controls

No information is available concerning release controls.

History of Releases

Aerial photographs taken in 1961-67 indicate portions of the soil within this site darkly stained, presumably with petroleum hydrocarbons. Soil samples indicated concentrations of petroleum hydrocarbons at 300-400 ppm.(5)(31)

Pollutant Migration Pathways

Soil and Groundwater: Percolation of rainwater through the trench would not occur since the unit is paved over. However, if the pavement is deteriorated, releases could occur.

Surface Water: Runoff from the contaminated soil is unlikely since the unit is paved with asphalt. However, if the pavement is deteriorated, releases could occur.

Air: Since this SWMU is paved with asphalt, releases to air are unlikely.

Subsurface Gas: Due to the presence of TCE in the groundwater, subsurface gas generation is likely.

7.6 RADIOACTIVE MATERIALS DISPOSAL FACILITY (RMDF)

Unit Characteristics

This site is located in the north-central portion of Area IV. It began operation in 1959 and consists of a complex of buildings including Buildings 21, 22, 34, 44, 75, 621, 658, 665, 688, the RMDF Drainage Pond, and an inactive leachfield. Operations performed at the RMDF include, but were not limited to, handling, treatment, and storage of high-activity and low-level radioactive wastes and materials.(2)(V2) A tentative closure date has been set for fiscal year 1995, or later.(V2) According to DOE, Buildings 21, 22 and the RMDF leachfield may qualify as a CERCLA site under DOE Order 5400.4.(13) Buildings within the RMDF that are sources of radionuclide emissions include Buildings 21, 22, 75 and 621.

Status

The operation and status of each building and portion of this SWMU is identified separately as follows:

Building Number:

21 Evaporation and solidification of liquid radioactive waste. Floor drains collected waste rinse water into a 200-gallon, double-lined, underground storage tank. The tank was removed in 1972, although its associated piping was not removed until 1985 or 1986.(V2) Located outside of the building is an area where the asphalt appears to be darker. This is an area where a radioactive spill occurred and the asphalt was painted over to contain the radiation (photo 60).(V2) Horizontal piping contains HEPA filters to remove airborne radioactive particulates (photos 61, 62). A monitor is located inside the filter that monitors for gross alpha, beta and gamma radiation before discharge from a 130-foot stack to the atmosphere.(V2)(31) A 5-gallon container of metallic sodium was in storage during the VSI.(V2)

22 Storage facility for high-level radioactive materials and waste, and mixed waste. In March 1989, Rockwell submitted a revised Part A Application to EPA for storage of mixed waste.(65)(V2) A 2-liter container of radioactive mercury and a 9-pound container of silicon oil were in storage during the VSI.(V2)

34 Administrative and Engineering Offices.(V2)

44 Health Physics Services.(V2)

75 Storage of low-level radioactive waste and mixed waste. Interim storage of transuranic waste. A revised Part A Application has been submitted to EPA. Radioactive waste is packaged for off-site shipment.(V2)

621 Radioactive source storage for materials used in research activities when not in use, also storage of mixed waste. A revised Part A Application has been submitted to EPA.(V2) A 700-gallon container of waste antifreeze was in storage during the VSI.(V2)

658 Security.(V2)

665 Emergency Decontamination Supplies Storage.(V2)

688 Hazardous Materials Storage Shed.(V2)

Drainage Pond: Collects drainage from the RMDF. Currently the pond contains sediments and water, and is being used as runoff control (photo 58). A float in the pond, which is an ambient air sampler, monitors for gamma radiation. Another air sampler for airborne radioactivity is located across the ravine.(V2) However, according to Rockwell, this air sampler is located within the pond enclosure and samples for airborne particulate radioactivity.(42)

Leachfield: Operated from 1959 - 1961 for sanitary waste water from the radioactive waste processing area located at the west end of Building 021 (photos 58, 59). In 1961, the Central Sanitary Sewer System was constructed and the leachfield was discontinued.(V2)

Waste Managed

The majority of documented wastes managed at these buildings are radionuclides such as ^{90}Sr and ^{137}Cs and low-level radioactive fuel.(5)(28)(V2) According to Rockwell and DOE representatives, the last shipment of radioactive fuel off-site occurred on May 18, 1989. A revised Part A Application has been filed with the DHS and EPA to include mixed waste storage resulting from the decommissioning and decontamination procedures occurring throughout Area IV.(V2) The mixed wastes would include mercury, TRU lead, sodium, and ethylene glycol.(V2)

Release Controls

Air from Buildings 21 and 22 passes through a HEPA filter and discharges through a 130-foot stack. Particulate matter captured contains uranium, plutonium, ^{137}Cs, ^{90}Sr, ^{85}Kr, and ^{147}Pm as mixed fission products and ^{60}Co and ^{152}Eu as activation products.(13) According to

Rockwell, continuous sampling of the stack is conducted and the HEPA filters are changed when needed and as indicated by pressure drop measurements across the filters.(42)

The 8,000-gallon underground storage tank associated with Building 22 is double-lined with leak detection devices, and was installed in 1987.(13)

The Drainage Pond has been sealed with coated asphalt to prevent leakage. The pond is equipped with a radiation monitor connected to an alarm system to warn if any radioactive contamination enters the pond.(13)(V2)

The leachfield was excavated to bedrock in 1978 and cracks in the bedrock were sealed with tar and the area was backfilled.(7)(13)(V2) Gross beta concentrations in soil samples from the leachfield were reported as high as 4,970 ± 176.9 pCi/g. The average background concentration is 25 ± 2 pCi/g.(31) This is almost 200 times background. An Assessment Plan is currently in preparation to quantify the extent of contamination in the soil immediately surrounding the facility. According to facility representatives, all radionuclides are contained within the asphalt paving.(13)(V2)

History of Releases

During the fall of 1962 or spring 1963, the RMDF radioactive water processing system leaked to the RMDF leachfield.(31)(47)(V2) In 1978, clean-up of the leachfield consisted of excavating approximately 36,000 cubic feet of contaminated soil and shipping off-site as a radioactive waste. Cracks in the bedrock showed radioactive contamination down to at least 10 feet below the bedrock surface. The cracks were sealed with tar and the leachfield backfilled with soil to below the original grade.(31)(47)(V2) The surface soil was sampled and found to be contaminated with low levels (ppb range) of toluene, methylene chloride, MEK, total xylenes, and ethylbenzene. According to a study conducted by Groundwater Resources Consultants, gross alpha and gross beta radiation were determined to be at background levels.(31)

In addition to the radioactive process water released to the leachfield in 1962 or 1963, the following radiological releases have been documented at the RMDF:(V2)(39)

- On February 14, 1978 excessive rainfall in January and February caused an estimated release of 2 microcuries (μCi). Catch basins were installed, 42,000 gallons of water were pumped to storage, and the leachfield was removed from service.
- On May 22, 1978 a sump pump failed and caused overflow of a 5,000 gallon hold-up tank containing radioactive liquids. Approximate release of 2 μCi.
- On January 17, 1979 contaminated process equipment was washed down and approximately 400 μCi of ^{90}Sr and ^{137}Cs were released into the drainage ditch.

7.7 ROCKWELL INTERNATIONAL HOT LABORATORY (RIHL) (Building 20)

Unit Characteristics

This building was used for preparation and shipment of irradiated reactor fuel for reprocessing from 1959 through 1987.(13)(V2) The radioactive fuel decontamination ended in 1987 and disassembly of Building 20 began in late 1989. Rockwell representatives anticipate that decommissioning activities will continue through 1993.(V2) No photograph was taken of this unit during the VSI.

Status

Rockwell submitted a revised Part A Application in March 1990 to include mixed waste storage at Building 20.(V2)

Waste Managed

Three 5,000-gallon underground storage tanks were located at this SWMU; two of which were empty and one contained a diesel/water mixture. These tanks were not double-lined, however, one was vaulted.(V2) They were originally used for storage of the fission gases, xenon and krypton, while they radioactively decayed. Rinse water contaminated with radioactivity drains from the cells and enters a 3,000-gallon holding tank.(V2) From here, it is pumped to a portable tank and then transported to RMDF (SWMU 7.6). An electropolishing solution composed of sulfuric and phosphoric acid is used to decontaminate the liquid waste drain system in place. This is followed by a rinse with a caustic cleaner (trade name Big-K) and later, by a water rinse. According to Rockwell, the acidic solution and spent Big-K will be considered a waste, however, it is presently still in use.(V2)

Past practices of outdoor storage and/or dispensing of solvents may have resulted in soil contamination. There is contamination in the Hot Lab from fuel decladding projects. This fuel would have all of the radionuclide constituents characteristic of spent fuel such as transuranics ($^{239-241}Pu$, ^{241}Am, and ^{252}Cf) and fission products (^{60}Co, ^{137}Cs, and ^{90}Sr).(13) The mixed wastes are radioactive contaminated lead, paint from sandblasting, acidic waste, and mercury.(V2) Other wastes include radiologically contaminated chem-wipes, soil and rinse water.(V2)

Release Controls

Since 1988, a newly constructed HEPA filter system has been used to trap airborne particulate radionuclides prior to release through a stack during the decontamination and decommissioning procedures.(13)(47) Prior to 1988, radioactive air emission from the Hot Laboratory were a significant fraction of the total SSFL air emissions.(13) A continuous stack exhaust monitor measures the activity of the effluent air and will alarm at a preset point.(47)(V2) The pipes leading from the hot cells to the 3,000-gallon holding tank are embedded in concrete.(V2)

All three underground storage tanks located at this site were removed in December 1989. According to Rockwell, the area around them was sampled and found not to be contaminated.(V2)

History of Releases

The file does not indicate whether releases of hazardous waste or hazardous constituents occurred at this unit. However, it was determined that prior to 1988, radioactive air emissions from Building 20 were a significant fraction of the total radioactive air emissions from Area IV.(13)(47) Also, on March 22, 1982, a 6 μCi release from a vacuum furnace of Zr fines occurred when the fines oxidized and resulted in a small violent reaction.(39) On April 16, 1986, 1.57 mCi of ^{90}Sr were probably disposed of along with hazardous waste.(39)

Pollutant Migration Pathways

Soil, Groundwater, and Surface Water: A very low potential for a release of the radioactively contaminated acidic rinse water to the soil, groundwater, and surface water exists given the piping is embedded within three feet of concrete.(V2)

Air: A low to medium potential for release of radioactively contaminated airborne particulates exists if improper maintenance of the HEPA filters occurs.

Subsurface Gas: Based on the contaminants present and the extent of secondary containment, subsurface gas generation is not expected to exist.

7.8 NEW CONSERVATION YARD

Unit Characteristics

The New Conservation Yard is 100 feet by 200 feet and located across the service area road to the south of the Old Conservation Yard (SWMU 7.4).(7)(31)

Status

The New Conservation Yard began operation in 1978 and is currently active.(V2) The DOE Phase II report indicates that this site qualifies as a potential CERCLA site under DOE Order 5400.4.(13)(28)

Waste Managed

The New Conservation Yard has been used for storage of used nonhazardous equipment and drums since the late 1970s prior to their potential salvage.(1) During the VSI, stained soil was observed as well as a potential asbestos gasket (photo 65).(V2)

Release Controls

No release controls are in place at this unit.(V2)

History of Releases

A DOE survey of May 1988 indicated that there were small areas of stained soil and dead vegetation visible at this site (photos 63-67).(7)(31)(V2) Soil samples collected in August 1988 indicated contamination with toluene at 0.11 mg/kg at the 1-1.5 foot level.(31)

Pollutant Migration Pathways

Soil and Groundwater: Soil contamination has been detected and could be a source of releases to groundwater in the future.

Surface Water: Based upon the waste managed and the unit description, surface water releases are unlikely.

Air: Not enough is known about the wastes managed at this unit to determine if air releases have occurred in the past.

Subsurface Gas: Not enough is known about the wastes managed at this unit to determine the potential for subsurface gas generation.

7.9 ESADA CHEMICAL STORAGE YARD

Unit Characteristics

ESADA (the Empire State Atomic Development Authority) site is located on the western edge of Area IV and was used from 1960 through 1968.(2)(V2) The site size is approximately 100 feet by 150 feet (photo 69). The area was used for testing sodium which consisted of purposely faulting the lines to determine if or how they would explode. The DOE Phase II report indicates that this site qualifies as a potential CERCLA site under DOE Order 5400.4.(13)(28) No indication of construction methods o· materials is available from the submitted reference documents.

Status

The site is currently a pistol range.(1)(2)

Waste Managed

The DOE reported that 50 to 100 drums were stored in this area in the 1970s, containing alcohols, sodium oxide solids and sodium hydroxide produced during the tests.(31)(V2) These drums were removed, the alcohol wastes going to the Component Handling Cleaning Facility (CHCF), Building 463, and the sodium wastes going to ETEC.(V2) Rockwell representatives stated that the drums found at this unit were not related to the ESADA, however, Rockwell personnel found the flat area to be an adequate drum storage area (photo 70).(V2)

Release Controls

Soil samples collected in August 1988 were analyzed and, according to DOE, did not indicate any levels exceeding federal or state standards.(1)(31)

History of Releases

There are no documented releases, however, six soil samples were collected around the drum storage area. The results indicate that contamination exists from hydrocarbons (0.9 mg/kg), sodium (up to 732 mg/kg), potassium (up to 2550 mg/kg) and pH (8.37).(31)(V2) A groundwater monitoring well was installed, but was too dry to yield any samples.(V2)

Pollutant Migration Pathways

Soil and Groundwater: A very low potential exists for releases to groundwater from the soil contamination present. However, the depth to groundwater may be too low to be affected.

Surface Water and Air: Not enough is known about the release controls during the operations of this SWMU to determine if releases to surface water or air have occurred. Based on the fact that the drums have been removed, future releases to surface water and air are unlikely.

Subsurface Gas: Not enough information is known about the wastes managed at this SWMU to determine if subsurface gas generation is probable.

7.10 BUILDING 05 COAL GASIFICATION

Unit Characteristics

This is the location of the former Old Molten Salt Test Facility. The Coal Gasification experiment converted low BTU and low sulfur coal to gas.(13)(V2)

Status

The unit was operational from 1958 through 1963 when it was conducting molten research (V2) and then from 1977 through 1981 when the gasification of coal occurred.(13)(V2) The Bowl Area (Area I) was the site of a pilot test for the gasification of coal.(13)

Wastes Managed

This was an experimental coal gasification facility which is no longer in operation. This process generated a "green liquor" waste water which contained organics, sulfur compounds and ash. The green liquor was filtered, the ash was disposed, the sulfur was stripped and removed as sodium sulfate, and the sodium was recycled. Coal was stored on adjacent property and transported pneumatically to the plant. During the period of operation, approximately 80,000 gallons of green liquor were generated and disposed of as hazardous waste.(V2) Two storage tanks are located in this area, one of which is an 8,000-gallon aboveground tank. An underground tank still contains waste sodium hydroxide. The facility is scheduled for decommissioning in the near future. The plan is to dismantle and dispose of the system with an expected completion date to be the end of 1991.(48)(V2) According to Rockwell, however, the expected year of completion has been extended to 1993.(42)

Release Controls

The green liquor has been removed from the tanks and taken to an off-site hazardous waste facility.

History of Releases

The following reportable spills occurred at this facility.(39)

- On May 7, 1981, an unknown quantity of molten salt carbonate was spilled at the Process Development Unit (PDU) due to gasket and equipment failure. Liquid went into storm channels which drain into R-2A Discharge Pond (SWMU 5.26).
- On February 11, 1980, several hundred gallons of sodium bicarbonate solution contaminated with coal ash was spilled due to overfilling a storage tank.

- March 16, 1979, an unknown quantity of molten salt mixed with 500-1,000 gallons of water, which does contain cyanide and some metals, spilled due to a tank overflow. Liquid went into storm channels which drain into R-2A Discharge Pond.

Pollutant Migration Pathways

Soil, Groundwater, Surface Water, and Air: Although releases of radiological and chemical contaminants have occurred in the past, a very low potential exists for continued releases to groundwater, surface water and air from the existing soil contamination. However, the depth to groundwater may be too low to be affected, and thereby releases to it would not be expected.

Subsurface Gas: Not enough is known about the waste characteristics to determine if subsurface gas generation is potential.

7.11 BUILDING 29 REACTIVE METAL STORAGE YARD

Unit Characteristics

This SWMU was not identified during the PR. It is a RCRA permitted, bermed, and concrete-based container storage area for radioactive, reactive and mixed wastes.(13)(V2) According to Rockwell, however, ^{137}Cs capsules used to be stored under the floor of Building 29. A capsule broke and contaminated the cell with radioactivity. In addition, according to Rockwell, the cell at Building 29 was decontaminated in approximately 1989.(EPA site visit 2/4/91) No photograph was taken of this unit during the VSI.

Status

During the VSI, a 5-gallon container of radioactive waste was in storage in this storage yard.(V2) Underground cold traps contain sodium metal. The contents of the cold traps could not be observed during the VSI because, according to Rockwell representatives, they are virtually impossible to open the cold traps by hand.(13)(V2)

Waste Managed

The wastes that are managed include reactive metals (such as sodium metal, lithium hydride as was discussed during an EPA site visit on February 4, 1991).(V2)

Release Controls

According to Rockwell representatives, the sodium metal is in underground cold traps that are sealed closed. They stated that they are double contained and pose little threat of potential releases.(13)(V2)

History of Releases

No releases from this SWMU have been documented.(V2)

Pollutant Migration Pathways

Soil, Groundwater, and Air: Rockwell representatives are unable to determine if any releases have already occurred to soil.

Surface Water and Subsurface Gas: A release to surface water and subsurface gas generation are unlikely based on the wastes managed and the secondary containment and release controls.

7.12 AREAS OF CONCERN - AREA IV

During evaluation of Rockwell International's waste management and release data, an area has been identified as an AOC.

