C-400 PROCESS AND STRUCTURE REVIEW

May 3, 1995

Prepared by
Science Applications International Corporation

Prepared for
Martin Marietta Energy Systems, Inc.

LOCKHEED MARTIN

LTR.KY/ER95-0180

Internal Correspondence

MARTIN MARIETTA ENERGY SYSTEMS, INC.

Date: June 8, 1995

To: D. R. Guminski, J. D. Hankins, and J. W. Morgan

c: R. C. Edwards (ORO-PAD), P. A. Gourieux, S. J. Kondracki, B. J. Montgomery, W. L. Richards, and G. G. Zinter (Jacobs Engineering)

c/enc: PGDP KEVIL DMC (RC)

From: G. R. Miller, LMES, PGDP, Kevil (5085)

Subject: **C-400 Process and Structure Review (KY/ERWM-38)**

Enclosed for your file and review is a copy of the captioned report. Copies of this report are also on file in the PGDP Kevil Document Management Center.

In summary, this report reviews the discharge history of the C-400 waste solution and neutralization systems and the present and past location of related process equipment. The purpose of the report was to aid in the interpretation of the complex plume geometrics emanating from the C-400 area. This historical review may have important implications in implementing the forthcoming WAG 6 investigation.

For your information, the report identified some potential compliance issues which your department may wish to address.

GRM:sgh

Enclosure

Science Applications International Corporation
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May 3, 1995

Jeff Douthitt
Martin Marietta Energy Systems, Inc.
Paducah Gaseous Diffusion Plant
761 Veterans Ave.
Kevil, KY 42053

Subject: **Deliverable:** Final C-400 Structural and Process Review
General Order 96B-99069C, Task P04/253

Dear Mr. Douthitt:

Enclosed please find 4 copies of the Final C-400 Structural and Process Review, as requested. If you have any questions, please feel free to contact me at 462-2640.

Thank you for your help during this project.

Sincerely,

SCIENCE APPLICATION INTERNATIONAL CORPORATION

John D. Tillson

cc: Jeff Garner, MMES-Kevil
Mark Sager, MMES-OR
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KY/ERWM-38

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DISCLAIMER

Science Applications International Corporation
Paducah, Kentucky

contributed to the preparation of this document and
should not be considered an eligible contractor for its review.

CONTENTS

1. INTRODUCTION

The C-400 Cleaning Building was one of the first buildings constructed at the Paducah Gaseous Diffusion Plant. The building and adjacent structures have been used in a wide variety of functions to support operations at the plant and outside contractual work. The primary functions of C-400 included cleaning, metal etching and plating, radioactive materials stabilization and recovery, metals recovery, uranium trioxide production, diffusion process equipment testing, and uranium tetrafluoride (green salt) pulverization. During these processes large quantities of materials were discharged or otherwise removed from the building. This structural and process review sought to identify, describe, and locate (in accordance with building grid maps) utilities, all pieces of equipment, and processes which have occurred within C-400, identify potential effluent types generated during C-400 operations, and identify the disposal flowpaths from C-400. This report is based on document reviews, interviews, and site inspections. When possible, information given was verified by identifiable multiple sources (either interview or document). Locations within the building are given in accordance with standard building floor plan grid maps. Figures 1, 2, 3, and 4 and Table 1 have been included to summarize equipment findings. It should be noted that items contained in this report, unless otherwise noted, describe activities or procedures that predate current regulations.

2. EQUIPMENT

2.1 ASH RECEIVER PROCESSING (Locations: see text) (Photographs 1, 2, 3, 4)

Ash receivers are hopper type vessels used to contain residual materials (ash) produced during the conversion of UF_4 to UF_6. The functions of the C-400 Building were to:

- Drive off, contain, and collect residual UF_6,
- Loosen and transfer the excess ash from receivers to drums, and
- Discharge drums into pulverizer unit.

Upon arrival, the ash received often still emitted or "smoked" UF_6 gas. To control and collect this discharge, the Receiving Booth (Photograph 1) was constructed (Location A2) and receivers were placed inside of it until space was available at the UF_6 scrubber (Column D11). The receiving booth was equipped with a vent system which collected and discharged these fumes to a scrubber system located on the west side of the building (Photograph 2).

Within the UF_6 Scrubber Facility, the ash receiver was heated and residual UF_6 was sent to the ash receiver UF_6 Recovery Scrubber. Scrubber solutions were sent to the Dissolver Systems for radiological materials recovery. After the ash receivers were purged of residual UF_6, they were manually agitated to loosen excess ash which was transferred to a 55 gallon drum (Photograph 3). This drum was sent to the pulverizer (Column D13, Photograph 4) for additional processing and the empty ash receiver was sent back to the feed plant. Pulverized material was reprocessed in the feed plant. Another pulverizer was located near the receiving booth during the early days of this process. It apparently operated in the same manner as the one at D13.

2.2 FEED PLANT FILTER CLEANING AND FUME SCRUBBING (Location Near A9.5)

In the 1950s and early 1960s, plugged or fouled filters were brought from the C-410 Building Reactor Fluorination Towers to C-400. The purpose of the cleaning process was to allow filter reuse. The cleaning solution used for this operation consisted of a mixture of alumina, nitric acid, and water. The cleaning process produced acidic fumes which were removed from the area to a scrubber unit (Photograph 5). To neutralize the acidic fumes, the scrubber was charged with a mixture of potassium hydroxide and water. Solutions were reportedly sent to the Dissolver Systems. The cleaning unit is visually similar to and located near the No. 4 Dissolver (Section 1.13).

2.3 CLEANING TANKS (Located Between Columns E5.5 and E10.5) (Photographs 6 and 7) (Tables 2 and 3)

These cleaning tanks are used to clean, pickle, heat, and cool a variety of equipment and materials (specific tank details are listed in Table 3). Data is insufficient to compile an actual list of all materials which have been processed in these tanks. Items which required cleaning would, in the distant past, often appear in one of the storage areas without explanation as to their origin. Potential contaminants of concern include metals, radionuclides, oil, and cleaning solvents. Evaporated materials vent to the fan room and then to the atmosphere. Large solid materials settle to the bottom where they are removed on an extended (greater than 10 year) cleanout schedule. According to the 1953 "as built" drawings, liquid materials were discharged, depending on which tank, to either the storm sewer (Section 2.3 of this report) or acid sewer system (Section 2.1 of this report) (Blueprints E4-44-M, E4-49-M, and E4-50-M). Solid materials and sludge were removed from the tanks and disposed of in areas presently unidentified. Through the years the liners in some of these tanks have been replaced. It is not currently known where the original liners and sludge materials were discarded. Solutions used are given in Table 3. There are nine tanks in C-400:

- Cleaning tank, acid, chromic
- Cleaning tank, acid, hydrochloric
- Cleaning tank, acid, nitric
- Cleaning tank, acid, sulfuric
- Cleaning tank, alkali
- Cleaning tanks, water (cold, hot, warm)
- Cleaning tank, waste accumulation tank

2.3.1 Cleaning Tank, Acid, Chromic (Location: F-9)

This is a large tank containing a mixture of water and chromic acid used to clean metal parts and was constructed with a lead liner covered with brick (Blueprint #E4-15-A). The accumulated residue settles in the bottom of the tank. Drainage piping for this tank connects it to the Acid Sewer System.

2.3.2 Cleaning Tank, Acid, Hydrochloric (Location: E-10)

This is a large tank containing hydrochloric acid which is used to clean (or "pickle") metal parts. Drainage piping for this tank connects it to the Storm Water Sewer.

2.3.3 Cleaning Tank, Acid, Nitric (Located between Columns F9.5 and F10.5)

This is a small tank filled with a solution of water, nitric and hydrofluoric acid used to clean (or "pickle") metal parts. Drainage piping for this tank connects it to the Acid Sewer System.

2.3.4 Cleaning Tank, Acid, Sulfuric (Troxide®) (Located between Columns F7 and F8)

This is a large tank which uses a solution of water and sulfuric acid used to clean metal parts. Drainage piping for this tank connects it to the Acid Sewer System.

2.3.5 Cleaning Tank, Alkali (Located between F5.6 and F6.5)

This is a large tank which uses a solution of water and caustic soda to clean metal parts. Drainage piping for this tank connects it to the Acid Sewer System.

2.3.6 Cleaning Tanks, Water (Cold, Hot, Warm)

These are large tanks filled with water used to rinse parts or cool/heat equipment. Drainage piping for these tanks connects them to the Storm Drain System.

2.3.7 Cleaning Tank, Waste Water Accumulation (Located at Column EF7.5)

This tank originally was designated as a sulfuric acid tank. Present building layout maps either have no name for it or list it as "Empty". During the course of this investigation it was found to be partially full of a dark colored liquid. Interviews indicated this is used as a holding tank for water from the basement. Piping from this tank connects it to the Acid Sewer System.

2.4 COMPRESSOR DISASSEMBLY PIT (Located Between Columns C3 and C4 to D3 and D4) (Photographs 8 and 9)

The Compressor Pit served as an area in which diffusion process compressors could be disassembled prior to cleaning and rebuilding. In the past solutions from this pit were pumped from the pit to the discard waste system. The piping has since been changed and any solutions presently generated during this process would be sent to the spray booth.

2.5 COMPRESSOR TURBINE BLADE REMOVAL STAND (Location: Column CD-1) (Photograph 10)

Within this unit a cleaned compressor turbine was held in place while an operator entered the turbine shaft and removed the blade nuts with an impact wrench. When knocked free, the blades fell to the funnel at the base and into an awaiting drum. The blades were sent to the C-746-A area to be melted, sold, or stored. The turbine shaft was sent to C-720 to be rebuilt.

2.6 CUBICLE AREA (Location: A13 to A14) (Photograph 11)

In the Northwest corner of the C-400 Building is a series of three rooms which have been known as the cubicles. Through the years these rooms have been used for a variety of small operations. For clarity, they are herein referenced as Rooms 1, 2, and 3 with Room 1 being furthest north. All three rooms were equipped with floor drains connected to the discard waste system.

Room 1 was used for chemical storage in the 1950s and 1960s. Presently it is used for storage of spare parts.

Room 2 is presently used as an office. In the past it housed respirator test facilities and was used during the gold reclamation program. It may have been used in the mercury recovery program. During this program, mercury was purified (using nitric acid, nickel wool, soda ash, and silica gel) for reuse in the plant. The cleaned mercury was shipped to C-720 for redistribution but it is not known where contaminated solids or solutions might have been sent.

Room 3 is presently sealed. In the 1950s and 1960s it was used to house the Millers Fluorinated Lubricant treatment facilities. The treatment process consisted of filtration and exposure to cobalt trifluoride which "re-fluorinated" the oil. Treated oil was returned to use, waste solutions were drained to the discard waste system. It was reported that this room may have been used for storage during part of the gold reclamation campaign, rhodium plating operations, and to house recovered neptunium.

2.7 CYLINDER WASH, TEST AND DRY AREA (Located Between Columns EF1 and EF3 and F1A and F3) (Photograph 12)

The C-400 Cylinder Wash Facility is actively used to remove the residual contamination from the inside of used UF_6 cylinders (more commonly known as the "heel"). Historically, a sodium carbonate solution was used for cylinder decontamination, although boric acid is presently used. The effluent from the decontamination process drains into a sump and is collected in tanks for reuse. After the cleaning solutions are deemed unusable, it is pumped to holding tanks for treatment in the dissolvers. Heel sludge associated with the use of reactor tails in UF_6 production was particularly high in technetium and neptunium (~36 grams and ~6 grams per cylinder, respectively). From late 1950s through early 1970s these materials and other radionuclides were removed from the solution using the No. 2 Dissolver, solvent extraction systems, and ion exchange columns (Section 1.32 of this report). Prior to construction of the cylinder wash facilities, this area was used for storage.

2.8 DEGREASERS, VAPOR - TRICHLOROETHYLENE - BLAKESLEE (SMALL), DETREX (LARGE NO. 1 AND NO. 2) (Locations: Columns 4A, EF4, and F4-F5, respectively) (Photographs 13 and 14) (Figures 5, 6 and 7)

The Vapor Degreasers used industrial grade trichloroethylene to remove oil and grease from a variety of materials. All three units in this building are presently inactive or have been removed. The procedure used was essentially the same for all three degreasers in this building (and several others located throughout the plant). First, a piece of equipment was inspected for gross fluoride or grease contamination. If present, it was removed in the spray booth or alkali tank respectively. When ready for the degreaser, the piece was suspended within the unit above the bottom by chain hoist. Trichloroethylene was then pumped into the bottom of the unit and heated with non-contact steam coils. The resultant vapor condensed on the suspended equipment and on a set of condensing coils which were located at the top of the tanks. Condensate from the coils and equipment drained back into the tank for reuse. When condensation on the part ceased the part was lifted and inspected for the presence of solvents. Attempts to reduce significant solvent accumulations were made by tilting or shifting the equipment. Even so, persons associated with the degreaser operations indicated that complete solvent removal was not always accomplished and large parts removed from the degreaser often had excess amounts of solvents that spilled off to the floor, outside of the degreasers. Following degreasing, the part was transferred to the cleaning tanks or spray booth for additional cleaning or set on the floor next to the degreaser.

Due to the hydroscopic nature of trichloroethylene and the presence of atmospheric moisture the two tended to become mixed. Because the presence of water reduced degreasing capacity, a water/trichloroethylene separation system was included on each unit. Following separation the trichloroethylene was returned for reuse and the water was drained. The small degreaser drained to the discard waste system and the large degreasers drained to the storm drain system or acid sewer system, depending on the operational condition of the sump pump under the degreaser. According to operation procedures these drains remained open at all times of operation.

For at least part of its operational time frame, still bottoms materials (mostly grease and oil) were taken to the burn area where it was placed in steel troughs and burned. The ash from this procedure was returned to C-400 for uranium recovery. Within the degreasers materials periodically accumulated on the heating coils and reduced their capability to boil solvent materials. When this material accumulated to a significant degree it was removed. The historic practice was to scoop out as much sludge as possible manually and flush out whatever remained. Solutions from the large degreasers were discharged to the storm water sewer; those from the small degreaser were discharged to the discard system.

Because the large degreaser and its components were originally made of common steel and water was present, it eventually rusted through, and leaks appeared in the base of the unit. The resulting leakage of solvents and other contaminants flowed to a sump near the unit. From the sump they were discharged to the storm water drain system via pipe. A hole on the underside

of this pipe may have allowed solutions within the pipe to escape to surrounding media. Sometime during the early 1970's (approximately 1973) the sump pump became inoperable and was tagged out. When sufficient liquid backed up, the liquid crossed the floor to the drains beneath the cleaning tanks. These floor drains were connected to the C-403 Neutralization Pit. The sump pump and degreaser body were replaced in approximately 1978.

The degreasing system was equipped with a variety of support or auxiliary structures which include storage holding tanks, drum loading station, fume removal blowers, cleaning stills, and spray hoses. The hoses were used to fill containers for remote cleaning operations or to direct a stream of solvents at hard to clean areas on material within the degreaser.

2.9 DIFFUSION EQUIPMENT DISASSEMBLY AND SCRAPPING (Located Primarily Between Columns DE-3 and DE-11) (Photographs 15 and 16)

As part of programs in which older diffusion process equipment was replaced or retrofitted, scrap metal was removed and segregated. The various metals were consolidated and either subjected to a variety of processes intended to destroy anything of a classified nature, or were placed at one of the storage areas (i.e., C-746-F). The consolidation process included shredding, cutting, compacting, and melting.

Melting programs were conducted in the C-746-A Smelter. The molten metal was cast as ingots for resale or storage. Some ingots are still stored at C-746 Pad. The slag was placed in C-746-F burial yard, and the furnace liners were placed in C-404 or C-746-F, depending upon the presence of restricted materials.

2.10 NO. 1 DISSOLVER (ALUMINA) (Location: BC4) (Photograph 17)

The Alumina Dissolver was used to extract difficult to remove radioactive constituents from a host of materials such as activated alumina and UF_6 scrubber product. Interviews indicate this unit was used to treat, among other things, drums of material shipped to PGDP from Portsmouth Gaseous Diffusion Plant. The only identification on the drums was "GLIT." Documentation references the use of this unit to treat ash from the C-405 Incinerator prior to uranium recovery.

After dissolving was complete, the pH of the solution was then increased and filtration was performed using a belt type filter. Fumes were apparently vented through the roof. They may; however, have been collected and passed through a scrubber before emission. Filtered materials were removed and disposed of. This unit is often referenced as the No. 1 Dissolver. The original No. 1 Dissolver was located at approximately B6.5 and was apparently operated as a uranium/acid mixer (Section 1.36). Drains in the area of this unit lead to the discard waste system.

2.11 NO. 2 DISSOLVER (TRACE ELEMENT) (Location: BC-6.5)

The No. 2 Dissolver was specifically used to process uranium contaminated waste with recoverable amounts of thorium, technetium, and neptunium. The sources for this waste are not entirely known but include cylinder wash solutions and magnesium fluoride (technetium) filter traps. The dissolver process used nitric acid to break down unwanted chemical bonds (i.e., carbonates) and potassium hydroxide to precipitate uranium. Filtering was apparently performed using plate and frame units.

Filtrate was processed through a series of ion exchange, acid and fluoride exposure steps to remove technetium. The precipitate was processed for uranium, thorium, and neptunium. These materials were processed in an area designed for trace element extraction (Section 1.32). Waste materials were reportedly discarded in C-404.

2.12 NO. 3 DISSOLVER (URANIUM) (Location: BC-6.5)

Of the five dissolvers this unit appears to have the least information. According to most sources it was used to treat solutions in which the only radiological concern was uranium (i.e. those generated from feed plant filter washes). It apparently operated in a manner similar to the No. 5 Dissolver.

2.13 NO. 4 DISSOLVER (URANIUM RECOVERABLE) (Located Between Columns 10A and 11A) (Photograph 18, Figure 8)

The C-400 No. 4 Dissolver was used to treat influents with a U_{235} assay between 1.0 % and 1.5%. Three unit operations could be performed in the No. 4 Dissolver: acidification, precipitation, and flocculation. Acidification of the influent was performed by the addition of nitric acid in order to dissolve uranium carbonate into uranyl nitrate. Addition of sodium hydroxide to achieve pH values of 10 to 12 was performed in order to precipitate uranium and other metals from the solution. Flocculation was performed by addition of ferrous sulfate. After precipitation and flocculation, the solution was fed to a coated vacuum filter for dewatering. The resulting filtrate was pumped to a filtrate holding tank for further treatment or discharge. Contributing units to the No. 4 Dissolver were cylinder wash, spray booth, lab waste, compressor pit, hand tables, and MgF_2 pellets. Additional filtrate treatment was performed in the No. 4 or No. 5 Dissolvers. Direct discharge was to the discard waste system. The precipitate from this unit used to be shipped offsite for uranium recovery at Frenauld, Ohio.

2.14 NO. 5 DISSOLVER (URANIUM) (Location: B-7) (Photograph 19, Figure 5)

The No. 5 Dissolver is an active unit that may be operated separate from the No. 4 Dissolver for influents that have an initial U_{235} assay of <1.0% or that are known to be RCRA hazardous. Wastes that were designated for separate treatment in the No. 5 Dissolver were introduced from the C-400 Holding Tanks, No. 4 Dissolver Filtrate Tank, or directly to the unit. The No. 5 Dissolver was designated for treatment of the following wastes: sodium bisulfate solution, hydrochloric acid, chromic acid and spent conversion solution, nickel stripper solution, miscellaneous acids and alkalies, and aqueous solutions containing metals. It should be noted that the precipitates from treatment of certain of these wastes are now recognized as hazardous and sent to storage after generation. Prior to this designation, sediments were placed in the C-404 Landfill.

Following treatment in the No. 5 Dissolver, diatomaceous earth was added and the solution was pumped through a drum-type, vacuum filter for solids separation and dewatering. The resultant filtrate was pumped to a retention tank for analysis prior to being discharged under permit. If the filtrate did not meet discharge limits, it was returned for additional treatment. Some filtrate batches have been used as make-up water in the large cleaning tanks, the primary use is reportedly make-up water for the cylinder wash.

2.15 DISSOLVER FEEDSTOCK (NON-C-400 SOURCES)

A large number of sources have contributed feedstock to the dissolver units. Most of these were/are located in C-400 and are described elsewhere in this report. There are; however, other sources that are located outside of C-400:

- C-340 Liquids
- C-404 Leachate
- C-405 Incinerator Ash
- C-409 Spray Booth
- C-710 Lab Solutions
- C-720 Machine Lubricants/Coolants
- Plantwide Uranium Decontamination Solutions
- C-720 Compressor Pit

2.15.1 C-340

C-340 served as a metals reduction facility which produced uranium metal from depleted UF_6. The ultimate sources of feedstock from this building have not been identified.

