Department of Energy
Oak Ridge Operations
Paducah Site Office
P.O. Box 1410
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December 18, 2001

Mr. Jeffrey L. Crane
Federal Facilities Branch
Waste Management Division
United States Environmental Protection Agency
Region IV
61 Forsyth Street
Atlanta, Georgia 30303

Mr. Michael V. Welch, P.E.
Manager
Hazardous Waste Branch
Kentucky Department for Environmental Protection
14 Reilly Road, Frankfort Office Park
Frankfort, Kentucky 40601

Dear Mr. Crane and Mr. Welch:

TRANSMITTAL OF THE PROCESS KNOWLEDGE REVIEW OF HISTORIC DISCHARGES TO THE NORTH-SOUTH DIVERSION DITCH WHITE PAPER AND THE WASTE DETERMINATION FOR CONTAMINATED SOILS ASSOCIATED WITH THE NORTH-SOUTH DIVERSION DITCH, PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY

Enclosed for your information are two white papers. The first one, titled *Process Knowledge Review of Historic Discharges to the North-South Diversion Ditch (NSDD)*, includes the results of a process knowledge review intended to identify potential discharges that historically contributed contaminants to the NSDD. That study concluded that the Resource Conservation and Recovery Act (RCRA) "listed" wastes have, more likely than not, been discharged to the NSDD during past operations.

The second white paper sets forth a proposed basis for handling waste media deemed to be contaminated with listed wastes as a result of the conclusions from the Process Knowledge Review. It includes proposed health-based levels to help support a decision on when excavated soils from the NSDD should not be managed as a RCRA "listed" waste. Since the Kentucky Division of Waste Management (KDWM) has been delegated authority for the RCRA program, the proposed determination on when the soils can be deemed to "no longer contain" listed waste must be made by KDWM. Also, since this is part of a Comprehensive Environmental Response, Compensation, and Liability Act remedial action, it will also need to be documented in the Record of Decision for the Environmental Protection Agency's (EPA) consideration.

If the enclosed information is satisfactory, please sign below acknowledging your approval/concurrence of the proposed waste determination and return it to the Department of Energy by January 18, 2002. If you have any questions or require additional information, please call David W. Dollins at (270) 441-6819.

Sincerely,

W. Don Seaborg, Site Manager
Paducah Site Office

I hereby acknowledge and approve the determination that the NSDD soils no longer contain listed hazardous waste as long as the listed constituents are below the risk-based standards specified by the proposed waste determination.

Jeff Crane, EPA

Mike Welch, Commonwealth of Kentucky

Enclosures

cc w/enclosures:
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North-South Diversion Ditch Waste Determination Criteria

1. INTRODUCTION

Excavation and disposal of contaminated soils has been identified as the preferred remedial alternative under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for the North-South Diversion Ditch (NSDD). Under the proposed action, the excavated soils will be characterized and, depending on contaminant concentrations present, will be designated for disposal in an appropriate on-site or off-site disposal facility (e.g., U-landfill). Any soils under consideration for disposal in the U-landfill will have to meet the waste acceptance criteria (WAC) established by the Solid Waste Permit as well as the disposal criteria being developed under a CERCLA risk/performance evaluation.

In addition to meeting WAC, to be disposed in the U-landfill, the soils must be non-RCRA hazardous wastes (because the U-landfill is not a hazardous waste disposal unit). Therefore, this analysis discusses:

1. Regulatory requirements and policies for determining the regulatory status (i.e., contained in policy) of NSDD soils.
2. Whether listed wastes discharged into the NSDD.
3. Whether the NSDD soils should be determined to be non-hazardous.
4. When RCRA LDRs will apply for NSDD soils.

This paper analyzes the latest available data and summarizes the applicable polices to inform these decisions.

Kentucky, as a state authorized to make RCRA waste determinations, and EPA, under its CERCLA authority, will approve how the NSDD soils will be managed. In particular, it is the role of Kentucky to make the determination whether environmental media found to contain listed waste constituents at levels below health-based standards may be considered to no longer contain those listed hazardous constituents.