BUILDING 059 (FORMER SNAP REACTOR FACILITY)

Building 059 was a test facility for SNAP systems reactors, built in 1962 and operated until 1964. In 1964, the system was shut down for building modifications. In January 1969, the SNAP Prototype Reactor commenced operation and operated until December 1969. Partial decontamination and decommissioning of the facility began in June 1978. The reactor core and associated NaK systems were removed and the reactor cell pit was sealed, however, some parts of this facility became activated by neutrons. HEPA filters were installed to filter out the radioactive airborne particulates generated during the decontamination and decommissioning activities (photo 72). According to DOE, this unit may qualify as a CERCLA site under DOE Order 5400.4.(13)(V2)

In 1983, during an inspection of Building 059, groundwater that had seeped into the building was found to be contaminated with ^{60}Co. According to DOE, the source of this contamination was most probably the activated ^{60}Co found in the structure concrete and steel inside the building, and the ^{60}Co-contaminated sand in the basement inside Building 059. The leak to the basement was located and sealed. Groundwater samples are collected from a standpipe on the west side of the facility (photo 73), analyzed for radioactive and chemical contamination, and discharged to the site's water reclamation system.

On July 13, EPA sampled the groundwater from a french drain around the western part of the building and detected tritium at 1,890 pCi/ℓ in the groundwater. According to Rockwell, the source of tritium is a result of the neutron activation of lithium that may have been present in the concrete aggregate.(42)(V2) However, EPA believes that Rockwell's theory does not explain the source of tritium at Building 059. In addition, Rockwell detected levels ranging from approximately 300-700 pCi/ℓ in different areas of the SSFL in 1989.

Chemical contaminants have also been detected in the groundwater at this site. In 1986, the groundwater discharge from the standpipe connected to the building's french drain was sampled and found to be contaminated with PCE (540 ppb), TCE (19 ppb) and trans-1-2-DCE (68 ppb). California state action levels of 4 ppb and 5 ppb were exceeded for PCE and TCE, respectively. The source of VOC contamination is unknown and has not been investigated.(7)(V2)

A water management control program was implemented to maintain a positive hydraulic head outside the building to prevent any outward migration of radioactive or other contaminants. According to Reference 13, VOCs are being removed using activated carbon filtration as groundwater is being pumped from the basement of the building, however, in the comments received from Rockwell (Reference 58) the water is not treated by activated carbon.

It is unlikely that there will be any future releases to the groundwater from this unit, however, the source of the groundwater contamination should be investigated. In addition, due to the presence of VOCs in the groundwater, subsurface gas generation is likely.

On April 21, 1992, McLaren/Hart collected four sediment samples in the watershed associated with Building 059. EPA, DTSC, and the BBI consultant collected split samples. Tritium was detected at concentrations of 9,810 ± 330 pCi/ℓ and 10,800 ± 300 pCi/ℓ in the McLaren/Hart samples. The EPA split sediment samples showed 10,700 ± 300 pCi/ℓ and 9,855 ± 325 pCi/ℓ. The DTSC split sediment sample contained 12,380 ± 371 pCi/ℓ. The BBI consultant's sediment split sample contained 12,720 ± 4,300 pCi/ℓ. (68) Cesium 137 was detected at 0.23 ± 0.03 pCi/g(dry) and plutonium 238 was detected at 0.19 ± 0.06 pCi/g(dry) in McLaren/Hart samples. (68)

INACTIVE SANITARY LEACHFIELDS ARE LOCATED IN THE FOLLOWING AREAS:(18)

SSET.F. AREA	-	Building 253
ATOMICS INT'L	-	Z1 - Building 003
ATOMICS INT'L	-	Z2 - Building 014
ATOMICS INT'L	-	Z3 - Building 030
ATOMICS INT'L	-	Z4 - Building 003 → 093
ATOMICS INT'L	-	Z5 - Building 021
ATOMICS INT'L	-	Z6 - Building 028
ATOMICS INT'L	-	Z7 - Building 012
ATOMICS INT'L	-	Z8 - Building 006
ATOMICS INT'L	-	Z10 - Building 483
ATOMICS INT'L	-	Z11 - Building 009
ATOMICS INT'L	-	Z12 - Building 020
ATOMICS INT'L	-	Z13 - Building 373
ATOMICS INT'L	-	Z14 - Building 363
ATOMICS INT'L	-	Z15 - Building 353

It should be determined if any hazardous waste or hazardous constituents exist at these sanitary leachfields.

SOUTH EAST DRUM STORAGE YARD

The Southeast Drum Storage Yard is approximately 50 feet by 100 feet and is located in the southeastern portion of Area IV. According to the DOE, 50 to 100 drums were stored in this area in the early 1960s. The DOE Phase II report indicates that this site qualifies as a potential CERCLA site under DOE Orders.(13)(28)(31) No information regarding construction methods or materials is available from the submitted reference documents or Rockwell representatives.(V2) This unit became operable in the late 1950s or early 1960s and remained operational until 1968.(V2)

No information is available on the contents of the drums that had been stored at this site, however, according to Rockwell representatives, the drums may have been associated with the Apollo Program.(V2)

All of the drums have been removed from this area to prevent any additional releases of hazardous substances. Two groundwater wells were installed in 1988. Water from monitor well RD-16, a deep groundwater well, (photo 68) and six soil samples were taken in August 1988. (A second shallow groundwater well was dry.) The samples were analyzed for VOCs, base neutral/acid extractable organics, and pH. According to DOE, no soil contamination was detected.(31)(V2)

There were no release controls maintained during the operating life of this SWMU. No releases have been documented at this site. However, there does not appear to be any evidence of potential releases at this SWMU.

7.13 SODIUM REACTOR EXPERIMENT WATERSHED

Following is a summary of sampling results from an April 1992 sampling event at the SRE Watershed. SAIC/TSC had not included this watershed and any buildings that may be closely related to any contamination that may be found in this area in the RFA report prior to the May 1994 revision.

The SRE Watershed, located approximately 1,000 feet northeast of Building 143 in Area IV, was sampled by McLaren/Hart immediately north of the SSFL property line and directly downstream from the SRE in the creek bed. The drainage area was heavily vegetated with woody scrub and large areas of poison oak. (68) On April 23, 1992, McLaren/Hart collected four sediment samples along the creek bed north of the property line. EPA, DTSC and the BBI consultant collected split samples. Cesium 137 collected by McLaren/Hart was detected in two samples (and a DTSC split) in concentrations ranging from 0.24 ± 0.06 pCi/g(dry) to 0.30 ± 0.05 pCi/g(dry). (68) Strontium 90 was detected in two McLaren/Hart samples in concentrations of 0.08 ± 0.02 and 0.09 ± 0.02 pCi/g(dry). (68)

A surface water sample was collected by McLaren/Hart from a pool of running water in the downstream direction, away from the SRE. Gross beta activity was detected at 4.9 ± 2.5 pCi/ℓ. (68)

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59. Internal Letter from F. A. Will (SSFL) to J. H. Monaghan et al., Rockwell International Corporation, Rocketdyne Division. January 28, 1987. Regarding Incident Notice: TCA Spill.

60. Letter from N. B. Bulen, Rockwell International Corporation, to Greg Kwey and Los Angeles RWQCB, Rocketdyne Division. February 23, 1987. Los Angeles RWQCB detailing TCA spill from TCA Distillation Unit.

61. Internal Letter from R. G. Leonard to F. A. Will et al., Rockwell International Corporation, Rocketdyne Division. April 3, 1987. Job Improvement Request–Equipment Laboratory TCA Distribution System.

62. Rockwell International Corporation, Rocketdyne Division. February 18, 1987. Incident Investigation Report for Equipment Laboratory.

63. Letter from J. E. Ross, Los Angeles Regional Water Quality Control Board, to S. R. Lafflam, Rockwell International Corporation. April 6, 1990. Regarding TPCA Determination-Lower Pond of the Sodium Burn Pit-Santa Susana Field Laboratory (File No. 200.003), with a copy of Soil & Groundwater Analyses from January 19 and 25, 1990.

64. Rockwell International Corporation, Rocketdyne Division. Significant Spills from 1975 to 1990.

65. Letter from Scott Simpson, to Karen Schwinn, EPA. December 27, 1990. Regarding clarifications on SWMUs. Comments on Draft Report and Letters from J. T. Crone (Rockwell International Corporation) to Carmen Santos, EPA, December 11, 1990, regarding comments on Draft RFA Report.

66. Letter from S. Cohen and Associates, to Gregg Dempsey, US EPA/Las Vegas Area. January 2, 1991. Regarding comments on Draft Visual re: radiological concerns.

67. Comments received by community members during meeting on March 19, 1991 and a conference call on March 28, 1991. Noted on Draft VSI, February 1991.

68. McLaren/Hart Environmental Engineering Corporation. March 10, 1993. Multi-media Sampling Report for the Brandeis-Bardin Institute and the Santa Monica Mountains Conservancy. Volume 1 and Volume II.

V1. Visual Site Inspection of Areas II and III of the Santa Susana Field Laboratory, Rockwell International Corporation, Rocketdyne Division; conducted by Miriam Renkin and Laurie Lamb, SAIC/TSC, August 27-29, 1990.

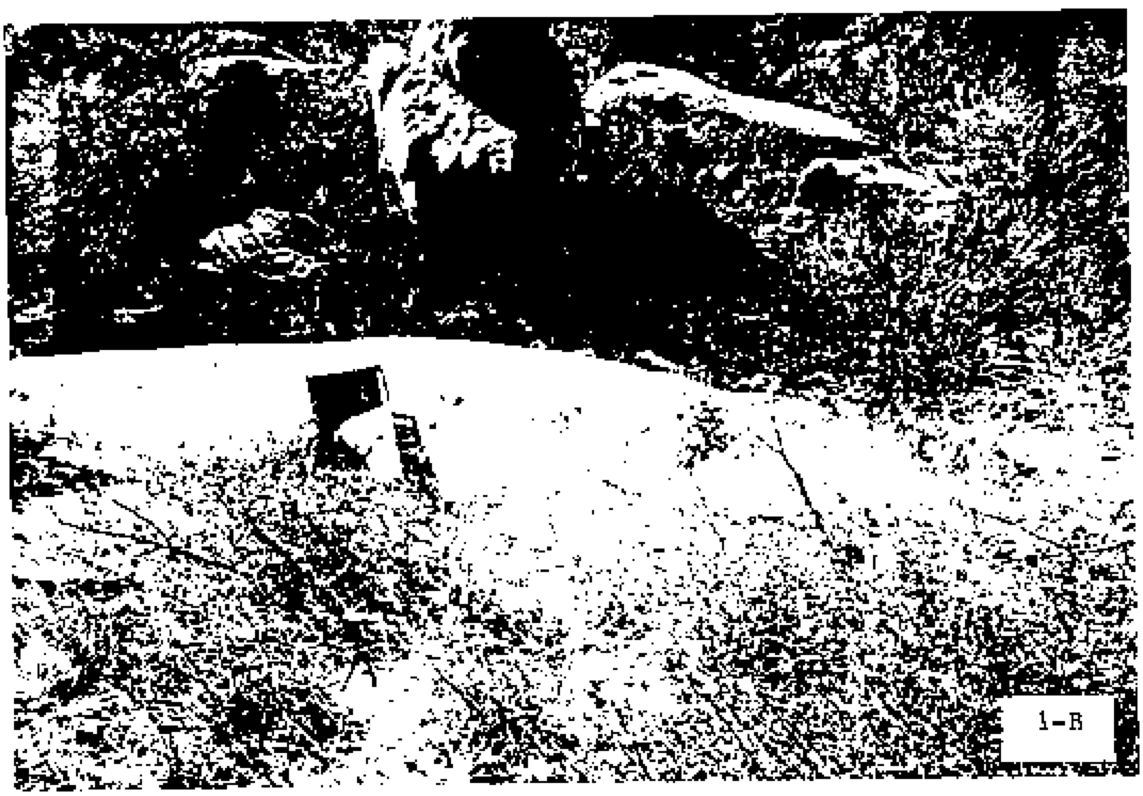
V2. Visual Site Inspection of Areas I and IV of the Santa Susana Field Laboratory, Rockwell International Corporation, Rocketdyne Division; conducted by Carmen Santos of EPA and Julie Poust and Thientam Tran, SAIC/TSC, August 27-31, 1990.

PHOTO LOG AREA I

Photo Number	Description
1-A.	The Old Area I Landfill. Note the steep ravine and vegetation. (SWMU 4.2)
1-B.	An empty and rusted container located on top of the Old Area I Landfill. (SWMU 4.2)
1-C.	A hazardous waste accumulation tank located at the Building 324 Instrument Lab. This tank contained waste solvents. Rockwell has the waste solvent disposed of within 90 days of accumulation. Note the secondary containment. (SWMU 4.2)
1-D.	The inactive test stand and Bowl Test Area (SWMU 4.15)
1-E.	Stained soil at the Old B-1 Area. Three underground storage tanks of JP-5 fuel were removed in 1984. Contamination was detected and cleaned up under the jurisdiction of the Ventura County Health Department. (SWMU 4.1)
1-F.	Stained soil near the Burn Pit. (SWMU 4.8)
1-G.	Containers accumulating in the Burn Pit following burning. (SWMU 4.8)
1-H.	Groundwater treatment units (air strippers) located near the Canyon Area Test Stand. The canisters contain activated carbon. (SWMU 4.18)
1-I.	Advanced Propulsion Test Facility - Lima Stand (SWMU 4.9)
1-J.	Advanced Propulsion Test Facility - Uncle Stand (SWMU 4.9)
1-K.	Advanced Propulsion Test Facility - Drainage surrounding test stands. (SWMU 4.9)
1-L.	Advanced Propulsion Test Facility - Fuel lines within cement-lined trenches. (SWMU 4.9)
1-M.	Advanced Propulsion Test Facility Pond #2 (APTF 2). This pond is cement covered, with rain runoff diversion channels. (SWMU 4.11)
1-N.	Laser Engineering Test Facility Ponds. (SWMU 4.13)
1-O.	Air Stripping Towers for Groundwater Treatment at Bowl Area. (SWMU 4.18)

1-A. The Old Area I Landfill. Note the steep ravine and vegetation. (SWMU 4.2)

1-B. An empty and rusted container located on top of the Old Area I Landfill. (SWMU 4.2)

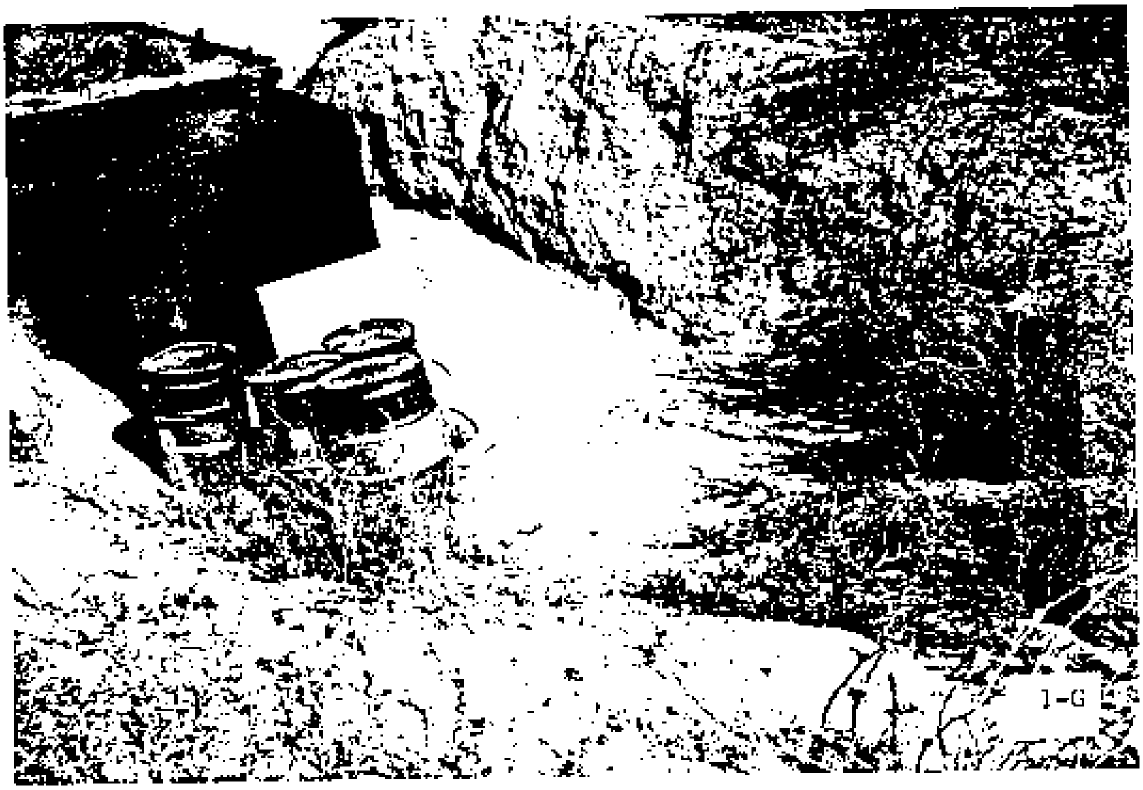


9. Delta Skim Pond, as seen from the Delta Test Area Spillways. The Propellant Load Facility (PLF) is in the background, and the closed PLF impoundment is located beneath the road on the berm around the far side of the pond. (SWMU 4.9)

10. Looking up concrete spillway (SWMU 4.15) towards Delta Test Area. (SWMU 5.23)

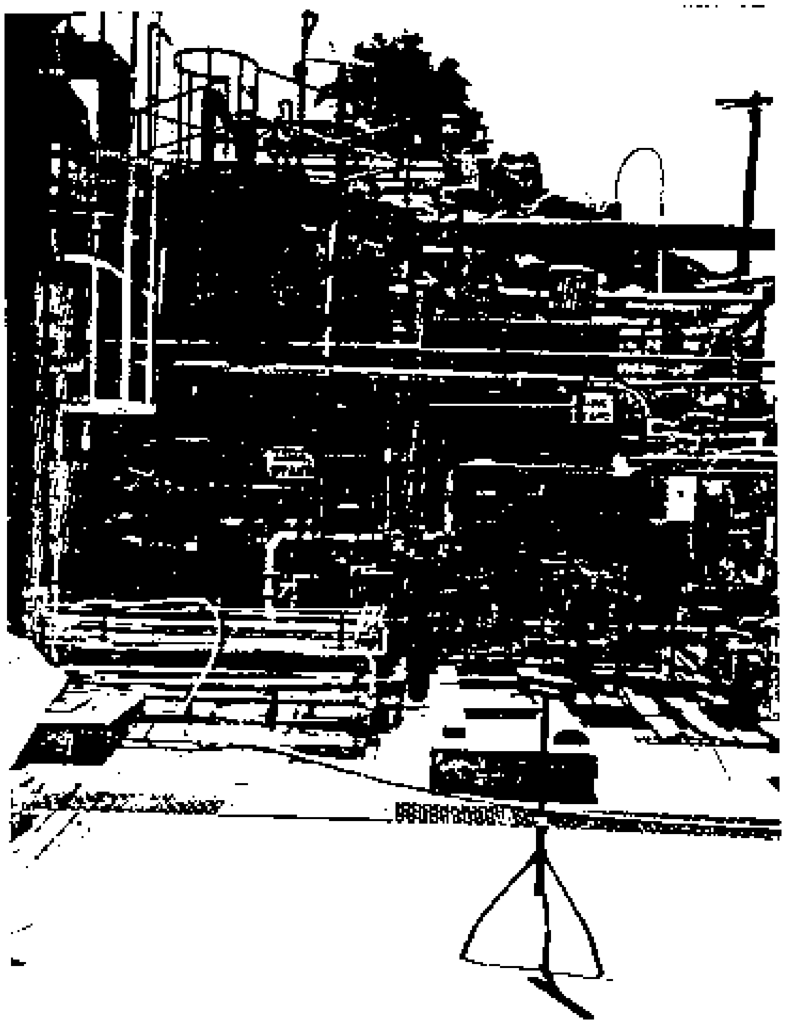
1-E. Stained soil at the Old B-1 Area. Three underground storage tanks of JP-5 fuel were removed in 1984. Contamination was detected and cleaned up under the jurisdiction of the Ventura County Health Department. (SWMU 4.1)