2.15.2 C-404 Leachate

C-404 leachate is collected at the sump (SW corner C-404), pumped into a tank and transferred to C-400, where it is dumped directly into the No. 5 Dissolver. The total list of materials disposed of in C-404 is not known.

2.15.3 C-405 Incinerator Ash

C-405 was reportedly used to burn radiologically contaminated refuse, photographic materials, and medical materials. Some documents reference efforts to treat ash from the C-405 incinerator in the #1, #2, or #3 Dissolvers.

2.15.4 C-409 Spray Booth

C-409 Spray Booth solutions were generated in the spray booth in C-409. The solutions were directly transferred to C-400 by way of fixed, above ground piping. These solutions were either treated in the dissolvers (high uranium content wash) and/or discharged to the North-South diversion ditch (low uranium content rinseate).

2.15.5 C-710 Lab Waste

C-710 Waste Laboratory Solutions are generated from a wide variety of analytical work done on uranium contaminated solutions. Potential contaminants include a variety of acids, metals, PCBs, solvents and radionuclides.

2.15.6 C-720 Compressor Pit

The C-720 Compressor Pit was used during the disassembly of large diffusion plant equipment. The pit also contains the large C-720 TCE degreaser and drains.

2.15.7 C-720 Machine Lubricants

C-720 solutions include machining lubricants used on radioactive contaminated metal. These solutions were treated in C-409 and fed to the No. 5 Dissolver.

2.15.8 Plantwide Uranium Decontamination Solutions

Plant wide decontamination solutions are generated when chemical operations personnel clean up liquid material that contain radiological material. These are containerized and fed to the dissolver units for processing.

2.16 DRUM WASH/CRUSHING (Located Between Columns 12E-13E and 12F-13F) (Photographs 20 & 21)

The Drum Wash/Crushing Unit was used to clean used drums until the mid-1980s. This unit utilized water and soda ash to dislodge and wash away encrusted material. The cleaning solution and entrained material was then sent to the No. 5 Dissolver. The empty drums were crushed and sent to "Drum Mountain" in the C-746 Scrapyard, where they are presently stored.

2.17 DUST COLLECTOR SYSTEMS (Locations Vary) (Photographs 22, 23, and 24)

The C-400 building has at least five fixed vacuum units all of which are presently inactive. One is by the seal area; the others are near the UF_4 Pulverizer. There are many more mobile units in the building. These units were used in C-400 and at remote decontamination sites throughout the plant. Although not specifically designed for dust removal, located throughout the building are jet "vacuums". These units consist of an air source (plant air), primary stack pipe and secondary connective pipes. A stream of air enters the bottom of the pipe and is discharged to the outside atmosphere. This results in a vacuum action on the secondary connective pipes. One such unit is located on top of the technetium processing room (Photograph 24).

Vacuum units are used to pick up particulates from the structure (walls and floor) and equipment. The mobile units discharge filtered air back into the building. The permanent units discharged filtered air to outside areas. The filters and containerized particulate are presently sent to low level waste storage buildings. In the past these materials would have been sent to C-404, the pulverizer, or to storage. Some materials may have been reprocessed through the dissolvers after incineration in C-405.

2.18 GOLD DISSOLVER TANK (Located at A7) (Photograph 25)

The Gold Dissolver Tank was used to hold acidic solutions generated from dissolving base metals from gold components during the Gold Reclamation campaign.

A tank at approximately the same location was used to treat aluminum with a variety of solutions, including nitric acid, sodium fluoride, sodium chloride, and muriated potash. Vapors were discharged through the nitric acid scrubber. This tank is similar in appearance to the tank labeled "Gold Dissolver Solution".

2.19 GOLD RECOVERY (Located Between Columns A6 and A11) (Figures 6 and 7)

The Gold Recovery System was used to reclaim scrap gold from a variety of base materials. There were four types of situations encountered during this program. These were:

- Gold on nitric acid soluble base material (i.e., copper)
- Gold easily separated from non-soluble base metal
- Gold on small non-soluble items and in slag
- Gold on plastic parts

Each of these situations required designated equipment and procedures. Pieces with gold on nitric acid soluble base metals were placed into a stainless steel basket. This was immersed in a concentrated nitric acid solution. This loosened the gold, and raising and lowering the basket caused the gold to fall into the bath. After gold base metal separation, the contents of the basket were transferred to a holding pan (for hand sorting) and the acid/gold mixture was transferred to a settling tank. Supernatant from the settling tank was apparently sent to the "Gold Dissolver Solution" tank and then to the discard waste system, or directly to the discard waste system.

Gold plated materials which would not dissolve during the exposure to nitric acid were loaded into a gold sorting table unit where gold and non-gold pieces were separated using a stream of water. Gold was collected in a mesh screen and the water was recycled. Non-gold items (i.e., circuit boards) were placed in a drum which, when full, was placed in C-746-F Landfill. Residual water with very fine pieces of gold was decanted to a settling pan. Later the water was drained off and fine grained materials were processed using the Aqua Regia gold reclamation system.

The Aqua Regia process was used to dissolve gold from parts where physical or nitric acid removal was not successful or when gold was recovered from melt slag. After dissolving, the gold was removed from solution and melted in a small furnace. Fumes were directed out through duct work to the nitric acid scrubber. There is mention of plastic dissolving in operations procedures. The employee with the most experience with this system could not recall that this procedure was ever used. Another tank, located within a concrete diked area, was reportedly installed to be used as part of the gold reclamation process, but has not been used (Photograph 26).

2.20 HAND TABLES (Located Between Columns B5 and B6) (Photograph 27)

The hand tables consist of long, shallow stainless steel troughs with a sink at the end. They were used for cleaning small pieces of equipment using sodium carbonate or nitric acid solutions in shallow stainless steel sinks. Oil or grease covered items were cleaned in the small degreaser prior to cleaning at the hand tables. Hand table solutions were reportedly pumped to the large

tanks behind the bench for reuse or treatment in dissolvers. After cleaning, materials were dried in the drying unit located at the end of the hand table rollers. Some piping connects the hand tables to the discard waste system. Another hand table was located at AB5 through AB6 on early blueprints (E4-113-M).

2.21 HONER (SANDBLASTING) UNITS (WET, SMALL DRY, LARGE DRY) (Located at A4, A5, or A6.5) (Photographs 28 and 29)

Glass beads and sand blasting media units have been used to remove difficult to remove contaminants. These included dry (active) and wet (inactive) units. Each of the dry units uses a stream of air and abrasive media to clean small parts. The only differences between the two units are their sizes and available cleaning space. The two types of abrasive used are glass beads (silica dioxide) and carborundum (aluminum oxide). During the cleaning process a part is placed in the unit and the air/abrasive stream is directed on it. The abrasive mixture and entrained contamination is then drawn to a cyclone separator, where solids and air are separated. The solid material is then reused for cleaning. This process continues until the cleaning becomes inefficient. At this time the spent material is containerized and sent to storage. A wide variety of parts were cleaned using this equipment and all were reportedly degreased. In the past, solid materials from this unit were placed in the C-404 Landfill.

In the past, a wet honing unit was used in C-400. Liquid from this unit would have been discharged to the Discard Waste System. It is not clear where the solid material from that unit was disposed of in the past, but interviewees indicated that if it contained radionuclides it would have been placed in C-404.

2.22 LAUNDRY AREA (Location: B10 to B14) (Photograph 30)

The C-400 laundry area contains equipment used to actively clean and dry rubber gloves, boots and fabric type materials. Detergents, surfactants, disinfectants, and alkali are used in conjunction with hot water in the cleaning process. Solutions are discharged via drain to the C-615 sanitary sewage plant. Air from the dryers is filtered and vented to the atmosphere. Lint from the dryers is presently drummed and sent to storage. The drain system to C-615 is constructed with bell jointed pipe. Interviewees indicated sanitary sewer lines may leak to some degree.

2.23 MISCELLANEOUS EQUIPMENT

These include a number of pieces of equipment which are located at and around C-400. These have been placed in this category because they have either not been used, or do not appear to serve as sources for significant uncontrolled releases. This list includes:

- Concrete/Nickel Dust Mixer (C-402)
- Degreasers, modern nonhhalogenated solvent type
- Metal cut hood and vacuum (E-12) (Photograph 31)
- UF_6 cylinder freeze down facility (southwest corner outside of C-400) (Photograph 32)

2.23.1 Concrete/Nickel Dust Mixer

The Concrete/Nickel Dust Mixer is a small quantity (~3 ft^3) mortar mixer that was used to test concrete encasement of radionuclide contaminated nickel dust. This unit was only used for a short time, and is located at C-402.

2.23.2 Degreasers, Modern Non-Halogenated Solvent Type (Located in the area of Column A5)

These products have been designated to efficiently remove oil and grease and not add hazardous constituents to the solutions produced.

2.23.3 Metal Cut Hood and Vacuum (Located in the area of Column F11)

A metal chop saw, hood and vacuum system was installed in C-400 but was reportedly not used to any great extent.

2.23.4 UF_6 Cylinder Freeze Down Facility (Located outside southwest corner of building)

The UF_6 Freeze Down Facility was designed to serve as a holding tank for leaking cylinders. If a cylinder was found to be leaking it could be cooled in this unit and then repaired. This system has reportedly not been used.

2.24 NICKEL STRIPPER (Location: A4) (Figure 8)

The Nickel Stripper was used to remove nickel from various equipment parts. Removal was accomplished by use of heated acid. Fumes were collected in a hood and discharged to the atmosphere. Drains from this unit were connected to the discard waste system.

2.25 MAGNESIUM FLUORIDE PELLET PRODUCTION AND PROCESSING (Locations: D10, C-402)

Magnesium fluoride pellets were used to fill filter traps for use in the feed plant and cascade buildings. Although not a problem itself, the pellets were used to trap technetium. Once loaded they were cleaned of technetium, dried, and reused. The technetium cleaning and pellet reprocessing program may have involved the No. 2 Dissolver, the trap mix regenerator

(Photograph 33), and C-402. Technetium recovery is described in Section 1.32 of this report.

2.26 PROTECTIVE COATING OPERATIONS (Locations: F11-F12 and Perhaps Cubicle #3)

A variety of operations were conducted in C-400 to emplace protective coatings on cleaned metal surfaces. These included:

- Alodine coating on aluminum and tantalum
- Anodizing aluminum
- Black oxide "black magic" on steel
- Cadmium plating
- Gold plating
- Nickel plating
- Rhodium plating

Some solutions produced by these processes have been referenced as RCRA characteristic or listed wastes. Presently they are containerized if generated. In the past they were reportedly discharged to one of the large cleaning tanks.

2.27 PULVERIZER/SCREENING AND LOADING FACILITY (Located Between D12.5 to D13 and DE12.5 to DE13) (Photographs 4 & 34) (Figure 9)

The Pulverizer/Screening and Loading Facility was used to pulverize and segregate green salt and ash receiver waste. The transfer and crushing process was done under dry conditions so large quantities of dust were produced. To control this problem a central dust collection system was connected to the pulverizer (D13 and D13.5). Interviewees indicated that without these systems working properly, dust spread throughout the northeast section of the building. Most waste materials were reportedly collected in drums and sent to C–746–Q or C-404. After processing, the material was sent to the feed plant. Another pulverizer was reportedly located somewhere in the southwest corner of the building. Its function was reportedly similar to this one only on a smaller scale. Some documents reference an "ash grinder" which was used to process UO_3 and ash receiver contents. The pulverizer and this unit are probably the same piece of equipment.

2.28 RECEIVING BOOTH (Location: A2-A3) (Photograph 1)

Originally constructed to contain fumes from ash receivers, this structure was used for additional work such as cleaning radioactively contaminated materials. Fumes and particulates generated during cleaning processes were drawn from the room and vented to the outside

atmosphere through a scrubber. The conditions in which this room was used were described by interviewees as, "If it was too dirty to clean up in the open area of C-400, it was cleaned in there."

2.29 SEAL AREAS (Locations: A3-A4 and 10-B) (Photographs 35 and 36)

The Seal Areas are used during the inspection, disassembly, and cleaning of diffusion process equipment. Seal components are separated, segregated, and sent for cleaning elsewhere in C-400 for cleaning. Removal of gross amounts of silver and lead was accomplished by melting. Fumes were vented to the outside atmosphere. The seal inspection area at 10-B is presently used as a maintenance shop. It is outfitted with common shop tools such as welders and parts cabinets. This room has a 2' x 3' steel plate on the floor, the purpose of which and what is beneath are unknown. It may be part of the test loop ventilation system.

2.30 SAFETY EQUIPMENT CLEANING AREA (Location: A11.5) (Photograph 37)

The Safety Equipment Cleaning Area is used to clean and disinfect respirators, face shields, gloves, and other reusable PPE. Products used in this process include detergents, bleach and alcohol. Waste solutions are discharged to the discard waste system and reportedly to the North-South diversion ditch. Potential contaminants include surfactant based detergents and removed from PPE.

2.31 SPRAY BOOTH (Located Between Columns C5-C6 and D5-D6) (Photographs 38 and 39) (Figures 10 and 11)

The C-400 Spray Booth was used to clean large radiologically contaminated items. To date there have been two spray booths at this location. Within them items were usually sprayed with a hot, high-pressure solution of water, sodium carbonate or steam and rinsed with diluted nitric acid. Nitric acid was supplied to the system from the external nitric acid storage tank (Photograph 40) via the nitric acid day tank (Location B5). After cleaning in the spray booth, the items were rinsed using plant water or dilute nitric acid which was then discharged to the discard waste system. When the cleaning solution was considered too contaminated to effectively clean, it was pumped to the C-400 Holding Tanks for processing in the dissolver units. Effluent from the operation may contain radionuclides, metals, and oil. Additional solutions were pumped to this spray booth from the C-409 Spray Booth.

For an undetermined time frame operators using the spray booth used only nitric acid in concentrated form for all washing. While this practice was outside of normal operating procedures it did apparently clean items very well, it directly discharged all materials to the discard waste system.

Because the original spray booth was built out of common steel, the acidic solutions dissolved the unit's base. During replacement of the original booth, it was found that the floor beneath was gravel, not concrete, and that this material had been eroded or had undergone severe settling (Blueprint E4-2-A). This phenomena was, until recently, reportedly visible along the dividing wall between the east and west sides.

2.32 TRACE ELEMENT AND TECHNETIUM EXTRACTION (Locations: Dissolver #2: BC6.5, Pulse Columns - BC8.5, Technetium - BC9.5, Neptunium: Cubicle C, Thorium, Unknown)

With the use of used fission reactor tails and high thorium ore in the production of diffusion feed materials, non-uranium radionuclides (neptunium, cesium, strontium, americium, plutonium, technetium and thorium) entered the feed plant and cascade systems. To remove or recover these materials a series of extraction systems and procedures was devised. The three elements specifically removed were neptunium, technetium and thorium. Materials which were designated for the trace element extraction system were treated in the No. 2 Dissolver (Section 1.11 of this report).

The filtrate from the dissolver was passed through ion exchange media to remove technetium. This was further refined using additional acid washing and ion exchange steps. Raw technetium solutions were transferred to a storage tank. This tank, the technetium storage tank, has been removed from service and placed in C-746-Q for storage. The final product was extracted, concentrated by drying and shipped off-site.

The precipitate was acidified to release neptunium, uranium, and thorium into solution. This solution was treated in solvent extraction systems (pulse columns) to separate the neptunium and thorium from uranium. The neptunium and thorium were separated using rinses of hydrochloric acid and potassium dichromate and passing it through ion exchange media. Solutions used in the solvent extraction system included tributyl phosphate, kerosene, diethyl ether, methyl isobutyl ketone and amyl acetate. Most of the components of the trace element extraction system have been removed from C-400. The technetium extraction system was located at C-9.5. After disassembly many of its parts were placed in the C-404 Landfill, or the contaminated scrap yard.

2.33 TRAIN CAR TANK

A large rubber lined tank located on the east side of the building appears to have been recycled for use at the plant. One of its uses was reportedly to hold solutions from the large cleaning tanks during tank liner change outs.

2.34 ULTRASONIC CLEANER (Location: A-5.5)

The Ultrasonic Cleaner used high frequency waves in a solution of sodium carbonate and water to clean equipment. Spent cleaning solutions were, according to standard operating procedures, discharged to the discard solution system (<500 ppm uranium) or to the dissolvers.

2.35 URANIUM OXIDE CALCINER (Location: Between B-9 and BC-9.5)

The Uranium Oxide Calciner was used to convert uranium dioxide to uranium trioxide with an interim conversion to uranyl nitrate. The uranium trioxide was then processed in C-410 into greensalt. After this unit was removed, a large slab of concrete was poured over the floor to cover severely eroded (acid) and contaminated (radionuclide) concrete. Uranium oxide pulverization using rod mills, may have originally been done in C-400 in the oxide conversion room.

2.36 URANIUM RECOVERY, GENERAL

Through the early history of the plant numerous pieces of equipment were involved in the recovery of uranium from solution or reduction of uranium concentration prior to discharge to the discard solution system. The function of these mixer/settler tanks was similar to the modern dissolvers but the goal (discharging solutions at levels no greater than 500 ppm uranium) was less stringent. Basically solutions were acidified (to completely dissolve uranium). Chemicals were added to increase the pH and the solution was then stirred, and left until as much uranium as possible would precipitate. The resultant sludge was pressed in one of many filters (plate and frame or Kelly). All filtrate and supernate was discharged to the discard waste system as long as it met the <500 ppm uranium discharge limit. Other units reportedly dealt with U_{235} assay reduction by isotopic dilution. At least some of the uranium filtrate was "cooked" in a small furnace. This baked off the filter paper and other burnable material. The residuum was then converted into uranium trioxide in the calciner and sent to the feed plant.

2.37 INSTRUMENT DECONTAMINATION (Location: A3-A3.5)

This area was used during the disassembly and cleaning of small pieces of equipment. Cleaning solutions used and other potential contaminants are presently unknown but were drained to the Discard Waste System.

2.38 URANIUM DIFFUSION TEST LOOP (Location: CD9-CD14)

A large area within C-400 in which diffusion process materials could be prepared and tested. This area is equipped with a large emergency ventilation tunnel system. This system extended into the technetium and uranium oxide rooms and may extend beneath the floor to near column D6 (a duct-like feature was sealed in this area in the past.)

3. UTILITIES

3.1 WASTE SOLUTIONS DISPOSAL (DISCARD WASTE, ACID SEWER, C-401 TRANSFER LINE)

Liquid materials have been removed from C-400 through drain systems on the east and west sides of the building (E4-11-M). All the east side drains and a couple on the west side were connected to the acid sewer systems. The remaining drains lead to the discard waste system. Many of the building's floor drains have been sealed or fitted with containment collars. The discard route taken by different solutions has changed through the years. These changes are reflected in Figures 1 through 4.

3.1.1 Discard Waste System

The Discard Waste System reportedly consists of connective piping (high silica cast iron-"duriron" beneath building and vitrified clay elsewhere), a primary lift sump (outside C-400 northwest corner), and a sump drain line. During the early 1950s, discharges to this system flowed through the pipes and into the sump. From the sump solutions were pumped into the C-401 waste transfer line. Use of this pump was discontinued around 1957, the pump was removed and a drain at the bottom of the sump was opened. From this moment on, solutions flowed from the bottom of the sump through a drain line to the manhole approximately 30 feet to the west of the sump, and then to the North-South Diversion Ditch. The discharge end of this pipe is reportedly located next to the fence post (an old sampling point) approximately 20 feet downstream from the bend in the above ground piping northwest of C-400. Analytical results indicate the discard waste sump contaminants include PCBs, americium, plutonium, cesium, uranium, neptunium, technetium, and VOCs.

3.1.2 Acid Sewer System

The acid sewer system drained much of the east side of C-400 and part of the west side. This system consists of:

- connective piping (duriron or vitrified clay)
- C-403 Neutralization Pit, and
- lift sump.

Materials which flowed down this system passed into the C-403 Neutralization Pit. Lime could be added to solutions within C-403 to increase the pH. Materials were pumped from the pit by a sump pump. During the early 1950s this pump discharged to the C-401 waste line. During ~1957, this line was reportedly dismantled. From this moment on solutions were directly discharged to the North-South Diversion Ditch. At present this system is inactive and all visible floor drains have been sealed.

3.1.3 C-401 Transfer Line

The C-401 Transfer Line was originally constructed to convey liquid materials from C-400 and C-403 to C-404. This line was reportedly cut around 1957, after radiological treatment systems were operational in C-400. These cuts were made at the discard waste sump and at the North-South Diversion Ditch, north of C-403. It was later cut again, closer to C-404, and a pump was placed in the C-404 Effluent Structure. The purpose of this pump was to remove supernatant from C-404 and discharge it to a tributary of the North-South Diversion Ditch. According to actively used engineering blueprints, this tributary flowed along Railroad Track 4 across the TSCA building site and into the North-South Diversion Ditch. The effluent end of this pipe is still located at the headwall next to the railroad track.

