EPA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF ENFORCEMENT

EPA-330/2-80-024

AUDIT OF PRODUCTION/WASTE GENERATION OPERATIONS
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

(September 18-28, 1979)

August 1980

NATIONAL ENFORCEMENT INVESTIGATIONS CENTER—Denver
REGION IX—San Francisco
STATE OF CALIFORNIA

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Thomas O. Dahl

CONFIDENTIAL

NATIONAL ENFORCEMENT INVESTIGATIONS CENTER - Denver

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The author would like to extend his thanks to the other audit members from NEIC, EPA Region IX and the State of California for their herculean efforts and patience in reducing the thousands of pages of documents reviewed to a usable meaningful end product. Without these efforts, this report and subsequent technical efforts to systematically define the extent of environmental problems and necessary remedies would not have been possible.

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I. INTRODUCTION

Occidental Chemical Company (Oxy), a subsidiary of Hooker Chemical Corporation which in turn is a subsidiary of Occidental Petroleum Corporation (Oxy Petroleum), owns and operates an agricultural fertilizers and pesticides plant in Lathrop, California. This plant came into national prominence in 1977 following discovery that a substantial proportion of the pesticide workers were sterile. Presumably, the cause of this sterility was from exposure to a nematocide, Dibromochloropropane (DBCP) which was both formulated (1957 to July 1977) and manufactured (1963 to 1971, 1974 to 1976) at the plant. Subsequent to this discovery, the State of California banned the sale and use of DBCP on August 12, 1977. This expanded into a nationwide ban on the production and use of DBCP except in certain limited uses.

Concurrent with the disturbing events occurring at the Occidental Chemical Company plant at Lathrop (Oxy-Lathrop), Occidental Petroleum Corporation was locked in an anti-trust suit with Mead Corporation over attempts by Oxy Petroleum to take over Mead. This suit resulted in the U.S. Securities and Exchange Commission's (SEC) acquisition of considerable Oxy files regarding environmental affairs. One of the plants for which these internal files were forthcoming was Oxy-Lathrop. This information was made available to the U.S. Environmental Protection Agency (EPA). The combination of the sterility issue and certain internal files indicating potential adverse environmental effects caused EPA and the State of California to launch an investigation of Oxy-Lathrop operations.

In July 1979, the State of California and EPA Headquarters requested that the EPA-National Enforcement Investigations Center (NEIC) coordinate the conduct of an audit of Oxy-Lathrop operations. The purpose of this audit would be to review past and present practices drawn from existing records and recollections regarding all waste generating production processes, disposal practices, and monitoring data relating to possible

effects of operations on the environment. Information gathered would be used in case preparation, if that were warranted, and to develop a plan of study to determine the extent of groundwater/soil contamination in the area as well as necessary remedies.

II. SUMMARY OF FINDINGS

During September 18 to 28, 1979 the EPA-NEIC, EPA Region IX and State of California* conducted an audit of operations at the Occidental Chemical Company, Lathrop, California. This audit, supervised and coordinated by NEIC, determined that past production and disposal practices relating to air emissions, and liquid and solid wastes were inadequate resulting in contamination of the air, groundwater and soil in the vicinity of the plant area. The findings of the audit are discussed below.

PRODUCTION FACILITIES

Production facilities at Oxy-Lathrop are divided into fertilizer and Ag Chem (pesticide) operations. The fertilizer operation produces sulfuric acid, phosphoric acid, ammonium sulfate, and a pelletized ammonium phosphate-sulfate product. Gypsum and fluorosilicic acid are byproducts from the production of phosphoric acid. In the past, ammonia**, normal superphosphate and vanadium pentoxide catalyst were also produced at this facility. Anhydrous ammonia and the vanadium pentoxide are now purchased and normal superphosphate operations were terminated in 1972.

The Ag Chem facilities consist of blending and packaging of concentrated pesticides into formulated, dilute pesticide products for

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* State personnel included staff from the California Department of Health Services and the Central Valley Regional Water Quality Control Board.

** Ammonia was produced at the California Ammonia Company (Calamco) adjacent to the Oxy facility which is a co-op with 48% Oxy ownership.

agricultural, home and garden use. The only pesticide manufactured at this site was 1,2-dibromo-3-chloropropane (DBCP). This was done during the years 1963 to 1971 and 1974 to 1976. DBCP was formulated at this site from 1957 until July 1977.

MASTER LIST OF OXY-LATHROP CHEMICALS

During the audit, a series of lists were provided by Oxy purporting to contain the names of all chemicals thought to have been used or produced at Lathrop. These lists were evaluated and summarized yielding 113 active ingredients, 8 solvents and oils, 45 inorganics, and 18 miscellaneous products. During the audit, an additional 162 materials were encountered which were not included in the master listing.

WASTE SOURCES AND CONTROL/DISPOSAL

Air Emissions

- An acid mist regulation was adopted on May 29, 1979 by the San Joaquin Air Pollution Control District (APCD) and affected facilities had until February 1980 to comply. Compliance testing at the Oxy-Lathrop sulfuric acid plants was conducted by the California Air Resources Board in August 1979, but the results were not available at the time of the audit.

- Measured SO_2 emissions from the sulfuric acid plants were very close to the allowable emission of 2,000 ppm. Furthermore, during periods of upset conditions between 20,000 to 30,000 ppm of SO_2 have been emitted. Recent continuous monitoring data indicated the plant to be in compliance during normal operating conditions.

- A project to control particulate and opacity emissions from the pellet plant dryer and blunger was completed in June 1979. Control equipment appeared to be functioning properly at the time of the audit. However, the fluorine emissions from this stack have exceeded the standards

(0.02 lb F/ton P_2O_5) adopted on January 29, 1979 by the APCD. Oxy-Lathrop was granted an extension to May 18, 1979 for submitting a final control plan. The plan was reportedly scheduled to be completed in the Spring of 1980.

- The ammonium sulfate plant was down for its annual turnaround at the time of the audit so visible emissions from the stack could not be observed. However, in the past, high production rates of ammonium sulfate have caused stack emissions to exceed the 20% opacity limitation. If this is true for the present operation, additional control equipment or operation at a reduced rate may be needed to maintain compliance.

- On July 1, 1979, Oxy-Lathrop filed a plan with the APCD to control fugitive dust emissions from warehouses 1, 4, 5, 6 and 9. The fugitive dust emissions from the loadout stations often exceeded the visible emission limitation of 20% opacity during loading operations. The control plan is intended to bring these emissions into compliance with the regulations and remedial measures were scheduled to be completed in March 1980.

- Tests conducted by Oxy-Lathrop showed that under certain operating conditions, the organic emissions from the agricultural chemicals stack (old scrubber) exceeded the 18 kg (40 lb)/day limit established by the APCD. In addition, it was determined that the emulsifiable concentrate (EC) plant could not be operated in compliance with the APCD regulations until a control system was put into use. A VIC carbon adsorption system was purchased and installed and at the time of the audit, Oxy-Lathrop was awaiting local APCD approval of the system in order to operate it for a test period.

Liquid Wastes

Fertilizer Operations

- Considerable water reuse is presently practiced within fertilizer operations at Oxy-Lathrop. Process wastewaters go to one of three water cycles: the unlined Gypsum Ponds, the lined Pellet Plant Pond or the unlined Concentrator Pond.

- In-plant spills and rainfall runoff within fertilizer manufacturing areas are returned directly to in-plant use or sent to the waste pond systems for reuse or percolation/evaporation. When the ammonia plant is operating, a portion of the drainage goes to a Rainwater Pond east of the plant for percolation/evaporation.

- Rainfall runoff from non-manufacturing areas is discharged to either the unlined Concentrator Pond system or the Rainwater Pond.

- Historical water use was largely once-through, resulting in discharge to unlined ponds for percolation/evaporation. Gypsum Ponds existed since the beginning of operations in 1953. Decant waters from Gypsum Ponds were siphoned to an unlined percolation/evaporation pcnd called the Southwest Wastewater Pond. The Concentrator Pond system became operational in 1964 followed by the Pellet Plant Pond in 1975. Ir 1978, Gypsum Pond decant water was segregated from Pellet Plant waters, affording direct reuse of pellet plant waters.

Ag Chem Operations

- Current liquid disposal practices within Ag Chem operations result in essentially a no-discharge system. Waste liquids and rainfall runoff are collected in a series of sumps and are pumped to hazardous waste holding tanks for subsequent disposal at a California approved Class 1 site.

- In-plant waste liquid generation is minimized through maximizing production runs, use of multi-directional spray nozzles, dry cleanups where possible and concerted liquid conservation practices.

- Pesticide workers' clothing is laundered onsite. The resulting laundry water is treated with caustic and discharged to a septic tank. The overflow from this tank is discharged to a leach field and percolates.

- Although present liquid waste handling results in essentially a no-discharge system, this has not been the situation for long. Pesticide formulation began in 1957 (DBCP) and liquid wastes were discharged to the Southwest Wastewater Pond for percolation/evaporation. The first hazardous waste disposal tank was brought on-line on May 24, 1976 with the second following in 1977. Some liquid wastes may have been discharged to the Southwest Wastewater Pond as recently as 1979, although exact dates could not be ascertained.

- Currently, hazardous waste liquids from processing total approximately 1,100,000 liters (300,000 gal)/ year. In 1976, seven months after installation of the first hazardous tank, they were estimated to be 2,560,000 liters (676,000 gal)/year. Prior to installation of the tank, they were estimated to be three times as high as this.

- Some hazardous waste liquids may have been incinerated onsite in 1970; however this practice continued for no more than six months.

- In 1970 a large number of drums, some apparently containing liquids, were being stored onsite. In conjunction with the construction of the incinerator, a drum-handling area was also constructed including a concrete pad, a drum-rinsing operation, a drum crusher, and a sump to drain liquids to the Southwest Wastewater Pond. All drums that had been stored were reportedly cleaned, crushed and disposed of. File correspondence indicates the shipment of some pesticide drums containing caustic wash to a drum reconditioner in Oakland, California. The drum-rinsing and decontamination operations at Oxy-Lathrop continued until sometime in 1977 and some drum crushing still exists.

- There have been three Ag Chem fires in the past, at least one of which resulted in large losses of pesticide products. The first fire

occurred in January 1966 at the DBCP plant; the second in July 1975 in the emulsifiable concentrate area; and the third on January 17, 1976 when the pesticide warehouse burned down. During the January 17, 1976 fire, large amounts of SSS tributyl phosphorotrithioate (DEF), methyl parathion and malathion were lost. Firefighting efforts resulted in large volumes of water being discharged to the Southwest Wastewater Pond.

- A non-fire related event which may have resulted in loss of product to the environment occurred in 1979. A leak was detected in a pipeline carrying ethylene dibromide (EDB). Some soil was excavated and sent to a Class 1 site. The line was reportedly rinsed, drained and its use discontinued. In the past, this line had carried DBCP.

Solid Wastes

- Solids generated in fertilizer and Ag Chem operations are currently divided into hazardous and non-hazardous wastes. The hazardous wastes are collected and transported to hazardous waste dumpsters in the Ag Chem area for subsequent offsite disposal by a contractor at a Class 1 site. Non-hazardous wastes are collected, centralized and hauled by private contractor to offsite disposal in Lodi, California.

- Some hazardous waste drums are currently hauled to a Class 1 site for disposal; others are sent to a drum reconditioner in Montbello, California.

- Information regarding past solid waste disposal practices is limited. Hazardous waste dumpsters have been in use since at least August 1974. Prior to and including part of 1970, some hazardous wastes were disposed of in a burning pit and disposal trench onsite in the "Boneyard Disposal Area." In 1970 an incinerator was constructed onsite to burn, among other things, hazardous solid wastes. This incinerator was disassembled in 1974.

- Past DBCP operations provided additional sources of solid wastes. The process included a dryer containing calcium chloride and a filter. Both the calcium chloride and filter material had to be replaced--every 2 to 3 batches in the instance of the calcium chloride. Both of these operations included direct contact with DBCP. Disposal practices for these materials prior to the advent of hazardous waste dumpsters were not ascertained.

PRODUCTION RECORDS REVIEW

Fertilizer Material Balances

- Based on a review of Oxy-Lathrop records from 1971 to 1978, daily losses of ammonia (NH_3) and phosphates (P_2O_5) ranged from 9.4 to 13.8 (10.4 to 15.2) and 3.0 to 7.9 m. tons (3.3 to 8.7 tons)/day, respectively. Daily losses of potassium (k_2O) from 1976 to 1978 averaged .09 to 1.2 m. tons (0.1 to 1.3 tons)/day. These losses included percolation to groundwaters and atmospheric discharges.

- Data collected by Oxy-Lathrop in 1966 and 1978 indicated fluoride losses to percolation at 2.59 and 3.15 m. tons (2.85 and 3.47 tons)/day, respectively. Losses of fluorine to the atmosphere ranged from 18 to 33 kg (40 to 72 lb)/day or 0.33 to 0.86 lb fluorine per ton of P_2O_5.

- Data collected by Oxy-Lathrop from 1978 to 1979 indicated SO_2 losses ranging from 2.8 to 22.7 m. tons (3.1 to 25.0 tons)/day. On November 24, 1976 annual losses of SO_2 were estimated to be 3,600 m. tons (4,000 tons)/yr or 10 m. tons (11 tons)/day. Although all losses were assumed to be to the atmosphere, the procedures could not provide for distinguishing between percolation and atmospheric discharge.

Ag Chem Material Balances

- Two production record types were reviewed: inventory cards that

listed raw materials and batch sheets that documented formulation of products. Records were generally available from only 1973 to date, with some incomplete records for 1971 to 1972.

- At least 84 active ingredients and solvents and 179 other ingredients were used from 1971 to 1979.

- Ten materials were used in excess of 454,000 kg (1,000,000 lbs). Over 1,400,000 kg (3,000,000 lbs) of DBCP were handled from 1971 to 1979. A computer summary of DBCP production from 1968 to 1977 showed 7,660,949 kg (16,874,339 lbs); however, the origin of this document could not be accurately described and it may represent DBCP formulations and/or manufacturing.

- At least 41 raw materials and products suffered damage or loss during storage and handling from 1971 to 1979, primarily resulting from the January 17, 1976 fire which destroyed the Ag Chem warehouse.

- Average finished product losses were 0.79 and 0.70% in 1973 and 1978, respectively. Although these losses are small in terms of percentages, if real, they represent large quantities when considering that millions of pounds of pesticides were formulated/manufactured.

- An interoffice Oxy-Lathrop memorandum of June 25, 1976 estimated pesticide losses to the ground at 5 tons/year. During the audit, the writer of the memo, Mr. Robert Edson, discounted the accuracy of the memo. However, he could not explain why specific numbers were included for pesticide concentrations and mass losses which would have presumed the availability of analytical data to make such an evaluation.

HISTORICAL GROUNDWATER AND SOIL DATA EVALUATION

- Past environmental data collected at or near the Oxy-Lathrop facilities have documented environmental contamination attributable to Oxy-Lathrop.

- Beginning in late 1962 and continuing to present, sulfate concentrations in the vicinity of Oxy-Lathrop have exceeded the California's Central Valley Regional Water Quality Control Board Resolution limit of 100 mg/l. Concentrations of sulfates in one of Oxy's wells, the "Best South" well, now exceed 2,000 mg/l. These high sulfate concentrations are a result of Oxy's wet phosphoric acid operation which generates large quantities of sulfate-laden gypsum wastes.

- At least 27 organic compounds have been detected near the Oxy-Lathrop facilities in soil, shallow groundwater, and process, irrigation and potable wells. All these compounds are known to have been handled at the Oxy-Lathrop plant. Twelve of the compounds are known animal carcinogens, and one is a suspected animal carcinogen. DBCP is a suspected human carcinogen. The adverse health effects inferences of these statements are conservative since numerous other non-carcinogenic health effects are also known for the compounds.

- Samples collected by the State of California in the vicinity of the Oxy-Lathrop facilities have indicated the phosphoric acid operation and attendant gypsum ponds to be the source of introduction of radioisotopes into the groundwater. No gross alpha or beta activity was detected to the east of the plant upgradient of the assumed direction of regional groundwater movement. Measureable gross alpha and beta activity was found in wells to the south, west and north of the plant. The majority of the radioactivity in these samples was attributable to uranium.

AERIAL OVERFLIGHT OF OXY-LATHROP FACILITIES

On September 26, 1979, the Oxy-Lathrop facilities were overflown with multi-band photography including false color infrared imagery. Certain areas of land leading westward from the previously used Boneyard Disposal Area and Southwest Wastewater Pond appeared dark or discolored, and vegetation appeared to be degraded. This pattern could have been caused by leachate leaving the disposal areas.

III. AUDIT FINDINGS

COMPANY HISTORY

The evolution of the present Occidental Chemical Company operations has followed a corporate maze of acquisitions/transfers. In 1953 the Best Company opened a plant in Lathrop, California which manufactured fertilizer products under the trade name Best Fertilizers. In 1957, the formulation of pesticides was incorporated into their burgeoning line of fertilizer products. The addition of pesticide products resulted in the 1962 construction of a separate Ag Chem production area at the plant site.

In 1963, Best Company was purchased by the Occidental Petroleum Corporation, which subsequently also acquired the Hooker Chemical Corporation in 1968. The Occidental Chemical Company was formed in 1968 within Occidental Petroleum, absorbing the Best Company. In 1974, Occidental Chemical Company became a subsidiary of Hooker Chemical Corporation.

Hooker Chemical Corporation purchased Zoecon Corporation, a Palo Alto, California based company, in June of 1977. Subsequently, in February 1978, the garden and lawn division of Occidental Chemical's Lathrop operations was transferred by Hooker to Zoecon. These facilities are located approximately 1 mile east of the main Occidental Chemical production facilities in Lathrop. In conjunction with the transfer, Zoecon retained the Best Products trade name.

PRODUCTION FACILITIES

Production facilities at Oxy-Lathrop are divided into fertilizer and Ag Chem (pesticide) operations. The fertilizer operation produces sulfuric acid, phosphoric acid, ammonium sulfate, and a pelletized ammonium

phosphate-sulfate product. Gypsum and fluorosilicic acid are byproducts from the production of phosphoric acid. In the past, ammonia*, normal superphosphate and vanadium pentoxide catalyst were also produced at this facility. Anhydrous ammonia and the vanadium pentoxide are now purchased and normal superphosphate operations were terminated in 1972.

The Ag Chem facilities blend and package concentrated pesticides into formulated, dilute pesticide products for agricultural, home and garden use. The only pesticide manufactured at this site was 1,2-dibromo-3-chloropropane (DBCP). This was done during the years 1963 to 1971 and 1974 to 1976. DBCP was formulated from 1957 until July 1977.

The following sections describe the individual processes and facilities included in the fertilizer and Ag Chem operations. Detailed flow charts for each process are available in the NEIC files.

Fertilizer Operations

Table 1 summarizes the past and present fertilizer operations at the Lathrop facility, including startup and shutdown dates. Those plants with no shutdown dates are still in operation and include the sulfuric acid, phosphoric acid, pellet and ammonium sulfate plants. The interrelationship of the various plants is shown in Figure 1.

Sulfuric Acid Plant

The sulfuric acid (H_2SO_4) plant consists of three single-contact trains: the first began operation in 1956 and has a production capacity of 113 m. tons (125 tons)/day, the second began operation in 1960 with a capacity of 204 m. tons (225 tons)/day and the third began operation in

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* Ammonia was produced at the California Ammonia Company (Calamco) adjacent to the Oxy facility which is a co-op with 48% Oxy ownership.

Table 1

FERTILIZER OPERATIONS
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

Plant	Startup	Rebuilt	Shutdown
Phosphoric Acid	1953		
Pellet Plant	1954	1972	
Sulfuric Acid			
No. 1	1956		
No. 2	1960		
No. 3	1964		
Ammonium Sulfate	1958		
Ammonia Plant	1958		1979
Normal Superphosphate	Prior to 1964	1966	1972
Phosphate Ore Crushing Plant	1963		1972
Vanadium Pentoxide Plant	1965		1968
Fluorosilicic Acid			
No. 1 Concentrator	1974		
No. 2 Concentrator	1976		

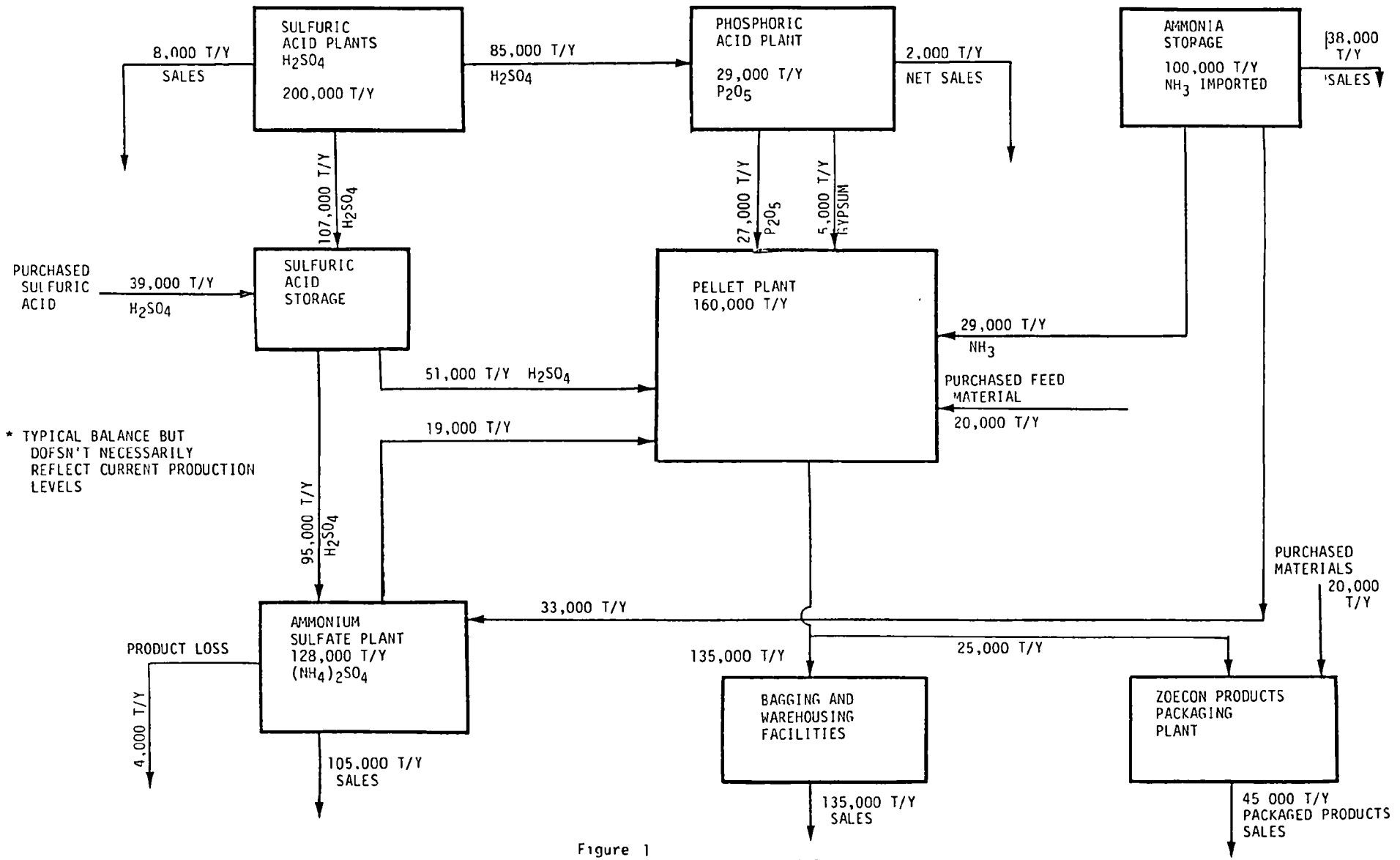

Figure 1
INTERRELATIONSHIP OF VARIOUS FERTILIZER OPERATIONS*
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

1964 with a capacity of 295 m. tons (325 tons)/day. Although design capacity is about 227,000 m. tons (250,000 tons)/yr, normal production has been between 181,000 and 200,000 m. tons (200,000 and 220,000 tons)/yr. Oxy can purchase up to 41,000 m. tons (45,000 tons)/yr from San Francisco Bay Area sources and has historically been a net purchaser of H_2SO_4 (10 to 15% of that required is purchased). All three plants operate seven days/week, twenty-four hours/day producing acid that is sold as product or used in the production of phosphoric acid, ammonium sulfate and in the Pellet Plant.

The following general process description applies to all three trains. Molten sulfur (S) is purchased from a Bay Area refinery, trucked to the Lathrop facility, and stored in heated insulated tanks for processing as molten sulfur. Piping connects these tanks to an underground pit from which the sulfur is pumped to a furnace and oxidized with dry air to sulfur dioxide (SO_2) vapors. The hot gases pass through a waste heat boiler and are sent to the single pass converter. In the converter, the SO_2 is oxidized further to sulfur trioxide (SO_3) by contacting oxygen while passing through three vanadium pentoxide (V_2O_5) catalyst beds. The hot gases pass through a second waste heat boiler, located between the first two catalyst beds, and a third heat boiler, located after the last catalyst bed. The SO_3 vapors are then hydrolyzed to H_2SO_4 in an absorbing tower where SO_3 gas flows upward through ceramic packing and countercurrent to sulfuric acid. SO_3 is readily hydrolyzed to H_2SO_4 by the water in the acid. Hydrolysis releases heat, increasing the temperature of the acid. By sending the acid to an acid pump tank and then through acid coolers, the temperature increase is offset. From the acid pump tank, the 98.8% acid product is drawn off, recycled through the absorbing tower, stored, or sent through a drying tower.

The drying tower produces the dry air required to oxidize the sulfur in the initial step of the process. Steam and air are mixed in an air blower to produce moist air that enters the drying tower and travels concurrently to a 98.8% acid solution. The acid absorbs excess moisture and is recycled to the acid pump tank. The dried air is sent to the sulfur furnace.

Presently, the vanadium pentoxide (V_2O_5) catalyst is purchased from outside sources. However, V_2O_5 pellets were produced at Oxy-Lathrop between 1965 and 1968. In this process, V_2O_5 flakes were reduced in size by a Pulva-Sizer Mill and mixed with dilute (20%) H_2SO_4, water, potassium hydroxide, sodium hydroxide, and molybdic acid in a stainless steel reactor tank. This liquid mixture was then combined with dry materials (dicalite No. 145, sulfur, sulfate of potash, and aqua ammonia) in a Sigma Blade Mixer. The slurry was sent to an extruder where a feed screw forced the catalyst into pellets and the pellets fell onto a belt dryer where the material was dried and conveyed to a rotary kiln. The natural-gas fueled kiln baked the pellets and dropped them into a squirrel cage cooling screw and screen. Fines that were screened out were returned to the Pulva-Sizer Mill and Sigma Blade Mixer and the finished product was stored for bagging.

Phosphoric Acid Plant

Phosphoric acid (H_3PO_4) is produced at the Lathrop facility by the wet process method in which phosphate rock is reacted with sulfuric acid. The phosphoric acid plant began operation in 1953 and has a capacity of 41,000 m. tons (45,000 tons)/yr. Since 1963, phosphate rock from Oxy mines in White Springs, Florida has been shipped to the Port of Stockton and trucked to the plant. Prior to this time, the ore was purchased from the Idaho/Wyoming/Utah area. Proximate analysis of phosphate rock from Florida is shown below:

TYPICAL ANALYSIS[a]
FLORIDA PHOSPHATE ROCK

	Percent
Moisture	2.9
P_2O_5 (dry basis)	32.04
Iron Oxide	1.0
Aluminum Oxide	1.02
Fluoride[b]	3.65

a Certificate of analysis 7/23/79.
b Lab analysis 11/20/78.

No data were available on the radiochemical content of the phosphate rock processed at this facility.