1-F. Stained soil near the Burn Pit. (SWMU 4.8)

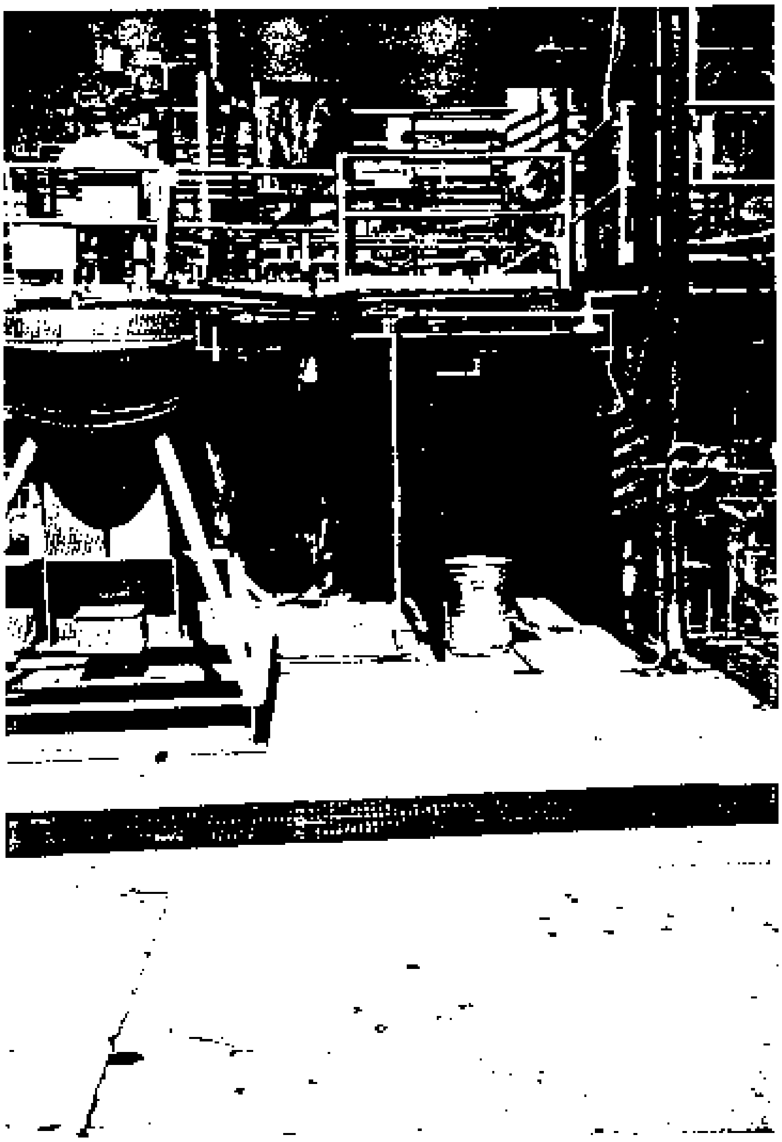


1-G. Containers accumulating in the Burn Pit following burning. (SWMU 4.8)

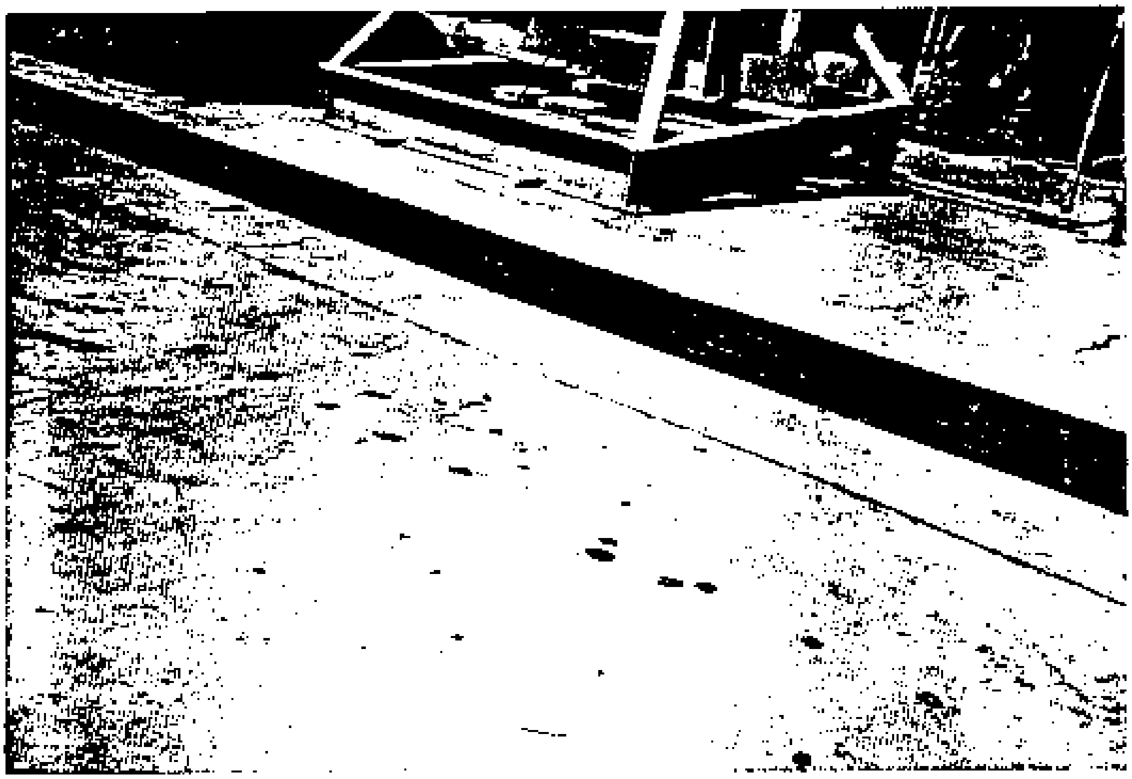
1-H. Groundwater treatment units (air strippers) located near the Canyon Area Test Stand. The canisters contain activated carbon. (SWMU 4.18)



1-1. Advanced Propulsion Test Facility - Lima Stand (SWMU 4.9)

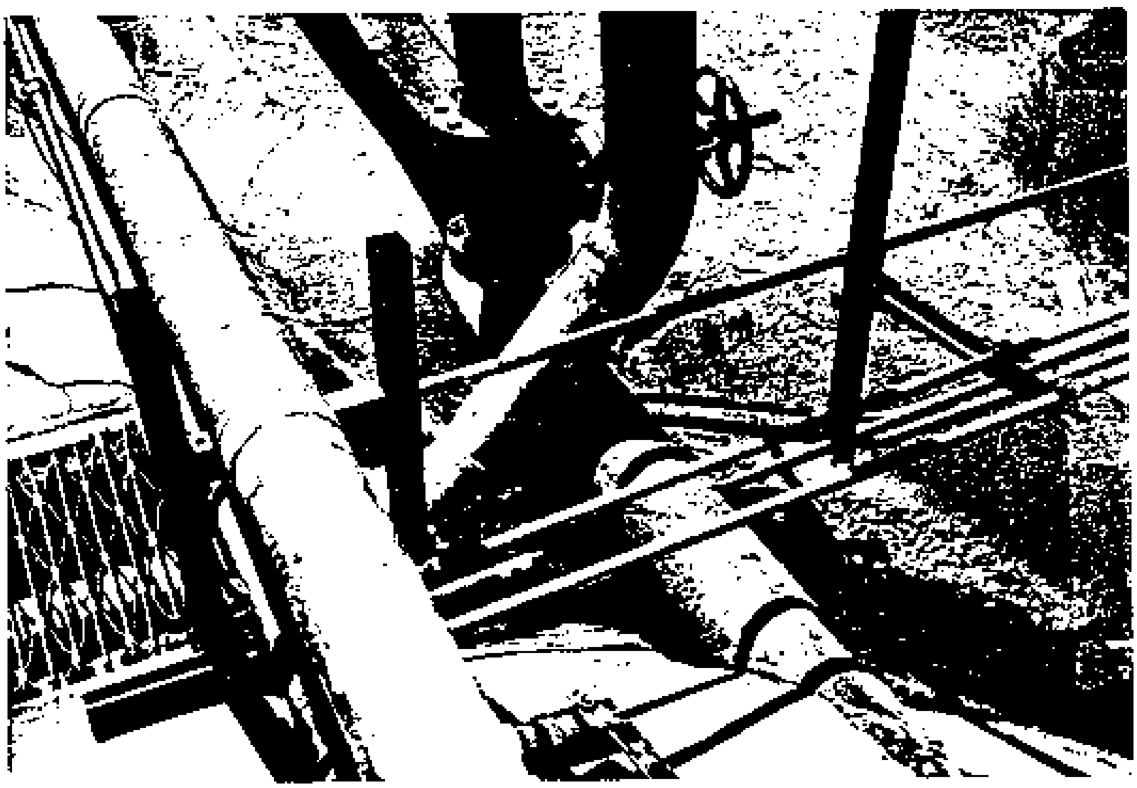


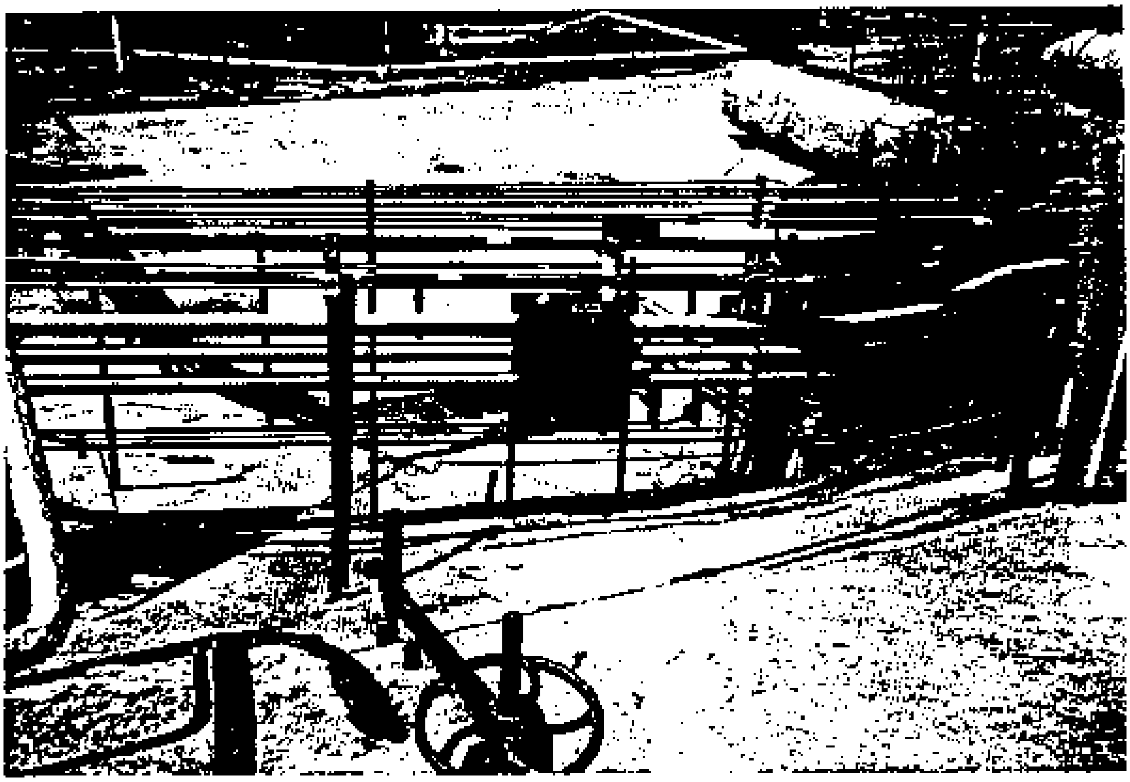
1-J. Advanced Propulsion Test Facility - Uncle Stand (SWMU 4.9)



1-K. Advanced Propulsion Test Facility - Drainage surrounding test stands. (SWMU 4.9)

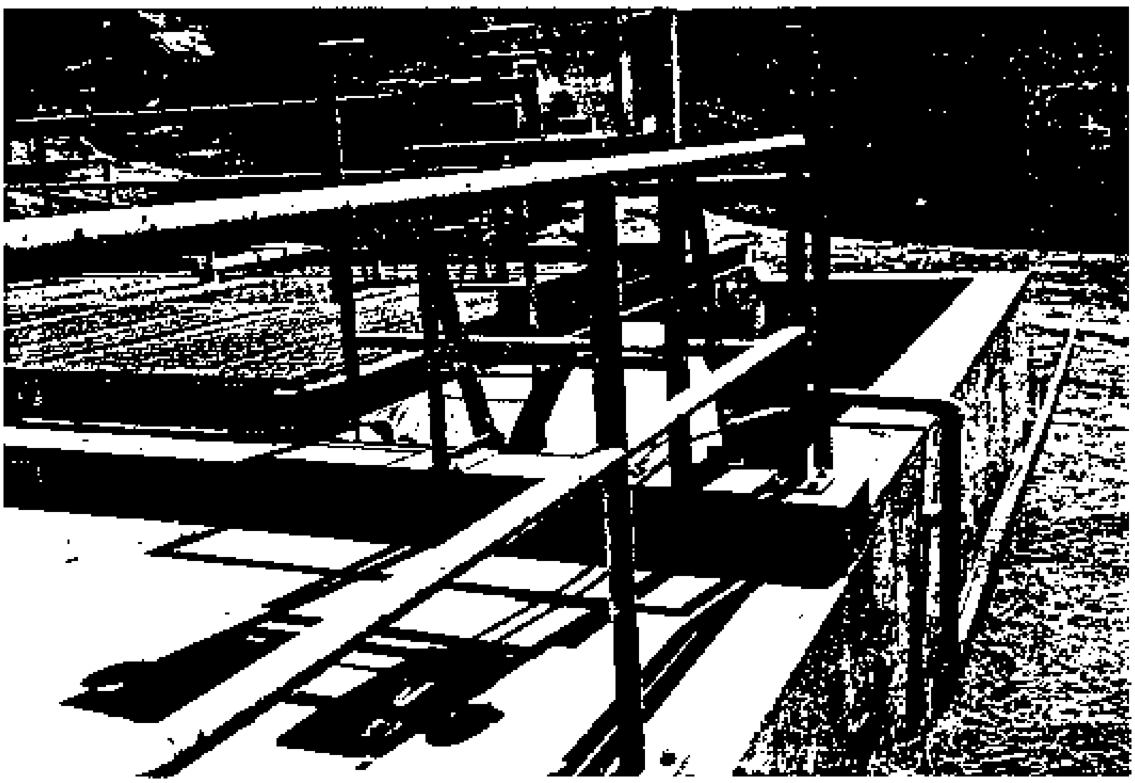
1-L. Advanced Propulsion Test Facility - Fuel lines within cement-lined trenches. (SWMU 4.9)

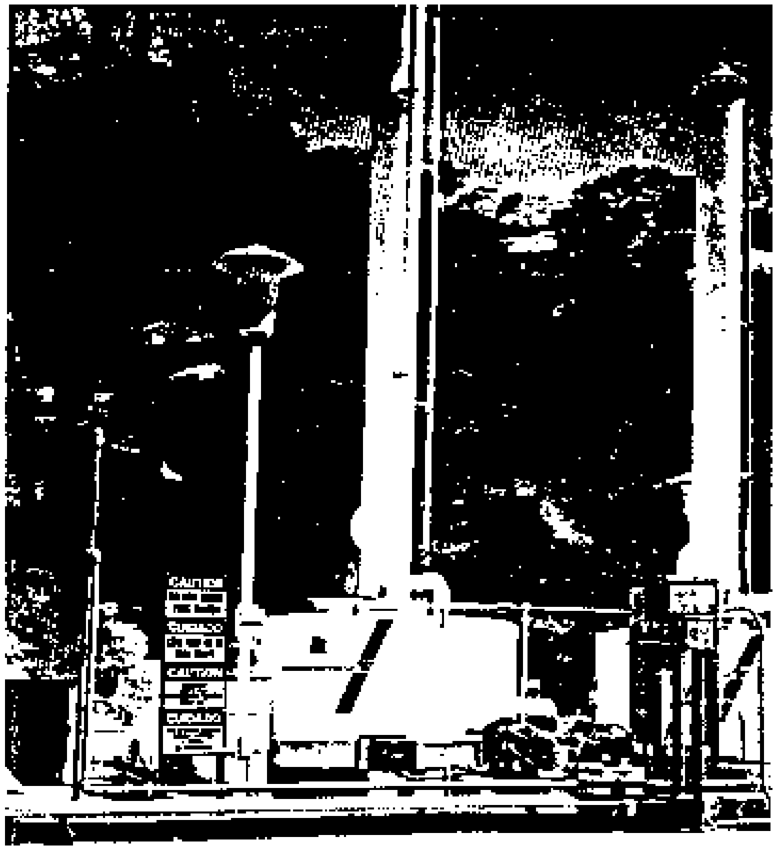




1-M. Advanced Propulsion Test Facility Pond #2 (APTF 2). This pond is cement covered, with rain runoff diversion channels. (SWMU 4.11)