3.2 SANITARY SEWER SYSTEM (Blueprints C13-106-C, E4-II-M, C13-101-C)

The sanitary sewer system drains waste materials from the change house, toilets, and laundry area. Although waste materials removed in the sinks and showers may have contained hazardous or radioactive constituents, the most significant contributor to this system is the laundry. Drainage from the laundry includes waste materials removed from clothing, and disinfectants and cleaning products. The cleaning products contain surfactants and sanitizers. These materials are discharged from the north side of the building into an 8" bell jointed vitrified clay pipe. Other vitrified clay lines leave from the northeast, northwest, south, and southeast edges of the building. These lines may have been partially placed on top of a bed of sand.

3.3 STORM WATER SEWER SYSTEM (Blueprints C4-101-C, C14-103-C)

Storm water is drained from C–400 through a series of pipes on the north, south and east sides (Drawing E9–11–M). This system includes lift stations, floor drains, perimeter drains, roof drains, and connective piping.

The three lift stations are located beneath the No. 1 Degreaser, (Column F3.5) in the steam condensate pit (Column A1), and due east of C–400 south of the C–402 Lime House. These lift stations were used to pump water up into the storm sewer lines to the east and south of the building.

Floor drains are located in the fan room, condensate pit (A1), and the area beneath the large degreasers. Of these the drains beneath the degreasers appear to be most significant.

Perimeter drains are located near ground surface around the fan room. The purpose of this system is to remove water prior to significant downward percolation and thereby enhance structural stability. It is constructed of "loose jointed" clay tile pipe. To direct and enhance drainage, the upper parts of the pipes are covered with tar paper and the excavation was

backfilled with coarse gravel (C4-11-M).

Roof drains are located throughout the building. These drains are designed to collect liquid and entrained particulates from the roof of the building. The connective piping directs these materials to the storm sewers to the north, south, and east sides of the building. To the north these lines discharge to the North-South Diversion Ditch after passing through a junction box within the swale north of C-400.

Connective piping used in the Storm Water System appears to have been constructed with cast iron (within C-400) and concrete or vitrified clay pipe outside of C-400. Major lines were laid in trenches which may have been leveled using loose sand. These lines encircle the building with the exception of the northwest corner.

3.4 RECIRCULATING COOLING WATER LINE (WASTE HEAT SYSTEM) (Blueprint T5E14179-0001)

Within C-400 the Waste Heat System consists of radiator type heaters connected with iron pipes. This system is connected to the Recirculating Cooling Water System by two 14" iron pipes at the north west corner. From this point the line extends to the C-535 cooling tower complex. and along the west side of C-400. The pipes may have been placed on a bed of loose sand. During the past 20 years a large (approximately 200' x 50' x 30' deep) trench was excavated to the west of C-400 to allow extension of waste heat lines to buildings in the south area of the plant.

3.5 PLANT WATER (Blueprint C12-11-M)

The Plant Water System carries pressurized clean water through 30" lines to the north and west of C-400 and a 16" line to the south. The building is connected to this system via 10" lines on the north and south sides. These lines were reportedly at least partially laid in a bed of loose sand.

3.6 POTABLE (DRINKING) WATER (Blueprint C11-9-M)

The potable water system carries pressurized drinking water to the south end of C-400 in an 8" line.

3.7 UTILITIES-OTHER

A large number of small gas and electric utilities enter C-400 via above or below ground lines. In addition, two above ground pipes convey spray booth solutions from C-409 to C-400. These lines were used to transfer C-409 spray booth solutions to the discard waste system or C-400.

4. CLEANING SOLVENTS

4.1 CLEANING SOLVENT USES

Organic degreasing solvents were used on metallic items which were contaminated with oil and grease. Originally there were three vapor degreasers which used industrial grade trichloroethylene as the solvent. During operation, trichloroethylene became exposed to air. Due to the hydroscopic nature of TCE it tended to absorb moisture from the air. The presence of moisture reduced the degreasing capabilities of TCE. To improve cleaning efficiency, a water/solvent separator was utilized. After separation the TCE was reused and the water was discharged. After degreasing was complete, the item was lifted and shifted to drain excess pools of solvents back to the degreaser. The item was then placed either on the floor next to the degreasers or into one of the cleaning tanks. Items placed on the floor may have been returned directly to service or cleaned in the spray booth (large items) or on the hand tables (small items).

Each of the degreasers was equipped with a spray hose that could be used to direct a stream of TCE at difficult to clean areas on items within the degreaser or to fill containers (five gallon buckets) used in remote cleaning operations. The TCE tank loading facility was equipped with a hose that could also be used to fill small containers (drums). Due to the efficient cleaning abilities of trichloroethylene, it was reportedly used throughout C-400 and at a variety of locations across the plant.

4.2 CLEANING SOLVENT LOSSES

Spent trichloroethylene may have been released to the environment from C-400 due to any of the following:

- Evaporation to atmosphere
- Cross contamination with cleaning tanks and subsequent "overflowing" of tanks
- Spillage to floor drains (sludge from both the C-403 Neutralization Pit and the Discard Waste System Sump was found to contain trichloroethylene)
- Cross contamination with hand table solutions
- Usage in small scale (bucket and brush) cleaning operations
- Drainage from water/solvent separators (storm drains and acid sewer system - large degreasers, discard waste system - small degreaser)
- Leaks to storm water or acid sewer system from the large degreaser (repaired ~1978)

- Cleanout operations [sludge removal by hand and steam flushing: During an undetermined time frame sludge from the degreaser still was burned to enable uranium recovery. At least some of the sludge from the large degreaser was reportedly disposed of in C-404. (Solids-liquids-storm drains-acid sewer system--large degreasers, discard waste system-small degreaser)]
- Storm sewer backflow (during periods of peak discharge/flow the storm sewer system could reportedly backflow to C-403).

5. RADIOLOGICAL MATERIALS

5.1 RADIOLOGICAL MATERIALS PROCESSING

Activities throughout the diffusion process have resulted in materials becoming contaminated with radiological agents. Through the operational history of C-400, equipment has been used to clean materials contaminated with radionuclides. Treatment of radiological waste streams have included:

- Dissolving, precipitating and settling (uranium)
- Dissolving, precipitating and filtering (uranium)
- Dissolving and ion exchange separation (technetium)
- Dissolving, precipitation, solvent extraction, and ion exchange separation (thorium, neptunium).

5.2 TECHNETIUM LOSSES

Normal operational losses of technetium from C-400 may have occurred through:

- Direct discharge to C-404 prior to the operation of treatment processes with C-400
- Discharges from C-400 after technetium removal equipment was taken offline in the early 1970s
- Direct discharge to the north-south diversion ditch (historically the acceptable uranium discharge limit was 500 ppm) (technetium discharges, Table 1)
- Cross contamination with cleaning tanks and eventual discharge to storm water sewer system or acid sewer system
- The treatment process, so the liquids were discharged directly to the discard waste system
- Leaks through spray booth sump
- Airborne dust or mist
- Discharge to C-403 acid neutralization pit via acid sewer drain system
- Residual contamination left on or in items discarded in the scrap yards or burial grounds.
- During experimental treatment runs wherein raw technetium product was put in the No. 5 Dissolver units to experiment with using the dissolvers to precipitate technetium.

5.3 DYE TRACE

Dye trace tests were performed January 5, 1995 on the safety equipment sink (approximately 40 gallons) and dissolver drain (approximately 16 gallons). Observations of local storm sewer, sanitary sewer or discard waste systems did not indicate the presence of dye. The general consensus among those involved was the volume of water/dye was not sufficient to:

- Flush out clear water in the lines,
- Exceed leakage within the lines, or
- Existing blueprints are incorrect and solutions are actually conveyed in a manner presently not identified.

6.1 DOCUMENTS

6.1 DOCUMENTS

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6.2 BLUEPRINTS

BLUEPRINTS
Prepared by: Smith, Hinchman, & Grylls, Inc.

Blueprint Number	Subject	Date-As Built
C11-9-M	Plan & ProfileLine C-400 Sanitary (Drinking) Water	8,26,53
C12-11-M	Water Distribution System; Plant Water	8,26,53
C13-101-C	Sanitary Sewers (Plants)	6,24,53
C13-106-C	Sanitary Sewers (C-400)	6,24,53
C14-101-C	Storm Sewer	6,24,53
C14-103-C	Storm Sewers (C-400)	6,24,53
E2-2-A	First Floor Plan	7,14,53
E10-1-M	Plan & Details of Acid Neutralization System	6,25,53
E4-11-M	Plumbing System Plan & Details	7,21,53
E4-111-M	Area No. 1 Pulverizing Process	7,21,53
E4-112-M	Area No. 2 Small Parts Disassembly	7,21,53
E4-113-M	Small Parts Decontamination	7,21,53
E4-115-M	Area No. 5 Instrument Decontamination	7,21,53
E4-117-M	Area No. 7 Outgoing Loading	7,21,53
E4-12-A	Laundry Room Details	7,14,53
E4-121-M	Coded Chemical Recovery	7,21,53

E4-123-M	Oxide Conversion Room Rodmill Process	7,21,53
E4-128-M	Pulse Column Assembly-Item-A-19	7,21,53
E4-13-A	Cubicle Areas	7,14,53
E4-137-M	Preparation Area Sections and Elevations	7,21,53
E4-142-M	Instrument Decontamination Elevation and Drains	7,21,53
E4-15-A	Cleaning Tanks	7,14,53
E4-17-A	Degreaser Pit Details	7,14,53
E4-18-A	Degreaser Pit Details	7,14,53
E4-20-A	Furnace Fan Room	7,14,53
E4-24-M	Degreasing Piping &Chrome Acid & Trioxide Tanks Circulating System	7,21,53
E4-30-M	Cold Trap Room Plan & Details	7,21,53
E4-37-M	Plumbing Floor Drains	7,21,53
E4-44-M	Miscellaneous Details Cleaning Tanks-Piping	7,21,53
E4-49-M	Piping at Cleaning Tanks-Sections	7,21,53
E4-50-M	Piping at Cleaning Tanks Plans & Details	7,21,53
E4-8-S	Emergency Fan Details	7,14,53
E4DR-1-S	Spray Booth	7,14,53

TSE-14179-001	Process Waste Heat Utilization Location and Routing Plan-Prepared by A.M. McKinney Co.	10,14,81

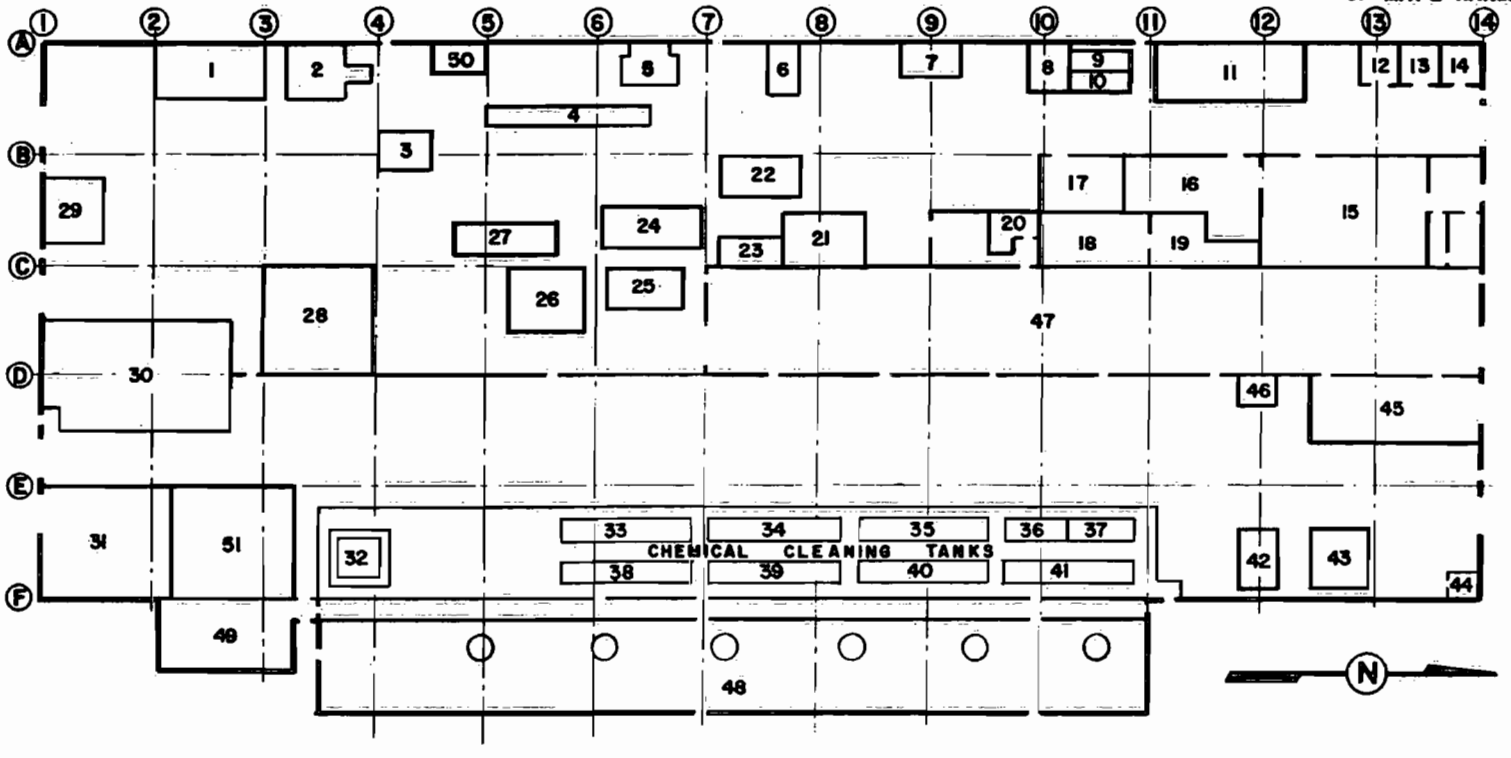
6.3 INTERVIEWEES

6.3 INTERVIEWEES CITED

Beckman, Palmer
Brucker, Bill
Guzzy, Frank
Hayden, David
Hines, Tom
Riley, D.K.
Watson, Ricky
Whinnery, Walter
Wilkerson, Mike

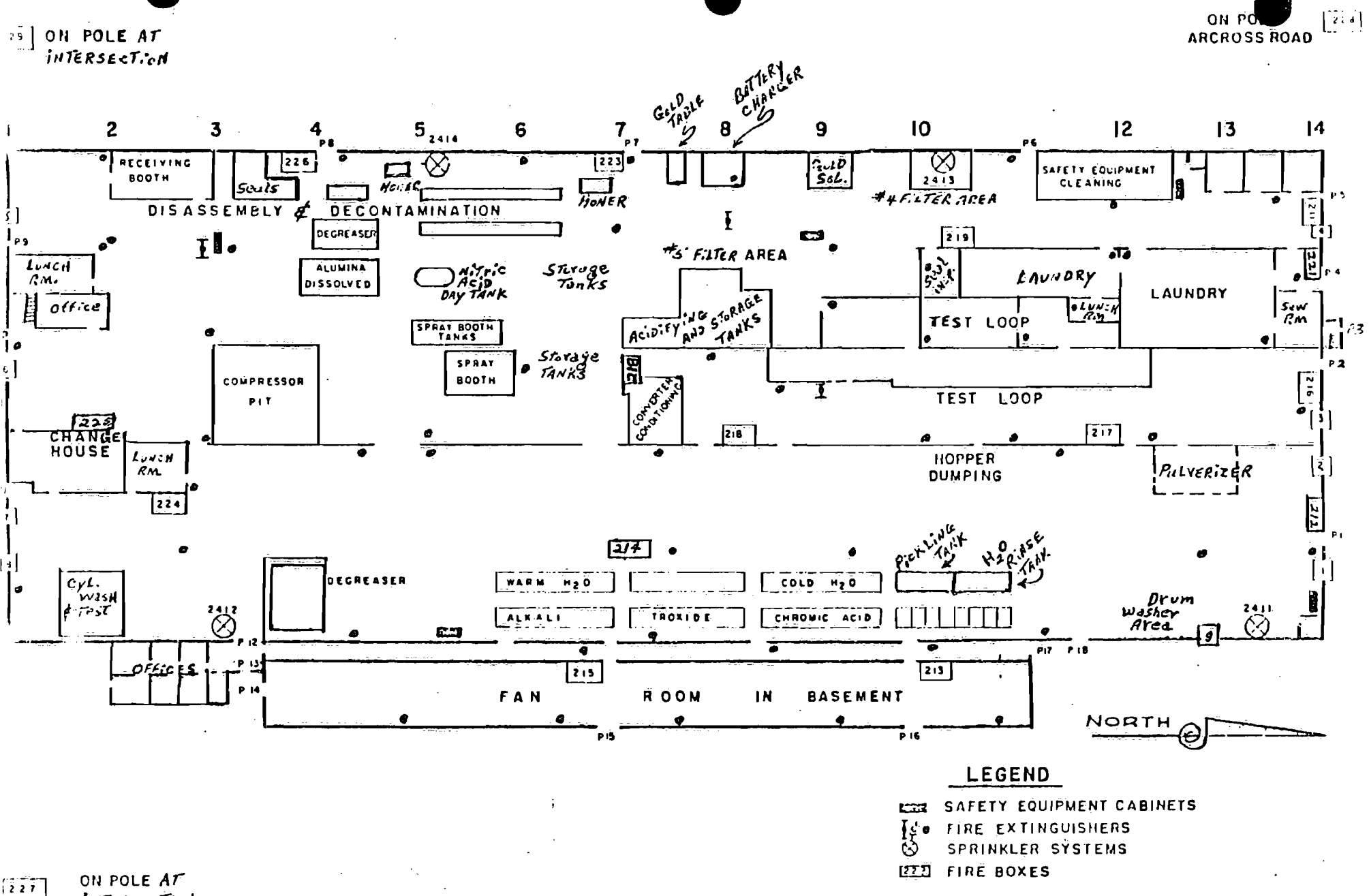
6.4 FLOOR PLANS

1 RECEIVING BOOTH
2 SEAL DISASSEMBLY
3 BLAKESLEY DEGREASER
4 HAND TABLE
5 LARGE DRY HONER
6 GOLD WASH TABLE
7 GOLD DISSOLVER SOL. TANK
8 NO. 4 DISSOLVER
9 GOLD DISSOLVER
10 GOLD FURNACE
11 SAFETY EQUIP. CLEANING
12 GOLD STORAGE
13 GOLD RECOVERY
14 LAUNDRY STORAGE
15 LAUNDRY
16 LAUNDRY STORAGE
17 MAINTENANCE SHOP
18 TEST LOOP CONTROL ROOM
19 STORAGE
20 WOMEN CHANGE HOUSE
21 U-SOLUTION STOR. TANKS
22 NO. 5 DISSOLVER
23 ACIDIFYING TANKS
24 NO. 5 DISSOLVER SOL. STOR.
25 SPRAY BOOTH SOL. STOR. TANKS
26 SPRAY BOOTH
27 SPRAY BOOTH TANKS
28 DISASSEMBLY PIT (ABANDONED)
29 LUNCH ROOM & OFFICE
30 MEN CHANGE HOUSE
31 CYL. CLEANING & TESTING
32 DETREX DEGREASER
33 WARM WATER TANK
34 TROXIDE TANK
35 COLD WATER TANK
36 HCL TANK
37 HOT WATER TANK
38 ALKALI TANK
39 TROXIDE TANK
40 CHROMIC ACID TANK
41 EMPTY TANK
42 SCRAP METAL DECON. SYS.
43 DRUM WASHER & CRUSHER
44 REST ROOM
45 UF_6 PULVR. & SCREENING
46 SECONDARY DRUM DUMPER
47 TEST LOOP (ABANDONED)
48 FAN ROOM
49 MAIN OFFICE
50 SMALL DRY HONER
51 MAT'L HANDLING AREA