A phosphate rock crusher was employed from 1963 to 1972 but is no longer used. Currently, the phosphate rock is loaded from one of the three storage silos into a rock hopper and fed directly to the reaction tank. The following overall process reaction occurs in the tank when H_2SO_4 is added:

$$3\ Ca_{10}\ (PO_4)_6\ F_2 + 30\ H_2SO_4 + SiO_2 + 58\ H_2O \rightarrow$$

$$30\ CaSO_4 \cdot 2\ H_2O + \pm 8\ H_3PO_4 + H_2SiF_6$$

Gypsum	Phosphoric Acid	Fluorosilicic Acid

The fluorosilicic acid decomposes to SiF_4 and HF, but is recovered later in the water scrubbers after the concentrators. Agitation in the tank is provided by turbines.

The gypsum/phosphoric acid slurry is pumped to a filter feed tank and separated by two vacuum filters. The acid is of a 22 to 26% concentration and is increased to 52% in one of two concentrators.

The filters are backwashed three times using washwaters retained from previous washes. The third wash is recycled back into the system at the reaction tank. Fresh water and gypsum pond decant supply the make-up water needed for the initial backwash. The gypsum cake remaining on the filter is repulped, ponded, dried, and sold as a soil conditioner/fertilizer product to local farmers.

The concentrated acid goes through a series of intermediate storage tanks and a Lamella separator (inclined screen and rake) to remove the solids. These solids are combined with solids from the concentrators and sent to the Gypsum Ponding area. The acid is either used in the Pellet Plant or sold as a product.

Fluorosilicic acid (H_2SiF_6) is recovered from the concentrators by scrubbing the waste gases. This practice began at the first concentrator in 1974 and at the second in 1976. Prior to this, the fluorine in the waste gas stream was released to the atmosphere.

As noted previously, normal superphosphate was produced at the Lathrop facility until 1972; however, no process flow information was available to the auditors for review.

Ammonia Plant

The ammonia (NH_3) plant began operation in 1958 as a cooperative venture between a farmers' co-op (52% ownership) and Best Fertilizers (48%). When Occidental Petroleum purchased Best Fertilizers, they also acquired 48% of the California Ammonia Company (Calamco). The plant has not been in operation since April 1979, reportedly a result of the high costs of energy and natural gas. The plant is being maintained, but will be shutdown for an indeterminate length of time. At the time of the audit, anhydrous ammonia was being purchased on the open market and from the Soviet Union.

Ammonium Sulfate Plant

The ammonium sulfate ($(NH_4)_2SO_4$) plant, which began operation in 1958, consists of two saturators and four centrifuges serving common equipment. This plant runs 24 hours/day, seven days/week producing $(NH_4)_2SO_4$ crystals for sale and for use in the Pellet Plant. A product of 21% nitrogen is guaranteed from this process. The capacity of the plant is about 116,000 m. tons (128,000 tons)/yr, but normally only 91,000 m. tons (100,000 tons)/yr are produced.

H_2SO_4 and NH_3 vapor react in a saturator forming crystals in a supersaturated solution. Diammonium phosphate is added to control crystal shape. The solution is centrifuged, separating the crystals from the

liquid. The liquid returns to the saturator while the crystals are cooled, dried, and screened, using a Tyler Hummer screen. The screen separates the fine and oversize from the usable crystals. The fine and over-sized materials are either recycled through the mother liquor tank or stored and used in the Pellet Plant. The mother liquor tank serves to recycle materials through the saturators including scrubbing water, fine and oversized crystals, sump water, sulfuric acid, ammonia liquid, dust-laden steam from the dryer and cooling tower blowdown. Vapors from the saturator and mother liquor tank pass through a scrubber and condenser to remove the ammonia vapors and the resulting liquid is returned to the mother liquor tank.

Pellet Plant

The Pellet Plant, which began operation in 1954, produces various grades of fertilizers. Current production level is about 163,000 m. tons (180,000 tons)/yr. Sulfuric and phosphoric acids are initially ammoniated, making slurries which overflow to a mix tank. Phosphoric acid, sulfuric acid, and ammonia are added in various proportions, depending on the product desired. The slurry passes to a blunger where ammonium sulfate crystals are added. The blunger spills the mixture to a gas fired dryer. The dried product passes through a lump breaker and is then elevated to one of three screens where a hammermill breaks up the oversized pieces. These are combined with the fines on the recycle conveyor, where potash (KCl, KSO_4), micronutrients (ZnO, FeS, gypsum), and dry bulk are added, returned to the fines elevator and passed to the blunger. The saleable product travels by conveyor to one of four warehouses for storage.

Vapors from the mix tank are passed through a Heil Scrubber which uses process water and this liquid is recycled to the mix tank. Fumes from the scrubber are passed to a condenser. The condensate is ponded and remaining vapors are released to the atmosphere. Air from the dryer goes to a baghouse and then to a condenser. Condensate is piped to a lined pond. Vapors from the condenser pass through a wet electrostatic precipitator and the recovered liquid is also ponded. Dust-laden air from the conveyor

and elevator pass through one of two cyclones and then to a baghouse. Vapors are released to the atmosphere and fines are recycled into the system via the recycle conveyor.

Ag Chem Operations

Ag chem operations at the Lathrop facility including the approximate dates of startup and shutdown for each plant are summarized below:

AG CHEM OPERATIONS

Plant	Startup	Rebuilt	Shutdown
Dust Plants			
No. 1	1962		
No. 2	1964		
No. 3	1974		
Emulsifiable Concentrate Plant	1962[a]	1971[b]	
Granular Plant	1967		
DBCP Formulations	1957		Aug. 1977
DBCP Mfg.	1963		1971
	1974		1976
Flowable Plant	1969		

a Located where No. 3 dust plant is now located.
b Relocated to present location.

Although numerous pesticides are formulated at Oxy-Lathrop, no pesticides currently are manufactured at this site.

The Ag Chem facility consists of seven plants: three dry plants, a granular plant, an emulsifiable concentrate plant, a flowable pesticide plant, a standby reactor capable of producing DBCP, and a facility for processing spray oils. The operation of these plants is seasonal in nature; during most of the year there is one shift operating per day, but this increases to three per day in the winter.

The following sections discuss each of these facilities and the type of products produced.

Dust Plants

The first dust plant began operation in 1962. It has a capacity ranging from 454 to 1,814 kg (1000 to 4000 lbs)/batch and is used primarily for the blending of dusts and pest control agents. The second dust plant began production in 1964 and has a capacity equal to approximately half the first dust plant [227 to 907 kg (500 to 2,000 lbs)/batch]. It is used primarily for processing foliar nutrients. The third dust plant was built in 1974 and has approximately half the capacity of the second dust plant [113 to 454 kg (250 to 1,000 lbs)/batch]. It is used in the processing of wettable powders. One batch of dry product can serve several customers. Sampling is performed at intervals of 1/3 and 2/3 of the way through each batch for quality control purposes.

Dry blending begins with the addition of materials at a cut-in hopper. The material is screw fed to a drag elevator and brought to a ribbon blender at the top. Liquids can be introduced there through a spray system. After blending, the product goes to a bagging hopper or to a pulverizer. The pulverizer reduces particle size and mixes the product more thoroughly. Usually dusts are packaged in 10, 20, 30, and 50 lb bags.

The No. 2 dust plant combines materials by the same process but has no elevator or pulverizer. Material is elevated with a forklift to the blender.

The No. 3 dust plant includes a cut-in hopper, elevator, one mixer, a microblender, and a small packaging facility capable of packing products in 4 to 12 lb bags. There is no pulverizer.

Granular Plant

The granular plant began operation in 1967 and is used to impregnate clay materials and fertilizers with pesticides. In most cases a liquid is applied onto a dry ingredient. Like the dust plants, this is a batch process with a capacity of 454 to 1,814 kg (1,000 to 4,000 lbs)/batch. The granular market is a deteriorating one. In the past, this plant made approximately four or five times as much product as it now does.

In this process, 55-gal barrels of pesticides are either mixed with an adhesive (oils or molasses) or used directly, if in a liquid state. This material is either pumped to a batch tank where liquids can be sprayed and then delivered to a "Munson" mixer or mixed directly. The mixer is the largest piece of equipment and functions comparably to a cement mixer. A cut-in hopper spills the clay or fertilizer (granules are between 24 and 48 mesh) to the mixer. An elevator carries the product from the mixer to a baghouse hopper where it is packaged, usually in 25 to 50 lb bags. Farm fertilizer is packaged exclusively in 80 lb bags.

Emulsifiable Concentrate Plant

The emulsifiable concentrate (EC) plant began operation in 1962. Here liquid products, accountable for the greatest proportion of Ag Chem sales, are mixed. This plant consists of two batch tanks of 5,300 and 3,785 liters (1,400 and 1,000 gal) capacities, and holding tanks of corresponding sizes. Batches must be a minimum of 1,320 to 1,510 liters (350 to 400 gal) and can serve several customers. Products are bottled in plastic, glass and metal one-gallon containers.

Ingredients are added to a batch tank and mixed through agitation. Solvents can be pumped directly from 55-gal containers. If the solvents are viscous, the 55-gal drums can be placed in a hot tank to reduce viscosity. Active ingredients (i.e., pesticides) are usually added as a last step. The batch tanks have a recirculating ability. Retention time ranges between 1 to 4 hours depending on the number of ingredients mixed.

Flowable Pesticide Plant

The flowable pesticide plant began operation in 1969 and mixes high viscosity products, generally a liquid and a solid, which usually have short shelf lives. Water and powders are typically used, but oil can be used instead of water or two liquids, such as water and an organic liquid, can also be mixed. This plant is idle most of the time due to a decreasing market for this type of product.

Two 2,270 liters (600-gal) tanks are available for mixing. Chelated and complexed metals are added in powder form. Buffers are also added to control the pH of the mixture. A Cowles Dissolver, the major piece of equipment which disperses the powder in the liquid, can mix only one tank at a time. A batch takes 2 to 4 hours to produce.

The product then goes to a drum filler and is packaged in 1 to 5 or 30-gal containers. The 1 to 5 gal containers are more popular now than in the past and are usually used for foliar nutrients. The 30-gal drums are used for dormant oils. These were more popular when oil was more commonly used.

DBCP Plant

DBCP is a compound prepared by bromination of allyl chloride at ambient temperature. Either alone or in formulations, DBCP was widely used as a soil fumigant for the control of nematodes and root-knot disease. Application was made by direct injection into the soil or addition to irrigation water.

DBCP formulation began in 1957 and continued until July of 1977 when it was banned by the State of California. Manufacturing of DBCP began in 1963 and continued until 1971, resumed in 1974 and continued until 1976. It was produced under a license from Dow Chemical Company which owned the patents for manufacturing of DBCP.

When the DBCP manufacturing plant was operating, the reaction took place in a glass-lined Pfaudler reactor, which was on weigh-scales and had a capacity of 13,600 kg (30,000 lbs)/batch. The operation was continuous (24 hrs)/day until a batch was completed. Two to three batches could be produced in a week.

The reaction of bromine with allyl chloride is exothermic with temperature control by bromine addition. Bromine is forced into the reactor operating at atmospheric pressure using pressurized nitrogen. Vapors pass through freshwater reflux condensers operating between 38 and 44°C (100 and 112°F) and are returned to the system. After the reaction is completed, the material is neutralized using soda ash and dried in a calcium chloride column. The DBCP is then filtered and stored; filters are replaced rather than backwashed every few batches. Five tanks were available for storage but have been cleaned since the ban in 1977 and put to other uses. After the ban, Oxy recalled the unsold and unused DBCP products which amounted to 56,247 kg (124,003 lbs) of mixtures of varying strength. Bulk stocks were returned to Dow Chemical in April and May of 1978. At the time of the audit, some stocks of DBCP were still stored at the Lathrop site awaiting disposal.

Spray Oils

Spray oils are the largest single liquid pack-out in the Ag Chem plant. Various spray stocks are stored in tanks located in the Ag Chem tank farm. These tanks are equipped with recirculating spargers and can be used for storage of spray stock, blending, or bulk storage or product. The major products from the blending are contact weed killers. The spray oils are shipped out through the bulk storage facilities in 19,000 to 26,000 liters (5,000 to 7,000 gal) tank trailers and trucks. Some of the spray oils are canned out through the EC plant.

MASTER LIST OF OXY LATHROP CHEMICALS

During the September 18 to 28, 1979 process audit of the Oxy-Lathrop facilities, NEIC was provided a series of lists containing the names of all chemicals thought to have been used or produced by the Company. The lists contained the names of raw materials, active ingredients, products, inorganics and organics. The Company lists were evaluated and summarized. Separate lists for Ag-Chem active ingredients, solvents and oils, inorganic chemicals and miscellaneous products and chemicals were prepared (Tables 2 to 5). These lists identified 113 active ingredients, 8 solvents and oils, 45 inorganics, and 18 miscellaneous products. Table 6 contains an additional 5 compounds which were reportedly purchased for resale but not used in production.

During the audit, the review of Ag Chem production records showed many of the chemicals in Tables 2 to 5. In addition, 162 materials were encountered that were not previously listed. Table 7 lists these materials. The nomenclature for active ingredients was readily cross-referenced. However, because unique production codes were not always available, some oils and solvents may be listed twice.

WASTE SOURCES AND CONTROL/DISPOSAL

Air Emissions

The air contaminants associated with the Oxy-Lathrop fertilizer and Ag Chem (pesticide) operations include particulate matter, sulfur dioxide, acid mist, fluorine compounds, volatile organics, and pesticide compounds. The potential sources of these emissions and related control equipment are discussed below.

Fertilizer Operations

Sulfuric Acid Plant - Sulfur dioxide (SO_2) and acid mist are the major pollutants emitted into the atmosphere from the three sulfuric acid

Table 2

AG-CHEM ACTIVE INGREDIENTS FROM OXY-LATHROP MASTER LISTS
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

COMPOUND	OTHER NAME(S)
Aldrin	
Ametryn	
Aramite	
Azinphos-methyl	Guthion
Bacillus Thuringiensis	Thiuricide, Bakthane
Benefin	Balan, Benefine
Bensulide	Betasan, Prefar
BHC	
BTB	
Cacodylic Acid	
Captan	
Carbaryl	Sevin
Carbophenthion	Trithion
Chlordane	
Chlorpyrifus	Dursban
Chlorthalonil	Dacthal
Cryolite	
Cube Resins	
Dalapan	Dowpan
DBCP	dibromochloropropane
DCPA	
DD	Telone
DDT	
DEF	
Destun	
Diazinon	
Dicamba	Banvel D
Dichlone	
Dichloran	Botran
Dicofol	Kelthane
Dieldrin	
Dimethoate	Cygon
Dimethrin	
Dinocap	Karathane
Dinoseb	DNBP
Dioxathion	Delnav
Dipheramid	
Disulfoton	Disyston
Dithane M-45	
Dodine	Cyprex
Dyrene	Anilazine
Endosulfan	Thiodan
Endrin	
Epichlorohydrin	
EPN	
Erbon	
Ethion	
Ethofumescate	Norton
ETDB	EDB, ethylene dibromide
Fensulfothion	Dasinit
Fenthion	Baytex
Ferbam	
Folpet	Phatton
Gibberellic acid	
Glyodin	
Glytac	
Heptachlor	
Lindane	gamma-BHC
Malathion	Cythion
Maleic Anhydride	MH
Maneb	
MCPA	
MCPP	Mecoprop
Metaldehyde	
Metam-Sodium	Vapan
Methiocarb	Mesurol

Table 2 (Cont)

AG-CHEM ACTIVE INGREDIENTS FROM OXY-LATHROP MASTER LISTS
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

COMPOUND	OTHER NAME(S)
Methoxychlor	
Methylparathion	
Mevinphos	Phosdrin
Mexacarbate	Zectram
Molinate	Ordram
Monocrotophos	Azodrin
Monuron	
Nabam	
Naled	Dibrom
n-octylbicycloheptene-dicarboximide	MGK-264
OVEX	Chlorfenson
Oxydemeton	Meta-systox R
Parathion	Ethyl parathion
Parinol	
PCNB	Pentachloronitrobenzene
PCP	Pentachlorophenol
Pentac	
Perthane	
Phosphamidon	
Piperonyl Butoxide	
Polyram	
Prometone	
Propham	IPC
Propargite	Omite
Propoxur	Baygon
Pyrethrum	
Rotenone	
Ryanodine	
Sabudilla	
Silvex	2,4,5-TP
Sodium Cacodylate	
2,4,5-T	
TDE	DDD
Temephos	Acephate, Abate
EPP	
Terbutol	Azak
Terrazole	
Tetrachlorvinphos	Garbona, Raban, Stirofus
Thimet	Phorate
Thiram	
TOK	Nitrofen
Toxaphene	
Tricalcium Arsenate	
Trichlorofon	Dipterex, Dylox
Trifluralin	Treflan
Zineb	
Ziram	

Table 3

SOLVENTS AND OILS FROM OXY-LATHROP MASTER LISTS
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

Nitration Grade Xylene
Isopropyl Alcohol
Cyclohexanone
PGSO 2 Oil
99 S Oil
Weed Oil (aromatic oil 54)
Chevron base C oil
Chevron thinner 339

Table 4

INORGANIC CHEMICAL USED AND PRODUCED FROM OXY-LATHROP MASTER LISTS
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

Ammonia	Molybdic Acid
Ammonium Nitrate	Phosphate Rock (calcium phosphate)
Ammonium Phosphate	Phosphoric Acid
Ammonium Sulfate	Polymers (water treatment)
Antimony Oxide	Potassium Chloride
Argon	Potassium Nitrate
Boric Acid	Potassium Phosphate
Bromine	Potassium Sulfate
Calcium Carbonate	Silica
Calcium Nitrate	Sodium Chloride (de-ionizers)
Carbon Dioxide	Sodium Hydroxide
Clay	Sodium Chromate (water treatment)
Copper Hydroxide	Sulfur
Copper Sulfate	Sulfuric Acid
Ferrous Sulfate	Superphosphate (dicalcium phosphate type)
Fluosilicic Acid	Superphosphate (monocalcium phosphate)
Gypsum (calcium sulfate)	Urea
Iron Sulfur (sulfides and polysulfides)	Vanadium Oxide
Lime	Water Treatement Chemicals
Magnesium Oxide	Zinc Oxide
Magnesium Sulfate	Zinc Oxysulfate
Manganese Carbonate	Zinc Sulfate
Manganese Sulfate	

Table 5

MISCELLANEOUS PRODUCTS AND MATERIALS
FROM OXY-LATHROP MASTER LIST
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

Cop-o-zinc	Double D Oil
Adhere	Oxy K Foliar Spray
Adjust	Oxy P Foliar Spray
Ad-wet	See White Spray Act.
Cocoamine Acetate	Sprint 38
Comp-Ad	Tennacco 500-100
Dimine 4	ZNK Spray A
Herb Ad	Zinc Chelate 6%
Nutrawet	Neutral Zn 52

Table 6

PRODUCTS PURCHASED FOR RESALE BY AG-CHEM
OXY-LATHROP BUT NOT USED IN PRODUCTION
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

TECHNICAL NAME	EPA AND COMMON NAME
Atrazine	Aatrex
2,4-D and its derivatives	
Diuron	
DSMA	
Simazine	Princep

Table 7

MISCELLANEOUS MATERIALS - OXY-LATHROP[a]
Lathrop, California

Acetic Acid
Allyl Chloride
Amyl Acetate
Citrus Oil
Diesel Oil
Ethyl Hexanol
Morpholine
Solvent Thinner 347
Excel
Reax 88E
Supersul 50 (thiovet)
Calcium Chloride
Acetic Anhydride
Adsee 775
Aerosil 200 (Cab-o-sil)
Aerosol OTB
Agrimul J-1
Aqueous Formaldehyde
Aquaflat
Antifoam A
Antifoam H-10
Arquad 20-75
Armeen CD
Atlox 804
Atlox 3403F
Atlox 3409F
Atlox 3431
Atlox 3453F
Atlox 3454F
Atlox 3455F
Atlox 3403F
Atlox 3404F
Attaclay
Calco oil blue liquid
Calcozine green mix, liquid
Calcozine Auramine 00
Calsoft T-60
Casein
Celatom MP-78
Celatom MP
Celite 209'
Kaolin Type 41 Clay
K-nite
Lignosite 458
Lignosite 854
Lorsban 4E
M-4 Clay
Measurol Tech
Metanil Yellow Dye
Microcel E
Microcel T-26
Multifilm Defoamer
Nephthalene-Acetic Acid
Nekal WT-27
Nekal BX-78
Neutralizer M-33
Ninate 401
Nopco 80-50
Nufilm p
Nutra Sol
Nutrawet-Folospray
Naphthol Green Dye
Cotton Seed Oil
60 Pale Oil
Pine Oil
Spray Stock L
PGSO 1 oil
Petro Ag
Powdered Bluestone
Propylene Glycol
PVP K30
Sellogen HR
Sellogen W
Semimol
Sequesterine 30A
Sequesterine 330 Fe
Sequesterine Zn 14%
Shelsol
Sorbitol 70 Solution
Sponto EMCOL HJPZ
Sponto N142B
Sponto 10% O
Sponto N164

Chevron Agent 236-64A
Cottonseed Oil
Copper-Traco 50%

Dicofol
Diethylene Glycol
Dipel
Dimethrin
Dioctyl Phthalate
Diphos Premix

Dolomite Ag
Dorflo, Oil
Dowfax 2A1
Dowfax 21
Dow Anol EM
Dowcil 100
Duot Diluent, Chevron
Emgard 2063
Emgard 2066
ESO (epoxidized soybean oil)
Ferrifloc
Flo Sul
Folpet (phaltan 50W)
GAFAC-729
GAFAC-Re-610
Geopan-GA-1
Gilsonite
Glycerol 96
Groco 2 Red (oleic acid)
Hampene 6 5% Zn Chelate
Hampene 14% Zn Chelate
Hisil 233
Hexylene Glycol
Hydrated Lime
Igepal Co 530
Igepal Co 430
Igepal Co 630
Igepal Co 710
Igepal DM-530
Igepal TN-74
Sponto A-69-40
Sponto 139-B
Sponto N-140B
Sponto AK-16-95N
Spray Stock L
Sprint 38
Sudan Blue
Sudan Orange
Sudan Red 0
Sudan Yellow Dye
Sugar
Sulfur
Supersul (thiolux)
Sulframin SXS 40% Liquid
Sulframin LX Flake 85%
Supersul 50 (thioret)
Tamd SN
Tamol TN
Tamol N Micro
Techmangan Nutra-spray
Techmangan (Mn SO_4)
Terton K120
T-mulz 121N
T-mulz 339
T-mulz A-02
Thylate
Titanox - RGHT-X (titanium pigment)
Tribasic Copper 53%
Triple 12
Triton X-15
Triton AG 120
Trusorb 30-60 Granules
Tween 80
Versene 100
Versenol 120
Vitamin B-1
VLR-Diluent Clay
Xylene Milling Green B Dye

a Miscellaneous materials identified during records audit at Oxy-Lathrop which were not included in Company's master lists - included are emulsifiers, diluents antifoam agents and dyes.

plants. Nearly all of the SO_2 and acid mist emissions are found in the exit gases from the absorbing towers. In addition to the exit gases, small quantities of sulfur oxides are emitted from storage tank vents and tank truck vents during loading and unloading operations and from process equipment leaks. However, very little data were available on emissions from these sources.

The exit gases from the three absorbers are vented to the atmosphere through a common stack with an inside diameter of 162 cm (64 in) and a stack height of 42.7 m (140 ft). Each absorbing tower is equipped with a vertical panel York type-S mist eliminator for acid mist control. These mist eliminators were installed in September 1974 to reduce the acid mist emission and to bring the plant into compliance with the visible emission regulation (San Joaquin APCD Rule 401). The measured and allowable SO_2 and acid mist emissions are summarized in Table 8.

The acid mist regulation was adopted on May 29, 1979, by the San Joaquin Air Pollution Control District (APCD) and affected facilities had until February 1980 to comply. Compliance testing was conducted by the California Air Resources Board (CARB) in August 1979, but results were not available at the time of the audit.

The measured SO_2 emissions [Table 8] were very close to the allowable emission. However, daily Reich test data submitted to the APCD show the majority of the emissions to be between 1,500 and 1,900 ppm. There have been periods of upset conditions when 20,000 to 30,000 ppm of SO_2 have been emitted and these are reported to the APCD on a routine basis.

The regulations also require that plant personnel continuously monitor the SO_2 emissions. The original Lear Siegler SO_2 monitor was installed in late 1977, but reportedly never operated properly. This unit was replaced in June 1979 with a Du Pont 460 SO_2 monitor. The monitor appeared to be operating properly at the time of the audit and continuous data (10 minute readings) were being collected and reported to the APCD. These readings also showed the SO_2 emissions to be in compliance during normal operating conditions.

Table 8

SULFURIC ACID PLANT EMISSIONS[a]
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

Date	Production Rate, T/D	SO_2 Emissions, ppm[b]	Acid Mist Emissions[c] lb/ton	lb/hr
2/24/72	-	2,095	0.57	-
5/19/76	600 Combined (stack)	1,580	2.92	73
4/7/77	No. 1 plant - 150	2,050	3.48	22
	No. 2 plant - 235	1,950	4.06	40
	No. 3 plant - 294	2,010	3.03	37
4/13/78	630 Combined (stack)	-	0.267	7
6/30/78	No. 1 plant - 182	-	0.316	2.4
	No. 2 plant - 190	-	0.385	3.1
	No. 3 plant - 294	-	0.386	3.7

a Based on stack test results.
b Allowable emission 2,000 ppm.
c Allowable emission 0.3 lb/ton of 100% H_2SO_4 adopted 5/29/79.

Phosphoric Acid Plant - The major air pollutants emitted by the phosphoric acid plant are sub-micron particulates, acid mists, silicon tetrafluoride (SiF_4), and hydrogen fluoride (HF). Fumes and vapors are generated at the reaction tank, filters, product holding tanks, and the concentrators.

The fumes and entrained particulates generated at the reaction tank are collected by an overhead duct, scrubbed in a 2-stage scrubbing system, and vented through the phosphoric acid fume stack. The 2-stage scrubbing system, consisting of a prescrubber and packed tower, was designed and installed by Oxy-Lathrop in 1972. The prescrubber is a horizontal duct with water sprays and is located over the reaction tanks. The fumes from the reaction tanks are collected in the duct, quenched with water sprays, and then sent through the packed tower. The tower is packed with high density polyethylene spheres 4 cm (1 5/8 in) in diameter to provide greater turbulence and better gas-liquid contact. Most of the entrained particulates and acid mist are removed in the prescrubber and the gaseous fluorine compounds are removed in the second stage of the system. Emission data from this stack are limited to data contained in the monthly air pollution reports for November 1975 through August 1979. These reports summarize opacity readings for the plant stacks and results of any stack tests performed during the reporting period. The stack test results are reported in Table 9. Data to verify the reported results were not provided during the audit. The allowable emissions from this stack are 20% opacity and 15 kg (33.8 lb)/hr. Emission data from this process prior to installation of the fume scrubbing system in 1972 were not available during the audit.

The San Joaquin County Air Pollution Control District adopted fluorine emission standards on January 29, 1979 and required sources to submit a final control plan by February 20, 1979. Oxy requested and was granted an extension to May 18, 1979. The emission standard is 0.02 lb fluorine/ton of P_2O_5 input. Stack test data collected by the State in 1977 (0.045 lb F/ton P_2O_5) and by Oxy in 1979 (0.03 lb F/ton P_2O_5) showed that Oxy did not meet the standard. The final control plan calls for the phosphoric acid

Table 9

SUMMARY OF STACK TEST DATA[a]
PHOSPHORIC ACID PLANT FUME STACK
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

Date	Opacity	Particulates		Fluorine		Gas Flowrate	
	%	kg/hr	(lb/hr)	kg/hr	(lb/hr)	m^3/min	(ft^3/min)
2/25/76	5	1.7	(3.7)	0.02	(0.04)	824	(29,106)
4/30/76	10	1.5	(3.3)	0.06	(0.13)	550	(19,430)
5/25/76	10	2.7	(5.0)	0.05	(0.1)	1,008	(35,615)
2/16/79	10	0.4	(0.91)	0.09	(0.19)	812	(28,690)

a Oxy-Lathrop monthly air pollution reports - 11/75 - 8/79.

plant tipping pan filters and the evaporator product tanks to be enclosed and collected vapors to be routed to the existing scrubber. To prevent the buildup of fluorosilicic acid in the scrubber water and to maintain fluorine removal, the scrubber blowdown will be routed to fluorosilicic acid production facilities. Mist eliminators will also be added to the concentrators and the fluorosilicic scrubbing system. Completion of this project was reportedly scheduled for the Spring of 1980.