1-N. Laser Engineering Test Facility Ponds. (SWMU 4.13)





1-O. Air Stripping Towers for Groundwater Treatment at Bowl Area. (SWMU 4.18)

PHOTO LOG - AREA II

Photo Number	Description
1.	Area II Landfill Looking Northwest Along the Slope. (SWMU 4.2.)
2.	Area II Landfill; Note Empty Drum on Slope. (SWMU 4.3)
3.	Area II Landfill. Top of Slope; Note Empty Tank. (SWMU 4.10)
4.	Area II Incinerator (Ash Pile in Photo 5 is to the Left). (SWMU 4.11)
5.	Ash Pile Behind Area II Incinerator. (SWMU 4.14)
6.	Bravo Test Stand RP-1 Waste Tank. (SWMU 4.13)
7.	Storable Propellant Area Pond 1 (SPA-1). (SWMU 4.16)
8.	Storable Propellant Area Pond 2 (SPA-2). (SWMU 4.17)
9.	Delta Skim Pond, as seen from the Delta Test Area Spillways. The Propellant Load Facility (PLF) is in the background, and the closed PLF impoundment is located beneath the road on the berm around the far side of the pond. (SWMU 4.9)
10.	Looking up concrete spillway (SWMU 4.15) towards Delta Test Area. (SWMU 5.23)
11.	Alfa-Bravo Skim Pond, (SWMU 5.12) looking back up the drainage to the Alfa Test Area. (SWMU 5.9) The test stands can be seen in the background. The Alfa Skim and Alfa Retention Ponds (SWMU 5.11) are located in the heavily vegetated area beyond the closed pond.
12.	Area of Bravo Skim Pond. (SWMU 5.15)
13.	Lined portion of spillway leading from Bravo 2 Test Stand to the Bravo Skim Pond. (SWMU 5.15)
14.	Sidewall of concrete area beneath Bravo 2 Test Stand showing paint that ran down the wall and into the concrete area beneath the stand. (SWMU 5.15)
15.	Unlined portion of Bravo Spillway looking up toward test stands. (SWMU 5.15)
16.	Coca Skim Pond. (SWMU 5.19)
17.	Aeration of R-2A Discharge Pond at upstream end. R-2B is to the right beyond the edge of the picture. Drums at the lower left are floats for a pump. (SWMU 5.26)
18.	Oil Sump and Clarifier, Area II LOX Plant. (SWMU 4.5)

PHOTO LOG AREA II

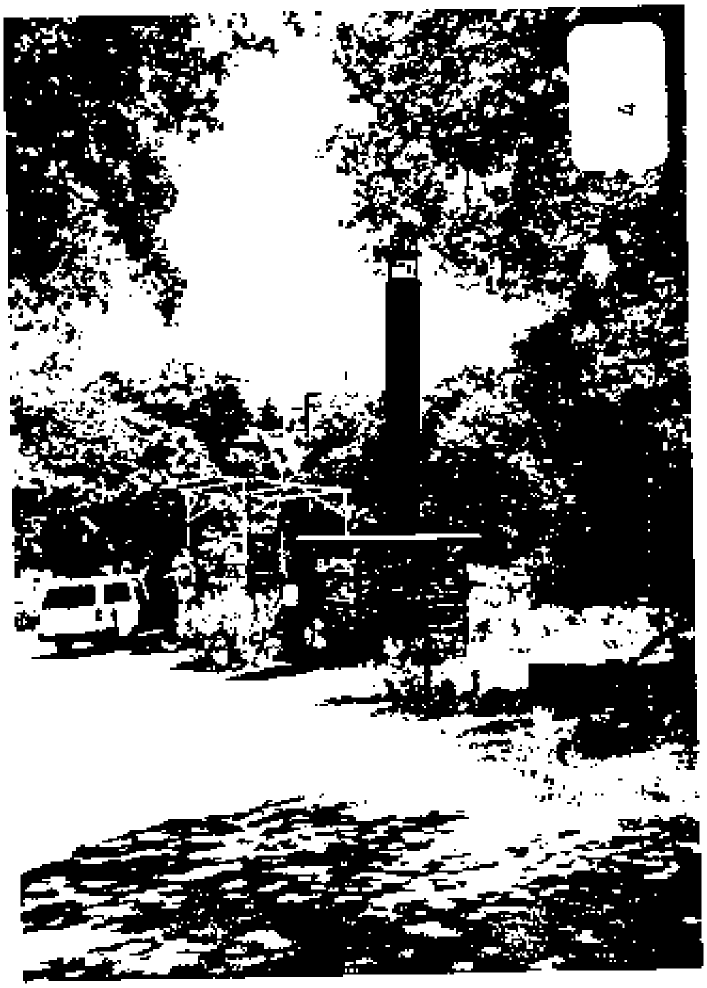
Photo Number	Description
19.	HWSA Waste Coolant Tank (yellow tank with white ends in center of picture). (SWMU 5.7)
20.	Hazardous Waste Storage Area.(SWMU 5.8)
21.	Over pack drums outside the concrete portion of the Hazardous Waste Storage Area. (SWMU 5.8)
22.	STL-IV ground-water treatment. (SWMU 5.27)
23.	Swimming Pool (UV/H_2O_2) Treatment System. (SWMU 5.4)
24.	Propellant Load Facility (PLF) Waste Tank. (SWMU 5.20)
25.	Tanks at the Alfa-Bravo Fuel Farm. (See AOC Area II) The labeled hazardous waste drum in the foreground contains waste fuel and water drained from the bottom of the trucks.
26.	Leaking value on pipe at Alfa-Bravo Fuel Farm. (See AOC Area II)
27.	Storm water basin at Alfa-Bravo Fuel Farm. The water had an oily sheen on it. (See AOC Area II)
28.	Hillside near Area II LOX Plant where asbestos and drums were dumped. The asbestos and drums have been removed. (SWMU 4.6)

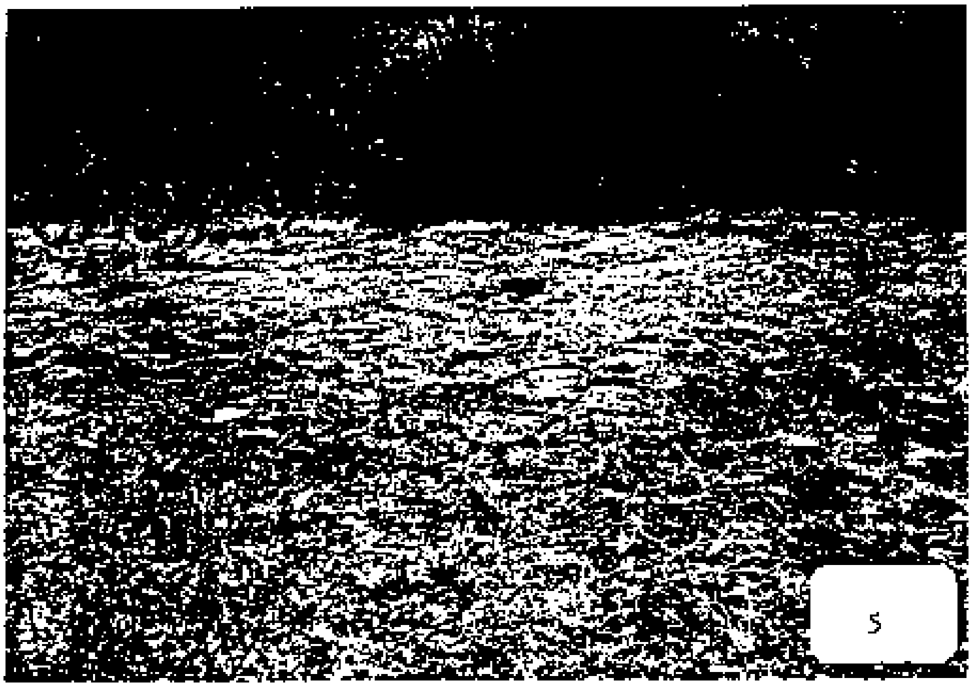
1. Area II Landfill Looking Northwest Along the Slope. (SWMU 4.2.)

2. Area II Landfill; Note Empty Drum on Slope. (SWMU 4.3)

3. Area II Landfill. Top of Slope; Note Empty Tank. (SWMU 4.2.1)

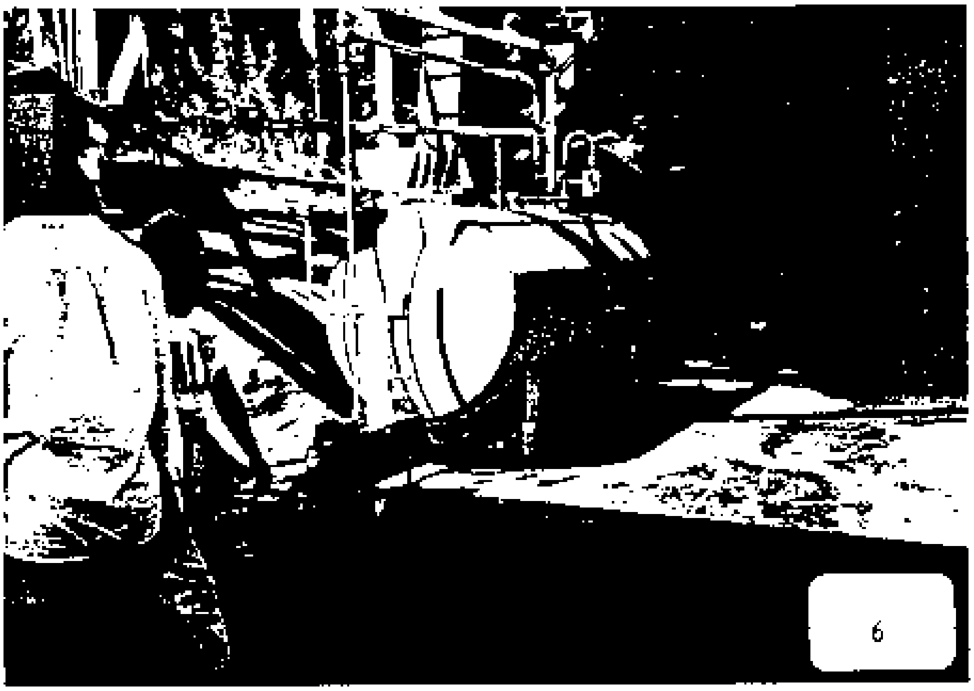
4. Area II Incinerator (Ash Pile in Photo 5 is to the Left). (SWMU 4.11)





5. Ash Pile Behind Area II Incinerator. (SWMU 4.14)

6. Bravo Test Stand RP-1 Waste Tank. (SWMU 4.13)

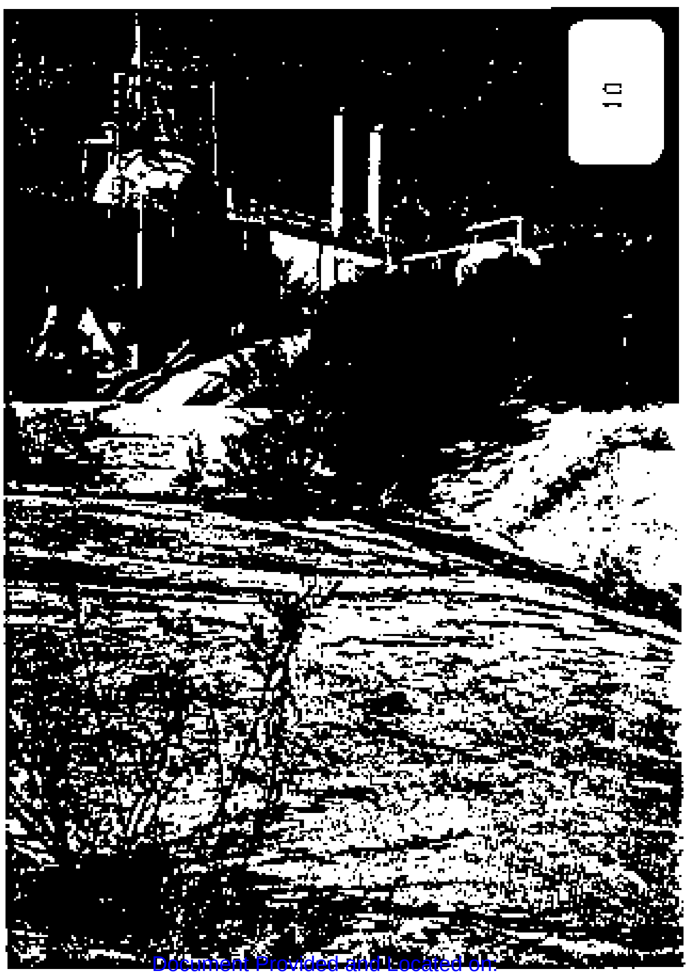


7. Storable Propellant Area Pond 1 (SPA-1). (SWMU 4.16)

8. Storable Propellant Area Pond 2 (SPA-2). (SWMU 4.17)

9. Delta Skim Pond, as seen from the Delta Test Area Spillways. The Propellant Load Facility (PLF) is in the background, and the closed PLF impoundment is located beneath the road on the berm around the far side of the pond. (SWMU 4.9)

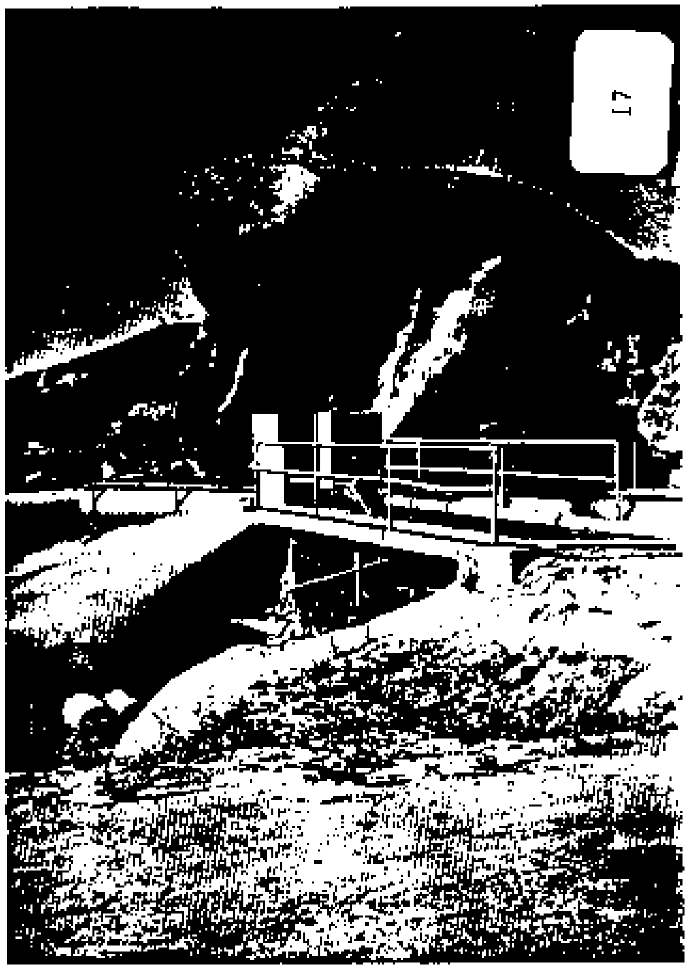
10. Looking up concrete spillway (SWMU 4.15) towards Delta Test Area. (SWMU 5.23)



11. Alfa-Bravo Skim Pond, (SWMU 5.12) looking back up the drainage to the Alfa Test Area. (SWMU 5.9) The test stands can be seen in the background. The Alfa Skim and Alfa Retention Ponds (SWMU 5.11) are located in the heavily vegetated area beyond the closed pond.

12. Area of Bravo Skim Pond. (SWMU 5.15)

17. Aeration of R-2A Discharge Pond at upstream end. R-2B is to the right beyond the edge of the picture. Drums at the lower left are floats for a pump. (SWMU 5.26)



18. Oil Sump and Clarifier, Area II LOX Plant. (SWMU 4.5)

19. HWSA Waste Coolant Tank (yellow tank with white ends in center of picture). (SWMU 4.2.7)

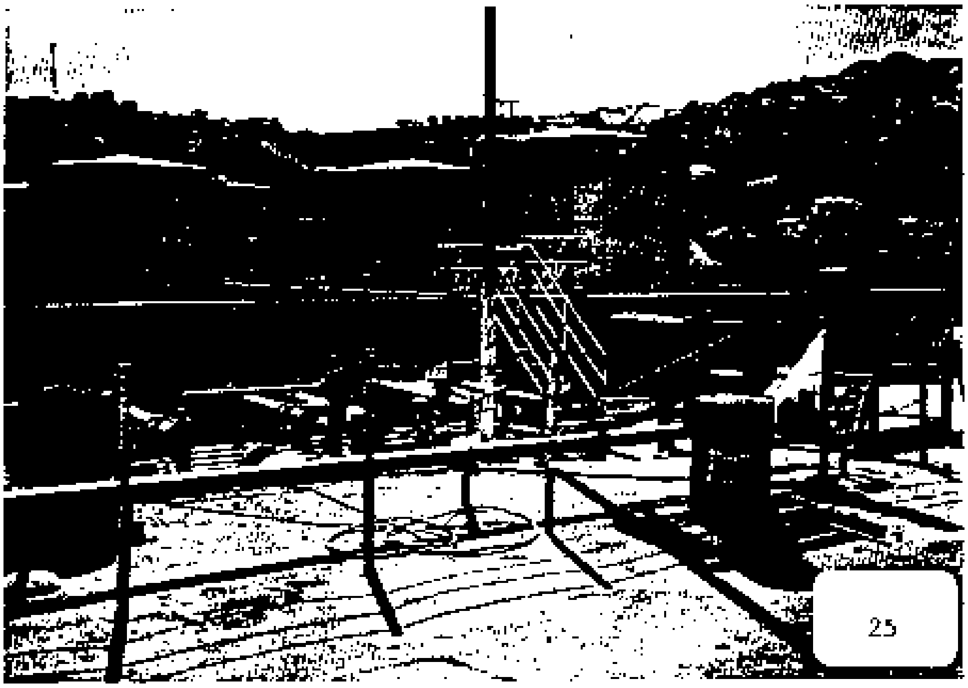
20. Hazardous Waste Storage Area.(SWMU 5.8)

21. Overpack drums outside the concrete portion of the Hazardous Waste Storage Area.

22. STL-IV groundwater treatment. (SWMU 5.27)

23. Swimming Pool (UV/H_2O_2) Treatment System. (SWMU 5.4)

24. Propellant Load Facility (PLF) Waste Tank. (SWMU 5.20)



25. Tanks at the Alfa-Bravo Fuel Farm. (See AOC Area II) The labeled hazardous waste drum in the foreground contains waste fuel and water drained from the bottom of the trucks.