Floor Plan 1
C-400 Building Layout

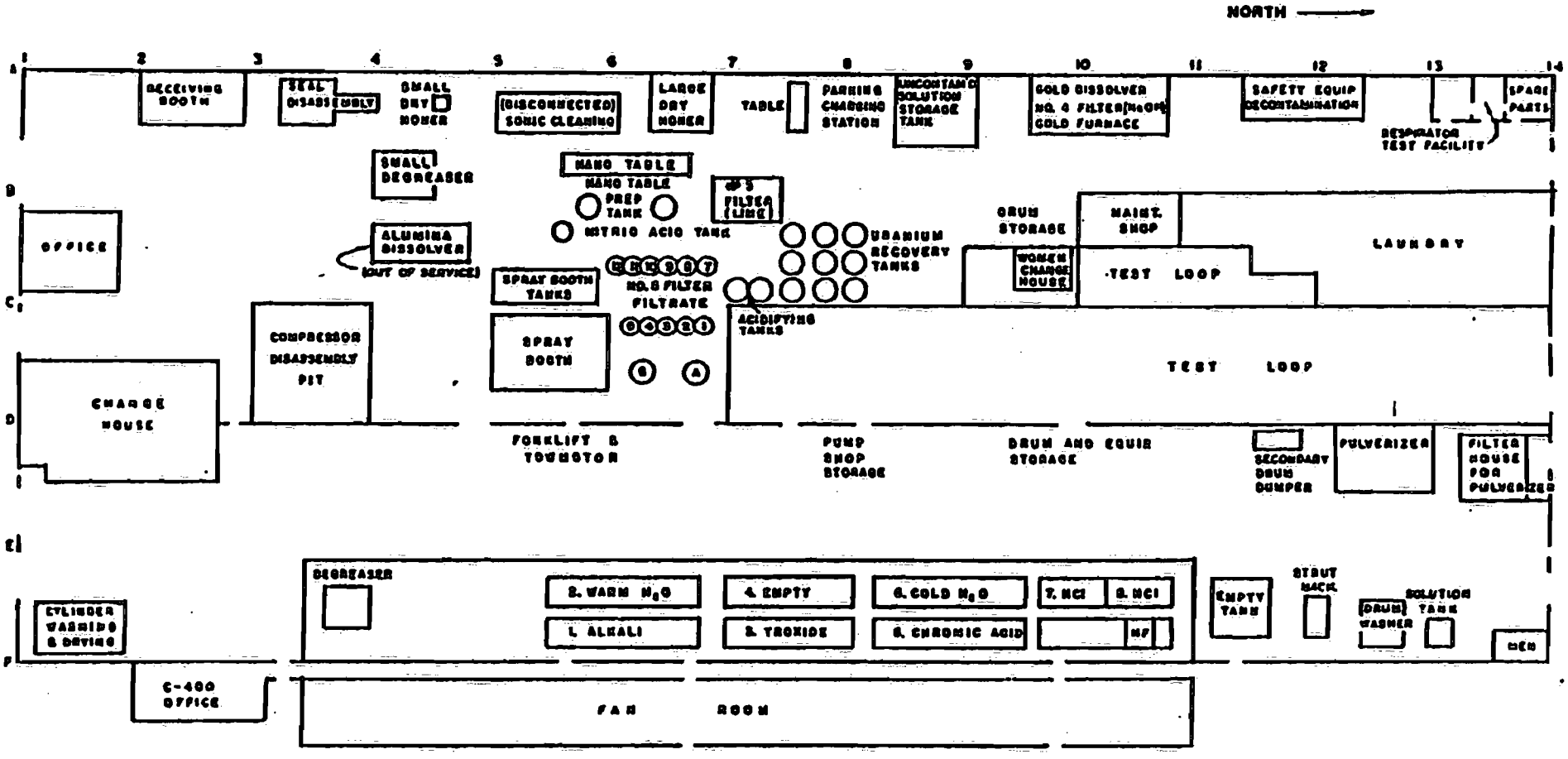
1985 ISHAK Rev. C



C-400 CHEMICAL PROCESSING FACILITY

Floor Plan 2

C-400 BUILDING LAYOUT



Floor Plan 3

6.5 TABLES

Section	Process	Material Description	Potential Contaminants	Discharge Route	Status	Location	Photographs	Interviewee	Figures or Tables	Blueprints	Document
1.1	Ash Receiver Processing	Gas (UF6)	Radionuclides	Dissolvers	Inactive	A3 Outside, D11	1, 2, and 4	Beckman	Figure 13	E4-111-M	KYD-1483
1.1	Ash Receiver Processing	Particulates	Metals (As, Cr, Ni, Pb), Radionuclides	Feed Plant, Dissolvers, or C-746-Q	Inactive	D11	1, 2, and 4	Beckman	Figure 13		KYD-1483 KY/L 1476
1.2	Feed Plant Filter Cleaning	Liquid	Radionuclides, Metals	Dissolvers, Discard Waste System	Inactive	A9.5	18				KYD-1483
1.3	Cleaning Tanks-All	Liquid/Sludge	Organic Solvents, Metals, Radionuclides, PCBs (Some Tanks Specifically Tested)			E5.5 to E10.5	6 and 7	Hayden, Watson	Tables 2 and 3	E4-11-M, E4-37-M, E4-44-M, E4-49-M, E4-50-M	CH 201
1.3.1	Cleaning Tanks-Acid, Chromic	Liquid/Sludge		Liquid Acid Sewer System / Solids-Unknown	Active	F9		Hayden, Watson	Tables 2 and 3	E4-11-M, E4-37-M, E4-44-M, E4-49-M, E4-50-M	CH201
1.3.2	Cleaning Tanks-Acid, Hydrochloric	Liquid/Sludge	Cr, Ni, Cd, Pb, Hg, Ag, Ba	Liquid to Storm Water System/ Solids,unknown	Active	EF10		Hayden, Watson	Tables 2 and 3	E4-11-M, E4-37-M, E4-44-M, E4-49-M, E4-50-M	Ch 201 and KY/L-1561 (3rd Qtr)
1.3.3	Cleaning Tanks-Acid, Nitric	Liquid/Sludge		Liquid Acid Sewer System / Solids-Unknown	Active	F10		Hayden, Watson	Tables 2 and 3	E4-11-M, E4-37-M, E4-44-M, E4-49-M, E4-50-M	CH201

Table 1

1.3.4	Cleaning Tanks-Acid, Sulfuric	Liquid/Sludge		Liquid Acid Sewer System / Solids-Unknown	Active	F7.5		Hayden, Watson	Tables 2 and 3	E4-11-M, E4-37-M, E4-44-M, E4-49-M, E4-50-M	CH201
1.3.5	Cleaning Tanks, Alkali	Liquid/Sludge	Pb, As, Ba, Se, Ni	Liquid Acid Sewer System / Solids-Unknown	Active	F6		Hayden, Watson	Tables 2 and 3	E4-11-M, E4-37-M, E4-44-M, E4-49-M, E4-50-M	CH201, KY/L-1525, KY/L-1561
1.3.6	Cleaning Tanks, Water, Cold	Liquid/Sludge		Liquid to Storm Water System/ Solids,unknown	Active	E9	7 and 8	Hayden, Watson	Tables 2 and 3	E4-11-M, E4-37-M, E4-44-M	CH 201
1.3.6	Cleaning Tanks, Water, Warm	Liquid/Sludge		Liquid to Storm Water System/ Solids,unknown	Active	E6	7 and 8	Hayden, Watson	Tables 2 and 3	E4-11-M, E4-37-M, E4-44-M	CH 201
1.3.6	Cleaning Tanks, Water, Hot	Liquid/Sludge	Pb, Ni, Cd	Liquid to Storm Water System/ Solids,unknown	Active	E10	7 and 8	Hayden, Watson	Tables 2 and 3	E4-11-M, E4-37-M, E4-44-M	CH201, KY/L-1525
1.3.7	Cleaning Tank Waste Water Accumulation	Liquid/Sludge	Unknown	Liquid Acid Sewer System / Solids-Unknown	Active	E7.5	7 and 8	Hayden, Watson	Tables 2 and 3	E4-11-M, E4-37-M, E4-44-M	CH114
1.4	Compressor Pit	Liquid, Sludge	Radionuclides, Metals	Discard Waste System/Dissolvers	Inactive/ Standby	CD3.5	8 and 9	Hayden		E4-11-M	
1.5	Compressor Turbine Stand	Solid	Radionuclides	Scrapyards	Inactive	CD1	10	Watson		E4-11-M	

Table 1

1.6	Cubicle 1 or 2, Mercury Recovery	Liquid, Solid, Filter Media-Solids	Acids, Mercury	Discard Waste System, Unknown	Inactive	A14	11	Beckman		E4-11-M, E4-13-A, E4-117-M	KYD-1483
1.6	Cubicle 2, Gold Recovery, Aqua Regia	Liquid	Metals, Radionuclides	Discard Waste System	Inactive	A13.5	11	Beckman		E4-11-M, E4-13-A, E4-117-M	CH-358
1.6	Cubicle 2 and 3, Trace Element Recovery	Liquid/ Solid	Radionuclides	Discard Waste System/ Unknown	Inactive	A13	11	Beckman, Guzzy		E4-11-M, E4-13-A, E4-117-M	KYD-1483
1.6	Cubicle 3, Millers Fluorinated LubricantOil Recovery	Liquid/ Solid		Discard Waste System/Unknown	Inactive	A13	11			E4-11-M, E4-13-A, E4-117-M	KYD-1483
1.7	Cylinder Wash, Dry, and Test	Liquid	Metals Radionuclides	Dissolvers, Trace Element Recovery	Active	EF2	12	Beckman, Hayden, Guzzy		E4-11-M	CH-110
1.8	Degreaser, Blakeslee (Small)	Liquid/ Sludge	Oil, Solvents, Radionuclides, Metals	Discard Waste System/Unknown	Inactive	4A	13	Hayden, Beckman, Guzzy, Wilkerson	Figure 5	E4-11-M, E4-112-M	CH-200
1.8	Degreaser Detrex (Large #1)	Liquid/ Sludge	Oil, Solvents, Radionuclides, Metals	Storm Sewer/Unkown	Inactive	EF4	14	Hayden, Beckman, Guzzy, Wilkerson	Figures 6 and 7	E4-17A, E4-18A, E4-11-M, E4-24-M	CH-208
1.8	Degreaser Detrex (Large #2 & #3)	Liquid/ Sludge	Oil, Solvents, Radionuclides (#2 Only), Metals	Storm Sewer/Dissolvers, Unknown	Inactive	F4-F5		Hayden, Beckman		E4-11-M, E4-24-M	CH-208

Table 1

1.9	Diffusion Equipment disassembly and scrapping	Liquid	Radionuclides, leached metals	Dissolvers, Discard Waste System, Acid Sewer System	Inactive	DE3 to DE11	15 and 16	Brucker			KYD-1483
1.9	Diffusion Equipment disassembly and scrapping	Metal Pieces	Radionuclides, Metals	C-746, C-404, C-746-D, or Scrap Yards	Inactive	DE3 to DE11	15 and 16	Brucker			
1.10	Dissolver, Alumina	Liquid/Solids	Radionuclides, Metals, Unknown	Discard Waste System, C-404/Unknown	Inactive	BC4	17	Wilkerson			KYD-1483
1.11	Dissolver #2	Liquid/Solids	Radionuclides, Metals, Unknown	Discard Waste System, C-404/Unknown	Inactive	AB6.5					KYD-1483
1.12	Dissolver #3	Liquid/Solids	Radionuclides, Metals, Unknown	Discard Waste System/C-404	Inactive	Unknown					KYD-1483
1.13	Dissolver #4	Liquid/Solids	Radionuclides, Metals, Unknown	Discard Waste System/Offsite-C-404 /Storage	Inactive	10.5A	18	Hayden, Wilkerson	Figure 8		KYD-1483
1.14	Dissolver #5	Liquid, Solids	Radionuclides, Metals, Cd, Pb, Se, Ni, and Ci	Discard Waste System/C-404, North-South Diversion Ditch, Storage	Active	B7	19	Hayden, Wilkerson			CH-113,CH-120, KY/L-1591
1.16	Drum Washer	Liquid	Metals, Radionuclides	Dissolver	Inactive	E12.5	20 and 21	Hayden, Watson			CH-362

Table 1

1.17	Dust Collection Systems	Solids/Gas	Radionuclides, Metals	Dissolvers, C-404, Pulverizers/Storage/Atmosphere	Both Active and Inactive	E13	22, 23, and 24	Watson, Beckman, Hayden			KYD/1483
1.18	Gold Dissolver Tank	Liquid	Metals, Radionuclides (Pb, Al, Ag, As, Se, Hg)	Discard Waste System	Inactive	A7	25	Beckman			CH-358
1.19	Gold Recovery	Liquid/Solid	Metals (Pb, Ag, As, Be, Hg), Radionuclides, Solvents	Discard Waste System, C-746-F	Inactive	A6, A11	25	Beckman	Figures 10 and 11		CH-358
1.20	Hand Tables	Liquid/Solid	Radionuclides/ Solvents, Metals	Discard Waste System, Dissolvers, Evaporation/ C-404	Active	B5.5	27	Hayden, Beckman		E4-113-M	CH-109
1.21	Honers, dry	Solid	Radionuclides/ Solvents, Metals (Ag, Cd, Ni, Pb, Se)	C-404/Storage	Active	A5, A6.5	28 and 29	Hayden			KY/L-1561 (1st Quarter)
1.21	Honers, wet	Liquid, Solid	Radionuclides, Degreasing Solvents, Metals (Ag, Cd, Ni, Pb, Se)	Discard Waste System/C-404, Unknown	Inactive	A6.5					KY/D-1483, KY/L-1511, KY/L-1561 (1st Quarter)
1.22	Laundry Area	Liquid	Cleaning Products (Surfactants, Chlorine), Radionuclides, Oil	Sanitary Sewer	Active	B10 to B14	30			E4-12-A, CH-106-A	CH-401, CH-402, CH-403, CH-404
1.24	Nickel Stripper	Liquid/Solid	Metals (Pb, Cr, Ag, Cd, Ni), VOCs	Discard Waste System/Unknown (Probably C-404 Storage)	Active	A4			Figure 12		CH-107, KY/L-1367, KY/L-1395, KY/L-1610

1.25	Magnesium, Fluoride Pellets	Liquid, Solid	Radionuclides	Dissolvers, Discard Waste System/C-404, Storage	Inactive	D10, C-402	33				CH-354, KYD/1483
1.26	Protective Coating Operations	Liquid	Plating Wastes	Discard Waste System, Acid Sewer System, Cleaning Tanks	Inactive	A5, A6, F11, and FH (Cubicle 3)		Watson, Anonymous			CH-114, CH-204, CH-205, CH-206
1.27	Pulverizer(s)	Solid	Radionuclides, Metals	Feed plant, Dissolvers	Inactive	A2.5 and D12.5	1, 3, and 4		Figure 13	E4-111-M	CH-353
1.28	Receiving booth	Particulates, gas	Radionuclides, Metals	Scrubber, Filter/Dissolvers	Active	A2.5	1	Whinnery		E4-111-M	
1.29	Seal Areas	Solid	Radionuclides, Metals	Scrapyards/ Unknown	Active	A3-A4	35 and 36	Anonymous			KYD-1483
1.3	Safety Equipment Cleaning Area	Liquid	Radionuclides, Metals, Oil, and Detergent	Discard Waste System	Active	A11.5	37				CH-400
1.31	Spray Booth	Liquid/Storage	Radionuclides, Metals, Oil	Dissolvers, Discard Waste System	Active	CD5.5	38 and 39	Hayden, Wilkerson	Figure 14	E4-11-M	CH-108
1.32	Trace Element Extraction	Sludge/Vapor	Radionuclides, Solvents	Discard Waste System, C-404, Atmosphere	Inactive		System Removed	Guzzy		E4-128-M, E4-121-M, E4-135-M, E4-110-A	KYD-1483

Table 1

1.34	Ultrasonic Cleaner	Liquid	Radionuclides	Discard Waste System, Dissolver	Inactive	A5.5	System Removed	Wilkerson			KYD-1483
1.39	Uranium Diffusion Test Loop	Gas	Radionuclides	Furnace Vent	Inactive	CD7 to CD14	Unavailable	Wilkerson		E4-2-M, E4-38-M, E4-32-M	KYD-1483
1.36	Uranium Oxide Calciner	Solid, Liquid	Radionuclides	Pulverizer, Nitric Acid Scrubber	Inactive	BC9	System Removed				KYD-1483
1.37	Instrument Decontaminati on	Liquid	Unknown	Discard Waste System	Inactive	A7				E4-142-M E4-115-M	

Table 1

CHEMICAL CLEANING INSTRUCTIONS

MATERIAL	STEP 1 DEGREASER (MINUTES)	STEP 2 ALKALI (MINUTES)	STEP 3 WARM WATER	STEP 4 TROXIDE (MINUTES)	STEP 5 COLD WATER	STEP 6 CHROMIC ACID (MINUTES)	STEP 7 NITRIC ACID (MINUTES)	STEP 8 COLD WATER	STEP 9 HOT WATER
MONEL F_2 GENERATOR PARTS	NONE	45	D-3 *	20-30	D-3 *	10	–	D-3 *	D-3 *
STEEL F_2 GENERATOR PARTS	NONE	45	D-3	20-30	D-3	NONE	–	NONE	D-3
COPPER F_2 GENERATOR PARTS	NONE	45	D-3	20-30	D-3	5	–	D-3	NONE
MONEL PIPE & EQUIPMENT	5-30	5	D-3	10-20	D-3	10	–	D-3	D-3
STEEL PIPE & EQUIPMENT	5-30	20-30	D-3	30-40	D-3	NONE	–	NONE	D-3
COPPER TUBING & EQUIPMENT **	5-30	30	D-3	30	D-3	5	–	D-3	D-3
STAINLESS STEEL PIPE & EQUIPMENT	5-30	5	D-3	10-15	D-3	NONE	–	NONE	D-3
ALUMINUM PARTS (WITH OXIDE FILM)	20-60	5(MAX)	D-3	D-3 STEEL TANK	PRESSURE RINSE	20	–	D-3	NONE
STAINLESS STEEL (LLL)	5-30	20-30	D-3	–	–	–	30-45	–	D-3

NOTE * = (D-3 MEANS DIP THREE TIMES)

** THE HCL TANK CAN ALSO BE USED FOR PICKLING STEEL ITEMS AT 10 MIN. INTERVALS

TABLE 2

DATA FOR CHEMICAL CLEANING BATHS

NO	CHEMICAL NAME	CHEMICAL IN SOLUTION	TEMP °F	CHEMICAL DOSAGE LIMIT	CHEMICAL DOSAGE UNITS	GAL. 4" BELOW WEIR	GAL. FT SOL.	LIQUID DIMENSIONS W	LIQUID DIMENSIONS L	LIQUID DIMENSIONS D	CLEARANCE W	CLEARANCE L	INITIAL CHEMICAL DOSAGE	INITIAL WATER CHARGE GAL	INITIAL WATER CHARGE BELOW WEIR	CHEMICAL DOSAGE PER FOOT
1	ALKALI	ALKALINE POWDER	190	14 TO 16	OZ / GAL	24,900	2,820	8'-2"	46'-2"	9'-2"	7'-8"	45'-8"	22,700 LB.	22,700	1'-2"	2,820 LB.
2	WARM WATER		180			24,900	2,820	8'-2"	46'-2"	9'-2"	7'-8"	45'-8"		24,900	4"	
3	TROXIDE COPPER	TROXIDE-E	150	32 TO 36	OZ. TROX / GAL.	18,400	2,230	6'-8"	44'-9"	8'-7"	6'-8"	39'-9"	41,400 LB.	16,200	1'-4"	4,460 LB.
4	TROXIDE STEEL	TROXIDE-E	150	32 TO 36	OZ. TROX / GAL.	18,400	2,230	6'-8"	44'-9"	8'-7"	6'-8"	39'-9"	41,400 LB.	16,200	1'-4"	4,460 LB.
5	CHROMIC ACID	SODIUM DICHROMATE	ROOM	3-1/2 TO 4-1/2	OZ. SOD. DICHR / GAL.	18,500	2,250	6'-9"	44'-8"	8'-7"	6'-9"	44'-8"	4,500 LB.	17,500	8"	560 LB.
—	—	SULFURIC ACID		3-1/2 TO 4	% BY VOLUME *								675 GAL.			84 GAL.
6	COLD WATER		ROOM			24,900	2,820	8'-2"	46'-2"	9'-2"	7'-8"	45'-8"		24,900	4"	
7	HOT WATER		200			19,700	2,290	6'-10"	44'-9"	8'-7"	6'-10"	44'-9"		19,700	4"	
8	ACID DIP	NITRIC	ROOM	20 %	% BY VOLUME	1,800	—	8'	7'	5'	—	—	500 GAL.	977	—	—
		HYDROFLUORIC	ROOM	3 %									50 GAL.			
9	HCL	HYDROCHLORIC	130	12 %	% BY WEIGHT	10,000		7'-6"	22'	8'-6"			3,600 GAL.			