Pellet Plant - The major air pollutants emitted from the Pellet Plant are particulate matter, ammonia, acid mists, and fluorine compounds. These pollutants are emitted from the mix tank, blunger (in which fertilizer pellets are formed), dryer, screens, and conveyors.

Fumes and vapors generated at the mix tank are collected and sent to a Heil scrubber, followed by a fume condenser, and then vented to the Pellet Plant fume stack which is 10 cm (4 in) in diameter and 30 m (100 ft) high.

The emissions data taken from the Company's monthly air pollution reports are summarized in Table 10. The opacity and particulate emissions complied with the regulations, but the fluorine emissions from this stack exceeded the standards (0.02 lb F/ton of P_2O_5) recently adopted by the APCD. Stack test data taken by the State in 1977 (0.52 lb F/ton P_2O_5) and Oxy data reported in an internal March 14, 1979 memo from John Baures to Bob Edson (0.3 lb F/ton P_2O_5) showed that Oxy did not meet the standard. The control plan calls for emissions from the Pellet Plant mix tank to be routed through the Pellet Plant dryer burner as secondary air and through the existing control equipment. This project was reportedly scheduled to be completed in the Spring of 1980.

The primary sources of particulate emissions from the Pellet Plant are the blunger, and the pellet dryer. The emissions from the dryer have been a source of frequent opacity violations and the subject of a number of variances and compliance plans to meet the opacity rule which was changed from 40 to 20% opacity in 1974. A history of air pollution control equipment associated with the Pellet Plant dryer is outlined in Table 11.

Table 10

SUMMARY OF STACK TEST DATA[a]
PELLET PLANT FUME STACK
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

Date	Gas Flowrate m^3/min	(ft^3/min)	Opacity %	Particulate kg/hr	(lb/hr)	Fluorine kg/hr	(lb/hr)	NH_3 kg/hr	(lb/hr)
4/29/76	314	(11,081)	20	3.4	(7.6)	0.7	(1.5)		
5/27/76	357	(12,603)	15	4.2	(9.3)	13.7	(30.3)	3.4	(7.4)
7/16/77	300	(10,570)	-	6.2	(13.6)	0.8	(1.8)	0.6	(1.4)
12/9/77	306	(10,800)	-	4.0	(8.9)	1.5	(3.2)	2.5	(5.9)

a Note: Scrubber efficiency tests done in 6/9/72 reported the following efficiencies - particulate - 76%; NH_3 - 53%.

Table 11

HISTORY OF AIR POLLUTION PROJECTS ON
PELLET PLANT DRYER AND BLUNGER
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

Date	Description
1971	High energy scrubbing system was installed
1974	Condenser cooling water system was modified to reduce NH_3 loss. Ammonia and ammonium chloride particulates were causing opacity excursions.
1976	A wet electrostatic precipitator (Electro-Dynactor Model EDY 48-3) was added to the existing scrubbing system which consisted of three-cyclone separators, a venturi scrubber, and a Polycon entrainment separator. This was added to remove ammonium chloride and other sub-micron particles that caused opacity violations.
1978	A sealed blunger feed tank was constructed to recycle air through the dryer.
1978-79	A 50,000 SCFM pulse jet self-cleaning baghouse was ordered to replace cyclones and venturi scrubber. Installation was completed June 30, 1979.

The present control system consists of routing the blunger air to the dryer and the dryer off-gases through a baghouse, the Polycon condenser (spray system), wet electrostatic precipitator (Dynactor), and finally to the atmosphere. This project was completed in June 1979 and appeared to be functioning properly at the time of the audit.

Additional sources of particulate emissions are the screens and conveyors. Presently the bucket elevator after the dryer, the screens and the recycle conveyor are vented to a baghouse to collect the product fines. The collected fines are recycled to the blunger for pelletizing. Rather than going to the atmosphere, the baghouse discharge was rerouted in 1976 to provide secondary air for the dryer burners.

Ammonium Sulfate Plant - The major air pollutants associated with the ammonium sulfate plant are particulates and ammonia (NH_3) vapors. These pollutants are emitted from the dryer, mother liquor tank, and the saturators (crystallizers).

The mother liquor tank is an enclosed vessel, under a slight vacuum, where the raw materials are mixed and reacted to form ammonium sulfate. Recycle streams, fines, and dust-laden steam from the dryer are also mixed in this tank. The mother liquor tank and the saturators are vented to a packed scrubber and condenser (spray chamber) to remove the particulates (ammonium sulfate), fines and NH_3. This system was installed in 1972 and originally was vented through the Pellet Plant stack. Presently, this system is vented through its own stack, but data such as physical dimensions and installation date were not provided during the audit. The scrubber water comes from the mother liquor tank and is returned to the tank by a gravity line. The spray chamber water comes from the ammonium sulfate cooling towers and the effluent is returned to the cooling tower sump.

Limited information was available on actual emissions, but a stack test performed in July 1977 indicated particulate emissions of 0.0041 grains/SCF or 0.1 kg (0.3 lb)/hr which was in compliance with the particulate emission regulation. The opacity readings from this stack were

about 10%, according to the monthly air pollution reports. However, in the past, high production rates of ammonium sulfate have caused stack emissions to exceed 20% opacity. If this is true for the present operation, additional control equipment or operation at a reduced rate may be needed to maintain compliance. The ammonium sulfate plant was down for its annual turnaround at the time of the audit and the emissions from the stack were not observed.

Miscellaneous Sources

Warehouses - On July 1, 1979, Oxy filed a plan with the APCD to control fugitive dust emissions from warehouses 1, 4, 5, 6 and 9. The fugitive dust emissions from the loadout stations often exceeded the visible emission limitation of 20% opacity during loading operations. The control plan was intended to bring these emissions into compliance with the regulations. The plan calls for the loadout stations at warehouses 1 and 4 to be equipped with retractable loading and filling spouts. The units will be connected to an exhaust fan and the dust will be collected in a baghouse. Warehouse 9 loadout Station 5, will be completely enclosed and an exhaust fan will collect the dust which will be routed to an existing dust collecting system. Warehouses 1, 4 and 6 will be equipped with an extendable flexible duct that will reduce the amount of product free-fall during loading to reduce the dust emissions. This abatement plan is scheduled to be completed in 1980. As an interim control measure, the products are to be coated with wax to minimize dusting.

Incinerator - A multiple chambered incinerator was operated between February 1970 and 1974. This incinerator was natural gas-fired with a maximum waste burn rate of 500 kg (1,200 lb)/hr and a normal burn rate of 270 kg (600 lb)/hr. Oxy personnel interviewed during the audit thought dry waste materials, including pesticides, were burned in the incinerator but were not sure if liquid wastes were also burned. However, an Oxy memo dated January 29, 1979 from Lloyd Thomas to Gregory J. Vervais indicated that, "all toxic waste, garbage, wood, paper and other small size combustible materials were destroyed in the incinerator." Data on emissions

from this incinerator were not provided during the audit. The incinerator was taken out of service in 1974 because it could not comply with the more stringent air pollution regulations adopted during that year.

Ag Chem Operations

Because this facility handles and blends toxic materials, it is important that work areas are hooded and ventilated to air pollution control equipment to minimize worker exposure to these materials. Adequate ventilation of work areas, control of spills, and control of organic vapor emissions are the major areas of air pollution control associated with this facility. Each of the plants in the Ag Chem area has its own ventilation system which, prior to 1978, discharged directly to the atmosphere. In 1978, an old scrubber was converted to a collection chamber and stack for all plant discharges. Presently all ventilation systems in the Ag Chem area are vented to the atmosphere through this stack. The following sections will describe the existing ventilation systems in each area of the facility. Table 12 provides a brief chronology of units installed in the Ag Chem area since 1962.

The Nos. 1 and 2 dust plants are vented to a common Pangborn baghouse that previously discharged to the atmosphere, but presently discharges through the new stack. The following equipment are hooded and vented to the baghouse (1,190 m^3/min): No. 1 dust plant - loader, mixer and bagger and No. 2 dust plant - loader and bagger.

The granular plant is vented to a baghouse which was installed in 1969. The following points are hooded and vented: batch tank, cut-in hopper, Munson mixer, bagging hopper, and bagger. Installation of local ventilation on the flowable plant occurred about the same time as the granular plant. The mix tanks, and drum filler stations in the flowable plant are hooded and vented to a 60 m^3/min dust collector.

The No. 3 dust plant (wettable powder plant) was constructed in 1974 and included its own baghouse and local ventilation system (2,460 m^3/min).

Table 12

CHRONOLOGY OF UNITS IN THE AG CHEM AREA
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

Date	Description
1962	No. 1 dust plant -- started construction
1962	EC liquid line -- built where No. 3 dust plant is now located
1963	Dow DBCP Plant -- started construction late 1963, started operation under license to Dow.
1964	No. 2 dust plant -- start up
1966	Toxaphene storage tank installed
1967	Granular plant constructed and start-up soon after
1969	Local ventilation system installed on granular plant (assume it included baghouse)
1970	Some waste disposal bins are placed in use
1971	EC plant relocated and enlarged to present location (area 9 on plot plan)
1973	Waste disposal bins and procedures are modified to meet State regs (regs were not specified)
1974	Relocate offices and install showers
1974	No. 3 dust plant constructed including local ventilation and baghouse
1974	Small package line which was attached to No. 1 plant was added to No. 3 plant
1975	Relocated electrical switchgear in EC plant to blockhouse; remote from package area
1975	Installed rinse system in EC plant equipment
1975	Installed new package and filter system for EC plant
1975	Purchased power sweeper with vacuum collection system
1976	Installed hazardous tank farm away from EC plant area. West wastewater tank is put into service
1976	Boundary of Ag Chem moves to the South 105 ft.
1977	Installed hot tank for heating technical grade materials and emulsifiers in EC plant
1978	Local ventilation system placed in service in EC plant
1978	Ag Chem stack with monitoring station installed
1979	Added loading dock to handle hazardous materials more safely
1979	Install activated carbon-solvent recovery system. Awaiting local APCD approval to operate for a test period.

The following in the No. 3 dust plant areas are hooded and vented: bagging area, batch mixer, dust hopper and elevator. Following startup and operation, a study by Oxy indicated that toxic fumes were being emitted from the wettable powder plant baghouse. As a result, a private consulting firm, hired to evaluate these findings, calculated that the emission levels were higher than OSHA standards. Since the fumes discharged at worker level, a tall stack was recommended to comply with the OSHA standards.

The major sources of fugitive dust from the dry plants are the bagging areas. Spills, broken bags, overfilling, etc., all contribute to the problem of fugitive dust. A mobile vacuum sweeper was purchased in 1976 to sweep dust from the paved areas, thereby minimizing dust and reducing the possibility of contaminated-rainfall runoff.

As a result of a 1976 Ag Chem fire, the Factory Mutual Company prepared an insurance report and made a recommendation that an exhaust ventilation system be added in the emulsifiable concentrate (EC) building to remove flammable toxic fumes. A fume collection system in the EC area was installed in 1977. The following pieces of equipment are hooded and vented to the fume control system: the mix tanks (2), batch blending tanks (2), and the liquid fill stations (2). This system was routed to the old scrubber and vented to the atmosphere. Tests conducted by Oxy showed that under certain operating conditions, the organic emissions from the Ag Chem stack (old scrubber) exceeded the 18 kg (40 lbs)/day limit established by the APCD. Table 13 summarizes the stack test conducted in 1978 on the Ag Chem stack. It was determined that the EC plant could not be operated in compliance with the APCD regulations until a control system was put into use. The control system chosen was a VIC carbon adsorption system. The present fume control system collects fumes and vapors from the EC area and routes them through a VIC carbon adsorption system and discharges them through the old scrubber. At the time of the audit Oxy was awaiting local APCD approval of the system in order to operate it for a test period.

DBCP Plant - As noted previously, manufacturing of DBCP began in 1963 and continued until 1971, resumed in 1974 and continued until 1976. The

Table 13

SUMMARY OF STACK TESTS ON THE AGRICULTURAL CHEMICAL STACK
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

Date	Organic Emissions kg/hr	(lb/hr)	Process Data
3/31/78	11	(24)	No. 2 dust plant down
4/20/78	3	(7)	No. 2 dust plant down EC No. 2 line-down
5/17/78	1	(3)	No. 2 dust plant-down granular plant-down

Note: Allowable organic emission is 18 kg (40 lb)/day.

exothermic reaction took place in a glass-lined reactor which was equipped with two freshwater condensers that return the condensate to the reactor. Bromine, allyl chloride, and DBCP vapors could escape from this system, especially during an upset condition. The extent of these emissions could not be determined from data gathered during the audit.

Storage Tanks - Ag Chem facility has 29 storage tanks ranging in size from 9 to 600 m^3 (2,500 to 159,000 gal). These tanks are all fixed roof tanks and store solvents, technical grade materials and products, etc. A listing of the storage tanks and data on each tank including material stored is contained in Appendix A. True vapor pressure data for all of the materials were not provided and, therefore, a compliance determination with regulation 410 (Storage of Organic Liquids) could not be made.

In 1976, an estimate of solvent emissions was made by Oxy and reported to the APCD. These estimates and the transmittal letter are also contained in Appendix A.

Liquid Wastes

Fertilizer Operations

Present Practices - Considerable water reuse is practiced within the fertilizer operations at Oxy-Lathrop, as evidenced by Figure 2 which is an Oxy blueprint dated July 18, 1979 entitled "General Plant-Water Balance Flow Sheet". The only major fresh water uses included are those in fluorosilicic acid production, boilers and cooling tower makeup at the ammonia, H_2SO_4 and ammonium sulfate plants. Although historically the major use was in the ammonia plant (Calamco) cooling tower, the termination of those operations left the H_2SO_4 cooling water as the major freshwater use.

Currently, process wastewaters go to one of three water cycles: the Gypsum (gyp) Ponds, the Pellet Plant Pond or the Concentrator Pond [Figure 3].

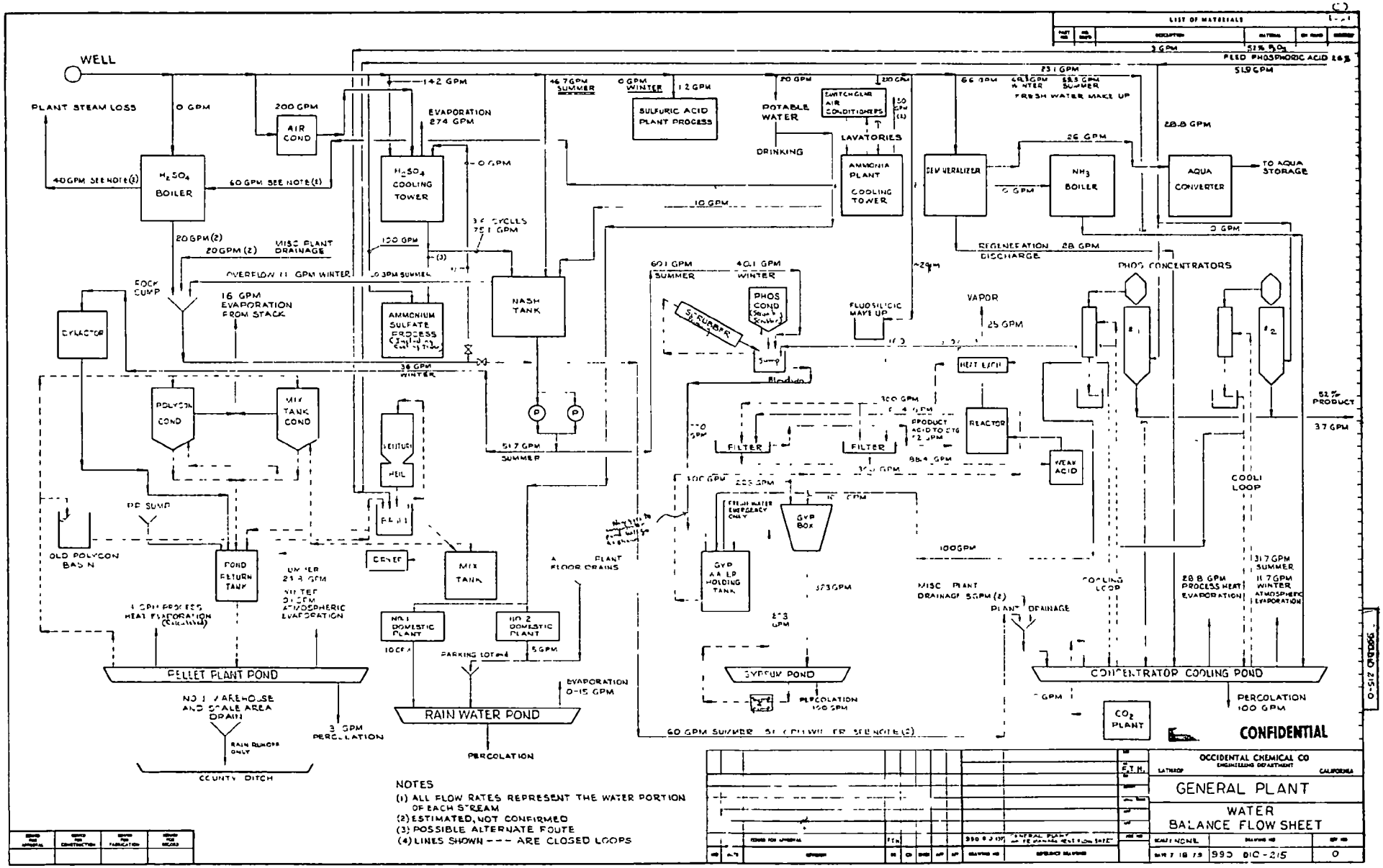

FIGURE 2. PLANT FLOW DIAGRAM - 7/18/79
Occidental Chemical Company
Lathrop, California

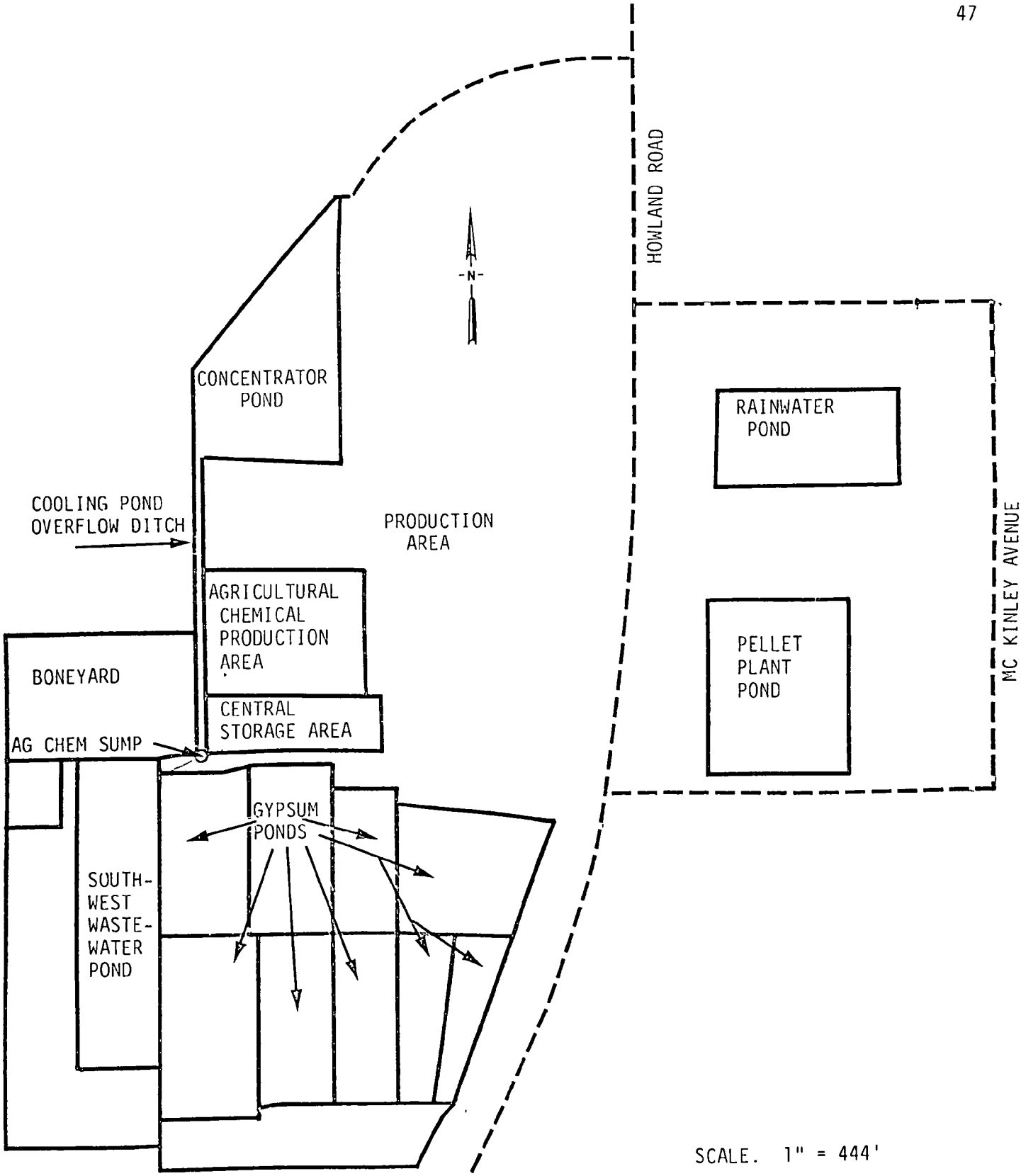

Figure 3
PLANT AND DISPOSAL SITE SCHEMATIC
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

Gypsum, resulting from the wet phosphoric acid operation, is slurried with water to the unlined ponds south of the plant. On a wet weight basis, approximately 5 lbs of gypsum is generated per lb of P_2O_5 produced (4.6 lbs/lbs on dry weight basis). Water is decanted from the gyp with moveable weirs into a ditch followed by collection in sumps and returned to the gyp water-holding tank for reuse. Water not decanted from the gyp is lost to the environment through a combination of percolation and evaporation. During the process audit, Mr. Robert Edson, Technical Services Manager, estimated these losses to be approximately 100 gpm based on meter measurements, of which 5 to 10 gpm was thought to be a result of evaporation. Dried gyp, once windrowed and disked, is hauled away for sale to local farmers as a soil conditioner.

Pellet Plant wastewaters are discharged to a pond system located on the east side of the plant for cooling prior to recycle to the pellet plant for reuse in cooling and product [Figure 2]. The Pellet Pond is approximately 2 ha (5 acres) in size and 1.5 m (5 ft) deep, underlain with a 7.6 cm (3 in) thick hydraulic asphalt liner. Design specifications for the asphalt liner called for a permeability of less than 10^{-6} cm/sec. Testing by Oxy has reportedly indicated the permeability to be approximately three times better (i.e., 0.3×10^{-6}) than this design criterion. According to Mr. Edson, percolation losses are estimated to be 3 gpm.

Wastewaters entering the unlined Concentrator Pond immediately northwest of the plant primarily originate at the phosphoric acid plant barometric condensers (referred to as "concentrators"). These waters are cooled by thermal evaporation and returned for reuse in the condensers. Percolation losses, according to Mr. Edson, are approximately 100 gpm based on past measurements.

All in-plant liquid spills and rainfall within the fertilizer manufacturing areas are handled in the following manner:

1. Phosphoric Acid Plant - The manufacturing area is on a concrete slab with curbing which carries liquid drainage to a sump for return to in-plant use.

2. Ammonium Sulfate Plant - Liquid drainage is caught within curbing and drained to a sump and returned to in-plant use.

3. Pellet Plant - Liquid drainage is collected and discharged to the previously described Pellet Plant Pond for return to in-plant use.

4. H_2SO_4 Plant - Although this area is not curbed, drainage is carried to the so-called "Rock Sump" and then discharged to the Concentrator Pond for return for in-plant use.

5. Ammonia Plant - When this plant is operating, a portion of the drainage goes to the Rainwater Pond located east of the plant and a portion goes to the Concentrator Pond for return to in-plant use.

Most rainfall runoff from non-manufacturing areas is discharged to the Concentrator Pond for return for in-plant use. However, the runoff from the plant parking lot and the north end of the warehousing area drains to sumps from which it is pumped to the unlined Rainwater Pond on the northeast side of the plant for percolation and evaporation.

Past Practices - Although wastewaters within the fertilizer plant areas are now for the most part segregated and returned to the respective plants for reuse, historical water uses were largely once-through, as evidenced by Figure 4 which is an Oxy blueprint dated May 9, 1967 entitled "General Plant Flow Diagram - Process Wastes (Existing Flows)". Virtually all wastewaters not returned directly, such as waters from the H_2SO_4 and ammonia plant cooling towers (ammonium sulfate cooling tower not brought on line until approximately 1972), made their way to an unlined 4.4 acre pond hereinafter referred to as the "Southwest Wastewater Pond" [Figure 3] Wastewaters entering the Southwest Wastewater Pond either percolated or evaporated since there was no return to in-plant use. Based on interviews with plant personnel and a review of internal records available to the audit team, the following was ascertained. Gyp ponds have existed at the

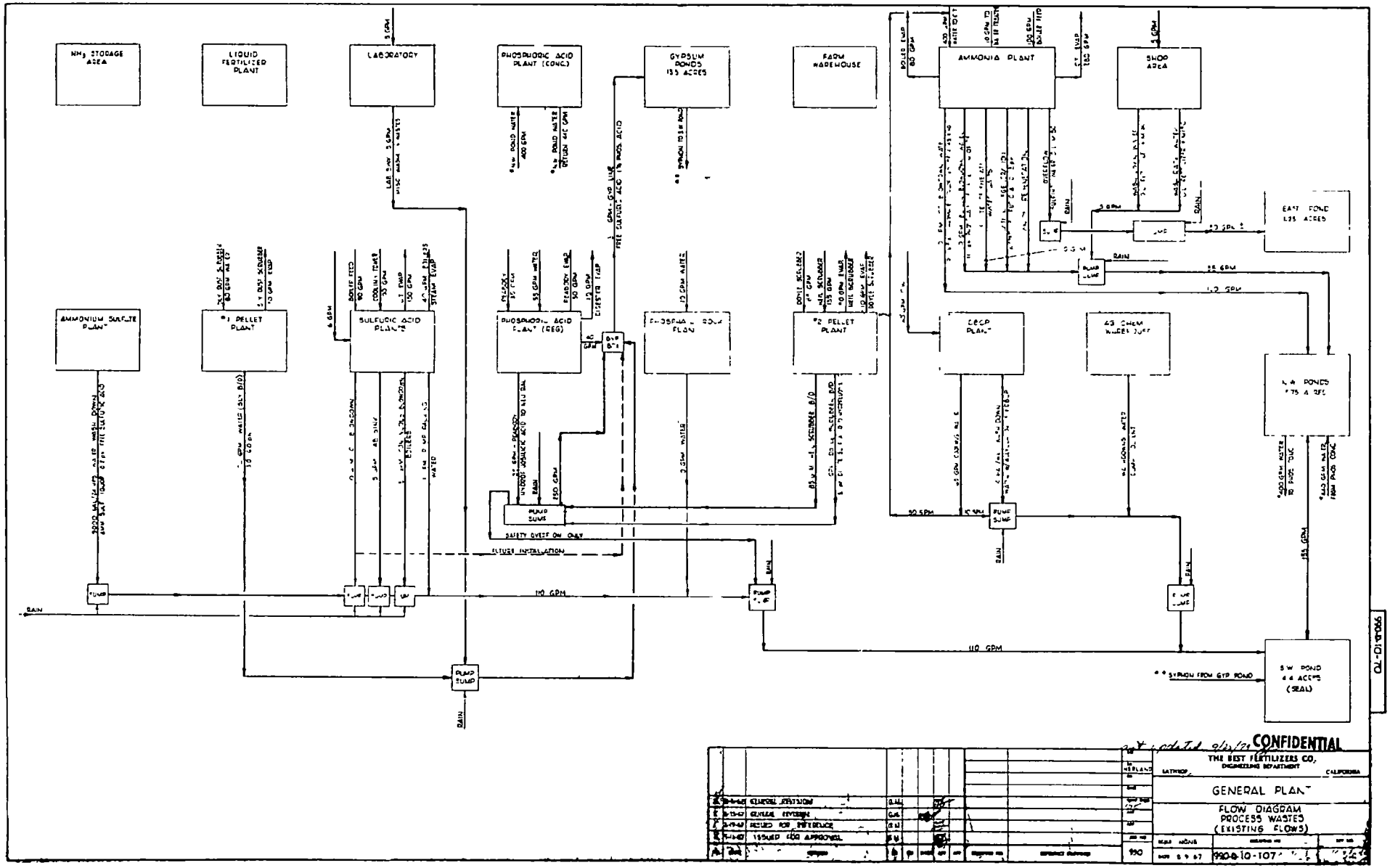

FIGURE 4. PLANT FLOW DIAGRAM - 5/9/67
Occidental Chemical Company
Lathrop, California

facility since the startup of the phosphoric acid operations in 1953; however, originally they were located farther to the north than at present, partially under what is now a warehousing area near the current Concentrator Pond. Construction of ponds in their present locations began in 1974 or 1975. Waters decanted from the gyp ponds were syphoned to the Southwest Wastewater Pond for percolation and evaporation. This continued until 1975 when the Pellet Plant Pond was completed. At that time gyp decant waters were collected and discharged to this new pond for reuse in the Pellet Plant. The gyp decant waters were finally segregated out of the Pellet Plant Pond in late 1978 for reuse in the phosphoric acid plant water cycle.