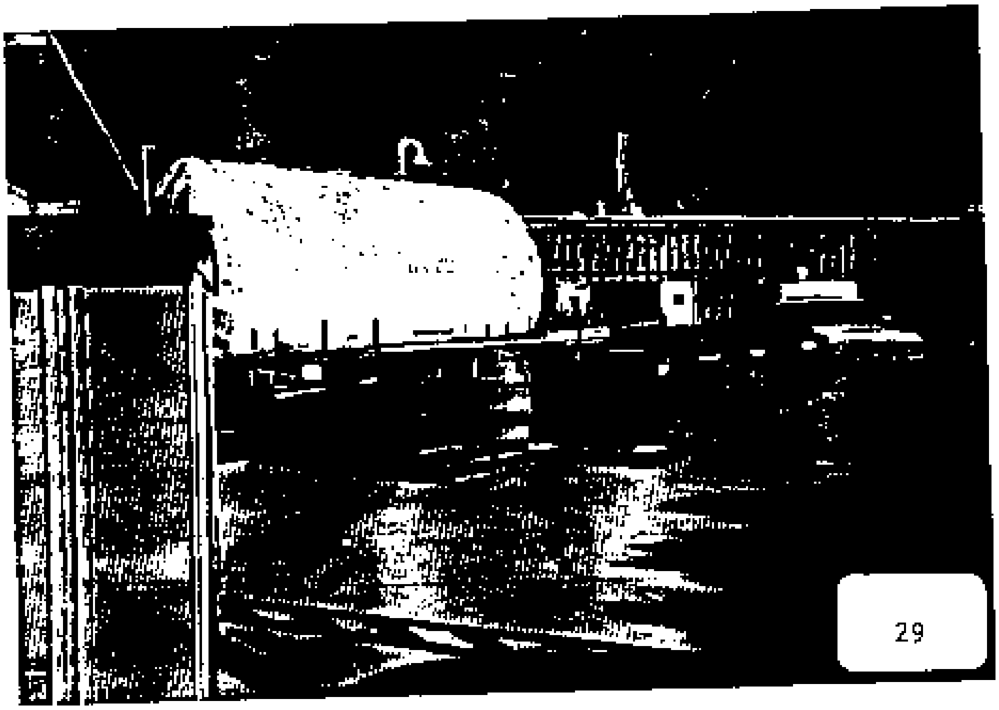
26. Leaking value on pipe at Alfa-Bravo Fuel Farm. (See AOC Area II)

27. Stormwater basin at Alfa-Bravo Fuel Farm. The water had an oily sheen on it. (See AOCs Area II)

28. Hillside near Area II LOX Plant where asbestos and drums were dumped. The asbestos and drums have been removed. (SWMU 4.6)

PHOTO LOG - AREA III

Photo Number	Description
29.	Drums of product and large "50% Caustic" tank on concrete pad with ECL building in back. (SWMU 6.1)
30.	ECL Waste Tank (upright white tank) next to "98% nitric acid" tank. ECL building is behind photographer. (SWMU 6.1)
31.	ECL concrete pad with pilot plant and reactor vessels. The waste tank is behind the photographer to the right. (SWMU 6.1)
32.	Drainage trenches leading from open "explosive research" lab areas to main drainage trench along northwest side of concrete pad. In the background are hazardous waste drums stored on pallets over this trench. (SWMU 6.1)
33.	ECL Runoff Tanks (See AOC Area III). The concrete pad is covering the closed ECL pond (SWMU 6.2) Water draining across the top of the concrete comes from the sink in the ECL building. (SWMU 6.1)
34.	Concrete cap over ECL Pond (SWMU 6.2). Water draining across the pad comes from the sink in the ECL building and goes to an unlined drainage beyond the cap. The french drain is beneath the low end of the cap. (SWMU 6.1)
35.	Closed suspect water pond (earth covered, within the cinder block wall). The concrete area in the foreground is the cap of the closed ECL pond. (See AOC Area III)
36.	ECL Collection Tank. In front of the tank, deep well RD8 sticks up through the concrete. (SWMU 6.3)
37.	Area III Sewage Treatment Plant. (See AOC Area III)
38.	Building 418 Compound A Facility. (SWMU 6.4)
39.	Pipelines at the Compound A Facility; according to Rockwell personnel the bottom one, which runs to the ECL area, may still contain fluorine. (SWMU 6.4)
40.	Surface of closed pond at Compound A Facility. (SWMU 6.4)
41.	STL-IV-1 Impoundment. (SWMU 6.6)
42.	STL-IV-2 Impoundment. (SWMU 6.7)
43.	Silvernale Reservoir. (SWMU 6.8)



29. Drums of product and large "50% Caustic" tank on concrete pad with ECL building in back. (SWMU 6.1)

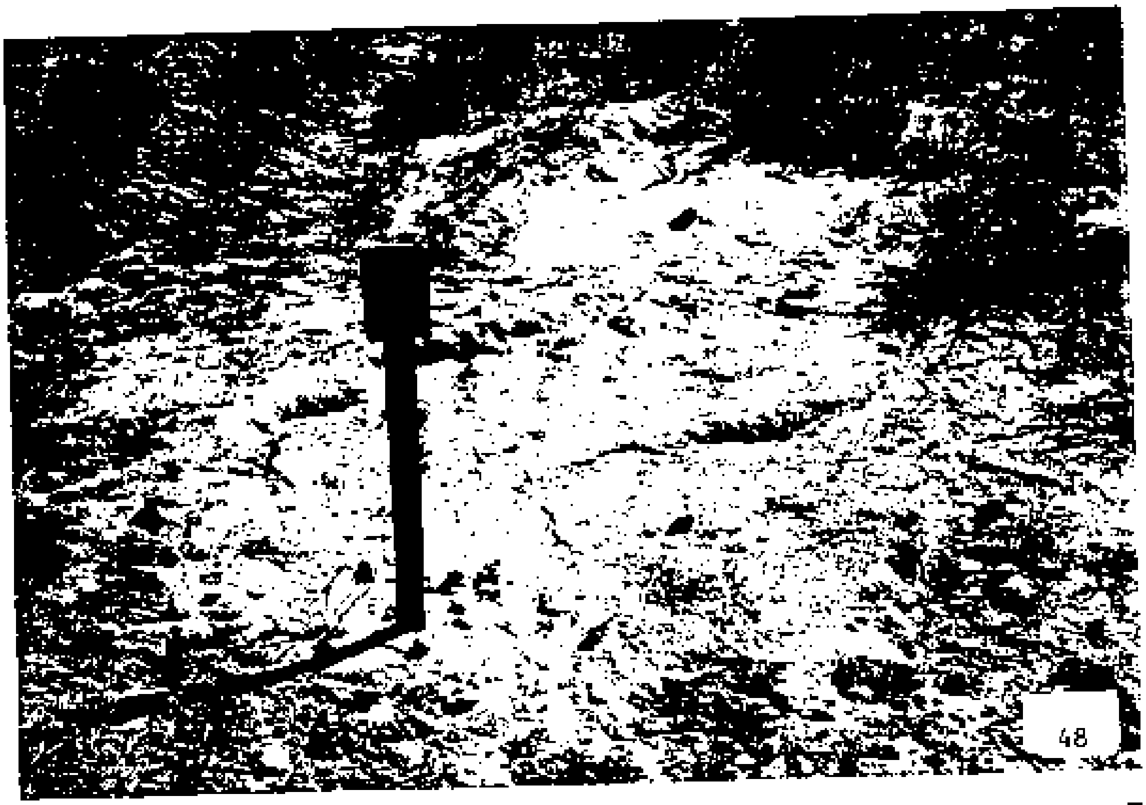
30. ECL Waste Tank (upright white tank) next to "98% nitric acid" tank. ECL building is behind photographer. (SWMU 6.1)

44. The Building 056 Landfill on the northern edge of the SSFL, approximately 300 feet west of Building 056.

45. The groundwater monitoring well, RD-7, located south of Building 056 Landfill. (SWMU 7.1)

46. A large hole located southwest of Building 056 Landfill, excavated with the intention of building the Building 056 SNAP facility. (The Building 056 SNAP was never built.) The excavated area has sheer vertical rock sides, and is surrounded by a chain link fence. The water in the pit is approximately ten feet deep. (SWMU 7.1)

47. The West Burial Area at Building 886 Former Sodium Burn Pit. (SWMU 7.3)

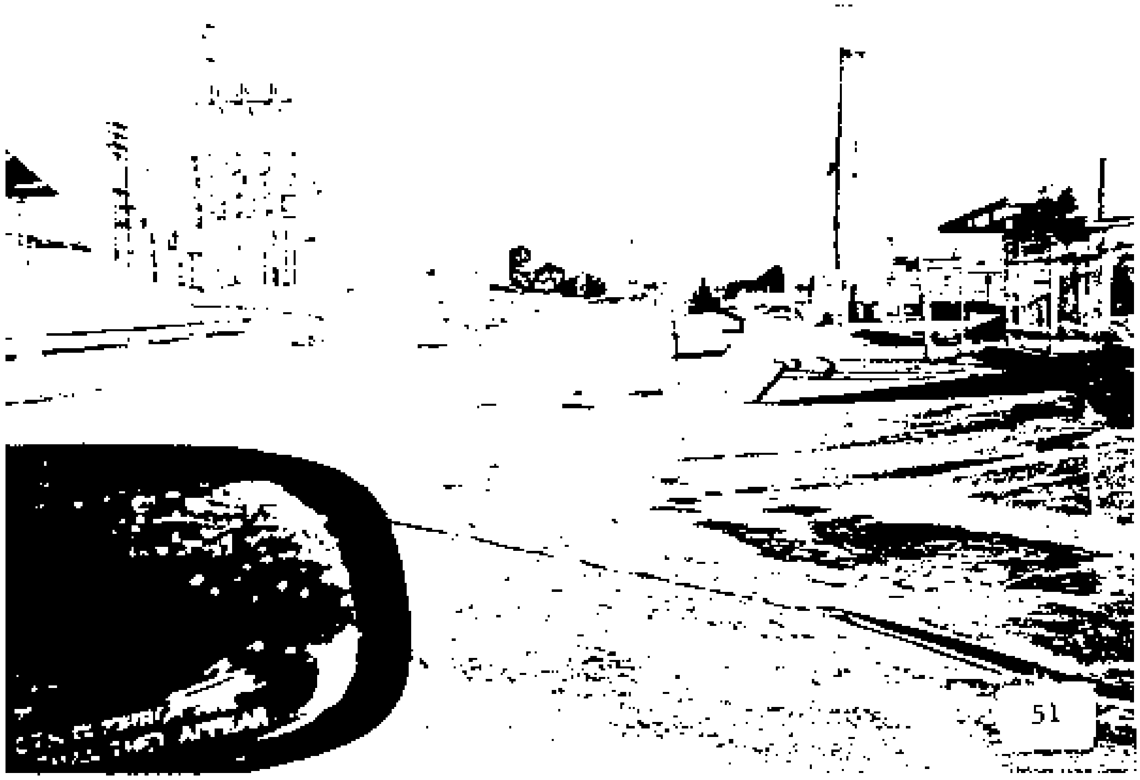


48. A radiation sign in the Lower Disposal Pond at the Former Sodium Burn Pit. (SWMU 7.3)

49. An air sampler located down gradient from Building 886 Former Sodium Burn Pit for detection of radioactive particulates. (SWMU 7.3)

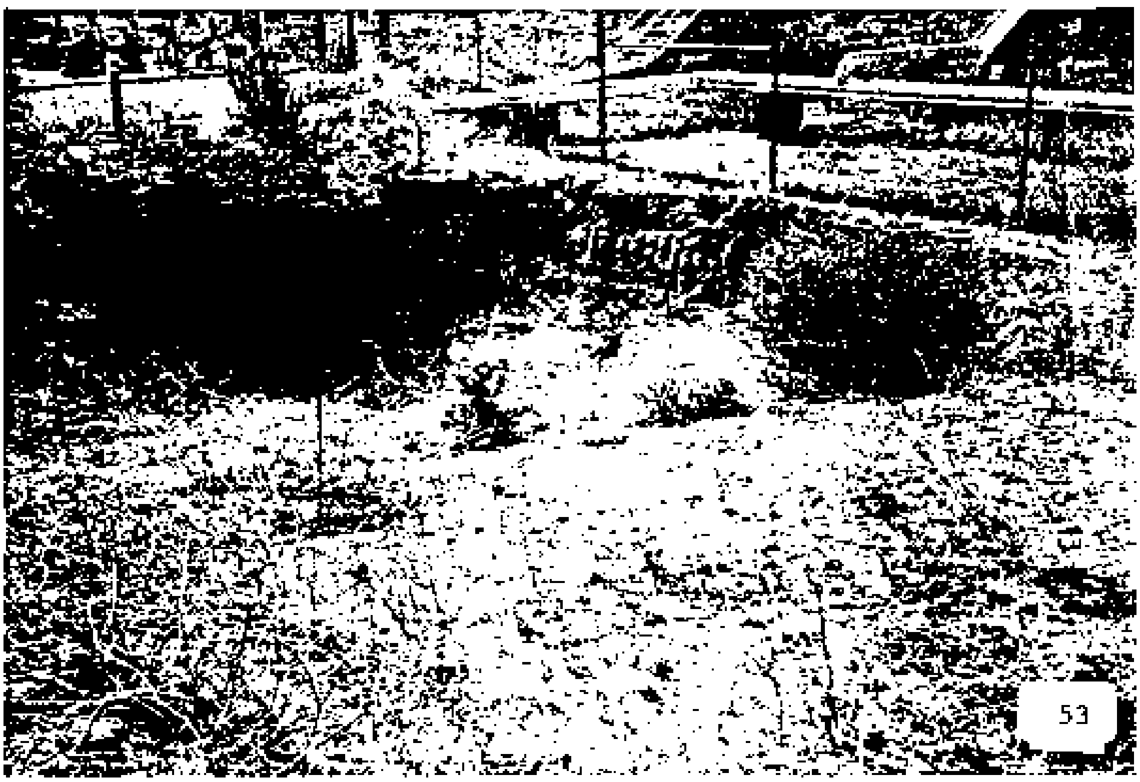
50. Cattle footprints at the Building 886 Former Sodium Burn Pit. (SWMU 7.3)

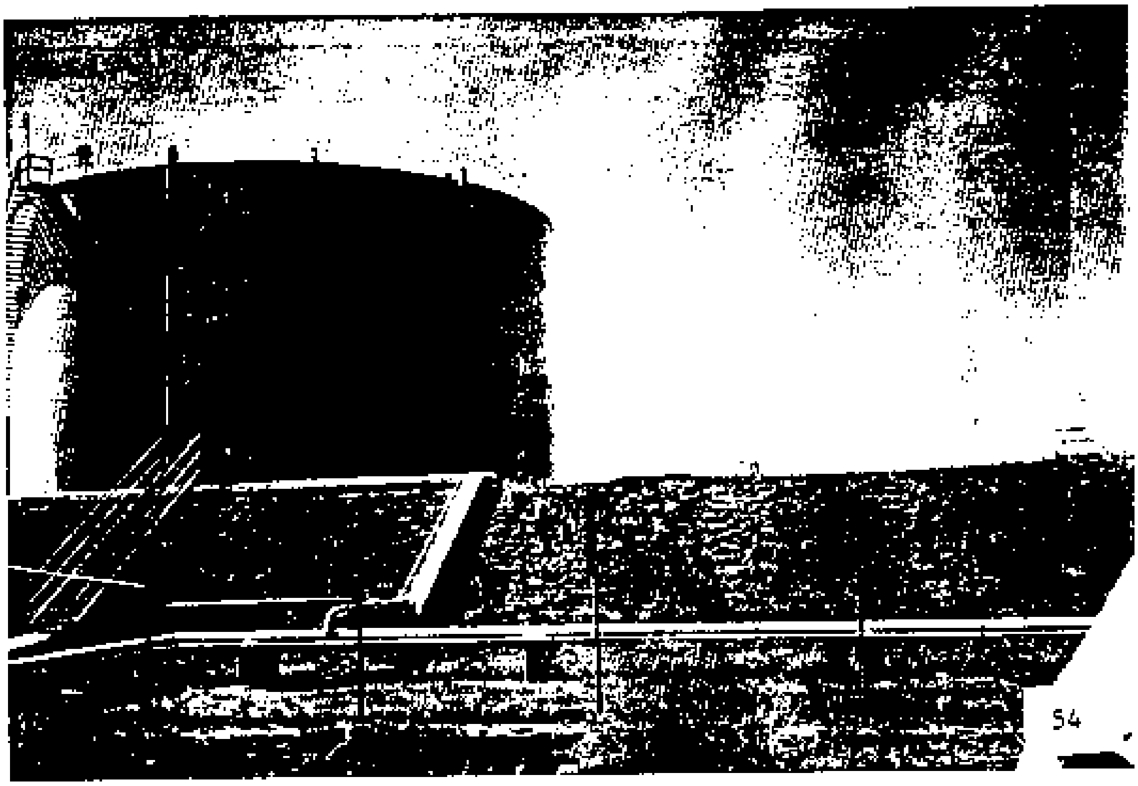
51. A herd of cows was observed near by the Building 886 Former Sodium Burn Pit. (SWMU 7.3)