NOTE- ALL SULFURIC ACID DOSAGES ARE IN GALLONS OF 66° BE ACID.
SP. GR = 1.835 93.2 % H_2SO_4

* PERCENT BY VOLUME EQUAL (GAL 66° BE SULFURIC ACID / GAL. SOLUTION) x 100

TABLE 3

6.6 FIGURES

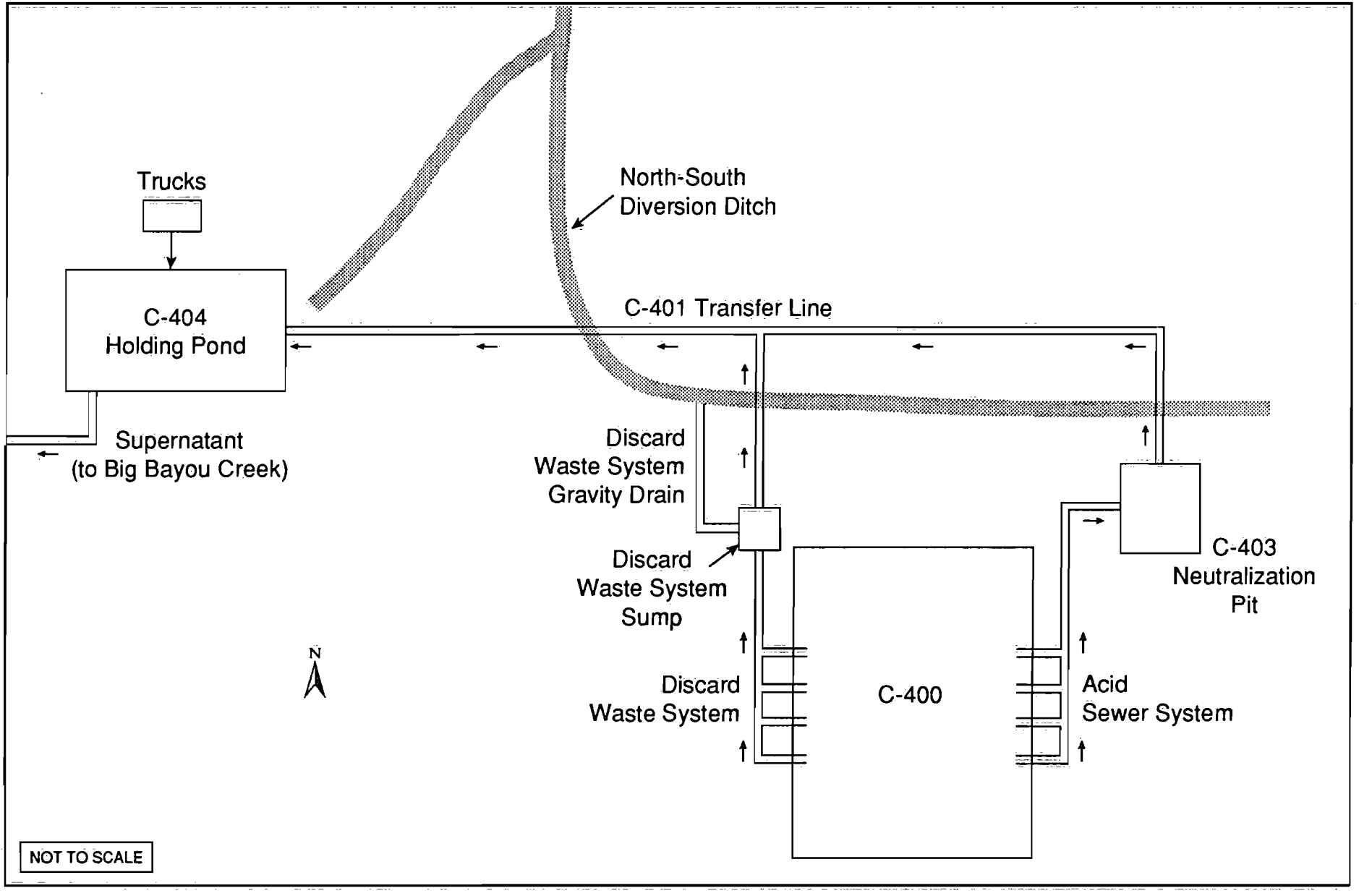


Fig. 1. C-400 pipe configuration for discard waste and acid sewer systems (through ~1957).

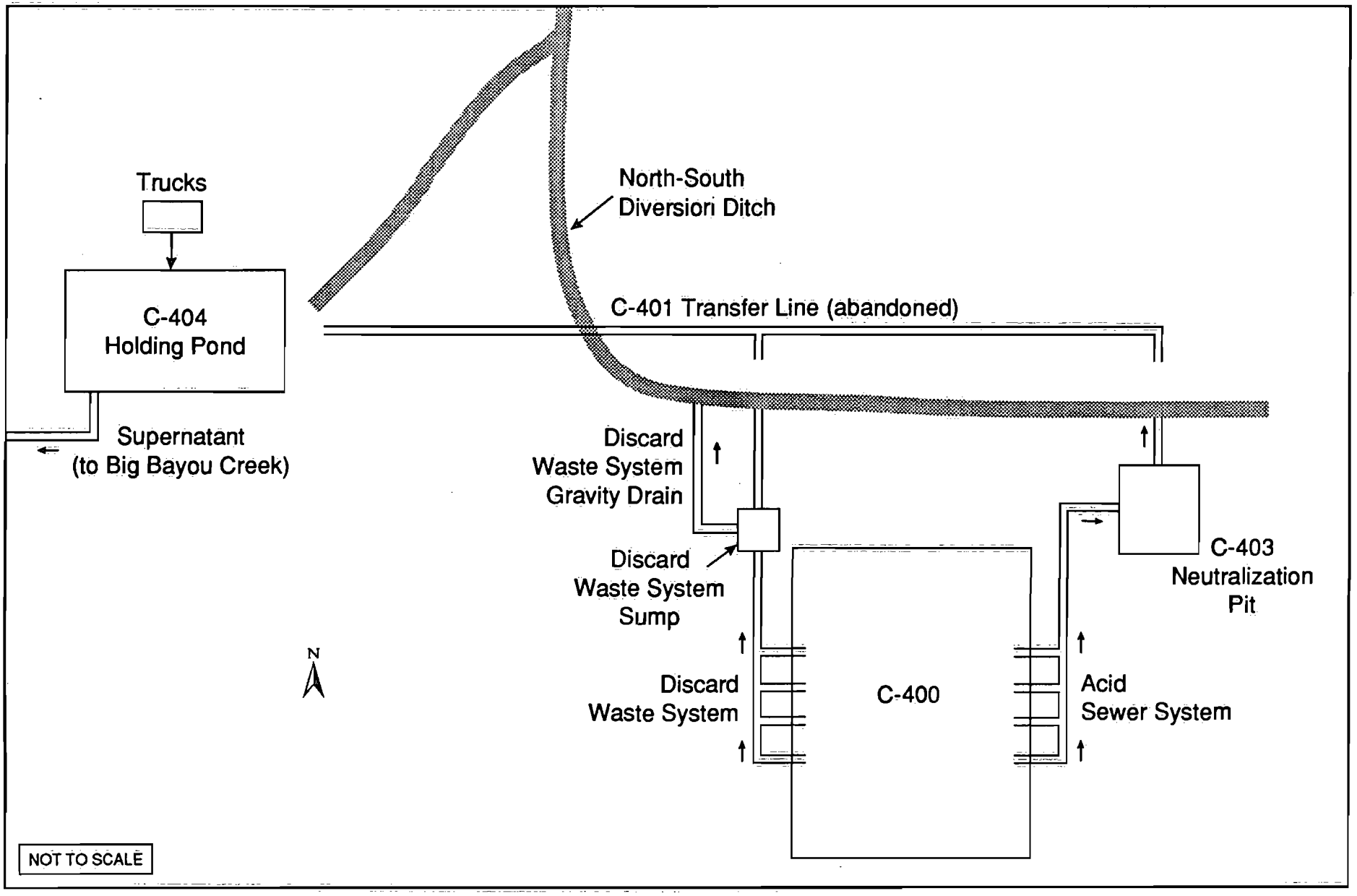


Fig. 2. C-400 pipe configuration for discard waste and acid sewer systems (~1957 through ~1960).

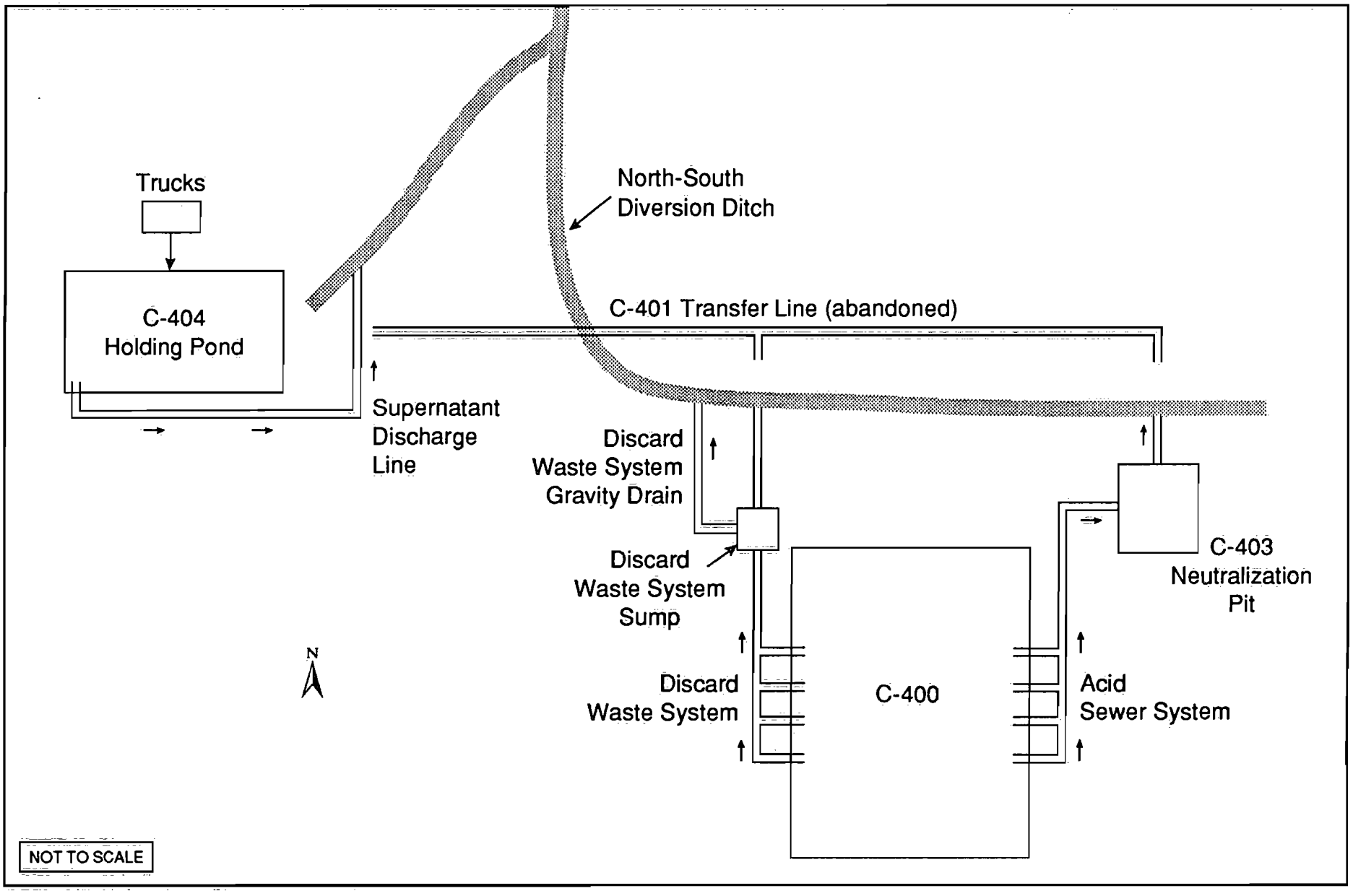


Fig. 3. C-400 pipe configuration for discard waste and acid sewer systems (~1960 through 1977).

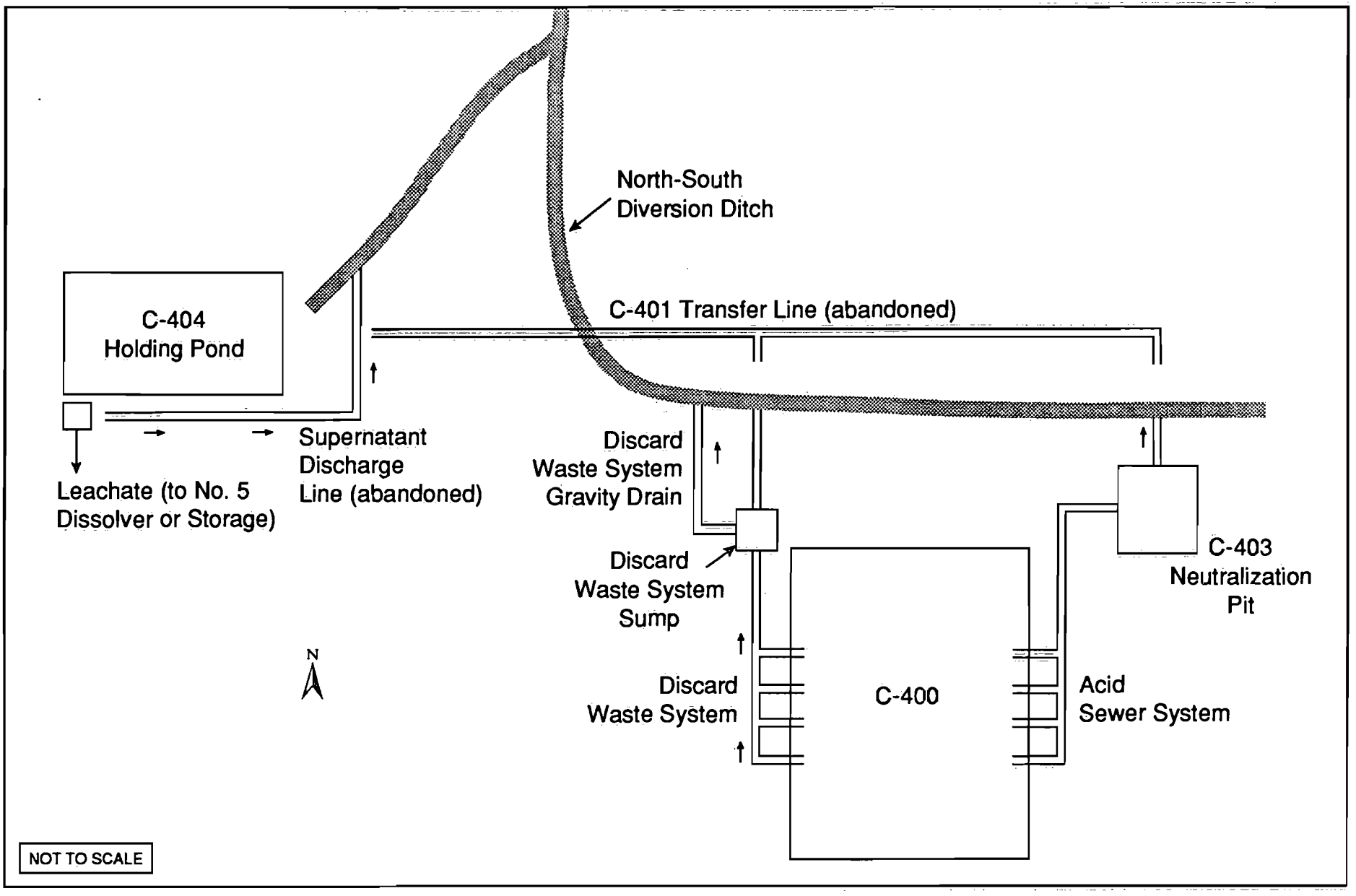


Fig. 4. C-400 pipe configuration for discard waste and acid sewer systems (present situation).

MARTIN MARIETTA ENERGY SYSTEMS, INC.
Paducah, Kentucky

Operations Division

STANDARD OPERATING PROCEDURE

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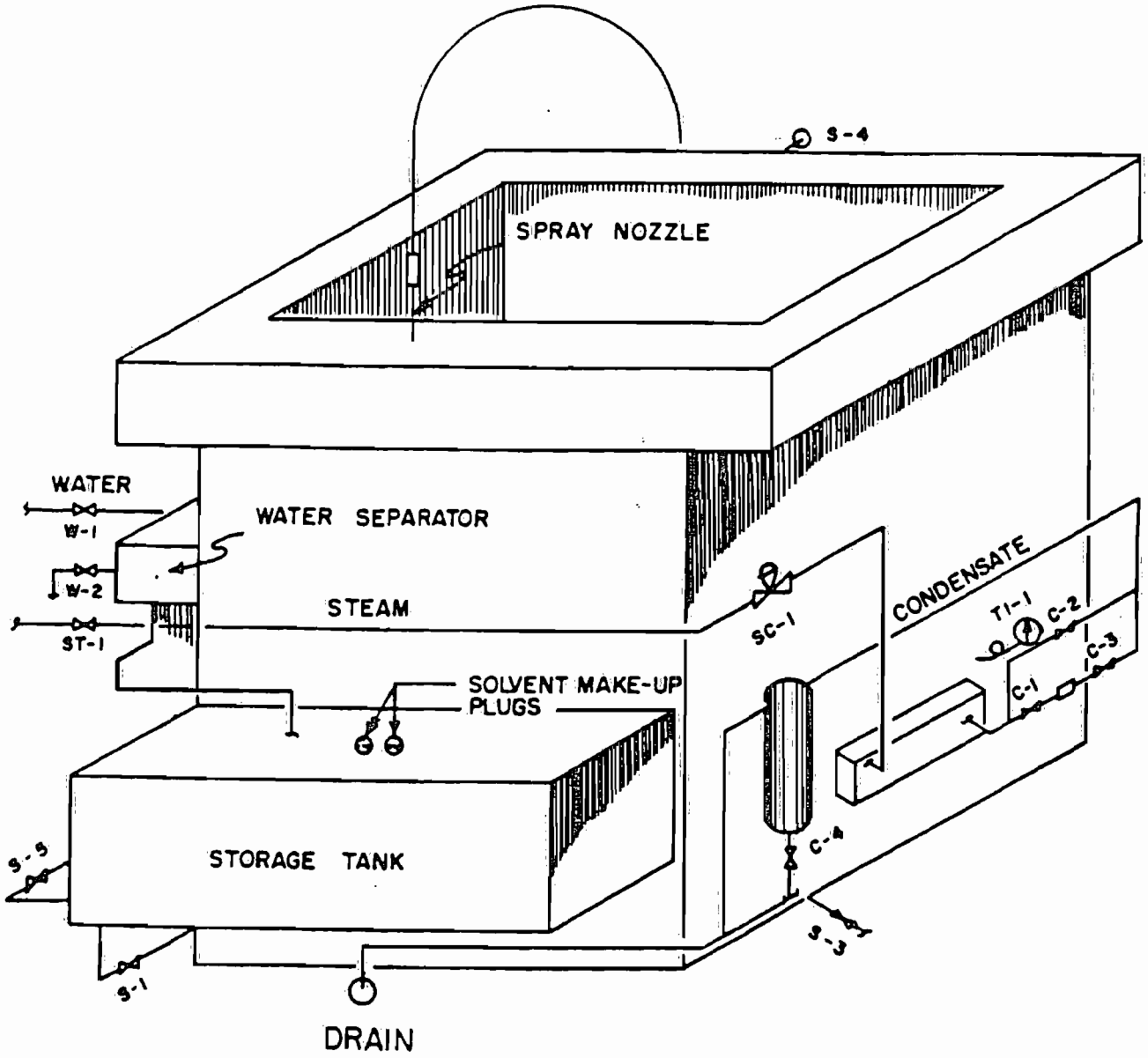
SUBJECT: OPERATION OF THE BLAKESLEE DEGREASER