Pellet Plant wastewaters, as well as those generated in the ammonium sulfate, phosphoric acid, and sulfuric acid plants were collected in a series of sumps and discharged to the Southwest Wastewater Pond for percolation and evaporation. As noted previously, the Pellet Plant Pond was completed in 1975 affording reuse of the Pellet Plant and gyp decant wastewaters. Wastewater discharges from the ammonium sulfate plant were essentially eliminated in 1972 with the construction of the aforementioned cooling tower.

In 1964, the first unlined Concentrator Pond was constructed to allow reuse of waters back into the phosphoric acid plant concentrators. This pond system was expanded again in approximately 1974. Any excess waters generated in these pond systems overflowed to the south to the Concentrator Pond Overflow Ditch [Figure 3] which drained waters to the Southwest Wastewater Pond either by gravity or via an alternate sump and pump located adjacent to the Southwest Wastewater Pond. According to Mr. Robert Edson, the Concentrator Pond also has overflowed at times onto the adjacent Libby Owens Ford property.

Piping for wastewaters generated in the sulfuric acid plants was rerouted to the Concentrator Pond system in approximately 1975; however, even as recently as late 1978, some drainage could instead go directly to the Southwest Wastewater Pond.

Wastewaters generated in the ammonia plant were probably discharged to the Southwest Wastewater Pond. Oxy personnel interviewed were not certain if they might have gone to the old firepond instead but this would seem to have generated excess water which would have had to go to the Southwest Wastewater Pond anyway. After completion of the Concentrator Pond system in 1964, these wastewaters were rerouted to it for either reuse in the phosphoric acid concentrators or overflow to the Southwest Wastewater Pond via the Concentrator Pond Overflow Ditch. A portion of the ammonia plant wastewaters were diverted to the Nash tank for in-plant reuse at some point in time which could not be ascertained during the audit, but even then there were excess waters which went to the Concentrator Pond system.

During at least a portion of the time the ammonia plant operated, an onsite CO_2 plant not owned by Oxy also contributed wastewaters to the Concentrator Pond system. This plant processed off-gases from the ammonia plant. Oxy personnel interviewed during the audit were not certain as to whether or not this CO_2 plant contributed wastewaters directly to the Southwest Wastewater Pond prior to the advent of the Concentrator Pond system in 1964.

According to Oxy personnel interviewed during the audit, throughout the history of the plant a Rainwater Runoff Pond has probably existed to the east of the plant [Figure 3]. Runoff which didn't drain to this pond or percolate directly would have drained to the Southwest Wastewater Pond for percolation and evaporation.

Ag Chem Operations

Historical information relating to Ag Chem operations had to be pieced together from a number of sources, including internal memoranda and records, and interviews with Oxy personnel during the audit. The Oxy-imposed ground rule for interviewing employees was that no one would answer questions regarding periods of time when they were not a supervisory management employee. This meant, for example, that despite the fact that Mr. David Crockett has been at the plant since 1960, working in the Ag Chem

area since the early 1960s, questions regarding times prior to "late August 1974" would not be answered since that was when he became the Ag Chem manager. Past managers, with the exception of Mr. Donald Mueller who only served in the job briefly in 1966, were reported to be no longer working at Oxy-Lathrop. Despite this apparent lack of first-hand memory, significant detail can be gleaned from the combination of sources of information.

Present Practices - Current liquid disposal practices within Ag Chem operations result in essentially a no-discharge system. The primary source of waste liquids within these operations are rinses of equipment between batches. Since the products are either water soluble or contain a petroleum-based carrier, rinses are performed with water, a caustic (NaOH), soda ash or commercial product) and water solution or a solvent. Ag Chem production runs are scheduled monthly to maximize durations and minimize the frequency of rinses. Four to 25 cleanups/month are performed in the emulsifiable concentrate area. Cleanups in the so-called "dry plants" are performed with approximately 300 to 500 lbs of an inert dust which is generally flushed through the equipment four times. These dusts can be reused and, as will be described later, once they are spent, they are handled as a dry-hazardous waste. The only need for liquid rinses in these dry plants is a water rinse if maintenance of equipment is scheduled to follow a production run.

Volume of liquid rinses within the "wet" processes in Ag Chem is also minimized through use of multi-directional spray nozzles first installed in 1975. Where possible, solvent rinses are collected and stored for subsequent reuse in production runs. Similarly, solvent-based product spills are recovered where possible for reuse.

Spills which cannot be recovered, water and caustic rinses and unrecoverable off-spec liquid batches are discharged to one of three sump systems. The first encompasses the dry blending, flowable pesticides and DBCP processing areas which all drain to a sump adjacent to the DBCP reactor. The second sump system drains the emulsifiable concentrate (EC)

process area and a tank farm area to a sump adjacent to the EC plant. Both of these sump systems are pumped to one of two @ 568,000 liters (150,000 gal) hazardous waste storage tanks located in the Ag Chem area. These tanks are in a paved area surrounded by a dike with a volume of 774,000 liters (204,479 gal) allowing 6 in. of freeboard. According to plant officials, the current yearly volume of these process waste liquids is estimated to be 1,100,000 liters (300,000 gal). The first of the two hazardous waste tanks was put into service on May 24, 1976; the second followed in 1977.

A third sump system collects rainfall runoff in the Ag Chem area, all of which is asphalt lined. This runoff is also pumped to the hazardous waste storage tanks and was estimated by Mr. Crockett to be approximately 3,400,000 liters (900,000 gal)/yr [190 to 230,000 liters (50 to 60,000 gal) of runoff per inch of rain].

Wastes collected in the two hazardous waste storage tanks are hauled by truck to California-approved Class 1 sites for subsequent disposal. According to Mr. Crockett, Oxy originally was contracting with Cal Tank Company to haul to the West Contra Costa Class 1 site in Richmond, California and then switched to use of the IT Class 1 site in Benicia, California. Recently, Oxy began using both Cal Tank and McKay Trucking to haul to the Environmental Disposal Service Class 1 site at Kettleman Hills. Some concentrated liquid solutions are put into drums and hauled by truck to the West Contra Costa and Coalinga, California sites. All these waste liquids are reportedly manifested per State of California Department of Health Services requirements.

A reportedly small volume of hazardous waste liquids are also brought over from the nearby Zoecon Inc. plant for storage in Oxy's hazardous waste tanks and subsequent disposal.

Pesticide workers' clothing is laundered onsite. The resulting laundry water is treated with caustic and discharged to a septic tank behind the Ag Chem offices. The overflow goes to a leach field and percolates.

Past Practices - Although present liquid waste handling in Ag Chem operations results in essentially a no-discharge system, this has not been the situation for long. According to information provided during the audit, Ag Chem plant construction began in 1962 and was completed in 1963. On the face of it, this would mean wastewaters were generated beginning in approximately 1963. However, other information provided indicated DBCP was formulated from 1957 to July 1977 and manufactured onsite from 1963 to 1971 and 1974 to 1976. Hence some pesticide-contaminated waste liquids would have been generated from 1957 on. Information was not available as to whether or not other pesticides were formulated prior to 1962 to 1963.

Written records regarding Ag Chem liquid waste handling practices prior to 1965 were not available. On February 11, 1965 a State inspector for the California Regional Water Quality Control Board, Mr. P. E. Jepperson, visited the plant and noted that certain pesticide packaging building wastewaters were being discharged to percolation ponds (presumably the Southwest Wastewater Pond) following treatment with caustic soda. An Oxy blueprint dated May 9, 1967 entitled "General Plant Flow Diagram--Process Wastes (Existing Flows)" [Figure 2] shows DBCP plant washdown waters and "Dump Solvent" and washdown waters from the Ag Chem warehouse areas being pumped to the Southwest Wastewater Pond. No other written information appear to exist until an exchange of letters in 1970 between the State of California Regional Water Quality Control Board and Oxy. These letters primarily concerned themselves with the so-called "Boneyard Disposal Area", which will be discussed under the "Solid Wastes" section of this report, and proposed future disposal methods. There was discussion of incineration of certain liquid wastes; however, these are indications that this practice of incinerating liquids could have been no more than six months duration following startup of the incinerator in 1970. The 1970 correspondence related to, among other things, the construction of a concrete pad near the incinerator to store empty drums. This was located just west of the present instrument and electrical building. There are indications that in 1970 there were perhaps as many as 8,000 empty and partially filled drums standing in the boneyard area. In a January 29, 1979 internal Oxy memo from Lloyd Thomas to Gregory J. Vervais, Mr. Thomas stated, "A drum crusher was built in early 1970 and all drums stored in the

boneyard were cleaned, crushed and disposed of by the superintendent of Ag Chem." According to Mr. Crockett, at least some drums have been crushed on a routine basis up to and including the present. A concrete sump was also present, presumably to carry contents of drained drums to the Southwest Wastewater Pond. The file correspondence from 1970 also indicates the shipment of some drums containing spent caustic wash from pesticide decontamination to Meyer Drum Company in Oakland, California. Since 1974 some hazardous waste drums have been sent to a drum reconditioner (now S. Rose Cooperage in Montbello, California). According to Mr. Crockett, Ag Chem also had a drum rinsing and decontamination operation until sometime in 1977.

Conversations with present Oxy employees who also were at the plant during these periods in question would likely have shed considerable light on past disposal practices. However, the previously mentioned ground rule restricting interviews to supervisory management employees precluded this. Consequently, the official Oxy recollection available to the government auditors began in late August 1974 with Mr. David Crockett. According to Mr. Crockett, all three Ag Chem wastewater sump systems previously described were in place then. Two of the three have since been reworked and the DBCP plant sump was about 3 m (10 ft) from where it currently is located. In-plant efforts were made to collect unrecoverable bad batches (i.e., ones that could not be reworked), equipment drainage and unrecoverable solvent rinses and send them to a Class 1 type site. It was acknowledged though that some solvent rinses, as well as all water and caustic rinses, went to the sump systems for onsite disposal. This disposal included pumping of the sump's contents to the Concentrator Pond Overflow Ditch via a pipe located just north of the present hazardous waste tanks. Once in the Concentrator Pond Overflow Ditch, the liquids flowed south several hundred feet to a sump area from which they could either be gravity fed or pumped into the unlined Southwest Wastewater Pond [Figure 3]. Once in the pond, liquids either evaporated or percolated to underlying groundwaters.

Regarding volume of process liquid wastes generated in Ag Chem operations, very little written information was available to the auditors. In a December 6, 1976 internal Oxy memo from Mr. Robert Edson to Mr. J. Lindley, yearly estimates were stated as 2,560,000 liters (676,000 gal). These were made seven months after installation of the first hazardous waste tank. In the memo, Mr. Edson indicated that discharges prior to the installation of the tank may have been as much as three times as high as this.

Interviews with plant personnel indicated there have been three Ag Chem fires in the past, at least one of which resulted in large losses of pesticide products. The first fire occurred in January of 1966 at the DBCP plant as a result of a ruptured bromine line. Mr. Don Mueller, who was in charge of Ag Chem operations briefly during this time, recalled the fire as being a gas fire above the DBCP reactor. He did not think the reactor ruptured but it had to be rebuilt. He could not remember whether or not the contents of the reactor were ruined and, if so, whether or not the DBCP was dumped to the sewer system which would then have carried it to the Southwest Wastewater Pond. However, an internal memorandum of February 17, 1967 from Mr. Jack Horner to Dr. W. L. Garman indicated there were losses of product during the fire. Whether these were to the atmosphere and/or the drainage system was not stated. During the audit interviews, Mr. Crockett also recalled losses of product during this fire.

The second fire occurred in July 1975 in electrical switch gear in the emulsifiable concentrate area. According to Mr. Crockett, some solvents burned but loss of product was minimal.

The third fire, which definitely resulted in a large loss of product, occurred on January 17, 1976. The pesticide warehouse burned down and in the fire fighting efforts, large volumes of water were applied. This resulted in runoff to the sewer system and subsequently to the Southwest Wastewater Pond, as well as excess runoff to the storage area immediately west of the Ag Chem area. According to Mr. Crockett, large quantities of SSS tributyl phosphorotrithioate (DEF), methyl parathion and malathion were

lost in the fire. An Oxy report was issued on March 16, 1976 and is available in the NEIC files.

Another non-fire related event which may have resulted in loss of product to the environment occurred in 1979. A leak was detected in a pipeline carrying EDB which historically had carried DBCP. The pipe was found to be corroded. Some materials were excavated and sent to a Class 1 site. The line was reportedly rinsed, drained and its use discontinued.

The point in time at which discharge of Ag Chem wastewaters to the Southwest Wastewater Pond ceased could not be ascertained. In an inter-office memo of April 12, 1977 from Dave Crockett to Al Osborn, Mr. Crockett indicated that the non-hazardous Ag Chem wastewaters (estimated by Crockett to be 50% of total liquid wastes) were being pumped to the Southwest Wastewater Pond. Another inter-office memo of April 28, 1977 from Evangeline Boykin to Al Osborn recommended the preparation of an AFE (Authorization for Expenditures) to construct a second hazardous waste tank. According to Ms. Boykin's memo, "After the tank is installed, there will be no further discharges of Ag Chem wastewaters to the ground." This tank was completed and put into service in 1977. However, a May 12, 1977 inter-office memo from R. Edson to E. Boykin indicated that at least some possibly contaminated rain runoff would continue to be allowed to drain to the pond. On January 5, 1979 R. Edson, in another inter-office memo to "Distribution" stated, "We do not have any flow in our waste disposal ditch today. We should all get together and try not to start this flow again." Whether or not this indicated there had been discharges recently, or if they resumed, could not be ascertained.

Solid Wastes

Fertilizer Operations

Present Practices - Solid wastes generated in the fertilizer operations are currently classified by Oxy as hazardous or non-hazardous. The hazardous wastes include asbestos insulation, vanadium pentoxide catalyst

screenings, sulfur spills, bags from air pollution control baghouses, and miscellaneous spills, etc. All these wastes are collected and transported to hazardous waste dumpsters in the Ag Chem area. These will be discussed in more detail below under "Ag Chem Operations."

All wastes designated as non-hazardous are collected, centralized and picked up by the Al Fuller Waste Handling Company for offsite disposal at the Harney Lane Disposal Site in Lodi, California.

Past Practices - Information regarding past solid waste disposal practices is limited. The Al Fuller Company has been picking up non-hazardous wastes since 1970. Whether or not this included some hazardous wastes as well could not be ascertained. According to Mr. Crockett, hazardous waste dumpsters were in existence in late August 1974, which presumably received hazardous wastes from fertilizer operations. Letters between the State of California and Oxy in 1970, pictures in State files, and conversations with former plant personnel indicated that prior to and including 1970, there was a burning pit and disposal trench in the so-called "Boneyard" area west of the plant [Figure 2]. On July 27, 1970, Oxy notified the State in writing that use of these pits/trenches was being discontinued. The previously referenced incinerator which went into service in February 1970 undoubtedly was used to incinerate some solid waste from fertilizer operations until it was discontinued and disassembled in 1974.

Ag Chem Operations

Present Practices - All solid wastes generated in Ag Chem operations, with the exception of items such as empty bags of inert additives (e.g., clays), are considered hazardous by Oxy. The few exceptions are collected and disposed of with non-hazardous fertilizer operations wastes. Hazardous solid wastes include solids manually collected from the sumps described under "Liquid Wastes", floor sweepings, dry blending residuals (both dry cleaning materials and dry product), off-spec and unsalvageable product, dust collection system residuals, dry product spills, empty bags and

containers, and spent baghouse bags. These materials, except the metal drums, are collected and hauled to onsite hazardous waste dumpsters which, when full, are hauled by truck to a Class 1 site for disposal. Some containers, such as 5-gal pails, are crushed first onsite and then placed in the hazardous waste dumpsters for subsequent disposal. Some drums are hauled by flat bed trucks to a Class 1 site. Other drums are sent to a drum reconditioner, S. Rose Cooperage, in Montbello, California, which is reportedly licensed by the State to receive such drums.

Past Practices - As noted previously, some hazardous waste dumpsters existed when Mr. Crockett assumed the Ag Chem manager's position in late August 1974. Presumably, all these wastes were hauled to a Class 1 site. To the best of Mr. Crockett's knowledge, no pesticide waste containers were disposed onsite (e.g., by burial) after he assumed the position.

Information regarding the practices used prior to late August 1974 is limited. The previously referenced State/Oxy correspondence in 1970 as well as State file photos document the use of onsite disposal areas in the Boneyard Area west of the plant. These disposal trenches were filled in in 1970 and graded over. Apparently one trench area was primarily used as a burning pit and another was a disposal trench for at least some pesticide waste containers.

Another potential source of hazardous wastes was in the DBCP operations. According to information provided by Mr. Crockett, finished DBCP was sent through a dryer contacting calcium chloride and then filtered. Spent calcium chloride was removed after every two to three DBCP batches. Similarly filter media (type not ascertained) would also have had to be removed periodically. Both of these spent materials would likely have contained some DBCP. Disposal procedures for these materials prior to the advent of hazardous waste dumpsters were not ascertained.

PRODUCTION RECORDS REVIEW

Fertilizer Material Balances

Ammonia, Phosphates and Potassium Losses

Annual losses (1971 to 1978) of ammonia (NH_3), phosphates (P_2O_5), and potassium (K_2O) from the fertilizer operation are summarized in Table 14. These annual losses were compiled from quarterly fertilizer material accounting reports and estimates made by Oxy.

Prior to 1972, material accounting was geared to production and was based on "factors" used to calculate production figures. These factors reflected recovery efficiencies and were used to plan production and sales schedules. Since 1972, detailed material accounting reports for NH_3, P_2O_5 and K_2O were prepared on a quarterly basis. These quarterly material accounting reports were based on material balances and were prepared to get a better handle on losses and to reduce these losses if possible. The material balances were derived from purchase records, production data, inventory and shipping data, and pond water inventories. Rather than using "factors" to determine material in and out, the majority of the data were derived from measurement and analysis of all solid and liquid material onsite, including pond water inventories. Compiling data in this manner provided a more accurate accounting of material. Losses were estimated by a "forced" material balance (i.e., in-out = losses). Losses from overformulation, bag weight averages, and losses to the wastewater pond were taken into account. The remainder of the losses were unaccounted for and were assumed to be lost to pond percolation and atmospheric discharge. Oxy-Lathrop's estimates of these losses are summarized in Table 15. Average daily losses of NH_3 ranged from 9.4 to 13.8 m. tons (10.4 to 15.2 tons)/day; losses of P_2O_5 ranged from 3.0 to 7.9 m. tons (3.3 to 8.7 tons)/day and losses of K_2O ranged from 0.09 to 1.2 m. tons (0.1 to 1.3 tons)/day.

Fluoride Losses

The data on fluoride losses provided by Oxy during the audit are

Table 14

ESTIMATES OF
ANNUAL NH_3, P_2O_5 AND K_2O LOSSES[a]
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

	NH_3	P_2O_5	K_2O
	annual loss-% of input (daily loss, tons)	annual loss-% of input (daily loss, tons)	annual loss-% of input (daily loss, tons)
1978	4525 - 3.74% (12.4)	3642 - 7.82% (10.0)	937 - 7.81% (2.6%)
1977	5251 - 4.9% (14.4)	2745 - 6.65% (7.5)	482 - 4.73% (1.3)
1976	5951 - 5.5% (16.3)	3471 - 9.7% (9.5)	1134 - 0.8% (3.1)
1975	4836 (13.2)	4689 (12.8)	- -
1974	7082 (19.4)	7281 (19.9)	- -
1973	4437 (12.2)	4635 (12.7)	- -
1972	4171 (11.4)	4271 (11.7)	- -
1971	4165 (11.4)	4844 (13.3)	- -

a Quarterly Fertilizer material accounting reports provided by Oxy for 1976 through 1978. 1971 through 1975 data based on Oxy memo dated 1/11/77 summarizing annual losses.

Table 15

ESTIMATES OF
POND PERCOLATION AND
ATMOSPHERIC DISCHARGE LOSSES
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

	NH_3 annual losses (daily), tons	P_2O_5 annual losses (daily), tons	K_2O annual losses (daily), tons
1978	4346 (11.9)	3160 (8.7)	311 (0.9)
1977	4987 (13.7)	2100 (5.8)	43 (0.1)
1976	5554 (15.2)	2817 (7.7)	476 (1.3)
1975	3799 (10.4)	1217 (3.3)	-
1974 thru 1972	3799 (10.4)[a]	1217 (3.3)[a]	-
1971[b]	3799 (10.4)[a]	1683 (4.6)	-

a Data based on 1975 figures.
b Material balance for P_2O_5 only.

summarized in Tables 16 and 17. The results of material balances done in 1966 and 1978 are given in Table 16 and include estimates of fluoride lost through pond percolation. The atmospheric losses are summarized in Table 17 and include estimates from Company personnel and results of State tests.

The material balances calculated by Oxy-Lathrop personnel were performed for a 10-month period in 1966 and a 6-month period in 1978. The material balances were based on production and shipping records and on analysis of material samples. As shown in Table 16, the estimated loss of fluoride to pond percolation (including concentrator ponds) was 2.59 m. tons (2.85 tons)/day in 1966, and 3.15 m. tons (3.47 tons)/day in 1978.

The estimated losses of fluorine to the atmosphere [Table 17] were compiled from the previously mentioned material balances, Company estimates, and State tests. The Company estimates and State test results were ascertained from correspondence relating to fluoride emissions. Background data, such as a copy of State test report, were obtained from sources other than the audit. The data reported in Table 17 are reported in two forms to give a common basis for comparing the estimates. The losses of fluorine to the atmosphere range from 18 to 33 kg (40 to 72 lb)/day or 0.33 to 0.86 lb fluorine/ton of P_2O_5. These emissions are substantially higher than the emission standard of 0.02 lb fluorine/ton of P_2O_5 recently adopted by the San Joaquin County Air Pollution Control District. At the time of the audit, Oxy was implementing a compliance schedule to meet this standard.

Sulfur Losses

Sulfur losses for 1978 and 1979 were taken from material balance data provided by Oxy during the audit. Material balance data for previous periods were not available for review. The sulfur dioxide (SO_2) losses as estimated from the material balances are summarized in Table 18. The SO_2 losses to the atmosphere ranged from 2.8 to 22.7 m. tons (3.1 to 25.0 tons)/day, with an average daily loss of 13.6 m. tons (15 tons)/day for the 1978 to 1979 period. An internal memo dated November 24, 1976, from Sy Bensky to Distribution indicated annual losses of SO_2 at 3,600 m. tons

Table 16

FLUORIDE LOSSES FROM MATERIAL BALANCE DATA
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

Time Period and Source of Data	Net Loss to Concentrator Ponds	Losses to Pond Percolation and Evaporation	Losses to Atmosphere	Unaccounted Losses
	(Total Tons Lost/Avg Daily Tons Lost)			
1/6 - 11/1/66[a] material balance dated 11/18/66 (304 days)	694/2.3	168/0.55	11/0.036	46/0.15
12/26/77 - 6/25/78[b] material balance dated 11/20/78 (182 days)	480/2.6	157.5/0.87	6.5/0.036	-

a Based on 3.8% Fluoride in phosphate rock.
b Based on 3.65% Fluoride in phosphate rock.

Table 17

SUMMARY OF FLUORIDE LOSSES TO THE ATMOSPHERE
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

Source of Data	Estimated Fluoride Losses to Atmosphere		
	lb/ton P_2O_5	Tons/Day	Comments
1966 material balance	0.86	0.036	Based on P_2O_5 input of 84 T/D from material balance
1978 material balance	0.60	0.036	Based on P_2O_5 input of 118 T/D from material balance
Summer 1977 ARB[a] stack test	0.565	0.033	T/D estimated using 1978 P_2O_5 input of 118 T/D
3/14/79 memo	0.33	0.02	T/D estimated using 1978 P_2O_5 input of 118 T/D

a Abbreviation for State of California Air Resources Board.

Table 18

SULFUR LOSSES FROM MATERIAL BALANCE DATA
OCCIDENTAL CHEMICAL COMPANY
Lathrop, California

Time Period and Source of Data	Stack Loss to Atmosphere as SO_2 (Total tons lost/Avg Daily Tons Lost)	Calculated Overall Efficiency (%)
1/1 - 6/25/78 (176 days) 8/1/78 material balance	2422/13.8	97.3
6/26 - 9/25/78 (92 days) 10/10/78 material balance	1106/12.0	97.4
9/26 - 12/31/78 (97 days) 1/18/79 material balance	2422/25.0	94.1
1/1 - 3/25/79 (84 days) 4/10/79 material balance	260/3.1	99.4
3/26 - 6/25/79 (93 days) 8/17/79 material balance	1994/21.4	93.5

(4,000 tons)/yr or 10 m. tons (11 tons)/day. The amount of sulfur lost to pond percolation was not delineated in the material balances since the material balances were only based on shipments of sulfur and products in and out of the facility. Analysis of wastewaters and pond inventories were not included in the balances. All losses were assumed to be to the atmosphere.

Ag Chem Material Balances

Two production record types from the Ag Chem plant were reviewed during the September 18 to 28, 1979 process audit of the Oxy-Lathrop facilities: inventory cards that listed raw materials and batch sheets that showed formulation of products. These records were only available for 1973 to date. The records were often difficult to read because of poor copies. Also, in some cases records were incomplete and consistent information was unavailable. Some records were available for time periods starting in 1971, but these were incomplete.

First, copies of the inventory cards were reviewed. The quantities of active ingredients and solvent chemicals handled were summarized by year. Many materials listed in the inventory were inactive ingredients such as emulsifiers, diluents, dispersants and dyes and were not summarized by quantity. Because it was impractical to accurately balance materials moving in and out of the inventory system, totals were based on the materials handled. "Materials handled" are defined as all materials charged out to production batches.

Table 19 summarizes the active ingredients handled at Oxy-Lathrop from 1971 to 1979. As noted above, the records were incomplete from 1971 to 1973; consequently, the figures listed represent only the available data. Table 20 lists the solvent chemicals handled. Tables 21 and 22 rank these materials by the total amounts handled. DBCP (1,2-dibromo-3-chloropropane) and EDB (ethylenedibromide) rank one and two of the active ingredients handled. Solvent Thinner 347 ranked first among the solvents. Eighty-four materials were summarized.