52. A herd of cows was observed near by the Building 886 Former Sodium Burn Pit. (SWMU 7.3)

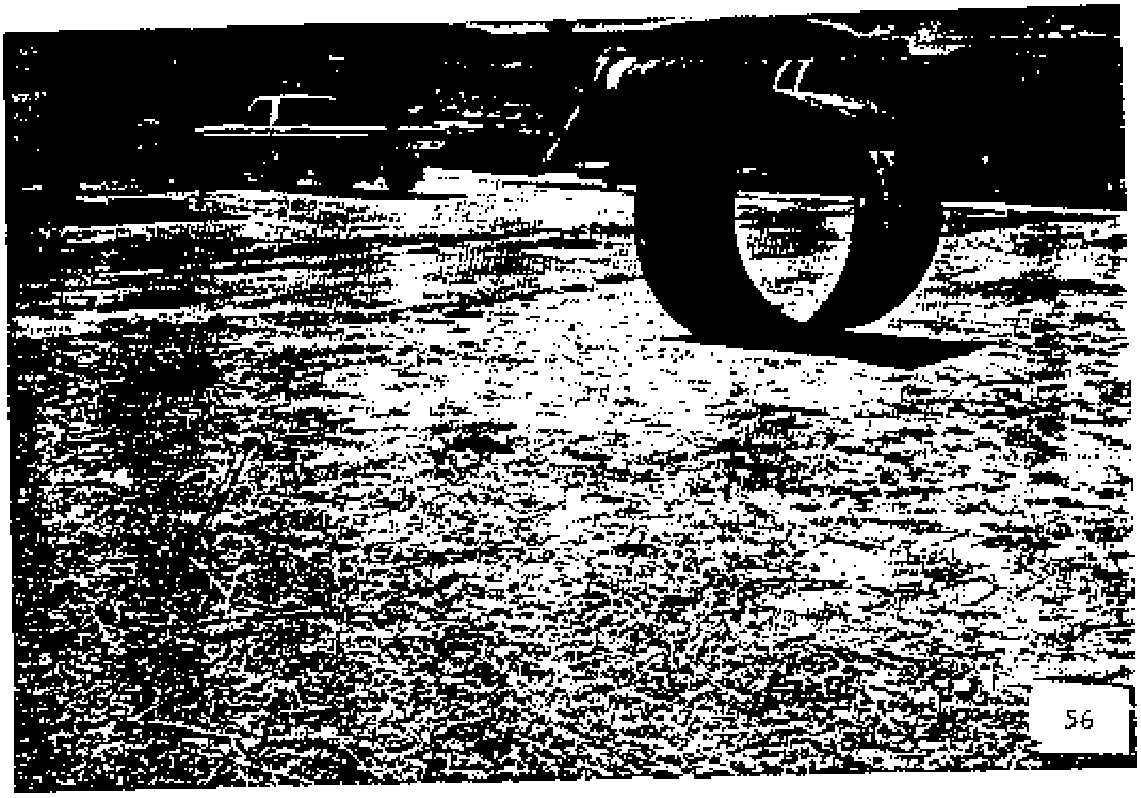
53. The piping system at the Old Conservation Yard connected from a 1.25 million gallon diesel product tank was removed. 100 cubic yards of soil was excavated during the piping removal. (SWMU 7.4)





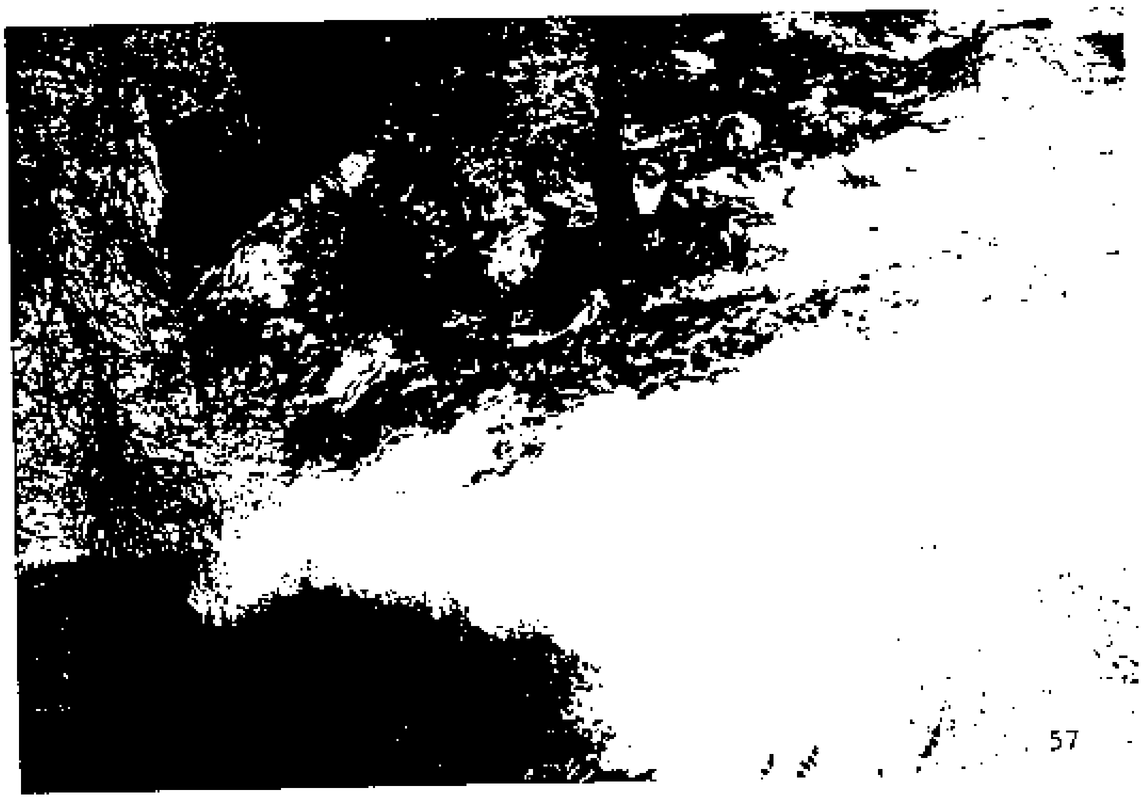
54. This 1.25 million gallon tank was next to the tank shown in Photo 4-J and apparently was of the same dimensions. Note the excavated area depicted in Photo 53 in the lower left corner. (SWMU 7.4)

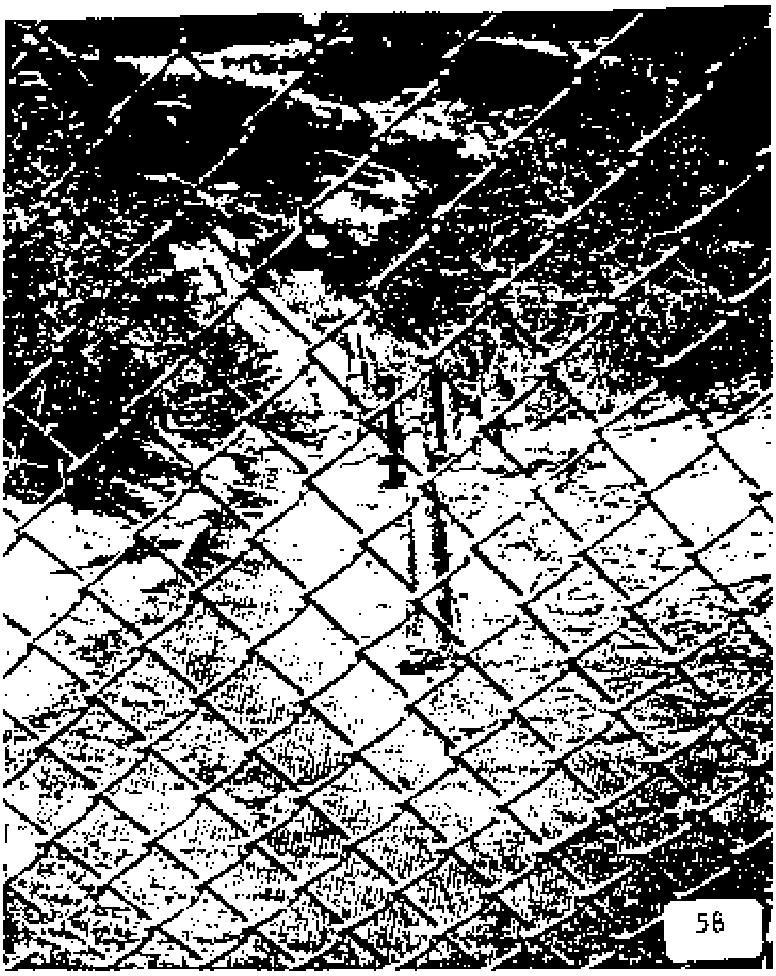
55. An overall view of the Old Conservation Yard with the excavated hole in the lower right corner and the 1.25 million gallon tank (Photo 54) in the upper right corner. (SWMU 7.4)



56. The Building 100 trench is located in the west central portion of Area IV and is the narrow paved area running down the center of this photograph.

57. A concrete lined ditch is used to collect surface water samples before it runs off from Building 100. (SWMU 7.5)





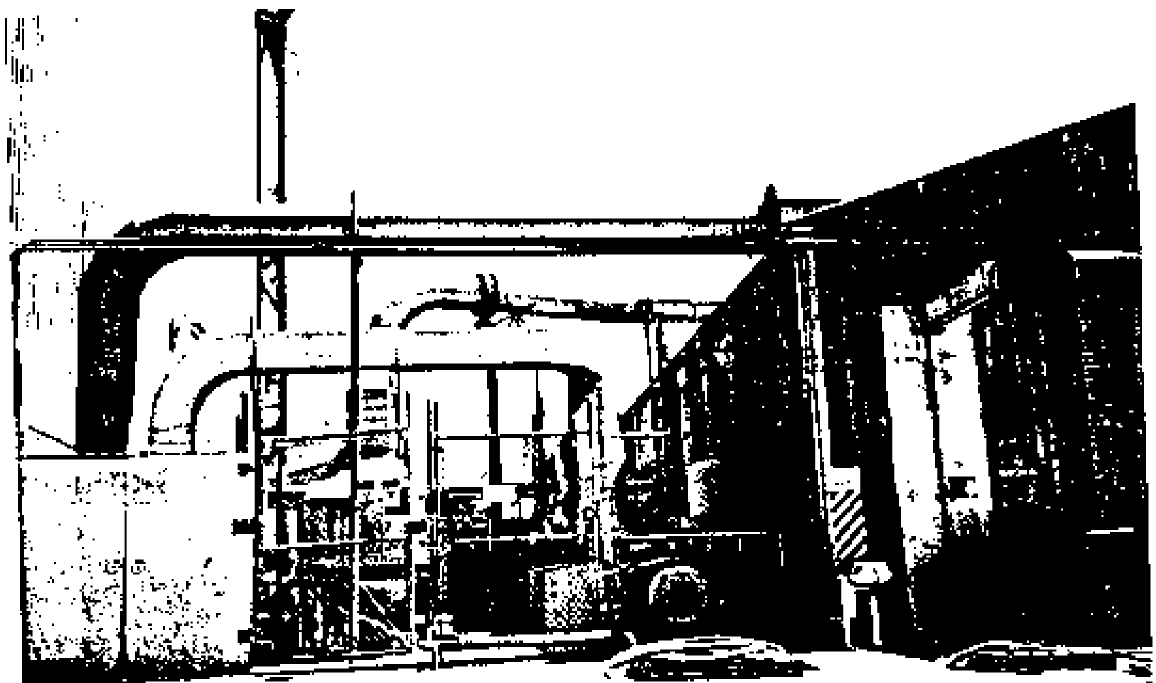
58. Piping leading toward the Radioactive Material Disposal Facility (RMDF) drainage pond. (SWMU 7.6)