SMALL DEGREASER

BLAKESLEE DEGREASER

Figure 5

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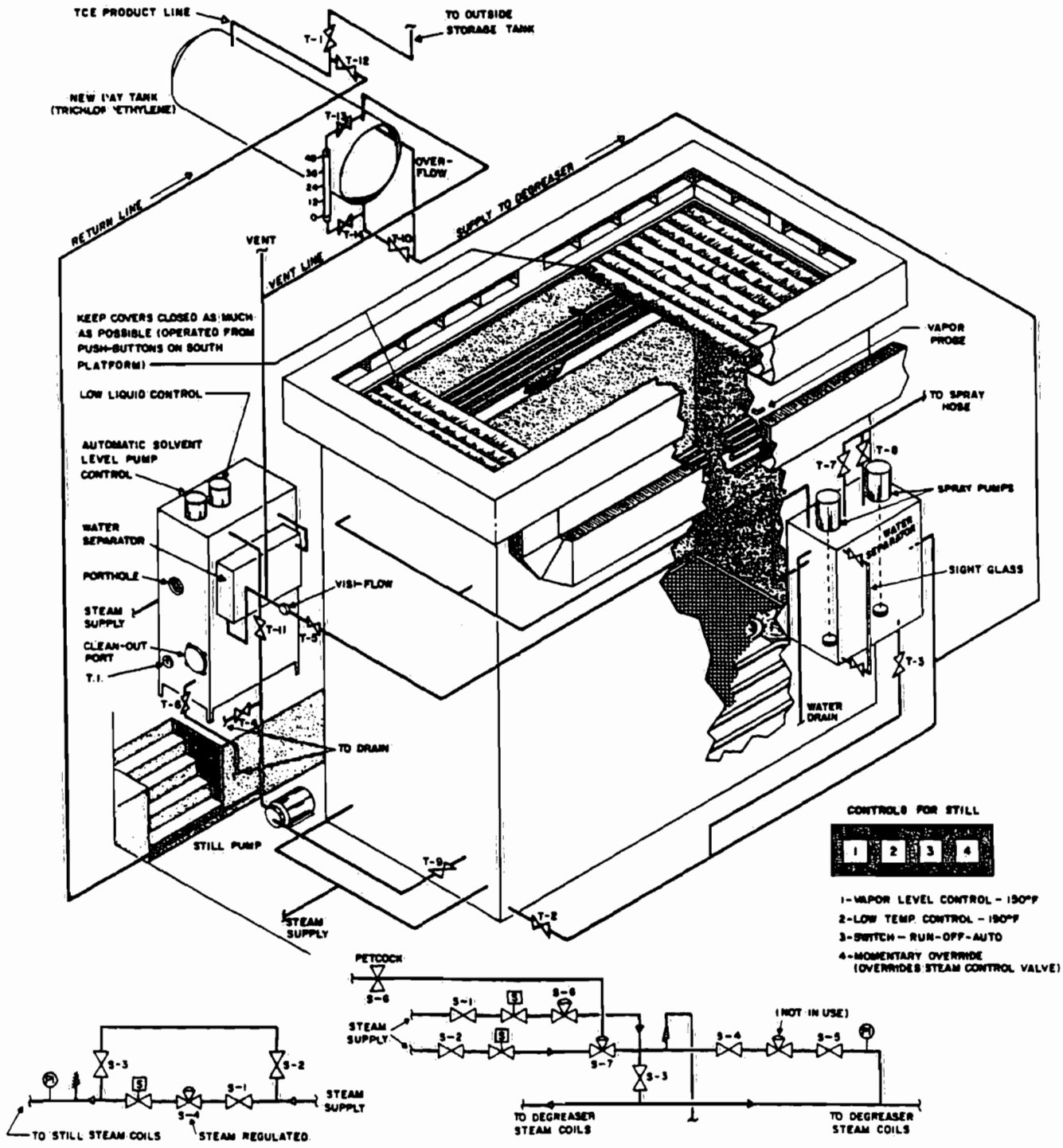
SUBJECT: OPERATION OF THE DETREX DEGREASER



DETREX DEGREASER & STILL

Figure 6

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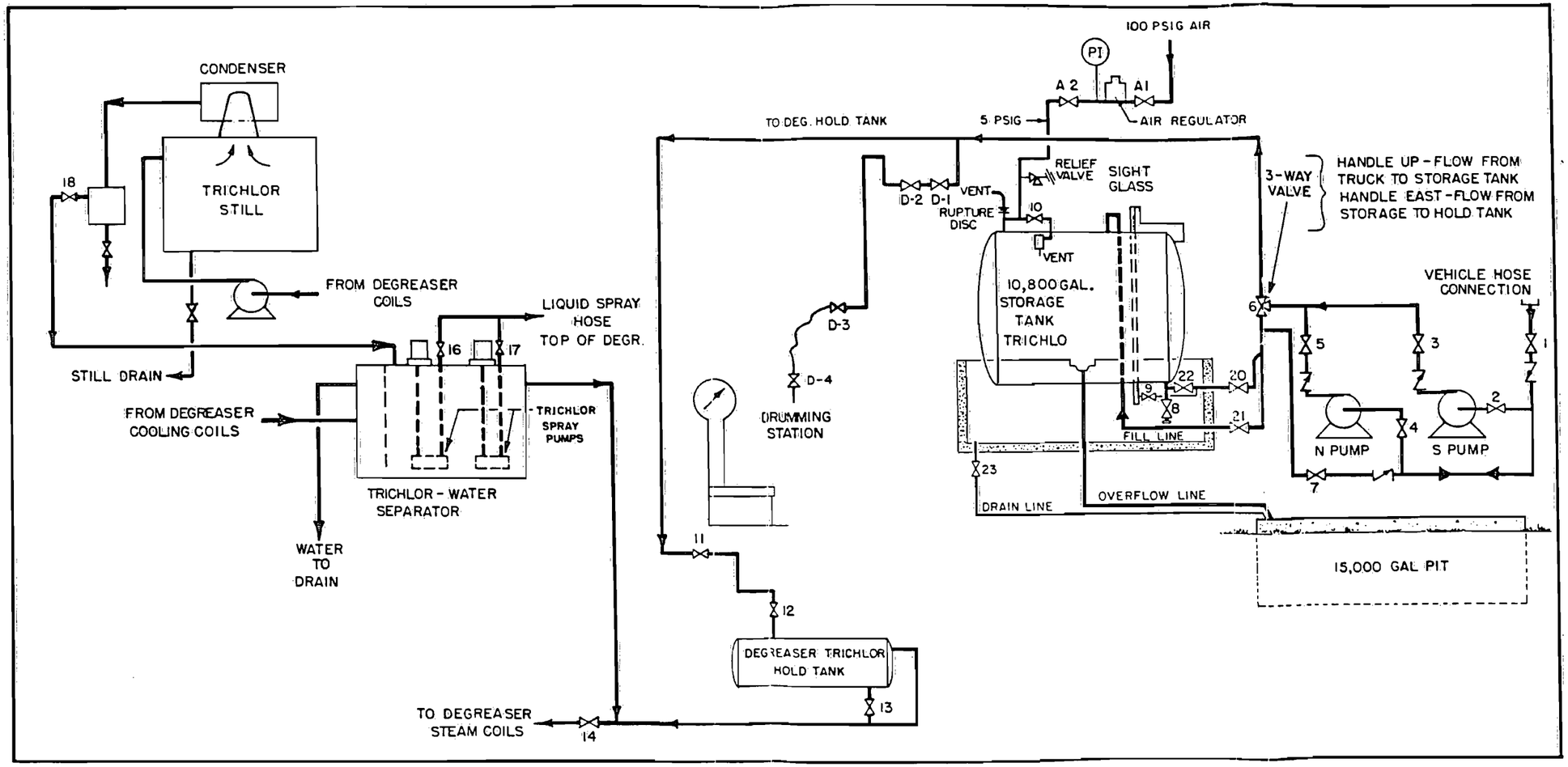

C-400 TRICHLOROETHYENE TRANSFER SYSTEM
Figure 7

Number	CH-112
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Reviewed	
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SUBJECT: URANIUM PRECIPITATION FOR RECOVERY

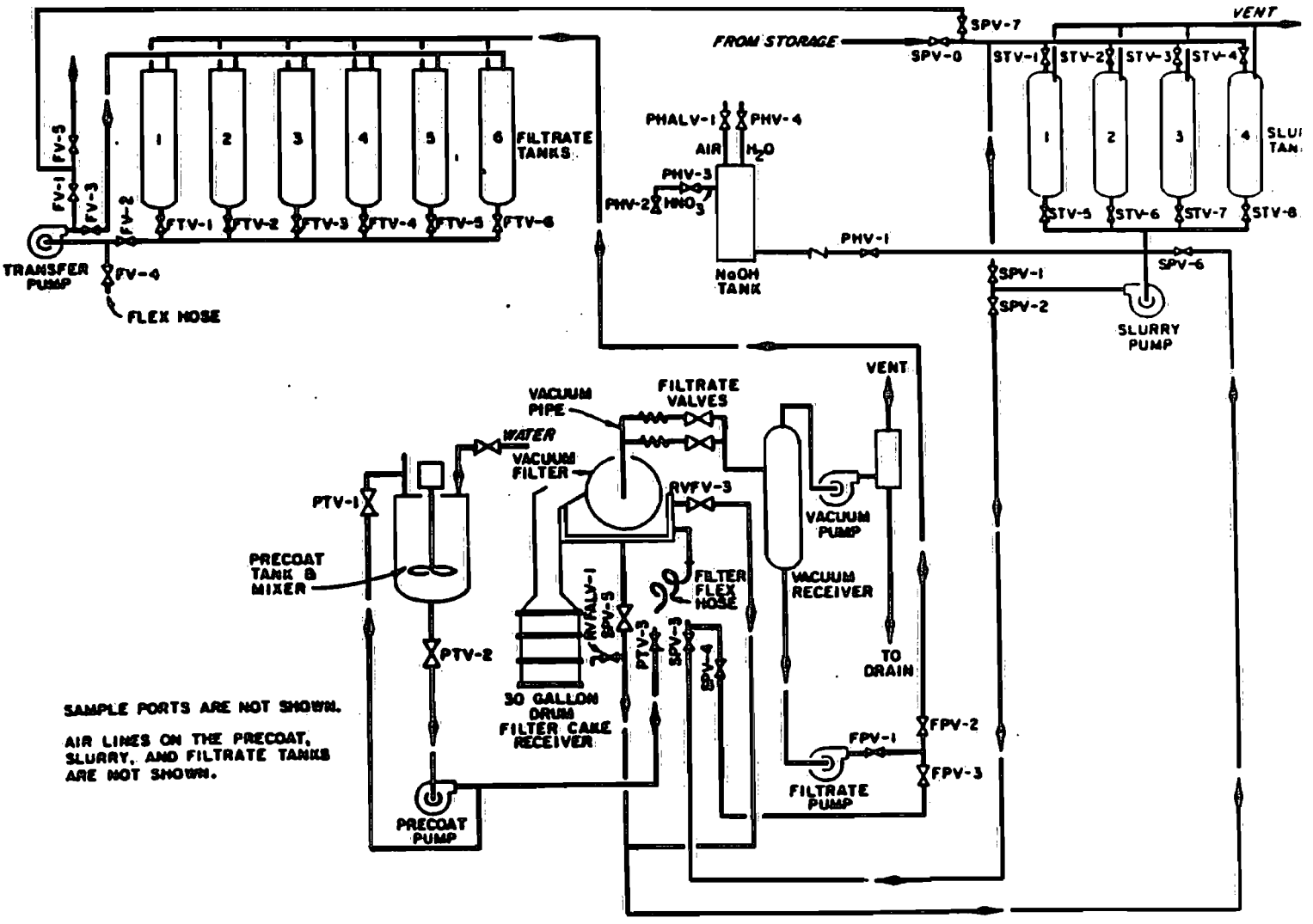

Figure 8

Number	CH-113
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Reviewed	
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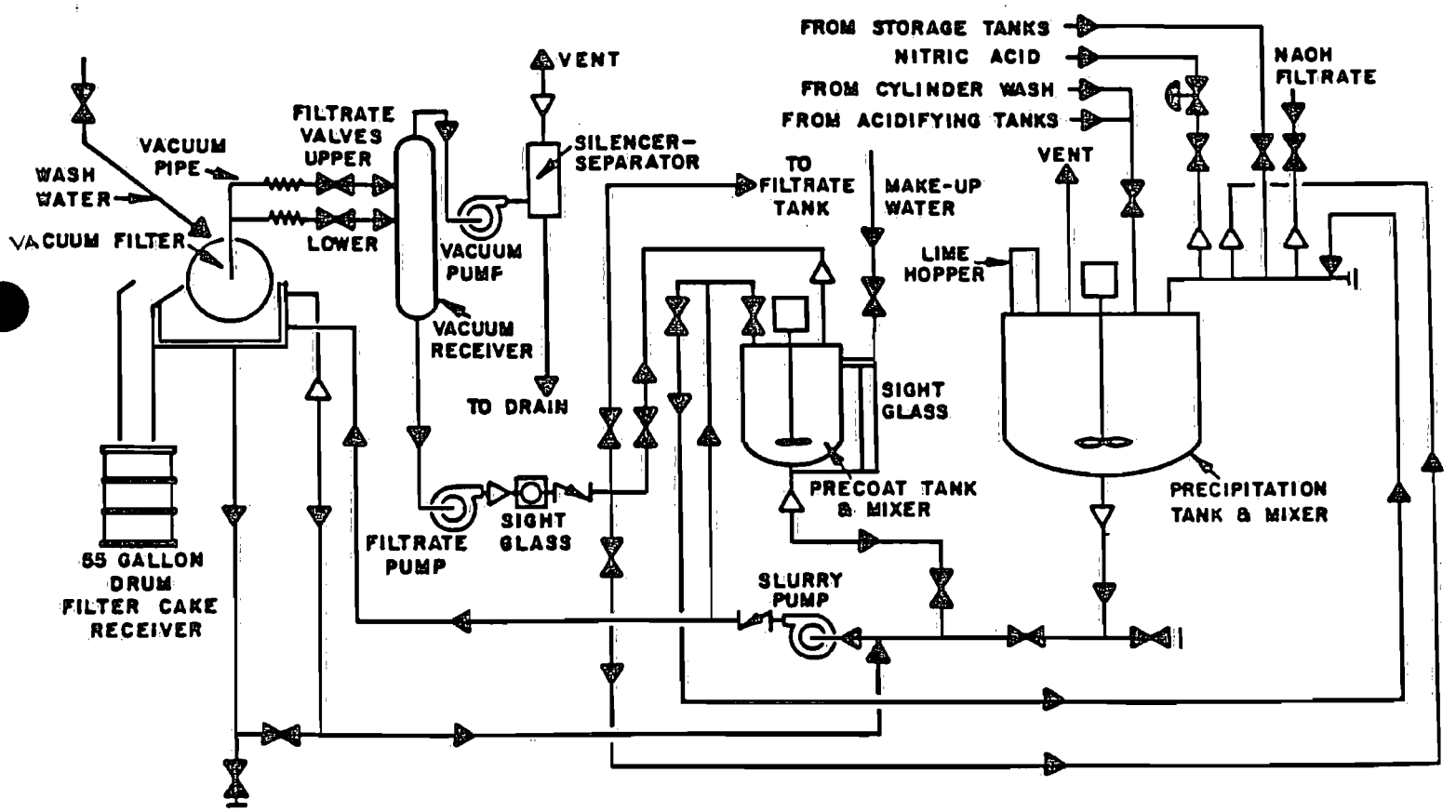
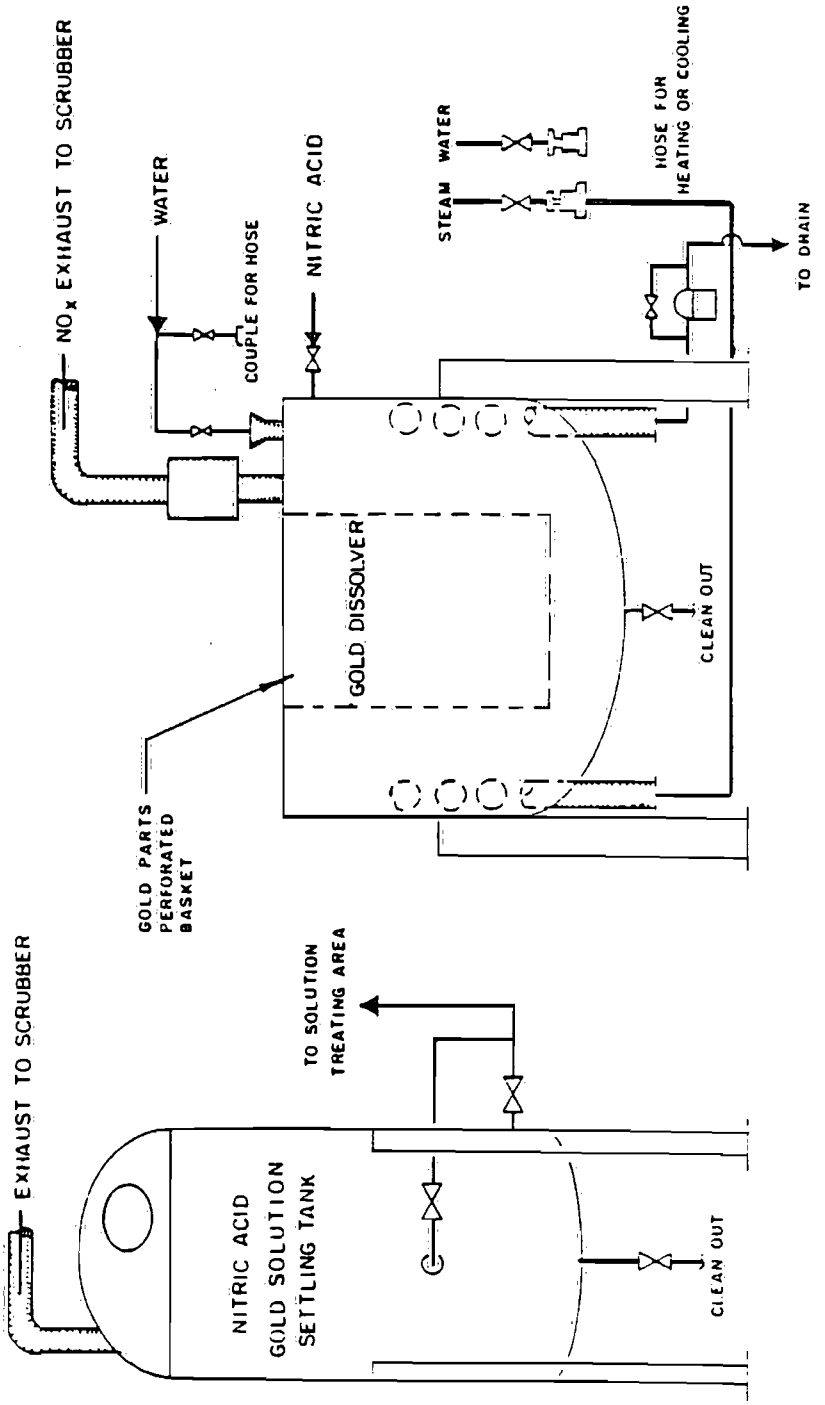
SUBJECT: URANIUM PRECIPITATION FOR DISCARD (LOW LEVEL WASTE STORAGE)