Table 19

SUMMARY OF ACTIVE INGREDIENTS HANDLED AT OXY-LATHROP FROM 1971 - 1979 YEARLY TOTALS
Raw Data were Incomplete for 1971 and 1972

Material Code	Name	Pounds of Material Handled 1971	1972	1973	1974	1975	1976	1977	1978	1979	Total	
210040	Abate (Tech)	528	2313	2942	2696	433	1982	-	170	155	11,219	
?	Allyl chloride	-	-	-	56375	109800	-	-	-	-	166,175	
211070	Aldrin	2424	5440	3495	7150	-	-	-	-	-	18,509	
213600	Azak 80 W	-	2950	8641	20481	-	-	-	-	-	32,072	
215090	Baytex 93 conc	2	2	12	13760	2970	4148	5952	5140	0	31,986	
215500	Betasan tech 93%	-	-	-	300	-	704	18673	8240	4639	33,056	
214350	BHC tech	-	127	-	-	-	-	-	-	-	127	
216762	Botran 90 dust base	-	-	-	1931	3284	2207	-	2170	-	9,592	
216110	BTB 2SW	1565	386	99	375	-	-	-	-	-	2,425	
800500	Captan 80 W	-	-	-	-	-	-	-	13465	-	13,465	
080075	Chlorothalonil (Dacthal)	-	-	-	750	-	-	-	-	-	750	
220090	Contact weed killer	-	-	-	43079	333421	266719	413066	243361	374395	1,674,011	
221402	Cube root (powdered)	-	-	-	816	3489	3183	2994	1398	1970	13,350	
?	Cygon tech	-	-	-	-	-	37500	-	-	-	37,500	
221725	Cyprex 65 W	11	15	8	73	15	8	78	675	-	883	
221740	Cythion (Malathion) tech 93%	-	-	-	41027	104343	64161	63088	52090	50829	375,538	*22791 # handled on unknown date
290900	DBCP-tech	-	3039313 *	-	102724	-	-	-	-	-	3,142,037	* years of production unknown
227000	Dibrom tech	24437	21603	31071	49974	25577	-	3392	5126	-	161,180	
225508	Diazinon 4 EC	-	-	-	-	-	-	25318	-	-	25,318	
225400	Diazinon premix	-	-	-	-	134850	14707	-	-	-	149,557	
226100	Diazinon MG-8 (tech)	-	2462	44685	152298	113824	107432	18465	140381	261451	840,998	
226125	Diazinon 40 W	-	-	-	-	-	-	1551	214	1048	2,813	
228070	Dieldrin tech	3173	5637	6503	6537	661	-	-	-	-	22,511	
228090	Dieldrin 50 dust base	100	-	-	-	-	-	-	-	-	100	
228462	Dimethoate 94%	-	-	-	-	-	36586	132632	136835	427308	733,361	
224280	Dimethyl T-75 (Dacthal)	-	-	-	-	-	1552	-	-	-	1,552	
228660	Disyston tech	38530	37000	38590	23855	-	-	-	-	-	137,975	
228670	Disyston 1 & 2	-	-	-	-	-	-	460	304	-	764	

Table 19 (cont'd)

SUMMARY OF ACTIVE INGREDIENTS HANDLED AT OXY-LATHROP FROM 1971 - 1979 YEARLY TOTALS
Raw Data were Incomplete for 1971 and 1972

Material Code	Name	Pounds of Material Handled 1971	1972	1973	1974	1975	1976	1977	1978	1979	Total
228650	Disyston 68%	785	5618	4560	9346	2020	3963	1924	1278	-	29,494
230180	Dursban premix	-	-	-	11422	13622	6370	5352	11306	10271	58,313
230205	Dursban 6-61 5 (conc)	-	-	-	3749	9343	5852	3911	5068	2409	30,332
230220	Dursban 52 5%	132	273	2344	2316	786	-	565	-	-	6,416
050125	Dyrene 80% (tech)	-	-	-	-	-	2006	1254	3008	1790	8,058
290820	EDB (tech)	-	-	-	45490	3210	185175	144001	758778	1448980	2,585,634
232600	Endrin	-	-	-	-	900	-	-	-	-	900
232720	Epichlorohydrin	-	-	-	3292	15396	2939	1123	-	-	22,750
233330	Ethion tech	-	-	-	8030	-	200	-	6500	-	14,730
249520	Ethyl parathion	-	-	31980	158093	101527	90114	104700	53020	21450	560,884
233790	Ferbam	10158	2121	82	-	-	-	-	-	-	12,361
210900	Lindane	-	-	-	-	-	3130	1777	6608	770	12,285
244800	Methyl parathion (tech)	-	27245	151229	125861	131272	162520	130879	96859	84090	909,955
244570	Methoxy chlor (tech)	11905	27955	10050	18956	11885	16241	8643	11618	400	117,653
253380	Mevinphos 10 3 (tech)	-	-	-	8035	12352	32750	32200	35311	33600	154,248
245420	Morpholine	-	-	-	-	-	2922	3490	2003	3914	12,329
248680	Ordram 8E	-	-	-	102	25535	34056	8650	9079	-	77,422
?	Omite (tech)	-	-	-	-	-	-	-	-	638508	638,508
800500	Parawet 25W (methyl parathion)	-	-	244562	100142	-	-	-	800	-	345,504
253020	Perthane (tech)	4870	10272	14503	30431	8950	17205	-	14112	-	100,343
253380	Phosdrin (tech)	13240	18448	8952	2990	4037	-	-	-	-	47,667
255780	Phosphamidon (tech)	4440	6877	-	-	-	-	-	-	-	11,317
650250	Pyrethrum	-	-	-	648	2810	2527	1982	3964	1504	13,435
?	Progibb (Gibberellic acid)	-	-	-	-	-	-	-	-	63 kg	63 kg
050275	Ryania powder 0.23%	-	-	-	-	8013	7800	6000	3250	3985	29,048
258440	Ryanicide 100 (Rynotox)*	-	-	-	-	-	-	-	-	-	0
259429	Sevimol (bulk)	-	-	-	-	10060	7959	1220	-	-	19,239 gal

*Material inventoried but none used

Table 19 (cont'd)

SUMMARY OF ACTIVE INGREDIENTS HANDLED AT OXY-LATHROP FROM 1971 - 1979 YEARLY TOTALS
Raw Data were Incomplete for 1971 and 1972

Material Code	Name	Pounds of Material Handled 1971	1972	1973	1974	1975	1976	1977	1978	1979	Total	
260600	Sevin 80 DB	-	10205	59845	80216	1492	15639	47660	27777	78690	321,524	
260680	Sevin 80 Spray	-	-	-	-	-	-	-	75	-	75	
259550	Sevin (tech)	350	-	-	9742	-	-	-	-	-	10,092	
266930	Terrachlor	1045	1542	-	-	-	4586	-	-	2035	9,808	
268100	Terrazol	1860	-	-	-	-	-	-	-	-	1,860	
269090	Thiodan 50 W	14050	17786	592	-	-	-	-	-	-	32,128	
271271	Thuricide HP-1, 5-B-DB	-	5375*	-	-	-	-	11940	3264	-	20,579	* year unavailable
269010	Thiosulfan (thiodan)	52820	93020	57601	18255	17240	87052	139276	53743	67132	586,139	
274600	Trithion tech (90%)	34876	33846	34431	-	-	13015	-	8920	13200	138,288	
272340	Toxaphene 90% (tech)	337157	224259	303416	93400	103772	143609	126034	115962	41782	1,489,391	
272300	Toxaphene 40 DB	3125	382	-	-	-	-	-	-	-	3,507	
191210	Urea (prilled)	-	-	18924	58902	23418	9552	9761	30763	12998	164,318	
275860	Urea-LoBi-(fines)	-	-	-	9946	62503	126824	150011	108504	111503	569,296	
279943	Ziram 76 W	-	58647*	-	-	16468	2418	-	-	-	77,533	* year unavailable
279970	Ziram 95% (tech)	3240	64017	68741	-	-	19320	66210	316262	545778	1,083,568	
279851	Zineb 75 WP	-	9122*	-	-	8390	5561	2380	7816	-	33,269	* year unavailable

Table 20

SUMMARY OF SOLVENTS HANDLED AT OXY-LATHROP FROM 1971 - 1979 YEARLY TOTALS
Raw Data were Incomplete for 1971 - 1972

	Pounds of Material Handled									
Name	1971	1972	1973	1974	1975	1976	1977	1978	1979	Total
Solvent thinner 347	-	-	-	1973859	1950195	2419762	1750559	1003156	1740450	10,837,981
Xylene	-	271377	724039	261295	58970	-	-	-	-	1,315,681
Xylene-nitration grade	-	-	-	-	-	8610	50806	1139133	-	1,198,548
Isopropanol	39032	127778	131662	38720	89678	188105	191548	199896	159176	1,165,595
Dow General (bulk oil)	-	-	-	100368	106792	140087	185460	126355	163629	822,631
Cyclohexanone	-	-	-	-	-	11817	63151	350640	54239	479,847
Chevron base oil	-	-	-	-	-	18648	17748	23537	29456	89 389
Citrus oil	7000	10841	11553	6212	-	-	-	-	-	35,506 (gal)
Ethyl hexanol	-	-	-	-	-	-	-	400	427	827
Amyl acetate	-	-	672	-	-	-	-	138	15	825
Acetic acid	-	-	-	-	-	-	121	184	230	535
Diesel oil	-	-	-	72228	9392	-	-	-	-	81,680

Table 21

SUMMARY OF ACTIVE INGREDIENTS HANDLED AT OXY-LATHROP
FROM 1971 to 1979 RANKED BY POUNDS HANDLED
Raw Data Were Incomplete From 1971 and 1972

Material	Total Pounds
DBCP-Tech	3,142,037
EDB-tech	2,585 634
Contact Weed Killer	1,674,041
Toxaphene 90% (tech)	1,489,391
Ziram 95% (tech)	1,083,568
Methyl parathion (tech)	909,955
Diazinon MG-8 (tech)	840,998
Dimethoate 94%	733,361
Omite (tech)	638,508
Thiosulfan (thiodan)	586,139
Urea-LoBi-(fines)	569,296
Ethyl parathion	560,884
Cythion (malathion) tech 93%	375,538
Parawet 25W (methyl parathion)	345,504
SEVIN 80 DB	321,524
Allyl chloride	166,175
Urea (prilled)	164,318
Dibrom tech	161,180
Mevinphos 10 3 (tech)	154,248
Diazinon Premix	149,557
Trithion tech (90%)	138,2'.8
Disyston tech	137,975
Methoxychlor (tech)	117,653
Perthane (tech)	100,343
Ziram 76W	77,533
Ordram 8E	77,422
Dursban Premix	58,343
Phosdrin (tech)	47,667
Cygon tech	37,500
Zineb 75WP	33,269
Betasan tech 93%	33,056
Thiodan 50W	32,428
AZAK 80W	32,072
BAYTEX 93 conc	31,986
Dursban 6-61 5 (conc)	30,332
Disyston 68%	29,494
Ryania Powder 0 23%	29,048
Diazinon 4EC	25,318
Epichlorohydrin	22,750
Dieldrin tech	22,511
Thuricide HP-1,5-B-DB	20,579
Sevimol (Bulk)	19,239 gal
Aldrin	18,509
Ethion tech	14,730
Captan 80W	13,465
Pyrethrum	13,435
Cube Root (powdered)	13,350
Ferbam	12,361
Morpholine	12,329
Lindane	12,285
Phosphamidon (tech)	11,317
ABATE (tech)	11,219
SEVIN (tech)	10,092
Terrachlor	9,808
Botran 90 dust base	9,592
Dyrene 80% (tech)	8,058
Dursban 52 5%	6,416
Toxaphene 40 DB	3,507
Diazinon 40W	2,813
BTB 25W	2,425
Terrazol	1,860
Dimethyl T-75 (Dacthal)	1,552
Endrin	900
Cyprex 65W	883
Disyston 1 & 2	764
Chlorothalonil (Dacthal)	750
BHC tech	127
Dieldrin 50 dust base	100
SEVIN 80 spray	75
Progibb (Gibberellic Acid)	63 Kg
Ryanicide	0

Table 22

SUMMARY OF SOLVENTS HANDLED AT OXY-LATHROP FROM 1971-1979
RANKED BY POUNDS HANDLED
Raw Data were Imcomplete for 1971 and 1972

Material	Total Pounds
Solvent Thinner 347	10,837,981
Xylene	1,315,681
Xylene nitration grade	1,198,548
Isopropanol	1,165,595
Dow General (bulk oil)	822,631
Cyclohexanone	479,847
Chevron base oil	89,389
Diesel oil	81,680
Citrus oil	35,606 gal
Ethyl hexanol	827
Amyl aretate	825
Acetic acid	535

In addition, Table 23 lists the names of other raw materials handled, and includes emulsifiers, diluents, dispersants and dyes. One hundred seventy-nine (179) other ingredients are listed in Table 23. The quantities of these materials handled varied from almost zero to over 41,000 kg (90,000 lbs). Their use, however, generally was less than many active ingredients.

During the interviewing of plant personnel it was noted that there was a damage reporting system to record losses of product, unrecoverable bad batches, etc. Subsequently, during the inventory card review, some records of damaged, destroyed or lost materials were noted. Table 24 summarizes these losses. Most losses were due to the January 17, 1976 fire described previously.

Second, all batch formulation sheets were reviewed and summarized for the 1973 and 1978 production years. The summaries were performed as follows: Consider the target formulation amount (or raw materials total) as the amount prepared. Calculate the actual amount formulated from bag weights and counts, container volumes and counts or any other applicable information recorded on the batch sheets. The difference of these two amounts divided by target formulation amount yields the fraction over or under formulation (or loss). Table 25 summarizes the percent product losses as percentages of the target formulation. The calculations did not include bulk quantity production because typically, there was no indication of the actual amount packaged, only the target amount.

Table 25 shows overall average product losses of 0.79 and 0.70% for 1973 and 1978, respectively. The losses were further broken down by major production plant type to liquids, dusts and granulars. The largest losses occurred for dusts and wettable powders - 1.2 and 0.86% for 1973 and 1978, respectively. In 1978, granulars actually showed an increase of 0.23% of product produced over the target formulation. Although the losses noted above are small in terms of percentages, if real they represent large quantities when considering that millions of pounds of pesticides were formulated/manufactured.

Table 23

LIST OF MATERIALS HANDLED AT OXY-LATHROP FROM
1971 - 1972 NOT INCLUDED IN TABLES 19 AND 20
Raw Data were Incomplete from 1971 and 1972

Many are Emulsifiers, Diluents and Antifoam Agents
and Handled in Small Quantities (Generally less than 10,000 pounds)

Acetic anhydride
Adsee
Aerosil 200 (CAB-O-SIL)
Aersol OTB
Agrimul J-1
Aqueous formaldehyde
Aquaflat
Antifoam A
Antifoam H-10
Arquad 20-75
Armeen CD
Atlox 804
Atlox 3403F
Atlox 3409F
Atlox 3431
Atlox 3453F
Atlox 3454F
Atlox 3455F
Atlox 3403F
Atlox 3404F
Attaclay
Calco oil blue liquid
Calcozine green mx, liquid
Calcozine auramine OO
Calsoft T-60
Casein
Celatom MP-78
Celatom MP
Celite 209
Chevron Agent 236-64A
Cotton seed oil
Copper-Traco 50%
Diammonium phosphate
Dicofol
Diethyleneglycol
Dipel
Dimethrin
Dioctyl phthalate
Diphos premix
Dipotassium phosphate
Dolomite Ag.
Dorflo, oil
Dowfax 2A1
Dowfax 21
Dow ANOL EM
Dowcil 100
Dust diluent, Chevron
Emgard 2063
Emgard 2066
ESO (Epoxidized soybean oil)
Ferrifluc
Ferrous sulfate
Flosul
Folpet (phaltan sow)
GAFAC-729
GAFAC-Re-610
Geopan-GA-1
Gilsonite
Glycerol 96
Groco 2 red (oleic acid)
Hampene 6.5% Zn chelate
Hampene 14% Zn chelate
Hisil 233
Hexylene glycol
Hydrated lime
Igepal Co 530
Igepal Co 430
Igepal Co 630
Igepal Co 710
Igepal DM-530
Igepon TN-74
Kaolin Type 41 Clay
K-nite
Lignosite 458
Lignosite 854
Lorsban 4E
M-4 clay
Manganese oxide
Magnesium sulfate
Manganese carbonate
Mono ammonium phosphate
Measurol Tech
Metanil yellow dye
Microcel E
Microcel T-26
Mono potassium phosphate
Multifilm defoamer
Naphthalene-acetic acid
Nekal WT-27
Nekal BX-78
Neutralizer M-33
Ninate 401

Table 23 (cont'd)

LIST OF MATERIALS HANDLED AT OXY-LATHROP FROM
1971 - 1972 NOT INCLUDED IN TABLES 19 AND 20
Raw Data were Incomplete from 1971 and 1972

Many are Emulsifiers, Diluents and Antifoam Agents
and Handled in Small Quantities (Generally less than 10,000 pounds)

Nopco 80-50
Nufilm p
Nutrasol
Nutrawet-Folospray
Naphthol green dye
Cotton seed oil
60 pale oil
Pine oil
Spray stock L
99 S oil
PGSO 1 oil
PGSO 2 oil
Petro Ag
Phosphate rock
Phosphoric acid
Potassium nitrate
Potassium sulfate
Powdered bluestone
Propylene glycol
PVP K30
Sellogen HR
Seelogen W
Semimol
Sequesterine 30A
Sequesterine 330 Fe
Sequesterine Zn 14%
Shelsol
Sorbitol 70 solution
Sponto EMCOL HJPZ
Sponto N142B
Sponto 108D
Sponto N164
Sponto A-69-40
Sponto 139-B
Sponto N-140B
Sponto AK-16-95N
Spray Stock L
Sprint 38
Sudam Blue
Sudan Orange
Sudan Red 0
Sudan yellow dye
Sugar
Sulfur
Sulfuric acid
Supersul (thiolux)
Sulframin SXS 40% liquid
Sulframin LX flake 85%
Supersul 50 (thioret)
Tamol SN
Tamol TN
Tamol N micro
Techmangan Nutra-Spray
Techmangan ($Mn\ SO_4$)
Tennco 500 - 100
Terton K120
T-mulz 121 N
T-mulz 539
T-mulz A-02
Thylate
Titanox-RGHT-X (titanium pigment)
Tribasiz copper 53%
Triple 12
Triton X-15
Triton Ag 120
Treble super phosphate
Trusorb 30-60 granules
Tween 80
Versene 100
Versenol 120
Vitamin B-1
VLR-Diluent lcay
Xylene milling green B dye
Zinc chelate
Zinc oxide
Zinc sulfate
Zinc sulfate (basic)

Table 24

SUMMARY OF LOST RAW MATERIALS AT OXY-LATHROP
Based on Inventory Review from 1973 to 1979

Material	Date	Amount	Reason
Abate (tech)	4/25/76	200#	water contaminated
Anti Foam H-10	1/17/76	200#	destroyed (fire?)
Arquad 20-75	1/16/?	428#	destroyed in fire
Armeen CD	1/16/76	66#	destroyed in fire
Betasan (tech 95%)	10/26/74	800#	dumped
Calcozine green mix liq.	1/17/76	37,176 ml	destroyed in fire
Calco oil blue liq.	1/17/76	10,638 ml	destroyed in fire
Calsoft T-60	1/19/76	480#	destroyed in fire
Celalom MP 78	8/2/76	1000#	damage-lost
Chevron base oil C (spray oil C)	1/16/76	1200#	destroyed in fire
Contac weed killer	4/28/79	275 gal	loss
Dioctyl phthalate	1/16/76	814#	destroyed in fire
Endrin 75DB	4/6/75	900#	dumped
Erid green	1/17/76	100#	destroyed in fire
Excel 24/48 granules	1/16/76	9100#	destroyed in fire
Excel 15/40 granules	4/25/76	1200#	destroyed in fire
GAFAC B1-729	1/16/79	920#	destroyed in fire
Glycerol 96	1/16/76	570#	destroyed in fire
Groco 2 Red	1/16/76	293#	destroyed in fire
Hamphene zinc chelate	3/25/76	413#	destroyed in fire
Hexylene glycol	1/16/76	420#	destroyed in fire
Igepal CO-430	1/16/76	510#	destroyed in fire
Igepal CO-630	1/16/76	643#	destroyed in fire
Igepal DM-530	1/16/76	1700#	destroyed in fire
Isopropyl alcohol	3/26/77	13,257 gal	product loss
Methyl parathion	1/19/76	1984#	destroyed in fire
Monowet SNO-35	6/24/78	860#	damaged material
Morpholine	1/16/76	427#	destroyed in fire
Multifilm defoamer	1/18/76	24(?)	destroyed in fire
NEKAI WT-27	1/16/76	1000#	destroyed in fire
Napthol green dye	1/16/76	2721.6 grams	destroyed in fire
60 pale oil	1/16/76	400#	destroyed in fire
60 pine oil	1/17/76	20079 ml	destroyed in fire
Oil Red-B-Liquid dye	1/17/76	20079 ml	destroyed in fire
SIPEX BOS	1/19/76	2700#	destroyed in fire
SPONTO 139-B	1/16/76	1458#	destroyed in fire
SPONTO (EMCOL N 140B)	1/16/76	1923#	destroyed in fire
Sudan yellow dye GRN	1/16/76	2706.52 grams	destroyed in fire
Sulframin SXS 40%	4/25/76	1825#	destroyed in fire
Zinc sulfate 36% (reg)	6/20/77	200#	to the dump
Zineb 7SWP	8/17/76	50#	? damage

Table 25

AG-CHEM PRODUCTION MATERIALS BALANCES AT OXY-LATHROP
IN 1973 AND 1978
Negative Values Represent Losses

	Percentage of Formulation	
	1973	1978
Overall	-0.79	-0.70
Liquids	-0.20	-0.76
Dusts and wettable powders	-1.2	-0.86
Granulars	-0.67	0.23

The only internal Oxy memo available to the audit team which purports to quantify pesticide losses from Ag Chem operations is one from Mr. Robert Edson to A. Osborn on June 25, 1976. Included in this memo is a statement that "To date we have been discharging more than 500 parts per million or about 5 tons of pesticide per year to the ground." When interviewed during the audit, Mr. Edson discounted the accuracy of this memo saying that it was based on estimates or best information available. Mr. Edson could not explain why specific numbers were included for pesticide concentrations and mass losses which would have presumed data had been collected.

DBCP Production Records Review Summary

As shown in Table 19, over 1,400,000 kg (3,000,000 lbs) of tech-DBCP was handled from 1971 to 1979 at Oxy-Lathrop. Much of this material was manufactured at Oxy-Lathrop. Exact batch sheets and production records for technical DBCP prior to 1971 were not available. Table 26, however, summarizes 100 batches produced during the period from 1971 to 1976.

Because tech-DBCP was produced in bulk, measurement of the exact yield of the reaction was virtually impossible. Sources of potential loss included product wash cycles, evaporative losses, spillage and spent dryer and filter material. At least one Company memo of February 17, 1967 from Jack Horner to Dr. W. L. Garman mentions significant losses but no specific reason(s) or amounts were given. Formulation of DBCP products in 1973 were summarized and an average of 0.928% over formulation for six products was determined. Generally, many of the formulations were for bulk products and the accuracy of finished product measurement was very limited.

A computerized summary of DBCP production from 1968 to 1977 showed 7,660,000 kg (16,874,339 lbs). The origin of this document could not be accurately described by Oxy and it may represent DBCP formulations and/or DBCP manufacturing. Table 27 is a copy of the Oxy-Lathrop DBCP summary. Prior to 1968 little information was available. Two Oxy-Lathrop inter-office production summaries, however, showed production of 72,656 kg (160,035 lbs) of tech-DBCP during April and May 1967.

Table 26

TECH DBCP MANUFACTURING AT OXY-LATHROP
Record Summary 1971-1976

Year	No. Bottles	Pounds Used	
		Allylchloride	Br_2
1971	52	556,100	1,086,280
1972	2	>7,200	>14,150[a]
1973	None[b]		
1974	6	56,325	110,250
1975	27	287,479	575,370
1976	13	134,550	272,715

a Batch 339 (2/16/72) data unclear; only one other batch reported.

b Available records showed no production in 1973.

Table 27

OXY-LATHROP DBCP PRODUCTION SUMMARY OF 1968 - 1977
Supplied to EPA by Oxy During Process Audit

	Total Pounds Produced in Each Month											
Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1968	0	0	0	0	0	0	0	8520	50979	142407	87953	97160
1969	51806	8520	443124	498784	178828	49942	6238	11996	118682	75567	48184	39100
1970	61771	205640	220665	177655	186052	78264	188346	13366	11086	86334	68484	180457
1971	12251	179446	226905	226165	42273	87540	20618	68112	50135	107392	142309	66099
1972	48694	186360	194701	135790	59829	46271	81043	41508	283595	282504	131509	14467
1973	170745	73023	152142	204502	198020	62458	49859	70760	72592	243889	405718	182607
1974	133252	281354	208067	248288	202136	228022	200516	22593	199759	664221	247081	248522
1975	325777	205581	321524	366657	105291	130104	129374	321363	103038	116728	162129	224673
1976	175158	216644	228984	195743	110912	139068	116521	422377	422686	23999	106784	133552
1977	222580	103508	402702	154099	82192	126050	255401	0	0	0	0	0
Totals	1202034	1460082	2398814	2207183	987315	947719	1047916	980595	1312552	1743041	1400151	1186637

HISTORICAL GROUNDWATER AND SOIL DATA EVALUATION

Past environmental data collected at or near the Oxy-Lathrop facilities have documented environmental contamination attributable to Oxy. A summary of selected data as it reflects (1) inorganics in groundwater, (2) organics in soil and groundwater, and (3) radioactivity in groundwater follows:

Inorganics Data - Groundwater

Groundwater monitoring data have been collected by Occidental Chemical Company and its predecessor, Best Fertilizer, at Lathrop, California since at least 1960. This sampling commenced in conjunction with California Central Valley Regional Water Quality Board Resolution No. 60-6. Although data presented in Table 28 represent only selected wells and parametric coverage, they are important in that they represent "usable" groundwater as it relates to the Resolution, depict the dramatic decline in groundwater quality over time, and document effects directly attributable to Oxy's operations.

In 1963, sulfate (SO_4) concentrations in the "Best West" well began to exceed the California Resolution limit of 100 mg/l. At that time, the Best West well was Oxy's principal process and domestic water source. As the years went by, SO_4 concentrations continued to increase, reaching 1817 mg/l in 1974 when the well was finally abandoned. The "Best South" well and Libby Owens Ford (LOF) wells also demonstrate the same trend [Table 28]. SO_4 concentrations in the Best South well exceeded the limitation of 100 mg/l in 1966 and rose steadily to 2,100 mg/l on May 4, 1979. This well is now used for process water only. SO_4 concentrations in the LOF well, which actually reflects various wells sampled over time, first exceeded the 100 mg/l limitation in late 1962.