59. The RMDF leachfield located at the west end of Building 021. (SWMU 7.6)

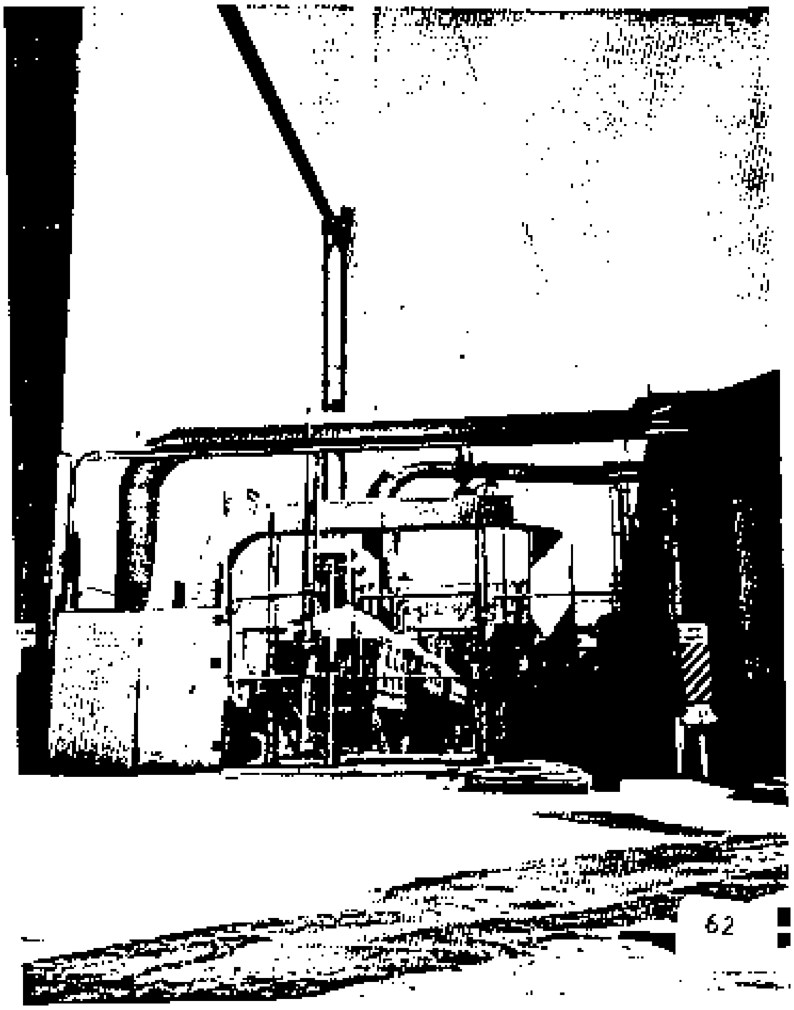
60

60. The painted asphalt area at RMDF is the location of a radioactive spill. (SWMU 7.6)

61. HEPA filters and 130 foot stack at RMDF. (SWMU 7.6)

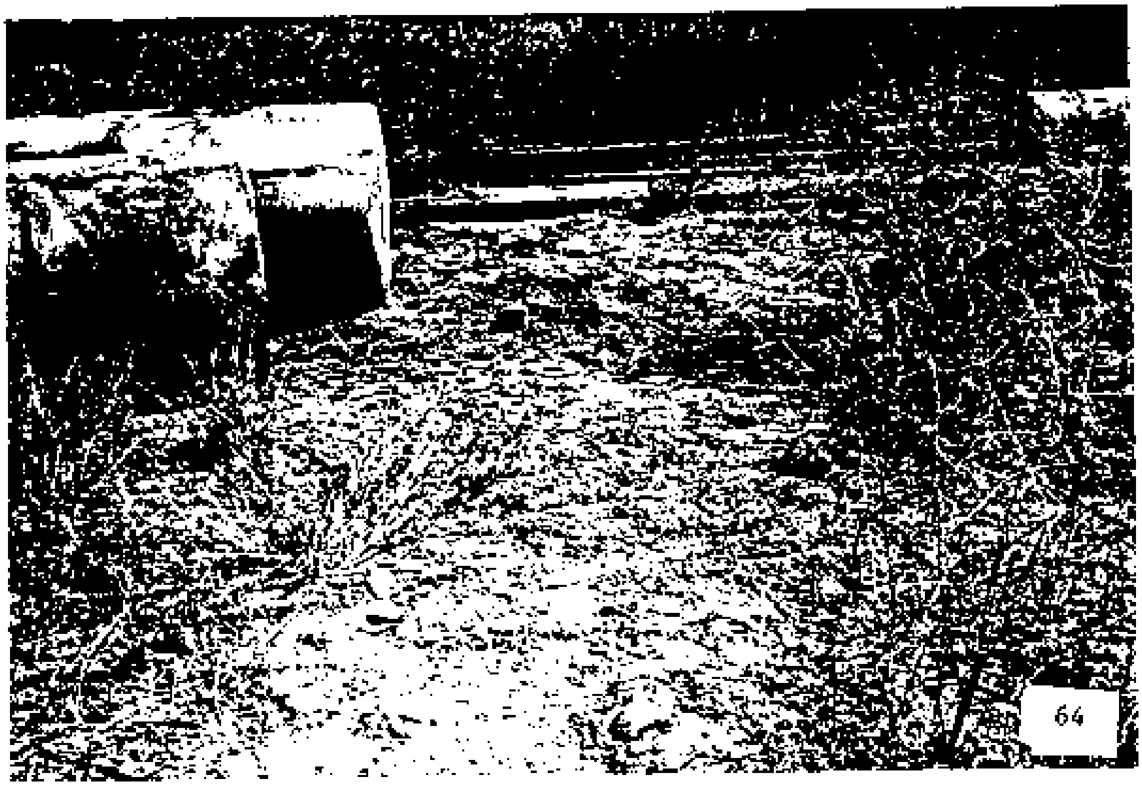


61



62. HEPA filters and 130 foot stack at RMDF. (SWMU 7.6)

63. Stained soil and dead vegetation at the New Conservation Yard. (SWMU 7.8)

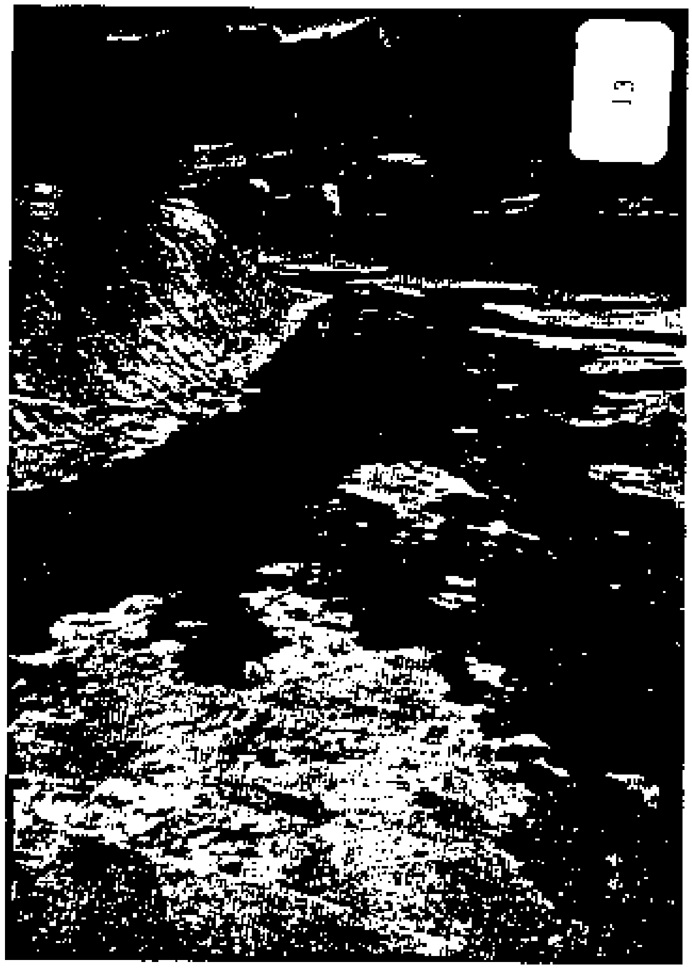


64. Stained soil, dead vegetation and empty underground tanks at the New Conservation Yard. (SWMU 7.8)

65. Stained soil, dead vegetation, and a potential asbestos gasket at the New Conservation Yard. (SWMU 7.8)

66. Empty containers and other scrap at the New Conservation Yard. (SWMU 7.8)

67. Various pieces of scrap at the New Conservation Yard. (SWMU 7.8)



13. Lined portion of spillway leading from Bravo 2 Test Stand to the Bravo Skim Pond. (SWMU 5.15)

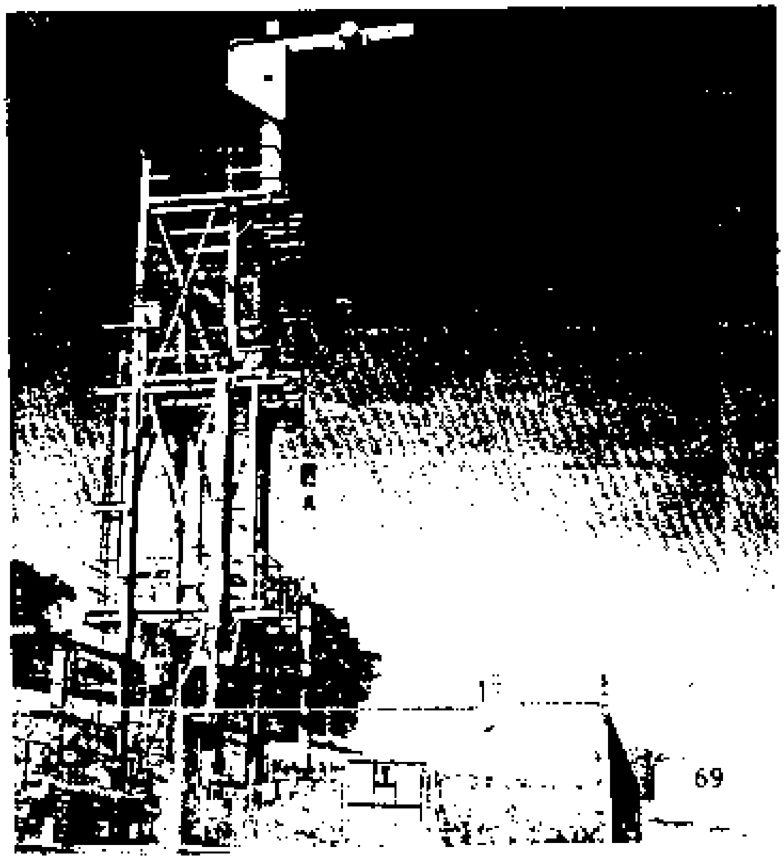
14. Side wall of concrete area beneath Bravo 2 Test Stand showing paint that ran down the wall and into the concrete area beneath the stand. (SWMU 5.15)

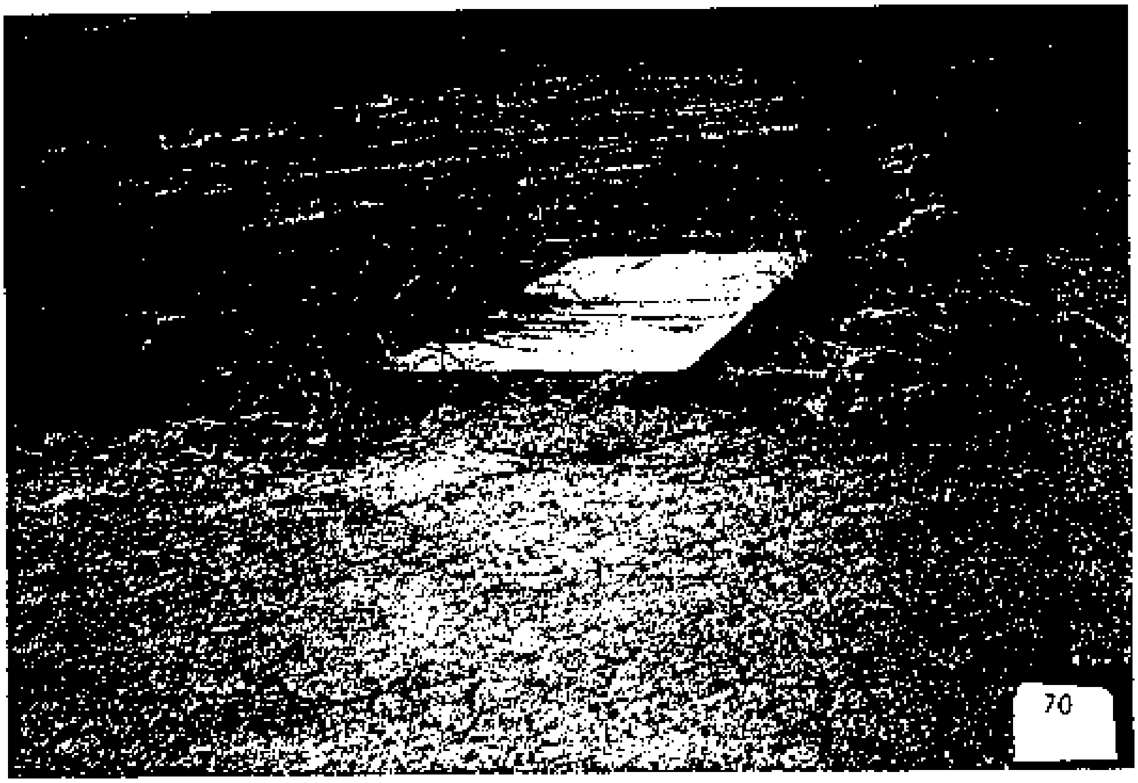
64. Stained soil, dead vegetation and empty underground tanks at the New Conservation Yard. (SWMU 7.8)

65. Stained soil, dead vegetation, and a potential asbestos gasket at the New Conservation Yard. (SWMU 7.8)

68. A deep groundwater monitoring well, RD-16, installed near the Southeast Drum Storage Yard Area in 1988.

69. ESADA Chemical Storage Yard located on the western edge of Area IV was used from 1960 through 1968. (SWMU 7.9)

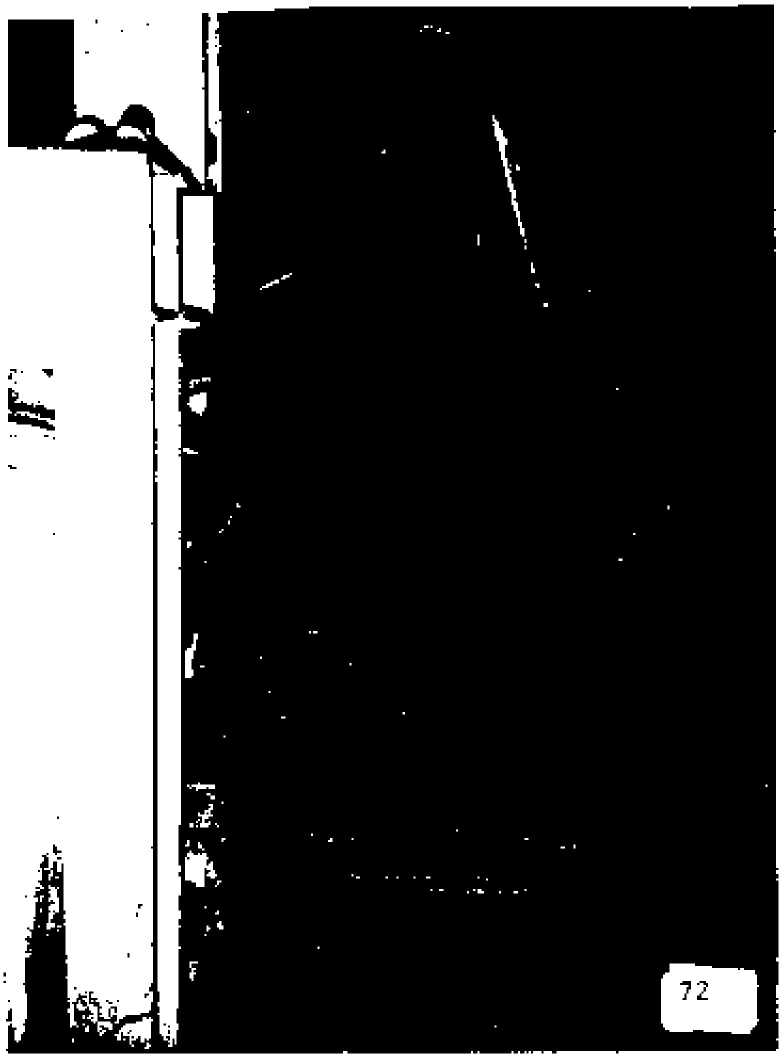




70. The flat area next to the ESADA Chemical Storage Yard as used for drum storage during the Apollo Program in the 1960s. (SWMU 7.9)

71. An underground storage tank contain sodium hydroxide waste at Building 05 Coal Gasification. (SWMU 7.10)

72. The location of the SNAP Reactor core which had been removed and transported to the Washington State DOE facility. Plastic covers were placed over any contaminated areas. HEPA filters were installed to filter out the radioactive airborne particulates. (See AOC Area IV)



73. Groundwater samples are collected from the standpipe on the west side of the SNAP Reactor and are analyzes for radioactive and chemical contamination before being discharged to the reclaimed water system. (See AOC Area IV)

ATTACHMENT 1 (Continued)(33)

NAME AND QUANTITY OF CONSTITUENT*	EPA NO.	DESCRIPTION OF SIGNIFICANT COMPONENTS	PHYSICAL STATE AT THE TIME OF CONSTITUENT**
CHLORINATED FLUOROCARBONS:			
TRICHLOROFLUOROR METHANE (Freon 11, Freon MF) 10 LBS.	U121 F001	ALL WERE SPENT SOLVENTS USED IN DEGREASING OPERATIONS AND DRUM RINSING	LIQUID
TRICHLOROTRI-FLUOROETHANE (Freon 113, Freon TF) 1,000 LBS.	F001		
JP-4 AND RJ-1 JET FUELS 5 LBS.	D001	ROCKET PROPELLANT FUEL MIXTURE OF KEROSENE AND GASOLINE	VAPORS FROM GASSIFIED OXIDIZER OR VAPORS FROM ROCKET ENGINE COMBUSTION OR LIQUID FROM ANY LEAKS

* Total amount, in pounds of constituent, that has passed through the impoundment intermittently during a 25 year period.

** DELIVERY means TRANSPORT OF CHEMICAL COMPOUNDS, by whatever PHYSICAL PROCESS going into the impoundment environs.

ATTACHMENT 2(33)

WASTE CHARACTERISTICS - SPA 2

NAME AND QUANTITY OF CONSTITUENT*	EPA NO.	DESCRIPTION OF SIGNIFICANT COMPONENTS	PHYSICAL STATE AT THE TIME OF DELIVERY**
FLUORINE 72,000 LBS.	P056 D002 D0003	LIQUID CRYOGENIC OXIDIZER	VAPORS FROM ANY LEAKS OF LIQUID WHICH WOULD IMMEDIATELY GASIFY AT ROOM TEMP
IRFNA (INHIBITED RED FUMING NITRIC ACID) 2,000 LBS.	D002 U134(FOR HF) P078(FOR NO_2)	NITRIC ACID WITH ADDED NITRIC OXIDE (NO_2) AND MAXIMUM ADDED INHIBITOR, HYDROGEN FLUORIDE HF 0.6%	
HYDROGEN PEROXIDE 100 LBS.	D001	ROCKET PROPELLANT OXIDIZER @ 90%	USED AT VARIOUS CONCENTRATIONS IN WATER FOR REMEDIAL TREATMENT TO NEUTRALIZE HYDRAZINES TO INNOCUOUS PRODUCTS
NITROGEN DIOXIDE (GAS) DECOMPOSITION PRODUCT OF NITROGEN TETROXIDE 10 LBS.	P078 D002	NITROGEN OXIDES ARE THE PRINCIPAL COMPONENTS OF SMOG	VAPORS FROM GASIFIED OXIDIZER (DRUM RINSINGS)
NITROGEN TETROXIDE (NTO) LIQUID 10,000 LBS.	D002 P078	ROCKET PROPELLANT OXIDIZER; THE LIQUID BECOMES GASEOUS NITROGEN DIOXIDE (NO_2) AT ROOM TEMPERATURE	VAPORS FROM ROCKET ENGINE COMBUSTION PROCESS OR LIQUIDS FROM ANY LEAKS (DRUM RINSINGS)
NITRIC ACID 10,000 LBS.	D002	OXIDIZER, CORROSIVE ACID	DRUM RINSINGS
HYDROGEN FLUORIDE 100 LBS.	U134 D002	OXIDIZER, CORROSIVE REACTION PRODUCT OF FLUORINE AND WATER	LIQUID

* Total amount, in pounds of constituent, that has passed through the impoundment intermittently during a 25 year period.

** DELIVERY means TRANSPORT OF CHEMICAL COMPOUNDS, by whatever PHYSICAL PROCESS going into the impoundment environs.

ATTACHMENT 2 (Continued)(33)

NAME AND QUANTITY OF CONSTITUENT*	EPA NO.	DESCRIPTION OF SIGNIFICANT COMPONENTS	PHYSICAL STATE AT THE TIME OF DELIVERY**
MIXED CHLORINATED SOLVENTS 10 LBS.	F001	CHLORINATED HYDROCARBONS	LIQUID
CHLORINATED FLUOROCARBONS:			
TRICHLOROFLUORO-METHANE (Freon 11, Freon MG) 10 LBS.	U121 F001	ALL WERE SPENT SOLVENTS USED IN DEGREASING OPERATIONS AND DRUM RINSINGS	LIQUID
TRICHLOROTRI-FLUOROTHANE (Freon 113, Freon TF) 1,000 LBS.	F001		

* Total amount, in pounds of constituent, that has passed through the impoundment intermittently during a 25 year period.

** DELIVERY means TRANSPORT OF CHEMICAL COMPOUNDS, by whatever PHYSICAL PROCESS going into the impoundment environs.

ATTACHMENT 3(33)

WASTE CHARACTERISTICS - DELTA SKIM POND

NAME AND QUANTITY OF CONSTITUENT*	EPA NO.	DESCRIPTION OF SIGNIFICANT COMPONENTS	PHYSICAL STATE AT THE TIME OF DELIVERY**
FLUORINE 250 LBS.	P056 D002 D003	LIQUID CRYOGENIC OXIDIZER	VAPORS FROM ROCKET ENGINE COMBUSTION PROCESS OR ANY LEAKS OF LIQUID WHICH WOULD IMMEDIATELY GASIFY AT ROOM TEMPERATURE
RP-1 (STRAIGHT-RUN KEROSENE FRACTION -SOME CRUDES HAVE NAPTHENE, CYCLIC PARAFFINS) 250 LBS.	CALIFORNIA ADMINISTRATED CODE 22; REG-ULATED AS AN OIL; NO EPA #	KEROSENE-BASED FUEL	VAPORS FROM ROCKET ENGINE OR LIQUID FROM ANY LEAKS
TRANS-1,2-DICHLOROETHYLENE 4,000 LBS.	U079	DECOMPOSITION OF PRODUCT OF TRICHLOROETHYLENE	AQUEOUS FORMATION
VINYL CHLORIDE 100 LBS.	U043		
JP-4 AND PJ-1 JET FUELS 25 LBS.	D001	MIXTURE OF KEROSENE AND GASOLINE	VAPORS FROM ROCKET ENGINE COMBUSTION OR ANY LEAKS
TRICHLOROETHYLENE 8.000 LBS.	U228 F001	SPENT SOLVENTS USED IN DEGREASING OPERATIONS AND ROCKET ENGINE PARTS RINSING	LIQUID
ETHYL BENZENE 5 LBS.	F003	FLAMMABLE SOLVENTS BENZENE, ETHYL BENZENE TOLUENE, AND XYLENE (BTX) ARE DECOMPOS-SITION PRODUCTS	LIQUID
BENZENE 5 LBS.	U-19 D001		
XYLENE 5 LBS.	U239 F003 D001	GASOLINE AND DIESEL FUEL	

* Total amount, in pounds of constituent, that has passed through the impoundment intermittently during a 25 year period.