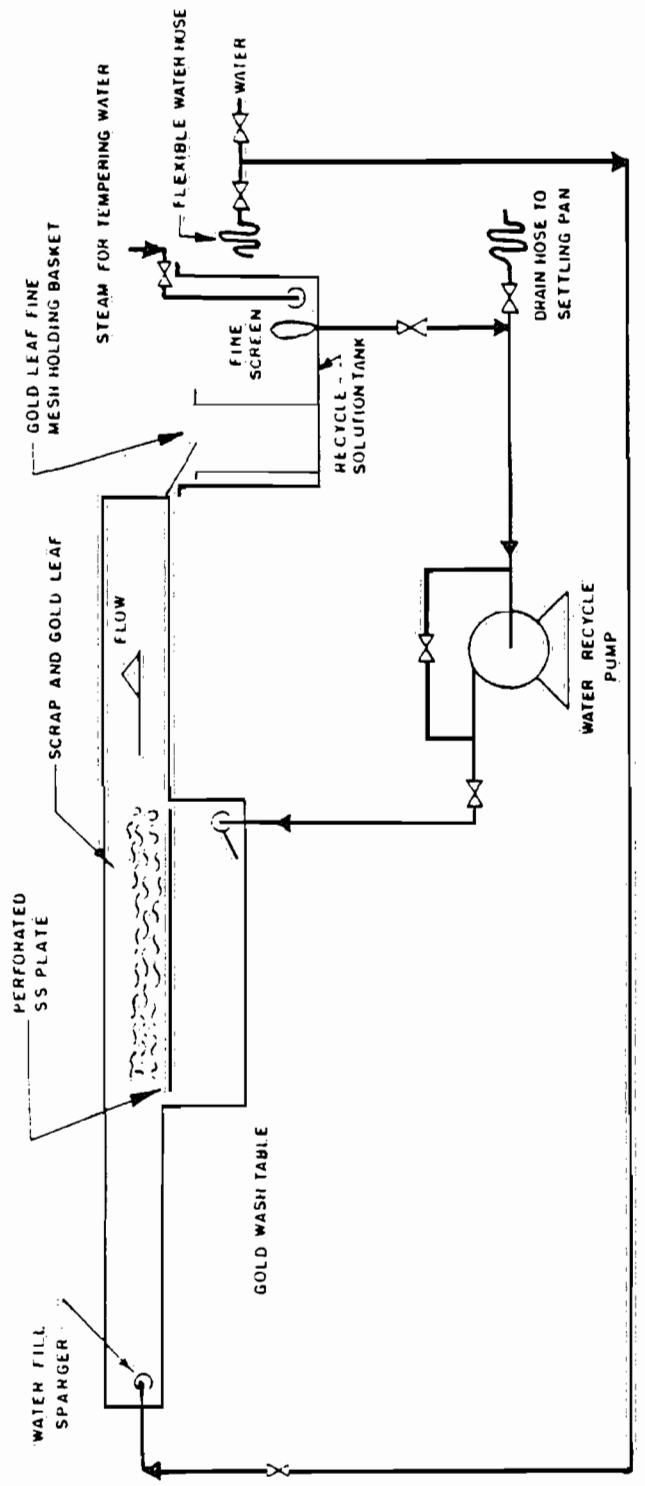


C-400 LIME PRECIPITATION SYSTE

Figure 9



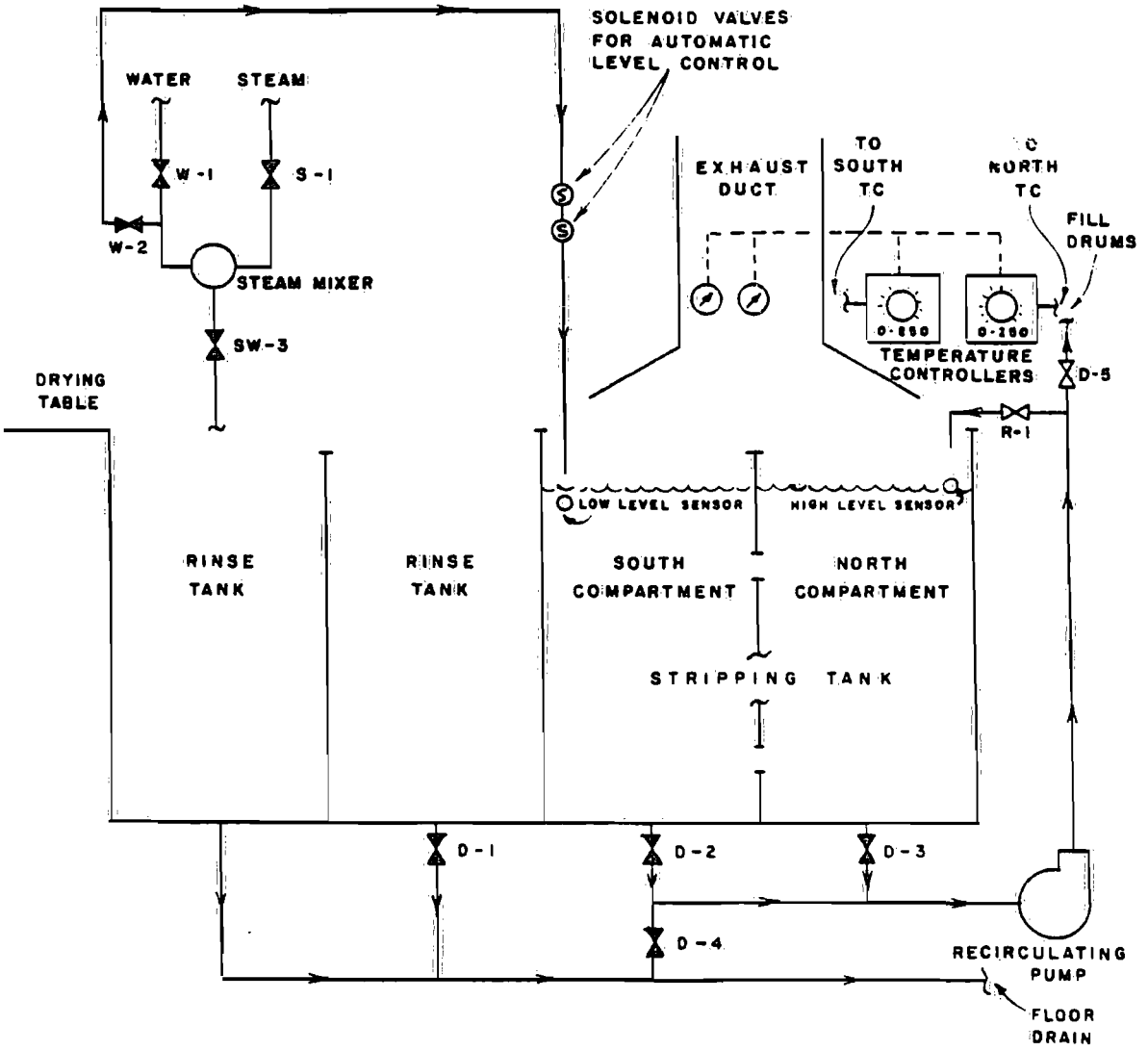
GOLD PARTS DISSOLVER AND SETTLING TANK
Figure 10



GOLD LEAF WASH TABLE

Figure 11

STANDARD OPERATING PROCEDURE
MARTIN MARIETTA ENERGY SYSTEMS, INC.
POST OFFICE BOX 1410
PADUCAH KENTUCKY 42001



Ch-107 SMALL PARTS NICKEL DEPLATING IN C-400

NICKEL STRIPPER FACILITY
Figure 12

Number	CH-353
Date	7-2-87
Page	15 of 16

SUBJECT: OPERATION OF PULVERIZER SCREENER FACILITY AND ASSOCIATED EQUIPMENT

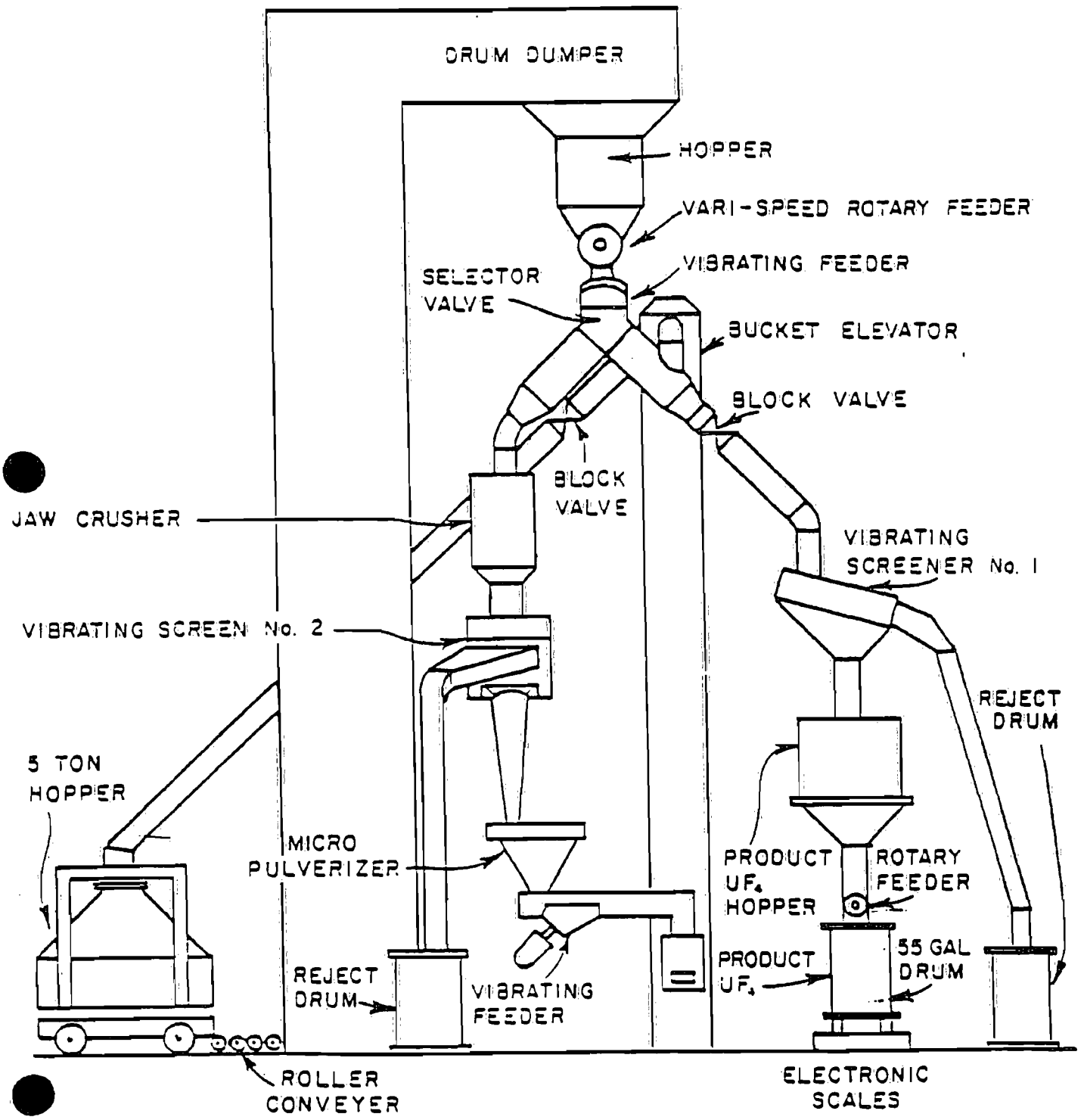


Figure 13

Number	CH-108
Date	9-27-88
Reviewed	
Page	14 of 17

JECT: OPERATION OF THE C-400 SPRAY BOOTH

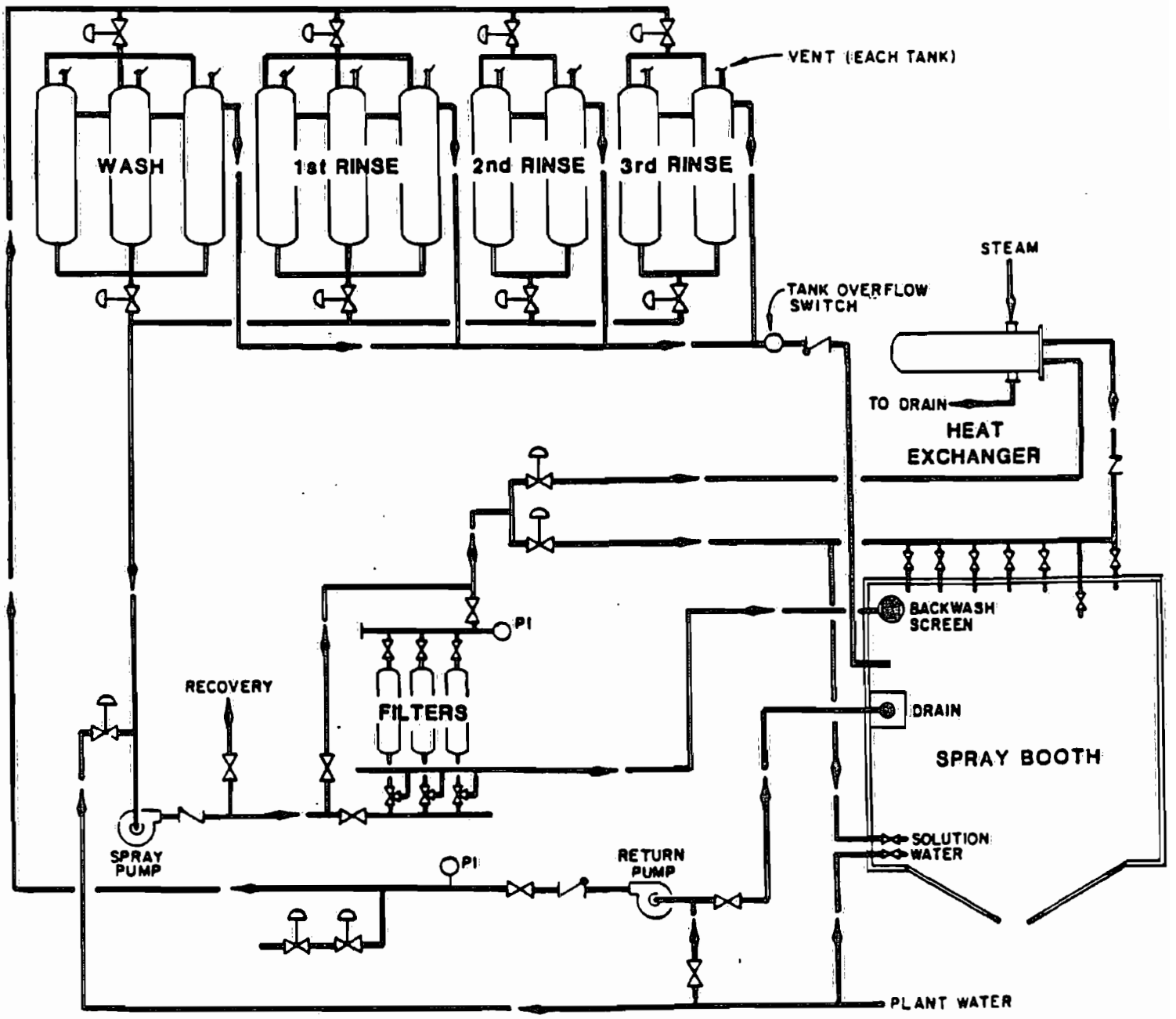


Figure 14

Number	CH-351
Date	8-27-87
Page	5 of 5

SUBJECT: NITRIC ACID HANDLING, C-400

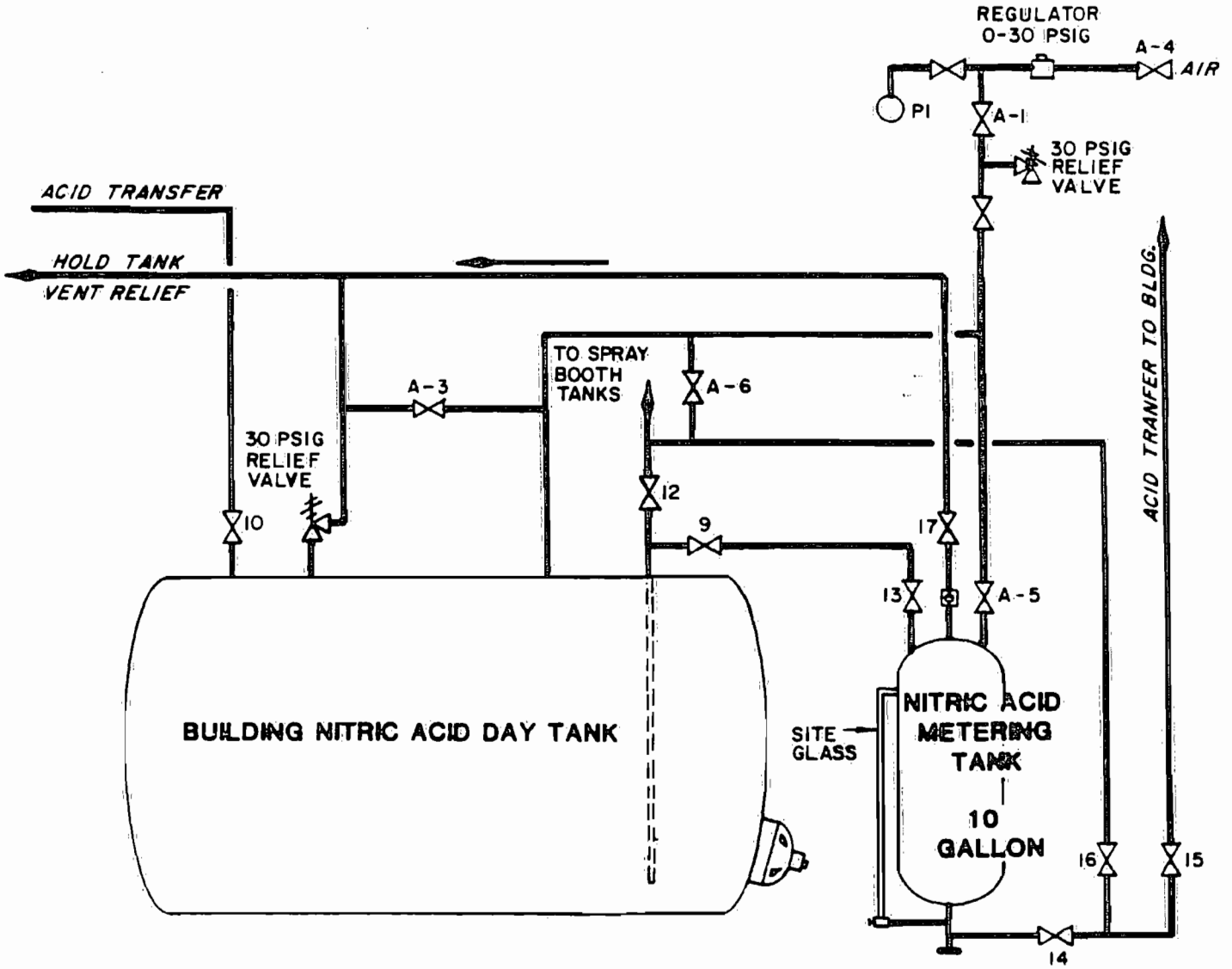
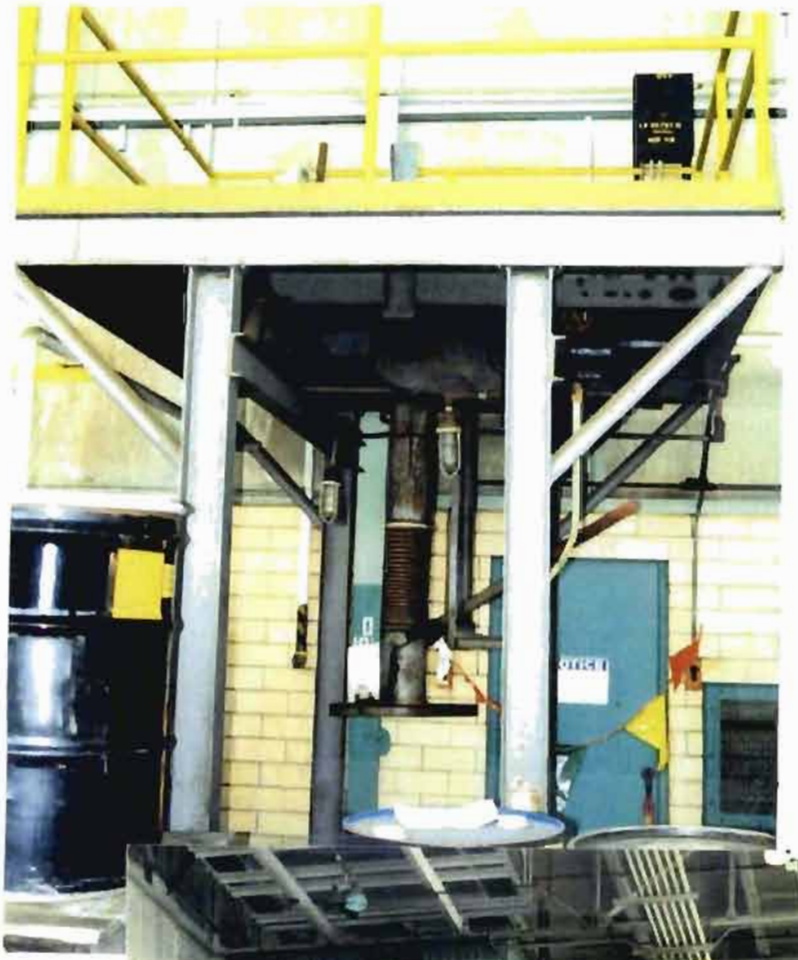