The presence of SO_4 in these wells is directly attributable to Oxy's operations at Lathrop. As described previously, large amounts of calcium sulfate (gypsum) are generated in the manufacture of phosphoric acid which

Table 28

Oxy-Lathrop Groundwater Monitoring Data - SO_4

Best West Well[1]		Best South Well[2]		L.O.F. Well[3]		Best East Well[4]	
Date	SO_4 (ppm)	Date[a]	SO_4 (ppm)	Date[a]	SO_4 (ppm)	Date[a]	SO_4 (ppm)
8/20/60	28		28				
1/61	23		26				
1/62	69		26				
2/15/62	64		-				
2/27/62	63 (63)[b]		27 (26)[b]		75		
4/7/62	73		54		75		
5/30/62	66		49		95		
7/27/62	85 (84)[b]		29 (44)[b]	7/7/62	91		
9/7/62	47		33		52		
11/27/62	87		22		123		
3/20/63	116		46		78		
5/24/63	130		37		134		
8/23/63	149		28		307		
11/23/63	154		27		174		
11/6/64	200		39		30[c]		
3/4/65	223		57		39		
5/5/65	229		64		38		
8/11/65	237		82		66		
11/2/65	228		90		25		
2/28/66	252		93		47		
5/28/66	244		78	5/26/66	49		
8/26/66	250		84		79		
11/4/66	270		153		76		
3/23/67	317		237		57	5/17/67	11
10/25/67	428		161				10
2/1/68	365		133				7
8/15/68	419		186				12
5/22/69	567		225		193 (10 g)		0
3/11/71	1396		392		1279 (Irr.)		6
5/2/73	112	5/3/73	682	5/1/73	641 (10 d)	5/1/73	0
5/16/74	1817	5/8/74	413	5/9/74	679 (10 d)	5/8/74	13
		5/1/75	1717	5/1/75	1042 (10 a)	5/1/75	28
		5/7/76	1001	5/8/76	29 (Comp)	5/7/76	22
		5/7/77	1317	5/7/77	59 (Comp)	5/7/77	30
		5/9/78	1699	5/9/78	66 (Comp)		
		5/4/79	2100	5/4/79	1270 (Comp)	5/4/79	37

a Unless otherwise specified, date listed is date from far left column.
b Concentrations in parentheses are from concurrent sampling by California Water Board.
c Apparently began to sample another LOF well, listed as No. 10 from 11/6/64-3/23/67.

Table 28 (Cont.)

Oxy-Lathrop Groundwater Monitoring Data - SO^4

[1]BEST WEST WELL

Oxy's May 1974 well water analysis survey report describes their well as "Located on west side of road on west side of NH_3 plant next to CO_2 plant." and describes the depth as 145 ft. An 8/21/62 memo to Colonel J. S. Gurlinski, California Water Board, from G. E. Schmidt describes well as "171' cased depth, 14" casing, 111' to 171' perforation interval (Use: Domestic, Fire Reservoir, Process Water)." File information indicates well was abandoned in 1974.

[2]BEST SOUTH WELL

Oxy's May 1979 well water analysis survey report describes their well as "next to gypsum ponds south end of Occidental Chemical Company Property." and describes depth as 130 ft. The G. E. Schmidt memo referenced above describes well as "14" casing, 260' cased depth, 125 to 135' perforation interval; (use: Process Water)".

[3]L.O.F. WELL

Data reported historically represents sampling of a series of wells on the Libby Owens Ford glass plant property just to the west of the Oxy plant. At least one of the wells was listed in file information as being 204 ft deep. Recent years' data (1976 to 1979) indicate a composite sample of various L.O.F. wells.

[4]BEST EAST WELL

Oxy's May 1979 well water analysis survey report describes well as "East of Occidental Chemical Company Plant and just west of McKinley Avenue." and describes depth as 250 ft. File information indicates this well was brought into use in 1966 and became Oxy's principal potable water quality well.

are slurried to onsite Gypsum Ponds for dewatering by percolation and evaporation. The water which percolates is laden with sulfate ions which have then been drawn into the cone of depression of the wells and contaminated them.

Groundwater monitoring data from these and other wells in the area were submitted to the State of California until 1967 when the State informed the Company in writing that they could terminate groundwater monitoring in lieu of initiation of wastewater pond monitoring. The Company did, however, continue to collect groundwater data for its own use and in early 1979, at the request of the State, turned this data over to the State.

The "Best East" well, installed in 1966 following the decline of water quality in the Best West well, graphically depicts background SO_4 concentrations in the area as well as a recent trend toward deteriorating quality [Table 28]. Concentrations from 1967 to 1974 were $\leq$13 mg/l. On May 4, 1979 this concentration had risen to 37 mg/l, perhaps a harbinger of migrating sulfate ions from the Gypsum Ponds into this well's cone of depression.

Organics Data - Soils/Groundwater

To date, no data have systematically been collected and reported to indicate the areal and vertical extent of organic contamination attributable to Oxy-Lathrop. It has been demonstrated, however, that compounds attributable to Oxy-Lathrop are in the soils in the vicinity of the plant and have migrated to usable groundwaters serving industrial, agricultural and potable uses.

The first organics data known to have been collected, which indicated the presence of organic compounds in soils on the Oxy property was collected by Oxy in 1970.* These data were collected in conjunction with a

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* See Appendix B for listing of organics data. Data is identified by compound, date of collection, concentration, source of data, and location of sample.

State of California directive to define any contamination associated with the "boneyard" disposal area. No groundwater sampling detecting specific organic compounds is known to have been conducted until May 1978, when Oxy, following discovery in 1977 of sterilization of pesticide plant workers, found 1.1 ppb of lindane in the Mendes irrigation well. Since these discoveries, a number of soil, shallow groundwater, and process irrigation, and potable well samples have been collected which indicated the presence of organic compounds. Disregarding the volatile organic compounds identified in Table 29, all the other compounds are known to have been handled at the Oxy-Lathrop plant. It can be assumed that Oxy-Lathrop is the primary source of these compounds in the area. As indicated in Table 29, twelve of the compounds are known animal carcinogens, and DDD is a suspected animal carcinogen. DBCP is also suspected of being a human carcinogen. The adverse health effects inferences of these statements are conservative since numerous other non-carcinogenic health effects are also known for the compounds.

Radioactivity Data - Groundwater

Phosphate rock used in phosphoric acid operations such as at Oxy-Lathrop is known to contain naturally-occurring radioisotopes. Since improper disposal/treatment of the resulting wastewaters could result in contamination of groundwaters, samples were collected of representative wells in the Lathrop area on four separate occasions from October to December 1979. All sampling was conducted by personnel of the California Central Valley Regional Water Quality Control Board. Three of the four sets of samples were analyzed by the California Department of Health Services; the fourth representing the greatest number of wells and widest radiochemical parameter coverage, was analyzed by the USEPA Office of Radiation Programs in Las Vegas, Nevada. This last set of data confirmed and refined earlier findings. Specific findings of the EPA analyses included documentation of:

(1) No gross alpha or beta activity to the east of the Oxy plant

Table 29

ORGANIC COMPOUNDS FOUND IN VICINITY OF OXY-LATHROP FACILITIES

Compound	Media Where Compounds Found and Maximum Concentration[a]		
	Soil/Sediment	Groundwater	Drinking Water
Aldrin	x (6.7)		
Total BHC Isomers	x (1-10 ppm)	x (2.0)	
α BHC[b]		x (6.1)	
β BHC[b]		x (0.59)	
γ BHC (Lindane)[b]	x (6.3)	x (22.1)	x (0.9)
Δ BHC		x (3.8)	
Chlordane[b]	x (40 ppm)		
DBCP[b]	x (2600)	x (95)	x (9.8)
DDD	x (1-10 ppm)		
DDE[b]	x (1-10 ppm)		
DDT[b]	x (20 ppm)		
DEF	x (4000 ppm)	x (3.2)[c]	x (0.4)[c]
		(0.5)	
Diazinon	x (39)[c]	x (11.0)	
Dibrom	x (5000)		
Dieldrin[b]	x (32)		
Dimethoate [b]	x (1.0)[c]	x (9.9)	x (1.8)[c]
Disulfoton (Disyston)	x (80 ppm)	x (3.5)	
DNBP	x (200)	x (18.0)	
Dursban (Chlorpyrifos)	x (200 ppm)		
EDB (ETDB)[b]	x (6700)	x (44)	

Table 29 (Cont.)

ORGANIC COMPOUNDS FOUND IN VICINITY OF OXY-LATHROP FACILITIES

Compound	Soil/Sediment	Groundwater	Drinking Water
Endosulfan I,II.	x (400 ppm)		
Ethion	x (12 ppm)		
Ethyl Parathion	x (1700 ppm)	x (7.5)	x (3.9)[c]
Heptachlor[b]	x (27)		
Malathion	x (5000)	x (1.6)[c]	
Methoxychlor	x (80 ppm)		
Methyl Parathion	(2.0 ppm)		x (0.8)[c]
PCNB[b]		x (6.3)	
<u>Volatile Organics</u>[d]			
Chloroform		x (2.0)	x (1.3)
1,1-Dichloroethane		x (4.0)	
1,1-Dichloroethylene		x (1.0)	
1,2-Dichloroethane			x (0.18)
trans-1,2-Dichloroethylene		x (0.3)	
1,1,1-Trichloroethane		x (0.5)	
1,2-Dichloropropane		x (0.6)	x (3.3)
Tetrachloroethylene		x (1.5)	

a All concentrations in parts per billion unless otherwise specified.
b Animal carcinogen.
c Not a positive identification according to Oxy. Highest <u>positive</u> identification is directly underneath this value, if available.
d No health effects computer search conducted on these compounds.

upgradient of the direction of regional groundwater movement which has been assumed to be to the west or northwest.

(2) Measureable gross alpha and beta activity in wells to the south, west and north of the Oxy plant. Gross alpha and beta levels were as high as 120 ± 38 and 36 ± 8.6 pci/l, respectively. The Lathrop County wells currently used as drinking water (Nos. 1, 4, 5) showed non-detectable to low (i.e., gross alpha and beta of 3.4 ± 2.9 and 4.2 ± 1.9, respectively) gross alpha or beta activity. The Lathrop County standby well (No. 3) had gross alpha and beta activities of 27 ± 19 and 10 ± 2.2 pci/l, respectively.

(3) The majority of the radioactivity in these samples was attributable to uranium, not isotopic thorium, radium-226 or polonium-210.

These data, like the inorganics, are also indicative of the effects of Oxy's activities in the Lathrop area.

AERIAL OVERFLIGHT OF OXY-LATHROP FACILITIES

The Oxy-Lathrop facilities were overflown on September 26, 1979 from 10:40 to 11:59 AM (PDT). The aerial reconnaissance was conducted in a Cessna 172 Aircraft using a Hasselblad 70 mm hand-held camera. Multiband photography was used which consisted of two spectral bands or segments of the optical spectrum from the ultraviolet through the near infrared (300 to 950 nanometers). This enabled the detection of soil discoloration, presence of liquid, and vegetation damage.

The pertinent results of the photo-interpretation of the aerial imagery are depicted in Figure 5, a location map. Indications are sketched on all four sides of the Occidental facility. Of particular interest are general areas found in the fields to the west of the Occidental waste disposal areas [Figure 5].

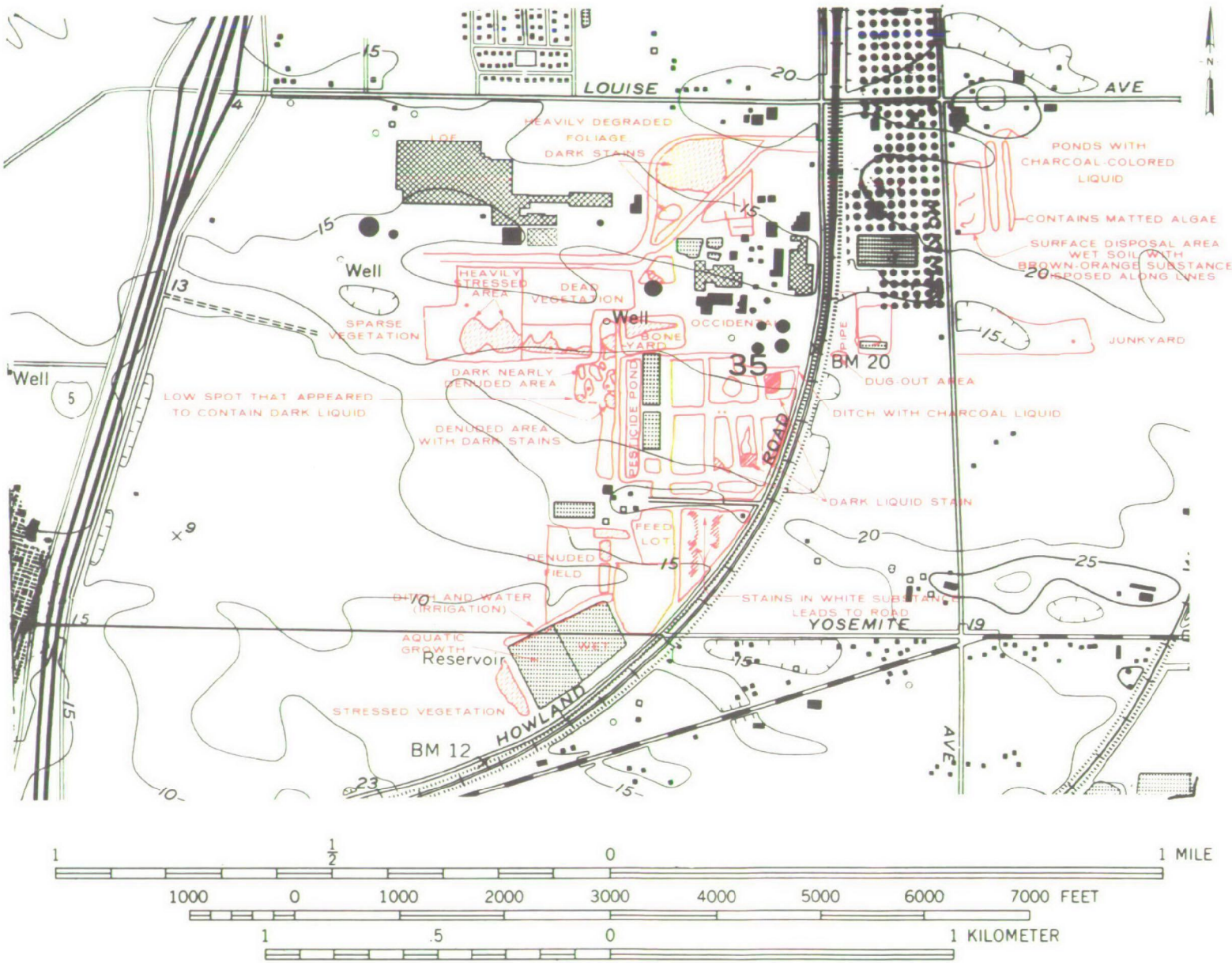

Figure 5. Location Map - Occidental Chemical Company, Lathrop, California

The false color infrared aerial imagery, exposed from yellow through red into the near infrared segments of the optical spectrum, showed numerous areas of dark or discolored soil and areas with apparently degraded vegetation. This is sketched in Figure 6, a false color infrared photograph. There appeared to be a continuous pattern of dark or discolored soil leading westward from the western edge of the Occidental facility, adjacent to the "boneyard" disposal area and pesticide wastewater pond (Southwest Wastewater Pond) as shown by arrows in Figure 6. This pattern could have been caused by the presence and movement of surface/near surface liquid containing a substance toxic to the vegetation in these indicated areas. The isocontour lines on the chart (Figure 5) do not indicate that this effect was due to ponding of a waste liquid or water, especially in the fields, if the land contour has not been significantly altered since the printing of the chart in 1976. The aerial photographs do not reveal any significant change in land contour.

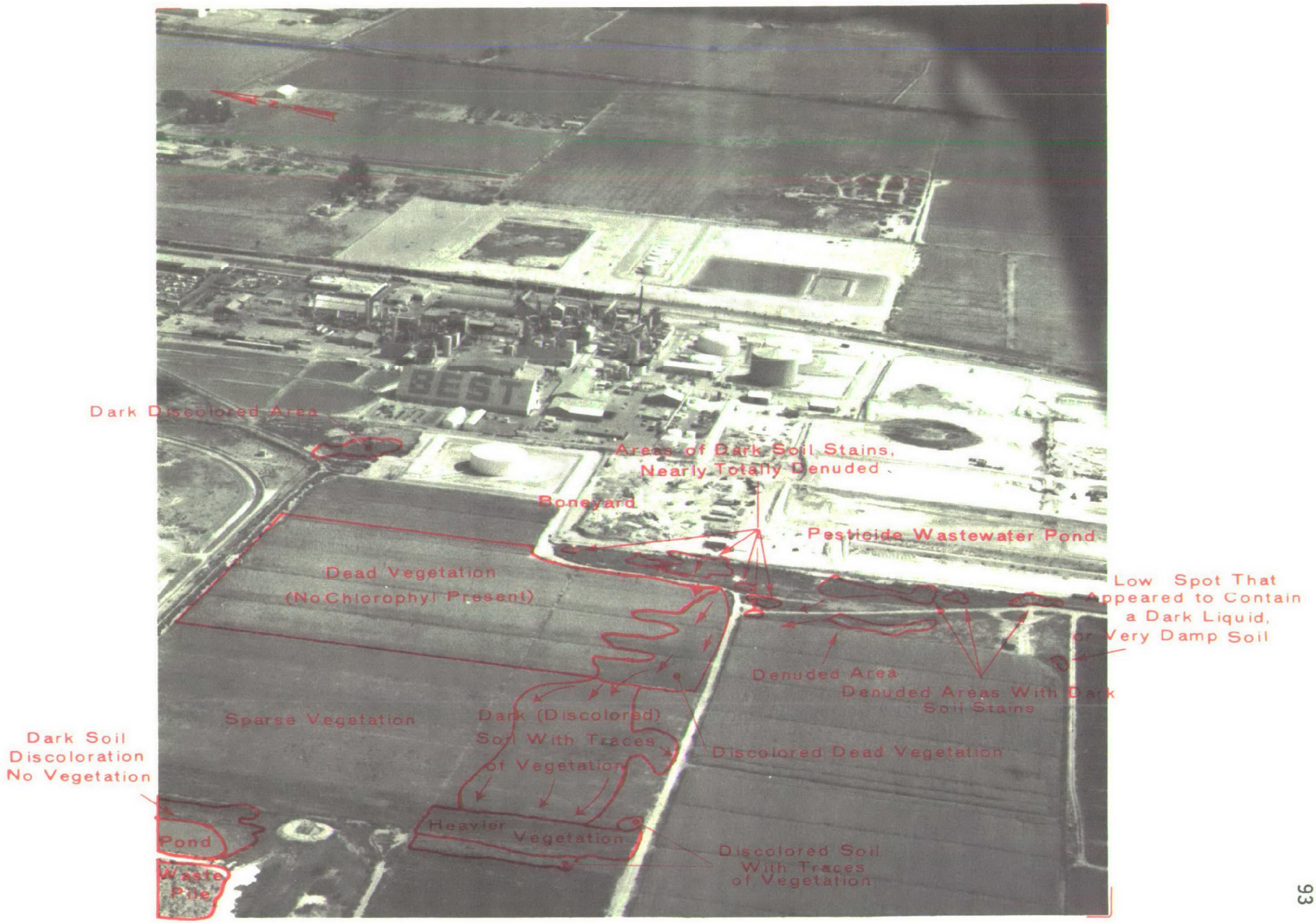

Figure 6. False Color Infrared Aerial Photograph. Occidental Chemical Company, Lathrop, California

APPENDIX A

ORGANIC SOLVENT EMISSIONS DATA AND INVENTORY OF AG CHEM STORAGE TANKS

OXY

OCCIDENTAL CHEMICAL COMPANY

16777 S Howland Ave PO Box 198 Lathrop, California 95330 (209)858 2511

July 29, 1976

San Joaquin County
Air Pollution Control District
Box 2009
Stockton, CA 95201

Dear Sirs:

Attached per your request is a data sheet containing emissions data for the organic solvents used in the pesticides formulated at our Lathrop Plant.

If you have any further questions, please contact Sy Bensky at extension 335.

Very truly yours,

J. H. Lindley
Vice President

JHL:am

cc: A. Osborn
R. Edson
D. Crockett
D. Lery (Houston)

FILE 414

CONFIDENTIAL

SOLVENT	Reactivity Rule 409 k	ARB	Thruput GPY	% OF TOTAL	EMISSIONS Daily lbs.	EMISSIONS Yearly lbs.
Isopropanol	S	III	25,000	8.5	0.35	87.5
Std-347 Solvent	S	II	25,000	8.5	0.35	87.5
Tenneco - 500	k2	III	25.000	8,5	0.35	87.5
Cyclohexanone	S	II	1,400	.5	0.02	5.0
Ethylene Glycol Methyl Ether	S	III	500	.2	0.01	2.5
Glycerol	S	III	2,000	.7	0.03	7.5
Dioctyl Phthalate	k2	III	500	.2	0.01	2.5
Weed Oil	k2	III	9,000	3.1	0.12	30.0
$PGSO_2$	S	I	202,000	69.0	2.85	712.
Diethylene Glycol	S	III	2,100	.7	0.03	7.5
Hexylene Glycol	S	III	260	.1	0.01	2.5
	TOTALS		292,760	100.0	4.13	1032.0

Rec'd 9/27/79

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SEPTEMBER 25, 1979

THE ATTACHED LIST IS THE MOST CURRENT INFORMATION AVAILABLE AND SHOULD BE USED TO REVISE THE INFORMATION ON DRAWING 541-D10-35, DATED 3/30/76.

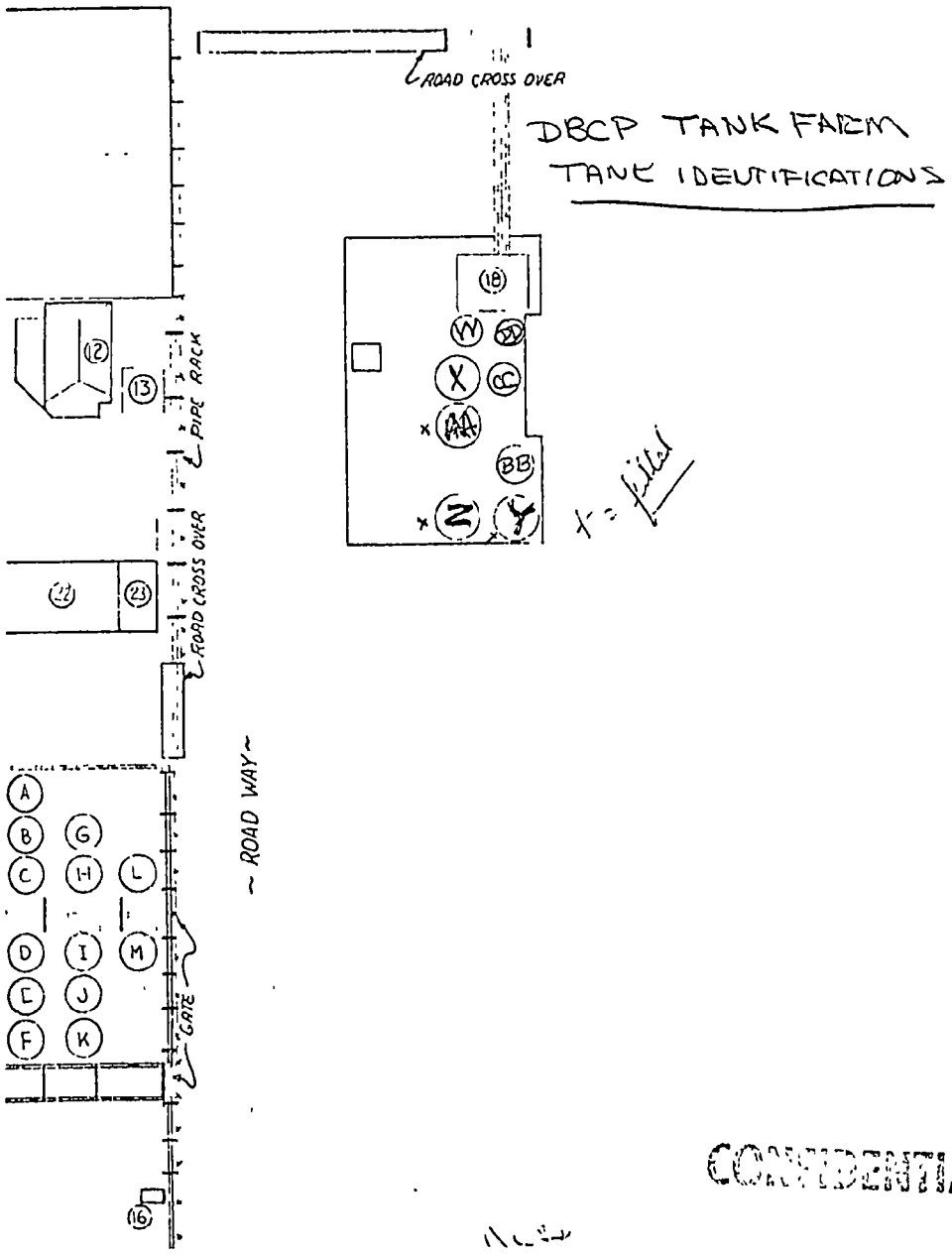
NOTE: ALL AG CHEM STORAGE TANKS HAVE A BREATHER OPENING AT THE TOP

STORAGE TANKS

CONFIDENTIAL

AG CHEM STORAGE TANKS

	A-4 Tank	Material Stored	Tank Capacity	Vapor Pressure in mm Hg at Temp. Given	1978 Storage
A.	TK-101	Spray Stock L	9,979 Gal	Not Available	21,389 Gal
B.	TK-102	Nitration Grade Xylene	15,060 Gal	10 at 80°F	163,488 Gal
C.	TK-103	Super 94 Oil	11,280 Gal	<0.1 at 100°F	86,305 Gal
D.	TK-104	Weed Oil	19,350 Gal	<.5 at 100°F	21,561 Gal
E.	TK-107	Cyclohexanone	4,390 Gal	2 at 20°C	43,387 Gal
F.	TK-108	Sponto N-500B	4,390 Gal	Not Available	1,189 Gal
G.	TK-105	Chevron 339 Thinner	10,176 Gal	Not Available	23,828 Gal
H.	TK-106	Super 94 Oil	11,740 Gal	<0.1 at 100°F	96,942 Gal
I	TK-113	Dow General	11,280 Gal	<90 at 20°C	13,809 Gal
J.	TK-114	Cythion Tech.	12,000 Gal	<.1 at 20°C	5,081 Gal
K.	TK-115	Sprint 38	4,390 Gal	Not Available	3,004 Gal
L.	TK-109	Double-D Oil	11,740 Gal	Not Available	75,668 Gal
M.	TK-116	Contact Weed Killer	11,280 Gal	<20 at 20°C	30,630 Gal
N.	TK-131	Liquid Zinc 9%	16,376 Gal	Not Available	13,003 Gal
P.	TK-127	Waste Water	158,640 Gal	Not Available	220,000 Gal
Q.	TK-128	Waste Water	158,640 Gal	Not Available	150,500 Gal
R.	TK-129	Shell 99 S Oil	93,240 Gal	<0.1 at 100°F	279,115 Gal
S.	TK-130	Tenneco 500-100	70,500 Gal	10 at 68°F	67,454 Gal
T.	TK-132	Waste Oil	2,000 Gal	Not Available	-0-
U.	TK-126	Isopropanol	11,900 Gal	34 at 20°C	3,445 Gal
V.	TK-135	Phosphoric Acid	4,390 Gal	5 at 78°F	1,173 Gal
W.	TK-	DBCP Tech.(Empty/Rinsed)	8,300 Gal	.8 at 68°F	-0-
X.	TK-	DBCP Tech.(Empty/Rinsed)	12,085 Gal	.8 at 68°F	-0-
Y.	TK-	EDB 85	11,800 Gal	12 at 25°C	25,349 Gal
Z.	TK-	EDB 85	11,800 Gal	12 at 25°C	25,349 Cal
AA	TK-	Toxaphene Tech.	11,500 Gal	<3 at 30°C	-0-
BB	TK-	Allyl Chloride	17,100 Gal	Not Available	-0-
CC	TK-	DBCP Tech. (Empty/Rinsed)	4,480 Gal	.8 at 68°F	-0-
DD	TK-	Holding Tank - DBCP Tech	2,500 Gal	.8 at 68°F	-0-



CONFIDENTIAL

A-6

OCCIDENTAL CHEMICAL COMPANY
P O Box 198, Lathrop, California 95330

INTER - OFFICE MEMO

TO: FROM:

SUBJECT: RPA & CA AUDIT DATE: 9-21-79

Sulfur Pit Closed Top	170 Ton	Molten Sulfur	280-300°F
No. 1 Molten Sulfur Tk closed Top	965 Ton	" "	[illegible]
No. 2 Molten Sulfur Tk closed Top	2041 Ton	" "	[illegible]

Molten Sulfur ~ 135°C Density 112 lb/ft³

Fluosilisic Acid			Temp
Holding Tk Closed Top	4315 Gallon	23% H_2SiF_6	Ambient
Product Tk closed Top	21,589 Gallon	23% H_2SiF_6	Ambient
Product Tk closed Top	154,070 Gallon	23% H_2SiF_6	Ambient

Ammonia Tk		
No 1 Atmospheric Stg Tk ~ 3" H_2O	6900 Ton	Anh. NH_3
No 2 Atm Stg Tk ~ 3" H_2O	14,200 Ton	Anh NH_3
Aqua Tk ~ 3" H_2O	12800 Ton	Aqua 25% NH_3
2 Bullets ~ 150 lb Operating Pressure	91 Ton (each)	Anh. NH_3

OCCIDENTAL CHEMICAL COMPANY
P O Box 198, Lathrop, California 95330

INTER - OFFICE MEMO

TO: FROM:

SUBJECT: EPA & CA Audit DATE. 9-21-79

PHOS PLANT

	Capacity, Gallons	Content	Temp
#1 Storage Tk (open Top)	316,400	22-26% Phosphoric	~ 118°F
#2 Storage Tk (open Top)	67,559	22-52% Phosphoric	~ 122°F
#2 Antifoam TK Closed Top with center open	16200	PAMAK WCFA (HERCULES)	Ambient
#4 Storage Tk open Top	67,559	50-52% Phosphoric	~ 12[illegible]°F
#6 Storage Tk open Top	263,160	50-52% Phosphoric	Ambient
#7 Storage Tk open Top	263,160	50-52% Phosphoric	Ambient
C.T. Silo	~ 1350 Ton	Phos Rock	
2 Silos	~ 540 Ton (each)	Phos Rock	

Sulfuric Acid Plant	Capacity, Ton	Content	Temp
No. 2 Stg Tk Closed Top	68	H_2SO_4	Ambient
No. 3 Stg Tk Closed Top	68	H_2SO_4	Ambient
No 4 Stg Tk Closed Top	1980	H_2SO_4	Ambient
No 5 Stg Tk Closed Top	1980	H_2SO_4	Ambient
No. 6 Stg Tk Closed Top	5700	H_2SO_4	~ 180°F
No 7 Stg Tk Closed Top	1200	H_2SO_4	~ Ambient
Cut Acid Tk 66°Be Closed Top	170	[illegible]	Ambient
Tank B 98% Acid Closed Top	68	[illegible]	Ambient

APPENDIX B

SUMMARY OF ORGANICS DATA COLLECTED AT OR IN THE VICINITY OF OXY-LATHROP FACILITY

ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF ENFORCEMENT
NATIONAL ENFORCEMENT INVESTIGATIONS CENTER
BUILDING 53, BOX 25227, DENVER FEDERAL CENTER
DENVER, COLORADO 80225

TO James Bunting
EPA Legal Coordinator, Oxy-Lathrop
Enforcement Division (EN-338)

DATE February 8, 1980

FROM Thomas O. Dahl
EPA Technical Coordinator, Oxy-Lathrop

SUBJECT Summary of Organics Data Collected at or in the Vicinity of Oxy-Lathrop Facility

Attached please find the subject data. To the best of my knowledge, this represents a complete summary of organics data collected by Occidental Chemical Company and their consultant(s) as well as the State of California. Primary sources of data included:

1) State of California Central Valley Regional Water Quality Control Board files up to January 9, 1980;

2) State of California, Department of Health Services files;

3) The SEC documents available to NEIC;

4) The report entitled, "Groundwater Quality in the Vicinity of Occidental Chemical Company, Lathrop, California -- Supplemental Report on Organic Compounds," of October 1979 by David Keith Todd acting as a consultant to Occidental Chemical; and

5) An October 2, 1979 submittal by William A. Falik of Landels, Ripley and Diamond to Harold L. Eisenberg of the California Attorney General's Office on behalf of Occidental Chemical Company, Lathrop, California. This October 2 submittal purported to include, among other things, "Organic analysis and data of groundwater or soil done prior to June, 1979, by or for Occidental Chemical Company at or around the Lathrop facility."