** DELIVERY means TRANSPORT OF CHEMICAL COMPOUNDS, by whatever PHYSICAL PROCESS going into the impoundment environs.

ATTACHMENT 3 (Continued)(33)

NAME AND QUANTITY OF CONSTITUENT*	EPA NO.	DESCRIPTION OF SIGNIFICANT COMPONENTS	PHYSICAL STATE AT THE TIME OF DELIVERY**
IRFNA (INHIBITED RED FUMING NITRIC ACID) 1,400 LBS.	4002 U134(FOR HF) P078(FOR NO_2)	NITRIC ACID WITH ADDED NITRIC OXIDE (NO_2) AND MAXIMUM ADDED INHIBITOR, HYDROGEN FLUORIDE (HF)-0.6%	VAPORS FROM ROCKET ENGINE COMBUSTION PROCESS OR ANY LEAKS OF LIQUID WHICH WOULD IMMEDIATELY HYDROLYZE TO NITRIC ACID IN WATER
HYDROGEN PEROXIDE 3,000 LBS.	D001	ROCKET PROPELLANT OXIDIZER @ 90%	USED AT VARIOUS CONCENTRATIONS IN WATER FOR REMEDIAL TREATMENT TO NEUTRALIZE HYDRAZINES TO INNOCUOUS PRODUCTS
UDMH UNSYMMETRICAL HYDRAZINE (1,1-DIEMTHL HYDRAZINE) 1,400 LBS.	098 D001	ROCKET FUEL: THE HYDRAZINE GROUP IS THE ACTIVE CONSTITUENT	VAPORS FROM ROCKET ENGINE COMBUSTION PROCESS OR LIQUIDS FROM ANY LEAKS
FORMALDEHYDE 1,000 LBS.	U122	DECOMPOSITION PRODUCT OF OXIDIZED METHYL HYDRAZINES	AQUEOUS FORMATION FROM REACTION OF WATER, PEROXIDE, AND HYDRAZINES
MIXED CHLORINATED SOLVENTS 5 LBS.	F001	CHLORINATED HYDROCARBONS	LEAKS

* Total amount, in pounds of constituent, that has passed through the impoundment intermittently during a 25 year period.

** DELIVERY means TRANSPORT OF CHEMICAL COMPOUNDS, by whatever PHYSICAL PROCESS going into the impoundment environs.

ATTACHMENT 4(33)

WASTE CHARACTERISTICS - ALFA-BRAVO SKIM POND

NAME AND QUANTITY OF CONSTITUENT*	EPA NO.	DESCRIPTION OF SIGNIFICANT COMPONENTS	PHYSICAL STATE AT THE TIME OF DELIVERY**
RP-1 (STRAIGHT-RUN KEROSENE FRACTION -SOME CRUDES HAVE NAPHTHENE, CYCLIC PARAFFINS) 2,000 LBS.	CALIFORNIA ADMINISTRATED CODE 22; REG-ULATED AS AN OIL: NO EPA #	KEROSENE-BASED FUELS	VAPORS FROM ROCKET ENGINE OR LIQUID FROM ANY LEAKS
HYDRAULIC OIL	CALIFORNIA ADMINISTRATED CODE 22; REG-ULATED AS AN OIL: NO EPA #	LUBRICATING OIL	ENGINE LEAKS
TRICHLOROETHYLENE 22,000 LBS.	U228 F001	ALL WERE SPENT SOLVENTS USED IN DEGREASING OPERATIONS AND ROCKET ENGINE PART RINSING AND THEIR DECOMPOSITION PRODUCTS	LIQUIDS
MISCELLANEOUS CHLORINATED SOLVENTS 10 LBS.	F001		
1,1,1-TRICHLORO-ETHANE 10 LBS.	U226 F001		
1,2-DICHLORO-1,1,2-TRIFLUORO-ETHANE (DECOMP. PRODUCT) 1 LBS.	F001		

* Total amount, in pounds of constituent, that has passed through the impoundment intermittently during a 25 year period.

** DELIVERY means TRANSPORT OF CHEMICAL COMPOUNDS, by whatever PHYSICAL PROCESS going into the impoundment environs.

ATTACHMENT 4 (Continued)(33)

NAME AND QUANTITY OF CONSTITUENT*	EPA NO.	DESCRIPTION OF SIGNIFICANT COMPONENTS	PHYSICAL STATE AT THE TIME OF DELIVERY**
CHLORINATED FLUOROCARBONS:			
TRICHLOROFLUORO-METHANE (Freon 11, Freon MF) 1 LB.	U121 F001	ALL WERE SPENT SOLVENTS USED IN DEGREASING OPERATIONS AND ROCKET ENGINE PARTS RINSING AND THEIR DECOMPOSITION PRODUCTS	LIQUID
TRICHLOROTRIFLUORO-ETHANE (Freon 113, Freon TF) 2 LBS.	F001		
TRANS-1,2-DICHLORO-ETHYLENE DECOMPS. PRODUCT OF TCE 11,000 LBS.	U079	DECOMPOSITION OF PRODUCT OF TRICHLORO-ETHYLENE	AQUEOUS FORMATION
VINYL CHLORIDE DECOMP. PRODUCT OF TCE 3,600 LBS.	U043	DECOMPOSITION OF PRODUCT OF TRICHLORO-ETHYLENE	AQUEOUS FORMATION
JP-4 AND RJ-1 JET FUEL 200 LBS.	U043	MIXTURE OF KEROSENE AND GASOLINE	VAPORS FROM ROCKET ENGINE COMBUSTION PROCESS OR ANY LEAKS
BENZENE 600 LBS.	U019 D001	FLAMMABLE SOLVENTS BENZENE, TOLUENE, XYLENE (BTX) ARE DECOMPOSITION PRODUCTS	LIQUID
XYLENE 600 LBS.	U239 F003 D001		
TOLUENE 600 LBS.	U220 F005 D001	GASOLINE AND DIESEL FUEL	

* Total amount, in pounds of constituent, that has passed through the impoundment intermittently during a 25 year period.

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ATTACHMENT 5

WASTE CHARACTERISTICS - ALFA-BRAVO SKIM POND

NAME AND QUANTITY OF CONSTITUENT*	EPA NO.	DESCRIPTION OF SIGNIFICANT COMPONENTS	PHYSICAL STATE AT THE TIME OF DELIVERY**
RP-1 (STRAIGHT-RUN KEROSENE FRACTION -SOME CRUDES HAVE NAPHTHENE, CYCLIC PARAFFINS) 2,000 LBS.	CALIFORNIA ADMINISTRATED CODE 22; REGULATED AS AN OIL; NO EPA #	KEROSENE-BASED FUELS	VAPORS FROM ROCKET ENGINE OR LIQUID FROM ANY LEAKS
HYDRAULIC OIL	CALIFORNIA ADMINISTRATED CODE 22; REGULATED AS AN OIL; NO EPA #	LUBRICATING OIL	ENGINE LEAKS
TRICHLOROETHYLENE 22,000 LBS.	U228 F001		
MISCELLANEOUS CHLORINATED SOLVENTS 10 LBS.	F001		
1,1,1-TRICHLOROETHANE 10 LBS.	U226 F001	ALL WERE SPENT SOLVENTS USED IN DEGREASING OPERATIONS AND ROCKET ENGINE PART RINSING AND THEIR DECOMPOSITION PRODUCTS	LIQUIDS
1,2-DICHLORO-1,1,2-TRIFLUOROETHANE (DECOMP. PRODUCT) 1 LBS.	F001		

* Total amount, in pounds of constituent, that has passed through the impoundment intermittently during a 25 year period.

** DELIVERY means TRANSPORT OF CHEMICAL COMPOUNDS, by whatever PHYSICAL PROCESS going into the impoundment environs.

ATTACHMENT 5 (Continued)

NAME AND QUANTITY OF CONSTITUENT*	EPA NO.	DESCRIPTION OF SIGNIFICANT COMPONENTS	PHYSICAL STATE AT THE TIME OF DELIVERY**
CHLORINATED FLUOROCARBONS:			
TRICHLOROFLUORO-METHANE (Freon 11, Freon MF) 1 LB.	U121 F001	ALL WERE SPENT SOLVENTS USED IN DEGREASING OPERATIONS AND ROCKET ENGINE PARTS RINSING AND THEIR DECOMPOSITION PRODUCTS	LIQUID
TRICHLOROTRIFLUORO-ETHANE (Freon 113, Freon TF) 2 LBS.	F001		
TRANS-1,2-DICHLORO-ETHYLENE DECOMPS. PRODUCT OF TCE 11,000 LBS.	U079	DECOMPOSITION OF PRODUCT OF TRICHLORO-ETHYLENE	AQUEOUS FORMATION
VINYL CHLORIDE DECOMP. PRODUCT OF TCE 3,600 LBS.	U043	DECOMPOSITION OF PRODUCT OF TRICHLORO-ETHYLENE	AQUEOUS FORMATION
JP-4 AND RJ-1 JET FUEL 200 LBS.	U043	MIXTURE OF KEROSENE AND GASOLINE	VAPORS FROM ROCKET ENGINE COMBUSTION PROCESS OR ANY LEAKS
BENZENE 600 LBS.	U019 D001	FLAMMABLE SOLVENTS BENZENE, TOLUENE, XYLENE (BTX) ARE DECOMPOSITION PRODUCTS GASOLINE AND DIESEL FUEL	LIQUID
XYLENE 600 LBS.	U239 F003 D001		
TOLUENE 600 LBS.	U220 F005 D001		

* Total amount, in pounds of constituent, that has passed through the impoundment intermittently during a 25 year period.

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ATTACHMENT 6

WASTE CHARACTERISTICS - STL-IV IMPOUNDMENTS

(from Reference 33)

NAME AND QUANTITY OF CONSTITUENT*	EPA NO.	DESCRIPTION OF SIGNIFICANT COMPONENTS	PHYSICAL STATE AT THE TIME OF DELIVERY**
NITRIC ACID 10,000 LBS.	D002	OXIDIZER, CORROSIVE ACID	HYDROLYSIS PRODUCT FROM REACTION OF NTO AND WATER
NITROGEN DIOXIDE (CAS) DECOMPOSITION PRODUCT OF NITROGEN TETROXIDE 1 LB.	P078 D002	NITROGEN OXIDES ARE THE PRINCIPAL COMPONENTS OF SMOG	VAPORS FROM GASIFIED OXIDIZER
ISOPROPYL ALCOHOL (2-PROPANOL) 5,000 LBS.	D001	COMMONLY KNOWN AS RUBBING ALCOHOL	LIQUID SOLVENT USED TO RINSE OFF FUEL PARTS
MONOMETHYL HYDRAZINE (MMH) 252,000 LBS.	P078 D002	ROCKET FUEL: THE HYDRAZINE GROUP IS THE ACTIVE CONSTITUENT	VAPORS FROM ROCKET ENGINE COMBUSTION PROCESS OR LIQUIDS FROM ANY LEAKS
NITROGEN TETROXIDE (NTO) LIQUID 200,000 LBS.	D002 P078	ROCKET PROPELLANT OXIDIZER; THE LIQUID BECOMES GASEOUS NITROGEN DIOXIDE (NO_2) AT ROOM TEMPERATURE	
MISCELLANEOUS CHLORINATED SOLVENTS 200 LBS	F001	ALL WERE SPENT SOLVENTS USED IN DEGREASING OPERATIONS AND ROCKET ENGINE PARTS RINSING	LIQUID
TRICHLOROETHYLENE 300 LBS.	U228 F001		
METHYLENE CHLORIDE 1 LB.	U080 F0001		

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ATTACHMENT 6 (Continued)(33)

NAME AND QUANTITY OF CONSTITUENT*	EPA NO.	DESCRIPTION OF SIGNIFICANT COMPONENTS	PHYSICAL STATE AT THE TIME OF DELIVERY**
ACETONE 30 LBS.	U002 F003 D001	FLAMMABLE SOLVENTS	
BENZENE 1 LB.	U019 D001	BENZENE, TOLUENE, XYLENE (BTX) ARE DECOMPOSITION PRODUCTS	LIQUID
XYLENE 1 LB.	U239 F003 D001	GASOLINE AND DIESEL FUEL	
TOLUENE 1 LB.	U220 F005 D001	FLAMMABLE SOLVENT SEE UNDER BENZENE AND EYLENE	LIQUID
ETHYL BENZENE 1 LB.	F003	DECOMPOSITION PRODUCT OF GASOLINE AND DIESEL FUEL	LIQUID
HYDROGEN PEROXIDE 150,000 LBS.	D001	ROCKET PROPELLANT OXIDIZER @ 90%	USED AT VARIOUS CONCENTRATIONS IN WATER FOR REMEDIAL TREATMENT TO NEUTRALIZE HYDRAZINES TO INNOCUOUS PRODUCTS
IRFNA (INHIBITED RED FUMING NITRIC ACID 1,000 LBS.	D002 U134 (FOR HF) P078 (FOR NO_2)	NITRIC ACID WITH ADDED NITRIC OXIDE (NO_2) AND MAXIMUM ADDED INHIBITOR, HYDROGEN FLUORIDE (HF) - 0.6%	VAPORS FROM ROCKET ENGINE COMBUSTION PROCESS OR ANY LEAKS

* Total amount, in pounds of constituent, that has passed through the impoundment intermittently during a 25 year period.

** DELIVERY means TRANSPORT OF CHEMICAL COMPOUNDS, by whatever PHYSICAL PROCESS going into the impoundment environs.

ATTACHMENT 6 (Continued)(33)

NAME AND QUANTITY OF CONSTITUENT*	EPA NO.	DESCRIPTION OF SIGNIFICANT COMPONENTS	PHYSICAL STATE AT THE TIME OF DELIVERY**
1,1,1-TRICHLORO-ETHANE 50 LBS.	U226 F001	ALL WERE SPENT SOLVENTS USED IN DECREASING OPERATIONS AND ROCKET ENGINE PARTS RINSING	LIQUID
CHLORINATED FLUOROCARBONS: TRICHLOROFLUORO-METHANE (FREON 11, FREON MF) 3 LBS.	U121 F001		
FREON 113 (1,1,2-TRICHLORO-1,1,2-TRIFLUORO-ETHANE) 315 LBS.	F001	CHLORINATED FLUOROCARBON	LIQUID SOLVENT USED TO RINSE OFF OXIDIZER PARTS
UDMH OR 1,1-DIMETHYL-HYDRAZINE OR UNSYMMETRICAL DIMETHYLHYDRAZINE 1,000 LBS.	U098 D001	ROCKET FUEL: THE HYDRAZINE GROUP IS THE ACTIVE CONSTITUENT	VAPORS FROM ROCKET ENGINE COMBUSTION PROCESS OR LIQUIDS FROM ANY LEAKS
HYDRAZINE 1,000 LBS.	U133 D001		
TRANS-1,2-DICHLOROETHYLENE 150 LBS.	U079	DECOMPOSITION OF PRODUCT OF TRICHLOROETHYLENE	AQUEOUS FORMATION
VINYL CHLORIDE 15 LBS.	U043	DECOMPOSITION OF PRODUCT OF TRICHLOROETHYLENE	AQUEOUS FORMATION
FORMALDEHYDE 100,000 LBS.	U122	DECOMPOSITION PRODUCT OF OXIDIZED MONO-METHYL HYDRAZINE	AQUEOUS FORMATION

* Total amount, in pounds of constituent, that has passed through the impoundment intermittently during a 25 year period.

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ATTACHMENT 1(33)

WASTE CHARACTERISTICS - SPA-1

NAME AND QUANTITY OF CONSTITUENT*	EPA NO.	DESCRIPTION OF SIGNIFICANT COMPONENTS	PHYSICAL STATE AT THE TIME OF CONSTITUENT**
ACETONE 10 LBS.	U002 F003 D001	FLAMMABLE SOLVENTS	LIQUID
METHYL ETHYL KETONE 10 LBS.	U159 F005	SOLVENT USED FOR DEGREASING	LIQUID
HYDROGEN PEROXIDE 10,000 LBS.	D001	ROCKET PROPELLANT OXIDIZER @ 90%	USED AT VARIOUS CON - CENTRATIONS IN WATER FOR REMEDIAL TREAT - MENT TO NEUTRALIZE HYDRAZINES TO INNOCUOUS PRODUCTS
TETRACHLORO-ETHYLENE 10 LBS.	U210 F001		
TRICHLOROETHYLENE 7,000 LBS.	U228 F001		
METHYLENE CHLORIDE 10 LBS.	U080 F001	ALL WERE SPENT SOLVENTS USED IN DEGREASING OPERATIONS AND DRUM RINSING	LIQUID
1,1,1-TRICHLORO-ETHANE 3,000 LBS.	U226 F001		
CARBON TETRA-CHLORIDE AND MISCELLANEOUS CHLORINATED SOLVENTS 30 LBS.	U211 F001		

* Total amount, in pounds of constituent, that has passed through the impoundment intermittently during a 25 year period.

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ATTACHMENT 1 (Continued)(33)

NAME AND QUANTITY OF CONSTITUENT*	EPA NO.	DESCRIPTION OF SIGNIFICANT COMPONENTS	PHYSICAL STATE AT THE TIME OF CONSTITUENT**
HYDRAZINE 3,000 LBS.	U133 D001	ROCKET PROPELLANT FUEL	RINSINGS FROM DRUMS
MONOMETHYL HYDRA - ZINE (MMH) 9,000 LBS.	P068 D001	ROCKET FUEL: THE HYDRAZINE GROUP IS THE ACTIVE CONSTITUENT	
ISOPROPYL ALCOHOL (2-PROPANOL) 200 LBS.	D001	COMMONLY KNOWN AS RUBBING ALCOHOL	LIQUID SOLVENT USED TO RINSE OFF FUEL PARTS
PR-1 (STRAIGHT-RUN KEROSENE FRACTION - SOME CRUDES HAVE NAPHTHENE, CYCLIC PARAFFINS) 1,000 LBS.	CALIFORNIA ADMINISTRATED CODE 22: REG-ULATED AS AN OIL: NO EPA #	KEROSENE-BASED FUEL	RINSINGS FROM DRUMS
UDMH OR HYDRAZINE, 1,1-DIMETHYL HYDRAZINE OR UNSYMMETRICAL DIMETHYL HYDRAZINE 1,000 LBS.	U098 D001	ROCKET PROPELLANT FUEL: HYDRAZINE IS THE ACTIVE COMPONENT	RINSINGS FROM DRUMS
TRANS-1,2-DICHLOROETHYLENE 4,000 LBS.	U079	DECOMPOSITION OF PRODUCT OF TRICHLORO-ETHYLENE	AQUEOUS FORMATION AFTER DRUM RINSINGS
VINYL CHLORIDE 2,000 LBS.	U043	DECOMPOSITION OF PRODUCT OF TRICHLORO-ETHYLENE	AQUEOUS FORMATION AFTER DRUM RINSINGS
FORMALDEHYDE 6,000 LBS.	U122	DECOMPOSITION PRODUCT OF OXIDIZED MONOMETHYL HYDRAZINE	AQUEOUS FORMATION AFTER DRUM RINSINGS

* Total amount, in pounds of constituent, that has passed through the impoundment intermittently during a 25 year period.

** DELIVERY means TRANSPORT OF CHEMICAL COMPOUNDS, by whatever PHYSICAL PROCESS going into the impoundment environs.