Figure 15

6.7 PHOTOGRAPHS

1. Receiving Booth

2. Scrubber



3. Hopper Transfer Stand

4. Pulverizer Unit

5. Nitric Acid Scrubber

6. Cleaning Tanks

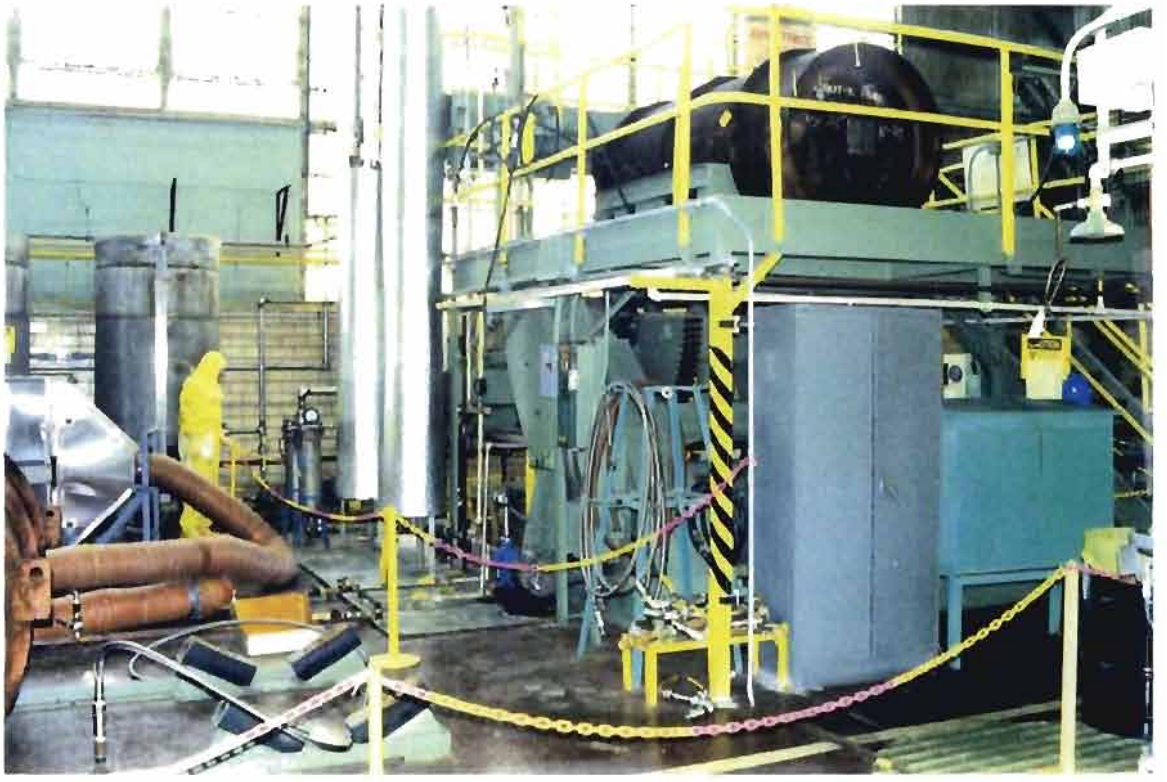
7. Cleaning Tanks

8. Compressor Pit

9. Compressor Pit

10. Compressor De-Blade Stand

11. Cubicle Area

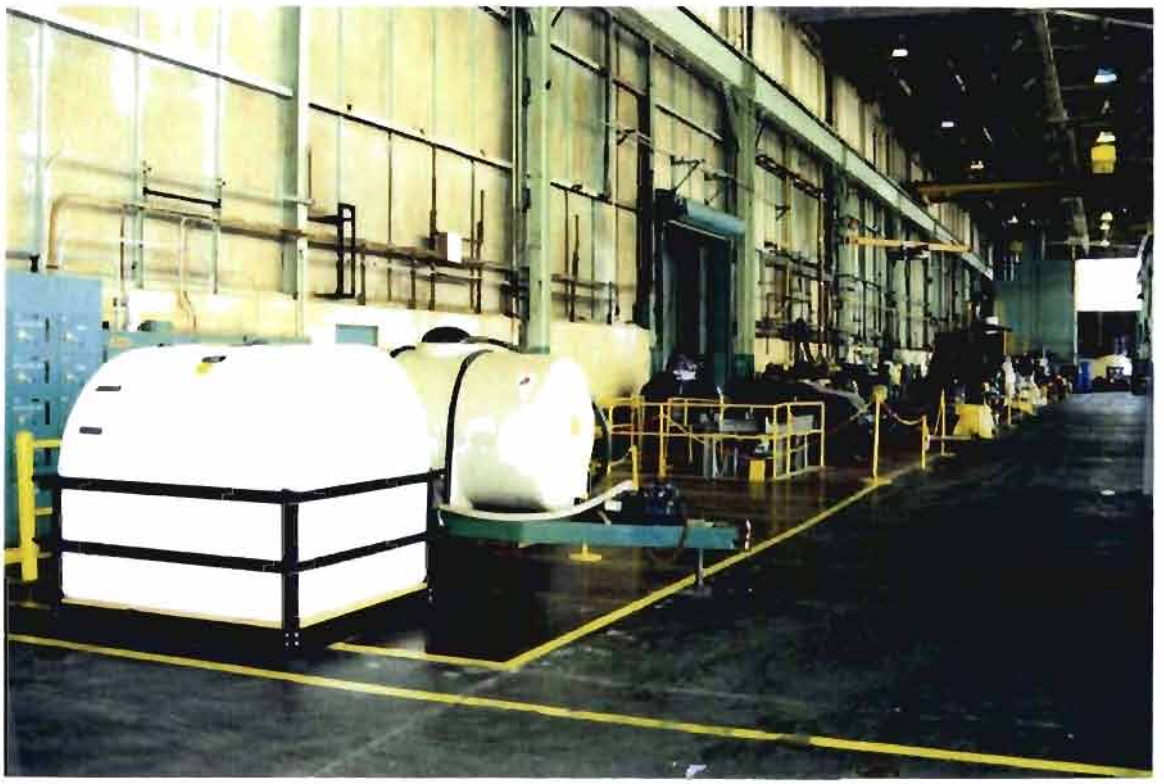


12. Cylinder Wash Area

13. Blakeslee (Small) Degreaser

14. Detrex (Large) Degreaser

15. Diffusion Equipment and
Scrap Removal Area - South



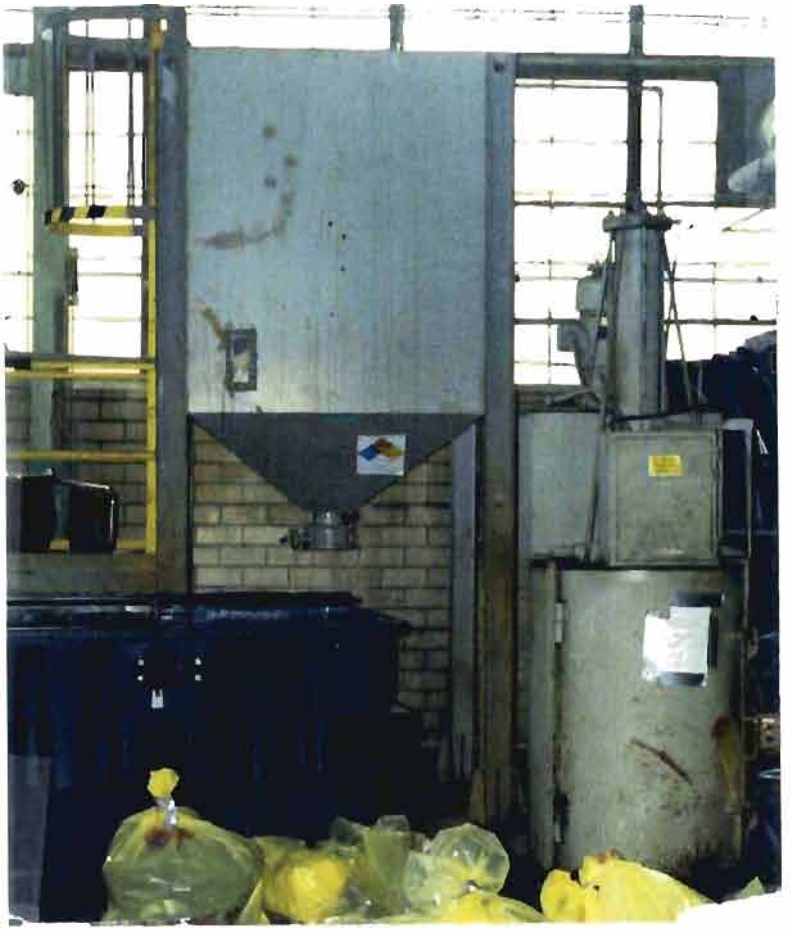
16. Diffusion Equipment and
Scrap Removal Area - North

17. Dissolver No. 1 (Alumina)

18. Dissolver No. 4
(Sodium Hydroxide)

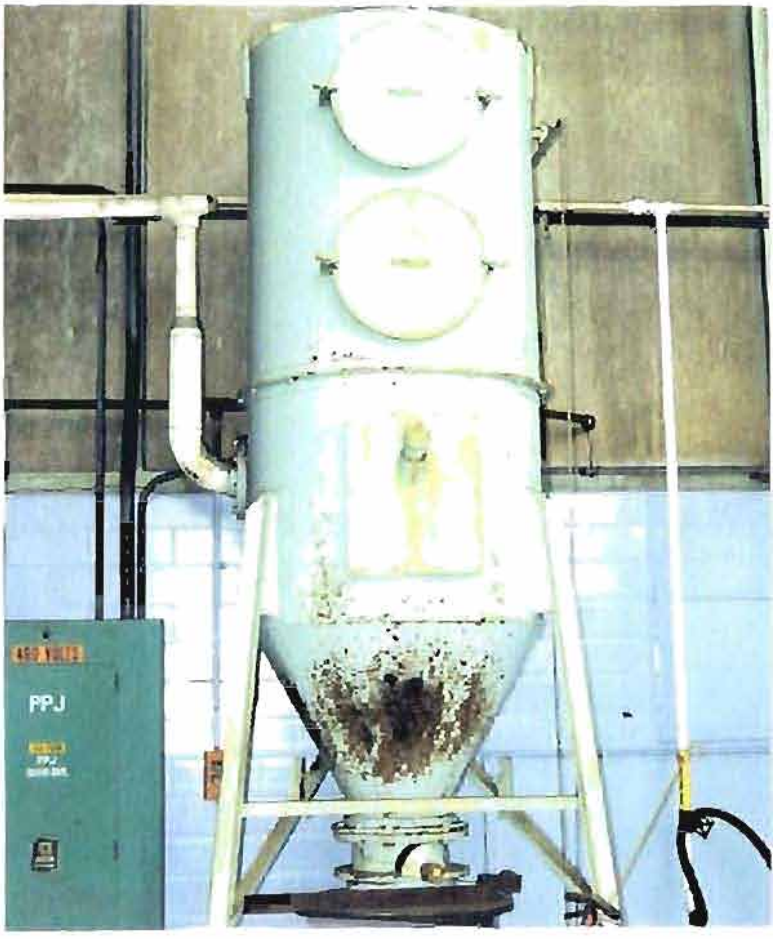
19. Dissolver No. 5

20. Drum Washer

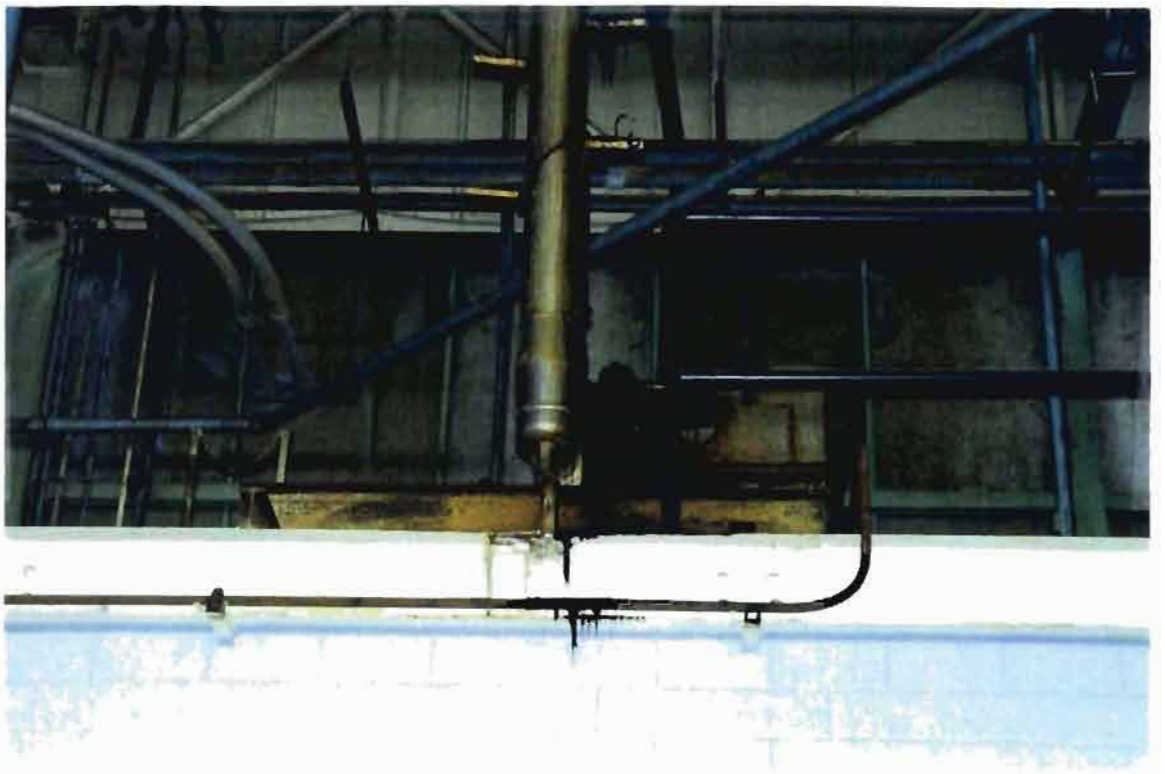


21. Drum Crusher

23. Dust Collecting Unit

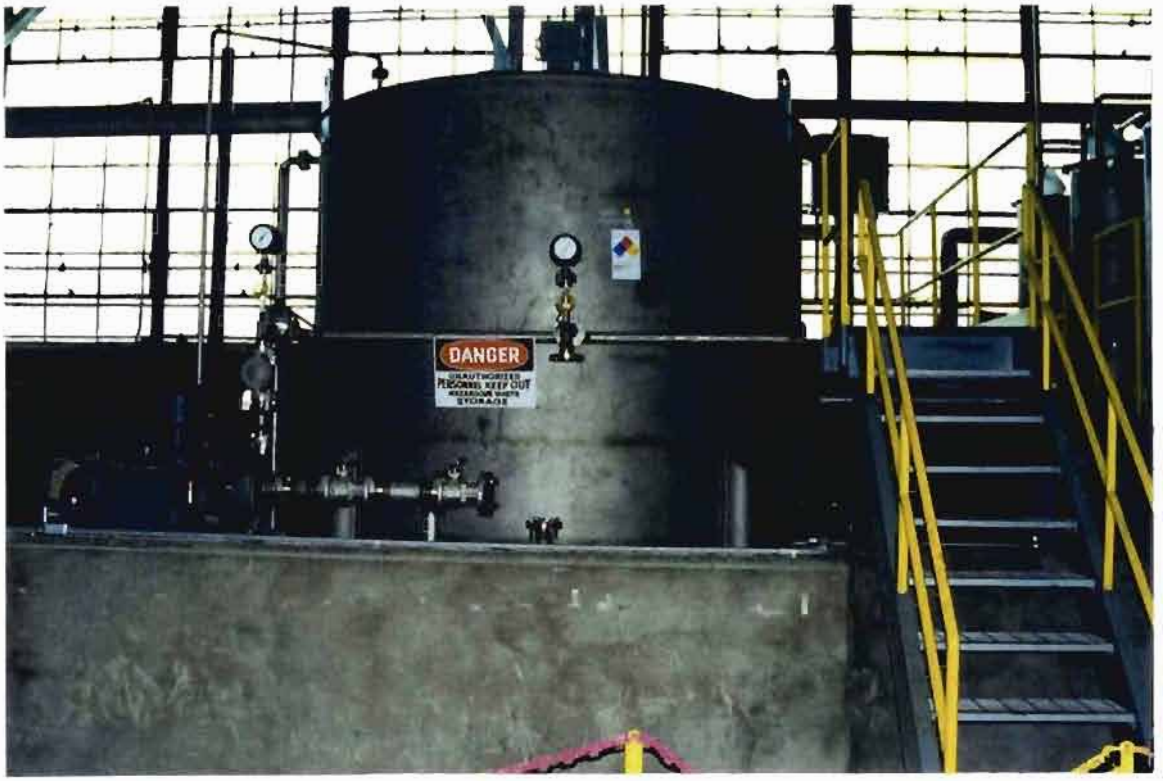


22. Dust Collecting Unit



24. Jet Vacuum Unit

25. Gold Dissolver Solution Tank



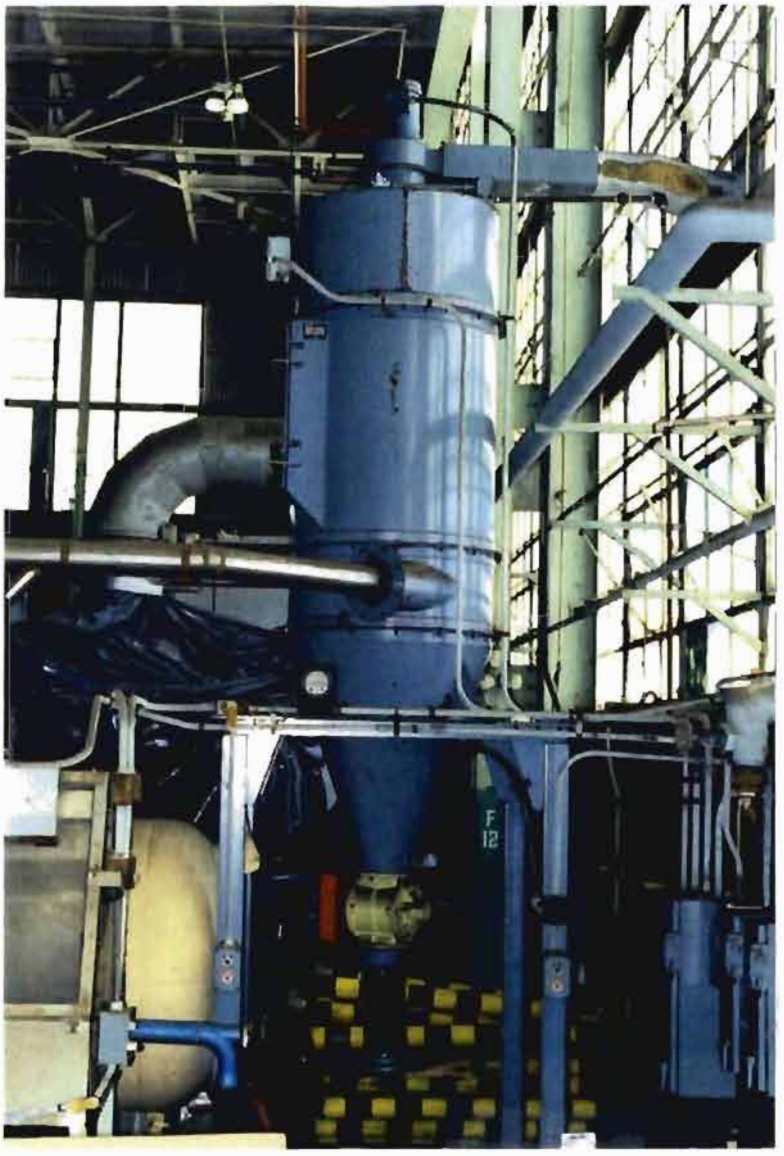
26. "Gold Dissolver" Tank
(Unused)

27. Hand Tables

28. Dry Honer (Large)

29. Dry Honer (Small)

30. Laundry Area



31. Metal Cut Saw, Hood and Vacuum

32. Cylinder Freezedown Facility

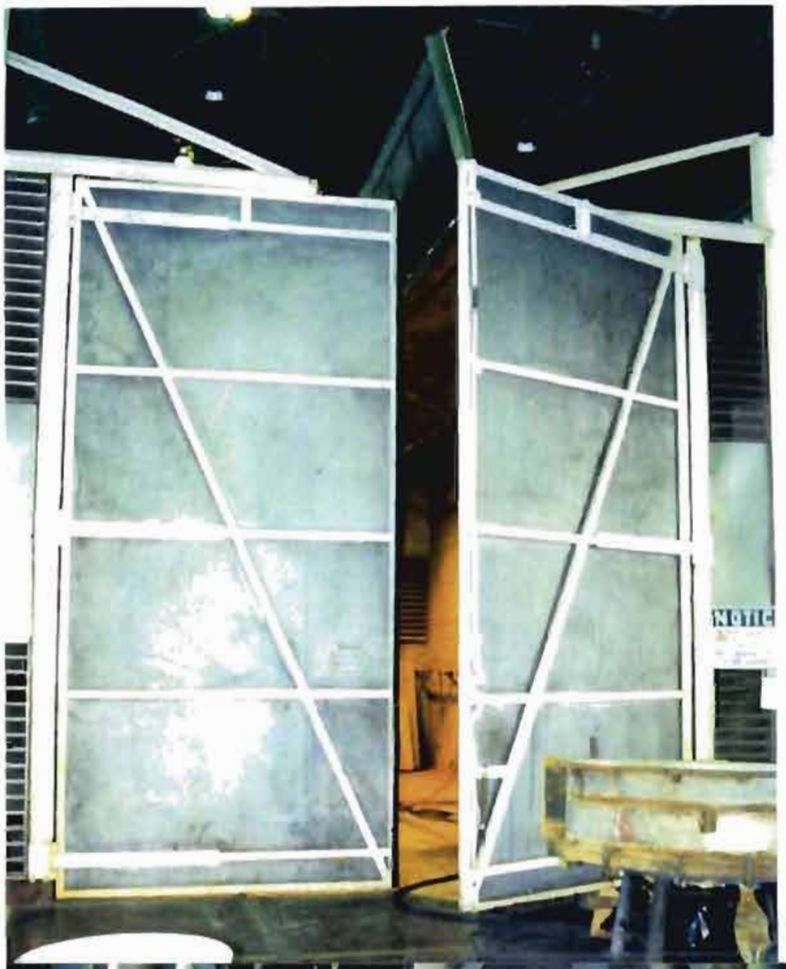
33. Trap Mix Regeneration Stand

34. Pulverizer Reject Drum

35. Seal Disassembly Area

36. Seal Inspection Area

37. Safety Equipment Cleaning Area



38. Spray Booth

39. Spray Booth Tanks

40. Nitric Acid Tank