Regarding the attached data, the following should be noted:

1) The date listed is the sampling date unless otherwise noted in the left margin.

2) Concentrations are in parts per billion (ppb) unless otherwise designated.

3) All samples are water samples unless noted otherwise, such as "sludge", "sediment", or "soil core samples" in the "location" column.

4) Some duplication of data exists since data were reported by several sources.

5) Maximum concentrations in soil/sediment, groundwater and drinking water have been marked with an asterisk. When maximum concentrations were noted as "Not a positive identification," the highest confirmed concentration was also noted, when available, with two asterisks.

If there are any questions regarding this summary, please call me.

Enclosures

cc: C. Wills, NEIC
M. Sterns, DOJ
R. Wyatt, EPA Region IX
H. Hatayama, California Health Services
R. Van De Pol, California Water Quality Control Board
H. Eisenberg, Asst. Attorney General, California

COMPOUND ALDRIN

DATE	CONCENTRATION	SOURCE	LOCATION
1/24/79	6.7 ppm	OXY	SOIL CORE - 2' DEEP, 50' FROM WEST PROPERTY FENCE, SOUTH OF CENTER.
1/24/79	5.8	OXY	SAME - 10' DEEP.
1/24/79	2.8	OXY	SAME - 30' DEEP.
1/25/79	3.2	OXY	SOIL CORE - 20' DEEP, 40' FROM PROPERTY FENCE, NEAR SOUTHWEST CORNER.
3/13/79	2.6	OXY	SOIL CORE - 5' DEEP, NEAR DISCHARGE DITCH, SOUTH OF CONCENTRATOR POND.
3/13/79	1.3	OXY	SAME - 20' DEEP.
3/13/79	1.3	OXY	SOIL CORE - 20' DEEP, NEAR NORTHEAST CORNER OF CONCENTRATOR POND.

COMPOUND TOTAL BHC ISOMERS

DATE		CONCENTRATION	SOURCE	LOCATION
Listed as "about 1 µg/L"	9/25/79	1.0*	STATE	LOF 1) A. (NO BETA ISOMER WAS FOUND).
Listed as "about 2 µg/L"	9/25/79	2.0	STATE	MENDES IRRIGATION WELL.
Listed as "about 0.1-0.5 µg/L".	9/25/79	0.1 - 0.5	STATE	LOF 10 F.
	8/3/79	1-10 PPM*	STATE	SEDIMENT-DITCH ADJACENT TO CONCENTRATOR POND.
	8/3/79	1-10 PPM	STATE	SEDIMENT-DITCH 100' SOUTH OF CONCENTRATOR POND.

COMPOUND α BHC

DATE	CONCENTRATION	SOURCE	LOCATION
Date submitted to lab. 2/7&9/79	0.024	STATE	LOF 10 A.
7/18-19/79	0.31	TODD REPORT	TEST WELL 5.
7/18-19/79	0.06	TODD REPORT	TEST WELL 6.
7/18-19/79	0.47	TODD REPORT	TEST WELL 7.
7/18-19/79	0.39	TODD REPORT	TEST WELL 8.
7/18-19/79	6.1 ::	TODD REPORT	TEST WELL 9.
7/18-19/79	0.08	TODD REPORT	TEST WELL 10.
7/18-19/79	0.07	TODD REPORT	TEST WELL 12.
8/1/79	1.5	TODD REPORT	TEST WELL 5.
8/1/79	0.37	TODD REPORT	TEST WELL 7.
8/1/79	0.28	TODD REPORT	TEST WELL 8.
8/1/79	3.1	TODD REPORT	TEST WELL 9.

COMPOUND β BHC

DATE	CONCENTRATION	SOURCE	LOCATION
7/18-19/79	0.13	TODD REPORT	TEST WELL 5.
7/18-19/79	0.28	TODD REPORT	TEST WELL 7.
7/18-19/79	0.59*	TODD REPORT	TEST WELL 9.
8/1/79	0.42	TODD REPORT	TEST WELL 5.
8/1/79	0.17	TODD REPORT	TEST WELL 7.
8/1/79	0.35	TODD REPORT	TEST WELL 9.

COMPOUND γ BHC (LINDANE)

DATE		CONCENTRATION	SOURCE	LOCATION
Date rec'd by Stoner lab.	5/24/78	1.1	OXY	MENDES IRRIGATION WELL.
	1/25/79	4.4	OXY	SOIL CORE - 20' DEEP, 40' FROM SOUTH PROPERTY FENCE NEAR SOUTHWEST CORNER.
Date submitted to lab.	2/7&9/79	0.053	STATE	LOF 10 A.
	2/28/79	0.3	OXY	PERRY IRRIGATION WELL.
	2/28/79	0.4	OXY	OLSEN IRRIGATION WELL.
	2/28/79	0.9 ::	OXY	MENDES DOMESTIC WELL.
	2/28/79	0.7	OXY	OXY SOUTH WELL.
	2/28/79	0.4	OXY	LOF 10 A.
	2/28/79	1.9	OXY	LOF 10 D.
	2/28/79	0.6	OXY	OXY SOUTHEAST WELL.
	2/28/79	0.7	OXY	OXY EAST WELL.
	2/28/79	0.5	OXY	OLSEN DOMESTIC.
	3/8/79	2.3	OXY	LOF 10 A.
	3/9/79	0.4	OXY	REICHLIN IRRIGATION WELL.
	3/9/79	2.0	OXY	MENDES IRRIGATION WELL.
	3/9/79	0.2	OXY	LATHROP DISTRICT WELL NO. 1.
	3/9/79	0.2	OXY	OXY SOUTH WELL.
	3/13/79	6.3 ::	OXY	SOIL CORE - 10' DEEP, NEAR WASTEWATER DISCHARGE DITCH AND ROADWAY.
	3/13/79	4.1	OXY	SAME - 15' DEEP.
	3/13/79	2.4	OXY	SOIL CORE - 10' DEEP, NEAR WASTEWATER DISCHARGE DITCH, 200' SOUTH OF ROADWAY.

COMPOUND γ BHC (LINDANE)

DATE	CONCENTRATION	SOURCE	LOCATION
3/13/79	4.8	OXY	SOIL CORE - 5' DEEP, NEAR DISCHARGE DITCH, SOUTH OF CONCENTRATION POND.
3/13/79	1.7	OXY	SAME - 10' DEEP.
3/13/79	3.0	OXY	SOIL CORE - 30' DEEP, NEAR NORTHEAST CORNER OF CONCENTRATION POND.
3/13/79	4.8	OXY	SOIL CORE - 30' DEEP, NEAR SOUTHWEST CORNER OF PROPERTY LINE.
7/18-19/79	0.51	TODD REPORT	TEST WELL 5.
7/18-19/79	0.08	TODD REPORT	TEST WELL 6.
7/18-19/79	5.1	TODD REPORT	TEST WELL 7.
7/18-19/79	22.1*	TODD REPORT	TEST WELL 9.
7/18-19/79	0.15	TODD REPORT	TEST WELL 10.
7/18-19/79	0.27	TODD REPORT	TEST WELL 12.
8/1/79	1.53	TODD REPORT	TEST WELL 5.
8/1/79	0.05	TODD REPORT	TEST WELL 6.
8/1/79	2.0	TODD REPORT	TEST WELL 7.
8/1/79	5.7	TODD REPORT	TEST WELL 9.
Listed as "about 0.5 μg/L" 9/25/79	0.5	STATE	MENDES BACK-UP WELL, NORTH OF HOUSE TRAILER.
Listed as "about 0.1 μg/L" 9/25/79	0.1	STATE	MENDES DOMESTIC, NORTHEAST OF CATTLE CORRAL.

COMPOUND Δ BHC

DATE	CONCENTRATION	SOURCE	LOCATION
7/18-19/79	0.35	TODD REPORT	TEST WELL 7.
7/18-19/79	3.8*	TODD REPORT	TEST WELL 9.
8/1/79	0.61	TODD REPORT	TEST WELL 5.
8/1/79	0.25	TODD REPORT	TEST WELL 7.
8/1/79	3.5	TODD REPORT	TEST WELL 9.

COMPOUND CHLORDANE

DATE	CONCENTRATION	SOURCE	LOCATION
1/24/79	260	OXY	SOIL CORE - 2' DEEP, 50' FROM WEST PROPERTY FENCE, SOUTH OF CENTER.
1/24/79	225	OXY	SAME - 10' DEEP.
1/24/79	386	OXY	SAME - 30' DEEP.
1/25/79	98	OXY	SOIL CORE - 2' DEEP, 40' FROM SOUTH PROPERTY FENCE, NEAR SOUTHWEST CORNER.
1/25/79	115	OXY	SAME - 10' DEEP.
1/25/79	280	OXY	SAME - 20' DEEP.
3/13/79	520	OXY	SOIL CORE - 10' DEEP, NEAR WASTEWATER DISCHARGE DITCH AND ROADWAY.
3/13/79	365	OXY	SAME - 15' DEEP.
3/13/79	320	OXY	SOIL CORE - 10' DEEP, NEAR WASTEWATER DISCHARGE DITCH, 200' SOUTH OF ROADWAY.
3/13/79	249	OXY	SOIL CORE - 5' DEEP NEAR DISCHARGE DITCH, SOUTH OF CONCENTRATOR POND.
3/13/79	191	OXY	SAME - 10' DEEP.
3/13/79	126	OXY	SAME - 20' DEEP.
3/13/79	71	OXY	SAME - 30' DEEP.
3/13/79	169	OXY	SOIL CORE - 10' DEEP, NEAR NORTHEAST CORNER OF CONCENTRATOR POND.
3/13/79	101	OXY	SAME - 20' DEEP.
3/13/79	250	OXY	SAME - 30' DEEP.

COMPOUND CHLORDANE

DATE	CONCENTRATION	SOURCE	LOCATION
3/13/79	5.3	OXY	SOIL CORE - 30' DEEP, AT SOUTHWEST CORNER OF PROPERTY LINE.
3/14/79	5000	TODD REPORT	SEDIMENT-POND #10.
3/14/79	5000	OXY	SEDIMENT-WASTEWATER POND.
3/14/79	40 PPM *	STATE	SEDIMENT-WASTEWATER POND.
3/15/79	5000	TODD REPORT	SEDIMENT-COOLING POND DITCH.
3/15/79	5000	OXY	SEDIMENT-DISCHARGE DITCH.
3/15/79	4000	OXY	SEDIMENT-DISCHARGE DITCH.
3/22/79	4000	OXY	SLUDGE - 4-6" BELOW WASTE POND BOTTOM.
7/11/79	10	STATE	OVERFLOW DITCH.
7/11/79	100	STATE	SEDIMENT- 40 YARDS FROM CONCENTRATOR POND IN OVERFLOW DITCH.
8/3/79	1-10 PPM	STATE	SEDIMENT-DITCH ADJACENT TO CONCENTRATOR POND.
8/3/79	1-10 PPM	STATE	SEDIMENT-DITCH 100' SOUTH OF CONCENTRATOR POND.

Date of memo in which data were included.

COMPOUND CHLOROFORM

DATE	CONCENTRATION	SOURCE	LOCATION
9/25/79	0.5	STATE	LCWD #1.
9/25/79	2.0*	STATE	FULLER IRRIGATION WELL.
9/25/79	0.2	STATE	LOF 10 A.
9/25/79	0.3	STATE	MENDES BACK-UP WELL, NORTH OF TRAILER HOUSE.
9/25/79	0.2	STATE	MENDES IRRIGATION WELL.
10/22/79	0.5	STATE	FULLER IRRIGATION WELL.
10/30/79	1.3*	STATE	LCWD #1.

COMPOUND DBCP

DATE	CONCENTRATION	SOURCE	LOCATION
Date of memo in which data were included. 3/16/78	0.3	OXY	SOIL CORE - 2' DEEP, 40' FROM SOUTH FENCE.
Date of memo in which data were included. 3/16/78	0.3	OXY	SAME - 10' DEEP.
Date of memo in which data were included. 3/16/78	0.6	OXY	SAME - 20' DEEP.
1/24/79	12.9	OXY	SOIL CORE - 2' DEEP, 50' FROM WEST PROPERTY FENCE, SOUTH OF CENTER.
1/24/79	3.5	OXY	SAME - 10' DEEP.
1/24/79	0.5	OXY	SAME - 30' DEEP.
1/25/79	0.6	OXY	SOIL CORE - 20' DEEP, 40' FROM SOUTH PROPERTY FENCE, NEAR SOUTHWEST CORNER.
2/5/79	5.8	STATE	MENDES DOMESTIC WELL.
2/8/79	13.0	STATE	LOF 10 A.
2/27/79	8.8	STATE	LOF 10 A.
2/27/79	4.3	STATE	MENDES DOMESTIC WELL.
2/27/79	1.0	STATE	CONCENTRATOR POND OVERFLOW.
2/27/79	220	STATE	SEDIMENT-CONCENTRATOR POND OVERFLOW DITCH.
2/27/79	1.6	TODD REPORT	SEDIMENT-COOLING POND DITCH.

COMPOUND DBCP

DATE		CONCENTRATION	SOURCE	LOCATION
	2/27/79	1.9	STATE	WASTEWATER POND.
Date samples were submitted to lab.	2/28/79	1.9	STATE	BEST STORM WATER POND.
0.1 is the detection level.	2/28/79	0.1	OXY	OLSEN IRRIGATION WELL.
	2/28/79	6.2	OXY	MENDES DOMESTIC WELL.
	2/28/79	8.2	OXY	LOF 10 A.
	2/28/79	6.6	OXY	LOF 10 A.
	2/28 AND 3/1/79	7.4	OXY	LOF 10 A.
	2/28 AND 3/1/79	5.3	OXY	MENDES DOMESTIC WELL.
Analyzed using a V-2-A1(GLC-ECD)	3/8/79	111	TODD REPORT	SEDIMENT-COOLING POND DITCH.
Analyzed using a GC-ECD .	3/8/79	990	TODD REPORT	SEDIMENT-COOLING POND DITCH.
	3/8/79	5.3	OXY	LOF 10 A.
	3/8/79	6.5	OXY	LOF 10 A.
Analyzed using a V-2-A1(GLC-ECD)	3/8/79	111	OXY	SEDIMENT-DISCHARGE DITCH.
Analyzed using a GC-ECD .	3/8/79	990	OXY	SEDIMENT-DISCHARGE DITCH.
	3/9/79	3.9	OXY	REICHLIN IRRIGATION WELL.
	3/9/79	57	OXY	MENDES IRRIGATION WELL.
	3/9/79	3.4	OXY	MENDES IRRIGATION WELL.

COMPOUND DBCP

DATE	CONCENTRATION	SOURCE	LOCATION
3/13/79	78	OXY	SOIL CORE - 5' DEEP NEAR WASTEWATER DISCHARGE DITCH AND ROADWAY.
3/13/79	900	OXY	SAME - 10' DEEP.
3/13/79	38	OXY	SAME - 15' DEEP.
3/13/79	285	OXY	SOIL CORE - 10' DEEP, NEAR WASTEWATER DISCHARGE DITCH 200' SOUTH OF ROADWAY.
3/13/79	1.5	OXY	SOIL CORE - 5' DEEP, NEAR DISCHARGE DITCH, SOUTH OF CONCENTRATION POND.
3/13/79	11.0	OXY	SOIL CORE - 30' DEEP, AT SOUTHWEST CORNER OF PROPERTY LINE.
3/14/79	2.0	TODD REPORT	POND #10.
3/14/79	100	TODD REPORT	SEDIMENT-POND #10.
3/14/79	65	OXY	MENDES IRRIGATION WELL.
3/14/79	100	OXY	SEDIMENT-WASTEWATER POND.
3/14/79	2.0	OXY	WASTEWATER POND.
3/14/79	2.0	STATE	WASTEWATER POND.
3/14/79	13.0	STATE	LOF 10 B.
3/14/79	41.0	STATE	LOF 10 F.
3/14/79	68.0	STATE	MENDES IRRIGATION WELL.
3/14/79	30.0	STATE	SEDIMENT-WASTEWATER POND.
3/15/79	2600*	TODD REPORT	SEDIMENT-COOLING POND DITCH.

COMPOUND DBCP

DATE	CONCENTRATION	SOURCE	LOCATION
3/15/79	2600	OXY	SEDIMENT-WASTEWATER DISCHARGE DITCH.
3/15/79	12.0 PPM	OXY	WATER FROM WEST TOXIC WASTEWATER TANK.
3/16/79	9.8*	STATE	MENDES DOMESTIC WELL.
4/9/79	17	STATE	MENDES IRRIGATION WELL.
5/1/79	5.0	TODD REPORT	TEST WELL 7.
5/17-18/79	0.2	TODD REPORT	TEST WELL 1.
5/17-18/79	0.3	TODD REPORT	TEST WELL 2.
5/17/18-79	1.3	TODD REPORT	TEST WELL 3.
5/17-18/79	2.7	TODD REPORT	TEST WELL 4.
5/17-18/79	0.8	TODD REPORT	TEST WELL 5.
5/17-18/79	0.6	TODD REPORT	TEST WELL 6.
5/17-18/79	2.0	TODD REPORT	TEST WELL 7.
5/17/18/79	0.6	TODD REPORT	TEST WELL 8.
6/1/79	0.1	TODD REPORT	TEST WELL 1.
6/1/79	0.2	TODD REPORT	TEST WELL 2.
6/1/79	0.1	TODD REPORT	TEST WELL 3.
6/1/79	0.2	TODD REPORT	TEST WELL 4.
6/1/79	3.8	TODD REPORT	TEST WELL 5.
6/1/79	1.0	TODD REPORT	TEST WELL 6.

COMPOUND DBCP

DATE	CONCENTRATION	SOURCE	LOCATION
6/1/79	3.9	TODD REPORT	TEST WELL 7.
6/1/79	0.05	TODD REPORT	TEST WELL 8.
7/11/79	6.0	STATE	SEDIMENT-OVERFLOW DITCH, 40 YARDS FROM CONCENTRATOR POND.
7/18-19/79	1.0	TODD REPORT	TEST WELL 5.
7/18-19/79	1.0	TODD REPORT	TEST WELL 6.
7/18-19/79	90	TODD REPORT	TEST WELL 7.
7/18-19/79	39	TODD REPORT	TEST WELL 9.
7/18-19/79	30	TODD REPORT	TEST WELL 12.
8/1/79	1.1	TODD REPORT	TEST WELL 5.
8/1/79	95*	TODD REPORT	TEST WELL 7.
8/1/79	23	TODD REPORT	TEST WELL 9.
8/1/79	22	TODD REPORT	TEST WELL 12.
8/3/79	0.36	STATE	OVERFLOW DITCH, 100' SOUTH.
9/25/79	15	STATE	LOF 10 A.
9/25/79	0.3	STATE	LOF 10 B.
9/25/79	19	STATE	LOF 10 F.
9/25/79	0.8	STATE	SULLIVAN WELL.
9/25/79	59	STATE	MENDES BACK-UP WELL, NORTH OF TRAILER HOUSE.

COMPOUND DBCP

DATE	CONCENTRATION	SOURCE	LOCATION
9/25/79	2.0	STATE	MENDES DOMESTIC WELL, NORTHEAST OF CATTLE CORRAL.
9/25/79	38	STATE	MENDES IRRIGATION WELL.
10/22/79	0.74	STATE	SULLIVAN WELL.
10/30/79	0.12	STATE	SULLIVAN WELL.
11/13/79	0.5	STATE	SULLIVAN WELL.
12/5/79	0.9	STATE	SULLIVAN WELL.
12/5/79	0.1	STATE	LCWD #1.
12/5/79	0.1	STATE	LCWD #3.

COMPOUND DDD

DATE	CONCENTRATION	SOURCE	LOCATION
7/11/79	1.0	STATE	DITCH AT CONCENTRATOR POND.
8/3/79	1-10 PPM*	STATE	SEDIMENT-DITCH ADJACENT TO CONCENTRATOR POND.
8/3/79	1-10 PPM	STATE	SEDIMENT-DITCH 100' SOUTH OF CONCENTRATOR POND.

COMPOUND DDE

DATE	CONCENTRATION	SOURCE	LOCATION
7/11/79	10	STATE	DITCH AT CONCENTRATOR POND.
7/11/79	10	STATE	OVERFLOW DITCH.
7/11/79	1000	STATE	SEDIMENT-OVERFLOW DITCH, 40 YARDS FROM CONCENTRATOR POND.
8/3/79	1-10 PPM*	STATE	SEDIMENT-DITCH ADJACENT TO CONCENTRATOR POND.
8/3/79	1-10 PPM	STATE	SEDIMENT-DITCH 100' SOUTH OF CONCENTRATOR POND.

COMPOUND DDT

DATE	CONCENTRATION	SOURCE	LOCATION
3/14/79	20 PPM *	TODD REPORT	SEDIMENT - POND #10.
3/14/79	20 PPM	OXY	SEDIMENT - WASTEWATER POND.
7/11/79	1.0	STATE	DITCH AT CONCENTRATOR POND.
7/11/79	10	STATE	OVERFLOW DITCH WATER.
7/11/79	1000	STATE	SEDIMENT - OVERFLOW DITCH, 40 YARDS FROM CONCENTRATOR POND.
8/3/79	1-10 PPM	STATE	SEDIMENT - DITCH ADJACENT TO CONCENTRATOR POND.
8/3/79	1-10 PPM	STATE	SEDIMENT - DITCH 100' SOUTH OF CONCENTRATOR POND.

COMPOUND DEF

DATE		CONCENTRATION	SOURCE	LOCATION
Identification not positive.	1/24/79	9.4	OXY	SOIL CORE - 10' DEEP, 50' FROM WEST PROPERTY FENCE, SOUTH OF CENTER.
Identification not positive.	1/24/79	60	OXY	SAME - 30' DEEP.
Identification not positive.	1/25/79	21	OXY	SOIL CORE - 2' DEEP, 40' FROM SOUTH PROPERTY FENCE, NEAR SOUTHWEST CORNER.
Identification not positive	1/25/79	2.5	OXY	SAME - 10' DEEP.
Identification not positive.	1/25/79	1.3	OXY	SAME - 20' DEEP.
Identification not positive.	2/27/79	22	OXY	WASTE POND WATER.
Identification not positive.	2/27/79	3.3	OXY	WATER FROM DISCHARGE DITCH TO WASTE POND.
Identification not positive.	3/8/79	3.2 *	OXY	LOF WELL 10 A.
Identification not positive.	3/8/79	0.3	OXY	RAINWATER POND.
Identification not positive.	3/9/79	0.2	OXY	REICHLIN IRRIGATION WELL.
Identification not positive.	3/9/79	0.8	OXY	MENDES IRRIGATION WELL.
Identification not positive.	3/9/79	0.4 *	OXY	LATHROP DISTRICT WELL NO. 1.

COMPOUND DEF

DATE		CONCENTRATION	SOURCE	LOCATION
Identification not positive.	3/9/79	0.2	OXY	OXY SOUTH WELL.
Identification not positive.	3/9/79	0.2	OXY	AIR PRODUCTS WELL.
Identification not positive.	3/13/79	102	OXY	SOIL CORE - 5' DEEP, NEAR WASTEWATER DISCHARGE DITCH AND ROADWAY.
Identification not positive.	3/13/79	108	OXY	SAME - 10' DEEP.
Identification not positive.	3/13/79	11.2	OXY	SAME - 15' DEEP.
Identification not positive.	3/13/79	18.5	OXY	SOIL CORE - 10' DEEP, NEAR WASTEWATER DISCHARGE DITCH, 200' SOUTH OF ROADWAY.
	3/14/79	30	TODD REPORT	POND #10.
	3/14/79	2000 PPM	TODD REPORT	SEDIMENT - POND #10.
	3/14/79	0.5 :: ::	OXY	OXY SOUTH WELL.
	3/14/79	2000 PPM	OXY	SEDIMENT - WASTEWATER POND.
	3/14/79	30	OXY	WASTEWATER POND.
	3/14/79	3000 PPM	STATE	SEDIMENT - WASTEWATER POND.
	3/15/79	1100 PPM	TODD REPORT	SEDIMENT-COOLING POND DITCH.
	3/15/79	1100 PPM	OXY	SEDIMENT-WASTEWATER DISCHARGE DITCH.
Date of memo in which data were included.	3/22/79	4000 PPM ::	OXY	SLUDGE - 4-6" BELOW WASTE POND BOTTOM.

COMPOUND DEF

DATE		CONCENTRATION	SOURCE	LOCATION
	3/15/79	1200 PPM	OXY	SEDIMENT - DISCHARGE DITCH.
Date of memo in which data were included.	3/22/79	0.4	OXY	BEST SOUTH WELL.
Date of memo in which data were included.	3/22/79	10	OXY	WASTE POND.
	5/1/79	0.2	TODD REPORT	TEST WELL 7.
	7/11/79	10	STATE	DITCH AT CONCENTRATOR POND.
	7/11/79	10	STATE	OVERFLOW DITCH.
	7/11/79	1000	STATE	SEDIMENT OVERFLOW DITCH, 40 YARDS FROM CONCENTRATOR POND.
	8/3/79	4000	STATE	SEDIMENT DITCH ADJACENT TO CONCENTRATOR POND.
	8/3/79	1000	STATE	SEDIMENT DITCH, 100' SOUTH OF CONCENTRATOR POND.

COMPOUND DIAZINON

DATE		CONCENTRATION	SOURCE	LOCATION
	1/20/76	5000	OXY	WASTE POND - CENTER WEST SIDE.
	1/20/76	40 PPM	OXY	BONEYARD POOL.
	2/26/76	2300	OXY	WASTE POND.
	3/4/76	1000	OXY	WASTE POND.
Not a positive identification.	1/24/79	4.8	OXY	SOIL CORE - 2' DEEP, 50' FROM WEST PROPERTY FENCE, SOUTH OF CENTER.
Not a positive identification.	1/24/79	3.1	OXY	SAME - 10' DEEP.
Not a positive identification	1/24/79	3.6	OXY	SAME - 30' DEEP.
Not a positive identification.	1/25/79	2.3	OXY	SOIL CORE - 2' DEEP, 40' FROM SOUTH PROPERTY FENCE, NEAR SOUTHWEST CORNER.
Not a positive identification.	1/25/79	1.4	OXY	SAME - 10' DEEP.
Not a positive identification.	1/25/79	6.5	OXY	SAME - 20' DEEP.
Not a positive identification.	3/13/79	7.4	OXY	SOIL CORE - 5' DEEP, NEAR WASTEWATER DISCHARGE DITCH AND ROADWAY.
Not a positive identification.	3/13/79	4.4	OXY	SAME - 10' DEEP.
Not a positive identification.	3/13/79	10.6	OXY	SAME - 15' DEEP.
Not a positive identification.	3/13/79	3.5	OXY	SOIL CORE - 10' DEEP, NEAR WASTEWATER DISCHARGE DITCH 200' SOUTH OF ROADWAY.

COMPOUND DIAZINON

DATE		CONCENTRATION	SOURCE	LOCATION
Not a positive identification.	3/13/79	0.8	OXY	SOIL CORE - 5' DEEP, NEAR DISCHARGE DITCH, SOUTH OF CONCENTRATOR POND.
Not a positive identification.	3/13/79	0.7	OXY	SAME - 10' DEEP.
Not a positive identification.	3/13/79	0.5	OXY	SAME - 20' DEEP.
Not a positive identification.	3/13/79	6.6	OXY	SAME - 30' DEEP.
Not a positive identification.	3/13/79	11	OXY	SOIL CORE - 10' DEEP, NEAR NORTHEAST CORNER OF CONCENTRATOR POND.
Not a positive identification.	3/13/79	39 ::	OXY	SAME - 20' DEEP.
Not a positive identification.	3/13/79	6.3	OXY	SAME - 30' DEEP.
Not a positive identification.	3/13/79	1.7	OXY	SOIL CORE - 30' DEEP, AT SOUTHWEST CORNER OF PROPERTY LINE.
	3/14/79	120	TODD REPORT	POND #10.
	3/14/79	120	OXY	WASTEWATER POND.
	3/15/79	200 PPM	OXY	TOXIC WASTEWATER TANK.
Date of memo in which these data were included.	3/22/79	20 PPM	OXY	TOXIC WASTEWATER TANK.
	5/1/79	1.8	TODD REPORT	TEST WELL 3.
	5/1/79	11.0 ::	TODD REPORT	TEST WELL 4.

COMPOUND DIAZINON

DATE	CONCENTRATION	SOURCE	LOCATION
5/1/79	4.9	TODD REPORT	TEST WELL 5.
5/1/79	1.8	TODD REPORT	TEST WELL 6.
5/1/79	1.7	TODD REPORT	TEST WELL 7.
5/1/79	0.85	TODD REPORT	TEST WELL 8.
5/17-18/79	0.3	TODD REPORT	TEST WELL 1.
5/17-18/79	4.1	TODD REPORT	TEST WELL 5.
6/1/79	0.2	TODD REPORT	TEST WELL 2.

COMPOUND DIBROM

DATE	CONCENTRATION	SOURCE	LOCATION
3/15/79	5000 *	TODD REPORT	SEDIMENT-COOLING POND DITCH.
3/15/79	5000	OXY	SEDIMENT-WASTEWATER DISCHARGE DITCH.

COMPOUND 1,1-DICHLOROETHANE

DATE	CONCENTRATION	SOURCE	LOCATION
9/25/79	0.3	STATE	FULLER IRRIGATION WELL.
10/22/79	4.0	STATE	FULLER IRRIGATION WELL.
10/30/79	1.3	STATE	FULLER IRRIGATION WELL.

COMPOUND 1,2-DICHLOROETHANE

DATE	CONCENTRATION	SOURCE	LOCATION
11/13/79	0.18 *	STATE	LCWD #3.

COMPOUND 1,1-DICHLOROETHYLENE

DATE	CONCENTRATION	SOURCE	LOCATION
9/25/79	0.2	STATE	LOF 10 A.
9/25/79	0.2	STATE	MENDES BACK-UP WELL, NORTH OF TRAILER HOUSE.
9/25/79	1.0	STATE	MENDES IRRIGATION WELL.

COMPOUND TRANS-1,2-DICHLOROETHYLENE

DATE	CONCENTRATION	SOURCE	LOCATION
11/13/79	0.3 *	STATE	FULLER IRRIGATION WELL.

COMPOUND 1,2-DICHLOROPROPANE

DATE	CONCENTRATION	SOURCE	LOCATION
9/25/79	0.5	STATE	LCWD #3.
9/25/79	1.3	STATE	FULLER DOMESTIC.
10/22/79	1.0	STATE	LCWD #3.
10/22/79	3.3 *	STATE	FULLER DOMESTIC.
10/30/79	0.3	STATE	LCWD #3.
10/30/79	0.2	STATE	SULLIVAN.
10/30/79	0.6 *	STATE	FULLER IRRIGATION.
10/30/79	2.0	STATE	FULLER DOMESTIC
11/13/79	0.42	STATE	LCWD #3.
11/13/79	0.5	STATE	FULLER IRRIGATION.
11/13/79	1.4	STATE	FULLER DOMESTIC.
12/5/79	0.42	STATE	LCWD #3.

COMPOUND DIELDRIN

DATE	CONCENTRATION	SOURCE	LOCATION
1/24/79	32	OXY	SOIL CORE - 2' DEEP, 50' FROM WEST PROPERTY FENCE, SOUTH OF CENTER.
3/13/79	3.3	OXY	SOIL CORE - 5' DEEP, NEAR DISCHARGE DITCH, SOUTH OF CONCENTRATOR POND.

COMPOUND DIMETHOATE

DATE		CONCENTRATION	SOURCE	LOCATION
	4/24/78	100	OXY	WASTEWATER POND NEAR ENTRANCE.
Not a positive identification.	2/27/79	1.2	OXY	OXY SOUTH WELL.
Not a positive identification.	2/28/79	4.2	OXY	LOF 10 A.
Not a positive identification.	2/28/79	5.0	OXY	LOF 10 D.
Not a positive identification.	2/28/79	1.8 ::	OXY	OXY EAST WELL.
Not a positive identification.	3/13/79	1.0 ::	OXY	SOIL CORE - 30' DEEP, AT SOUTHWEST CORNER OF PROPERTY LINE.
	8/1/79	2.1	TODD REPORT	TEST WELL 5.
	8/1/79	9.9 ::	TODD REPORT	TEST WELL 7.

COMPOUND DISULFOTON (DISYSTON)

DATE		CONCENTRATION	SOURCE	LOCATION
Not a positive identification.	2/27/79	0.4	OXY	DISCHARGE DITCH TO WASTE POND.
Not a positive identification.	3/9/79	2.2	OXY	MENDES IRRIGATION WELL.
Not a positive identification.	3/13/79	1.1	OXY	SOIL CORE - 5' DEEP NEAR WASTEWATER DISCHARGE DITCH AND ROADWAY.
Not a positive identification.	3/13/79	4.3	OXY	SAME - 15' DEEP.
	3/15/79	40 PPM	TODD REPORT	SEDIMENT - COOLING POND DITCH.
	3/15/79	40 PPM	OXY	SEDIMENT - WASTEWATER DISCHARGE DITCH.
	3/15/79	80 PPM ::	OXY	SEDIMENT - DISCHARGE DITCH.
	5/1/79	3.5 ::	TODD REPORT	TEST WELL 7.
	7/11/79	10	STATE	OVERFLOW DITCH.
	7/11/79	100	STATE	SEDIMENT - 40 YARDS FROM CONCENTRATOR POND.
	8/3/79	1000	STATE	SEDIMENT - DITCH ADJACENT TO CONCENTRATOR POND.

COMPOUND DNBP

DATE	CONCENTRATION	SOURCE	LOCATION
2/27/79	200 *	STATE	SEDIMENT - CONCENTRATOR POND OVERFLOW DITCH.
7/18-19/79	18 *	TODD REPORT	TEST WELL 7.
7/18-19/79	1.5	TODD REPORT	TEST WELL 10.
8/1/79	17.5	TODD REPORT	TEST WELL 7.

COMPOUND DURSBAN (CHLORPYRIFOS)

DATE	CONCENTRATION	SOURCE	LOCATION
3/14/79	4000	TODD REPORT	SEDIMENT- POND #10.
3/14/79	4000	OXY	SEDIMENT - WASTEWATER POND.
3/14/79	4000	STATE	SEDIMENT - WASTEWATER POND.
3/15/79	200 PPM *	TODD REPORT	SEDIMENT - COOLING POND DITCH.
3/15/79	200 PPM	OXY	SEDIMENT - WASTEWATER DISCHARGE DITCH.
3/22/79	4000	OXY	SLUDGE - 4-6" BELOW WASTE POND BOTTOM.
7/11/79	100	STATE	SEDIMENT - 40 YARDS FROM CONCENTRATOR POND IN OVERFLOW DITCH.

Date of memo in which data were included.

COMPOUND EDB (ETDB, 1,2-DIBROMOETHANE)

DATE	CONCENTRATION	SOURCE	LOCATION
3/14/79	44 ::	OXY	MENDES IRRIGATION WELL.
3/15/79	6700 ::	TODD REPORT	SEDIMENT-COOLING POND DITCH.
3/15/79	6700	OXY	SEDIMENT-WASTEWATER DISCHARGE DITCH.
3/15/79	800 PPM	OXY	TOXIC WASTEWATER TANK.
7/18-19/79	35	TODD REPORT	TEST WELL 7.
8/1/79	34	TODD REPORT	TEST WELL 7.
9/25/79	3.0	STATE	LOF 10 A.
9/25/79	2.0	STATE	LOF 10 F.
9/25/79	2.5	STATE	MENDES BACKUP WELL.
9/25/79	2.5	STATE	MENDES IRRIGATION WELL.

COMPOUND ENDOSULFAN I, II

	DATE	CONCENTRATION	SOURCE	LOCATION
	4/22/77	250 PPM	OXY	AG CHEM DITCH WATER.
	4/19/78	17	OXY	WASTEWATER POND NEAR ENTRANCE.
	4/19/78	0.2	OXY	POND - MIDWAY WESTSIDE.
	4/24/78	2.1	OXY	POND NEAR ENTRANCE.
	4/26/78	0.1	OXY	POND NEAR ENTRANCE.
	2/27/79	4.0	OXY	WASTE POND.
	2/27/79	10 PPM	STATE	SEDIMENT-CONCENTRATOR POND OVERFLOW DITCH.
Listed as "about 0 1 ppb"	2/28/79	0.1	STATE	CONCENTRATOR POND OVERFLOW.
	3/14/79	4.0	TODD REPORT	POND #10.
	3/14/79	40 PPM	TODD REPORT	SEDIMENT POND #10.
	3/14/79	40 PPM	OXY	SEDIMENT-WASTEWATER POND.
	3/14/79	4.0	OXY	WASTEWATER POND.
	3/14/79	40 PPM	STATE	SEDIMENT-WASTEWATER POND.
	3/15/79	20 PPM	TODD REPORT	SEDIMENT-COOLING POND DITCH.
	3/15/79	20 PPM	OXY	SEDIMENT-WASTEWATER DISCHARGE DITCH.
	3/15/79	4 PPM	OXY	TOXIC WASTEWATER TANK.
	3/15/79	400 PPM ::	OXY	SEDIMENT-DISCHARGE DITCH.
Date of memo in which data were included.	3/22/79	40 PPM	OXY	SLUDGE - 4-6" BELOW BOTTOM OF WASTE POND.

COMPOUND ENDOSULFAN I, II

DATE		CONCENTRATION	SOURCE	LOCATION
Date of memo in which data were included.	3/22/79	2000	OXY	TOXIC WASTEWATER TANK.
	8/3/79	1-10 PPM	STATE	SEDIMENT-DITCH ADJACENT TO CONCENTRATOR POND.
	8/3/79	1-10 PPM	STATE	SEDIMENT-DITCH 100' SOUTH OF CONCENTRATOR POND.

COMPOUND ETHION

DATE	CONCENTRATION	SOURCE	LOCATION
3/15/79	10 PPM	TODD REPORT	SEDIMENT-COOLING POND DITCH.
3/15/79	10 PPM	OXY	SEDIMENT-WASTEWATER DISCHARGE DITCH.
3/15/79	12 PPM *	OXY	SEDIMENT-DISCHARGE DITCH.
7/11/79	100	STATE	SEDIMENT-DISCHARGE DITCH 40 YARDS FROM CONCENTRATOR POND.
8/3/79	500	STATE	SEDIMENT-DITCH ADJACENT TO CONCENTRATOR POND.
8/3/79	1000	STATE	SEDIMENT-DITCH 100' SOUTH OF CONCENTRATOR POND.

COMPOUND ETHYL PARATHION

DATE		CONCENTRATION	SOURCE	LOCATION
	1/19/76	5000	OXY	WASTEWATER POND - CENTER WEST SIDE
	3/4/76	1000	OXY	WASTE POND.
Date of [illegible] in which data were included See attached map for locations	7/19/76	1000	OXY	SITE B - 2' DEEP.
Same as above	7/19/76	1000	OXY	SITE B - 10' DEEP.
Same as above	7/19/76	500	OXY	SITE B - 20' DEEP.
Same as above.	7/19/76	100	OXY	SITE C - 2' DEEP.
Same as above.	7/19/76	100	OXY	SITE C - 10' DEEP.
Same as above.	7/19/76	1000	OXY	SITE C - 20' DEEP.
Same as above.	7/19/76	100	OXY	SITE C - 30' DEEP.
Same as above.	7/19/76	230 PPM	OXY	SITE D - SURFACE.
Same as above.	7/19/76	150 PPM	OXY	SITE D - 1' DEEP.
Same as above.	7/19/76	400 PPM	OXY	SITE E - SURFACE.
Same as above.	7/19/76	40 PPM	OXY	SITE E - 1' DEEP.
Same as above.	7/19/76	130 PPM	OXY	SITE G - 1' DEEP.
Same as above.	7/19/76	1700 PPM *	OXY	SITE H - 6" DEEP.
Same as above.	7/19/76	50 PPM	OXY	SITE H - 1' DEEP.
Same as above.	7/19/76	125 PPM	OXY	SITE J - 1' DEEP.
Same as above.	7/19/76	50 PPM	OXY	SITE J - 2' DEEP.
Same as above.	7/19/76	50 PPM	OXY	SITE J - 3' DEEP.

COMPOUND ETHYL PARATHION

DATE		CONCENTRATION	SOURCE	LOCATION
	4/19/78	500	OXY	WASTEWATER POND NEAR ENTRANCE.
	4/24/78	300	OXY	WASTEWATER POND NEAR ENTRANCE.
Not a positive identification.	1/24/79	3.6	OXY	SOIL CORE - 2' DEEP, 50' FROM WEST PROPERTY FENCE, SOUTH OF CENTER.
	2/27/79	4000	STATE	SEDIMENT-CONCENTRATOR POND OVERFLOW DITCH.
Not a positive identification.	2/27/79	10.9	OXY	WASTE POND.
Not a positive ID.	2/28/79	0.8	OXY	PERRY IRRIGATION WELL.
Not a positive ID.	2/28/79	0.4	OXY	OXY SOUTH WELL.
Not a positive ID.	2/28/79	1.3	OXY	LOF 10 D.
Not a positive ID.	2/28/79	3.9 ::	OXY	OXY SOUTHEAST WELL.
Not a positive ID.	2/28/79	1.5	OXY	OXY EAST WELL.
Not a positive ID	2/28/79	1.1	OXY	OLSEN DOMESTIC.
Not a positive ID.	2/28/79	0.2	OXY	FORT DOMESTIC.
Not a positive ID.	2/28/79	0.7	OXY	MOSSDALE RECREATIONAL AREA WELL.
Not a positive ID.	3/13/79	123	OXY	SOIL CORE - 5' DEEP, NEAR WASTEWATER DISCHARGE DITCH AND ROADWAY.
Not a positive ID.	3/13/79	9.7	OXY	SAME - 10' DEEP.
Not a positive ID.	3/13/79	1.0	OXY	SOIL CORE - 10' DEEP, NEAR WASTEWATER DISCHARGE DITCH, 200 FT SOUTH OF ROADWAY
	3/14/79	20	TODD REPORT	POND #10.

COMPOUND ETHYL PARATHION

DATE	CONCENTRATION	SOURCE	LOCATION
3/14/79	4000	TODD REPORT	SEDIMENT-POND #10.
3/14/79	4000	OXY	SEDIMENT-WASTEWATER POND.
3/14/79	20	OXY	WASTEWATER POND.
3/14/79	4000	STATE	SEDIMENT-WASTEWATER POND.
3/15/79	60 PPM	TODD REPORT	SEDIMENT-COOLING POND DITCH.
3/15/79	60 PPM	OXY	SEDIMENT-WASTEWATER DISCHARGE DITCH.
3/15/79	10 PPM	OXY	TOXIC WASTEWATER TANK.
3/15/79	80 PPM	OXY	SEDIMENT-DISCHARGE DITCH.
3/22/79	8000	OXY	SLUDGE - 4-6" BELOW WASTE POND BOTTOM.
3/22/79	12 PPM	OXY	TOXIC WASTEWATER TANK.
5/1/79	0.2	TODD REPORT	TEST WELL 4.
5/1/79	0.6	TODD REPORT	TEST WELL 5.
5/1/79	7.5	TODD REPORT	TEST WELL 7.
5/17-18/79	3.1	TODD REPORT	TEST WELL 7.
6/1/79	2.2	TODD REPORT	TEST WELL 7.
7/11/79	10	STATE	END OF DITCH.
7/11/79	10	STATE	OVERFLOW DITCH.
7/11/79	100	STATE	SEDIMENT - 40 YARDS FROM CONCENTRATOR POND IN OVERFLOW DITCH.

Date of memo in which data were included.

Date of memo in which data were included.

COMPOUND ETHYL PARATHION

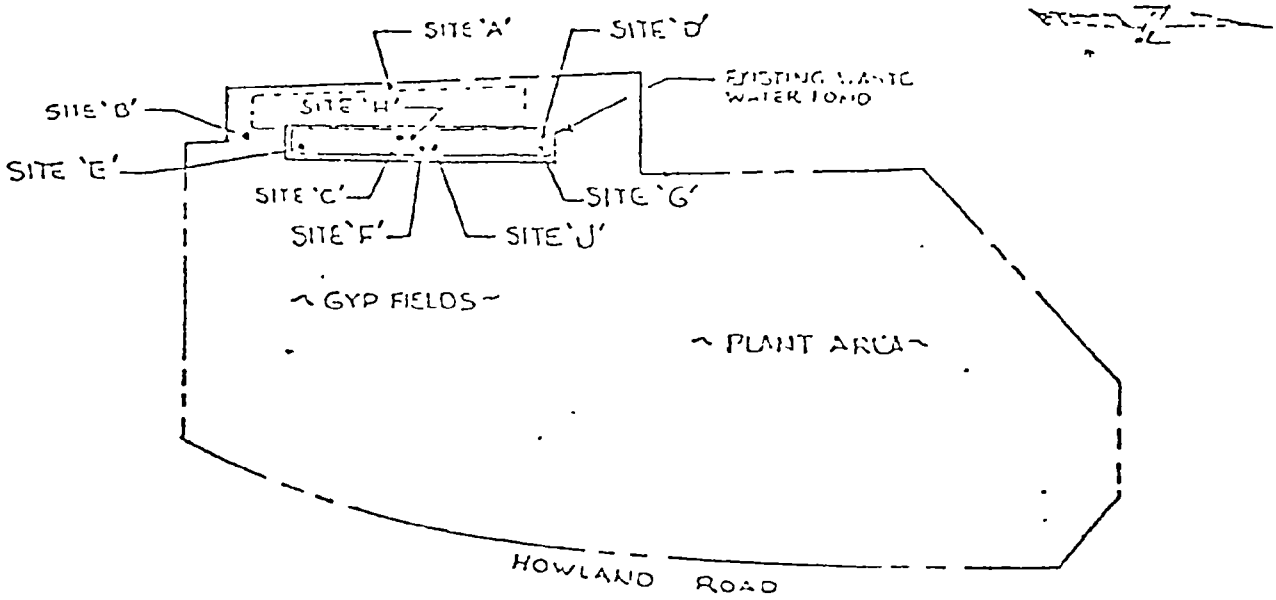
DATE	CONCENTRATION	SOURCE	LOCATION
7/18-19/79	4.6	TODD REPORT	TEST WELL 7.
8/1/79	1.3	TODD REPORT	TEST WELL 5.
8/1/79	3.6	TODD REPORT	TEST WELL 7.
8/3/79	1000	STATE	SEDIMENT-DITCH ADJACENT TO CONCENTRATOR POND.
8/3/79	500	STATE	SEDIMENT-DITCH 100' SOUTH OF CONCENTRATOR POND.

DESCRIPTION [illegible]

MADE BY P. PRATER CHECKED BY _____ APPROVED BY _____ DATE 7-19-76

FORM [illegible]

ATTACHMENT - ETHYL PARATHION



PLANT PLOT PLAN

SOIL CORE SAMPLES WERE TAKEN IN LOCATIONS AS SHOWN ON THE ABOVE PLOT PLAN

SITE 'A' (WATER @ 7 FT)
30' FROM WEST FENCE
A-1 2 FT BELOW SURFACE
A-2 10 FT
A-3 20 FT
A-4 30 FT

SITE 'B' (WATER @ 6 FT)
40 FT FROM SOUTH FENCE
B-1 2 FT BELOW SURFACE
B-2 10 FT
B-3 20 FT

SITE 'C' (WATER @ 10 FT)
WEST SIDE, CENTER OF POND
C-1 2 FT BELOW SURFACE
C-2 10 FT
C-3 20 FT
C-4 25 FT
C-5 30 FT

SITE 'D'
NORTH WEST CORNER
D-1 SURFACE
D-2 1 FT

SITE 'E'
SOUTH EAST CORNER
E-1 SURFACE
E-2 1 FT

SITE 'F'
CENTER, EAST SIDE
F-1 SURFACE
F-2 1 FT

SITE 'G'
NORTH WEST CORNER
G-1 SURFACE
G-2 1 FT

SITE 'H'
WEST SIDE, CENTER OF POND
H-1 SURFACE
H-2 1 FT
H-3 2 FT
H-4 3 FT

SITE 'J'
CENTER, EAST SIDE
J-1 SURFACE
J-2 1 FT
J-3 2 FT
J-4 3 FT

COMPOUND HEPTACHLOR

DATE	CONCENTRATION	SOURCE	LOCATION
1/24/79	27 *	OXY	SOIL CORE - 2' DEEP, 50' FROM WEST PROPERTY FENCE, SOUTH OF CENTER.
1/24/79	19	OXY	SAME - 10' DEEP.
1/24/79	7.9	OXY	SAME - 30' DEEP.
3/13/79	3.0	OXY	SOIL CORE - 10' DEEP, NEAR WASTEWATER DITCH 200' SOUTH OF ROAD.
3/13/79	1.7	OXY	SAME - 20' DEEP.

COMPOUND MALATHION

DATE		CONCENTRATION	SOURCE	LOCATION
Not a positive identification.	2/27/79	11.8	OXY	WASTEWATER POND.
Not a positive identification.	3/8/79	1.6 *	OXY	LOF 10 A.
Not a positive identification.	3/13/79	71	OXY	SOIL CORE - 5' DEEP, NEAR WASTEWATER DISCHARGE DITCH AND ROADWAY.
Not a positive identification.	3/13/79	4.9	OXY	SAME - 10' DEEP.
	3/14/79	10	TODD REPORT	POND #10.
	3/14/79	10	OXY	WASTEWATER POND.
	3/15/79	5000 *	TODD REPORT	SEDIMENT-COOLING POND DITCH.
	3/15/79	5000	OXY	SEDIMENT-WASTEWATER DISCHARGE DITCH.
	3/15/79	10 PPM	OXY	TOXIC WASTEWATER TANK.

COMPOUND METHOXYCHLOR

DATE	CONCENTRATION	SOURCE	LOCATION
3/14/79	80 PPM *	TODD REPORT	SEDIMENT- POND #10.
3/14/79	80 PPM	OXY	SEDIMENT-WASTEWATER POND.
3/15/79	35 PPM	TODD REPORT	SEDIMENT-COOLING POND DITCH.
3/15/79	35 PPM	OXY	SEDIMENT-WASTEWATER DISCHARGE DITCH.
3/15/79	40 PPM	OXY	SEDIMENT-DISCHARGE DITCH.
3/22/79	80 PPM	OXY	SLUDGE-WASTE POND BOTTOM, 4-6" BELOW BOTTOM.
7/11/79	1	STATE	OVERFLOW DITCH.
7/11/79	100	STATE	SEDIMENT - 40 YARDS FROM CONCENTRATOR POND.

COMPOUND METHYL PARATHION

DATE	CONCENTRATION	SOURCE	LOCATION
1/19/76	10 PPM	OXY	WASTE POND-CENTER WEST SIDE.
1/20/76	10 PPM	OXY	WASTE POND-CENTER WEST SIDE.
1/20/76	30 PPM	OXY	BONEYARD POOL.
2/2/76	3500	OXY	WASTE POND.
3/4/76	2000	OXY	WASTE POND.
4/22/77	2535	OXY	AG CHEM DITCH.
2/27/79	2000 *	STATE	SEDIMENT-CONCENTRATOR POND OVERFLOW DITCH.
2/28/79	0.8*	OXY	MENDES DOMESTIC WELL.

* Not a positive identification.

COMPOUND PCNB

DATE	CONCENTRATION	SOURCE	LOCATION
5/17-18/79	6.3 ::	TODD REPORT	TEST WELL 7.

COMPOUND TETRACHLOROETHYLENE

DATE	CONCENTRATION	SOURCE	LOCATION
9/25/79	1.5 ppb	STATE	LOF 10 B.

COMPOUND 1,1,1-TRICHLOROETHANE

DATE	CONCENTRATION	SOURCE	LOCATION
9/25/79	0.5 *	STATE	FULLER IRRIGATION WELL.