2. WHAT ARE REGULATORY REQUIREMENTS FOR DETERMINING IF RCRA HAZARDOUS WASTE WERE DISPOSED IN NSDD?

The Resource Conservation and Recovery Act (RCRA) and corresponding State law regulates certain solid wastes as hazardous wastes. In particular, regulations found at 401 KAR Chapters 30 through 40 (40 CFR Parts 260 through 270 in the Federal requirements) establish the applicable regulatory program. For a material to be a hazardous waste it must first meet the definition of solid waste as defined by statute and regulation. Once a material has been determined to meet the definition of a solid waste, it is a hazardous waste if it is not excluded under regulation and meets one of the following criteria:

- Characteristic: A solid waste is a "Characteristic" hazardous waste if it is corrosive, reactive, ignitable, or the concentrations of certain constituents exceed certain concentrations using the Toxiclty Characteristic Leaching Procedure (TCLP); or,

- Listed: A solid waste is a "Listed" hazardous waste if it originated from certain non-specific sources (F-Listed), certain specific sources (K-Listed), or it is a discarded commercial/off-specification chemical product (U/P-Listed).

When making a hazardous waste determination, the regulations allow the generator to use analytical testing or process knowledge as the basis for making such a determination. With regard to making a

"listed" determination in the context of management of CERCLA generated waste media, EPA guidance, *Management of Remediation Wastes*, October 1998, states the following:

> "Where a facility owner/operator makes a good faith effort to determine if a material is a listed hazardous waste but cannot make such a determination because documentation regarding a source of contamination, contaminant, or waste is unavailable or inconclusive, EPA has stated that one may assume the source, contaminant or waste is not listed hazardous waste and, therefore, provided the material in question does not exhibit a characteristic of hazardous waste, RCRA requirements do not apply."

This discussion evaluates the readily available process knowledge and existing analytical data to support a hazardous waste determination for the contaminated soils in the NSDD. Such a determination will have to consider both "listed" and "characteristic" criteria.

Because the NSDD ditch was used as a conveyance for effluents regulated under the Kentucky Pollutant Discharge Elimination System (KPDES) permit authorized pursuant to the Clean Water Act (CWA), it is important to understand if any RCRA related exemptions/exclusions could apply. As noted above, a "hazardous waste" is defined as a "solid waste" that either exhibits a "characteristic" or meets certain "listing" criteria contained in the regulations. Section 3 and 4 of 401 KAR 31:010 (40 CFR 261.3/261.4) specifically excludes certain wastewater discharges from the definition of "solid waste" and "hazardous waste" if the subject discharge meets specific criteria and is authorized under the Clean Water Act (CWA). However, these exclusions only apply to the effluents being discharged. Therefore, just as sludge becomes subject to a hazardous waste determination once it is removed from an exempt wastewater treatment unit, any soil/sediment (as media) that becomes contaminated from contact with KPDES permitted effluents is subject to a hazardous waste determination once it is excavated.

3. ARE LISTED WASTE PRESENT IN THE NSDD – SUMMARY OF HISTORIC DISCHARGES TO THE NSDD?

Although it is impossible to identify the origin of every contaminant that was ever discharged to the NSDD since commencement of plant operations in the 1950's, this discussion attempts to summarize key information on the principle contributors identified in a document titled, Process Knowledge Review of Historic Discharges to the North-South Diversion Ditch, as well as other readily available information. The following areas are believed to have been the primary sources of effluent historically discharged to the NSDD:

- C-403 Neutralization Pit
- C-400 Northwest Sump
- C-410 Neutralization Lagoon
- C-600 Steam Plant Fly Ash
- Storm water runoff

The following section discusses each of these sources in greater detail.

3.1 C-403 NEUTRALIZATION PIT

The C-403 Neutralization Pit was constructed in the early 1950's and operated through the 1990's. It was originally included on the RCRA Part A Permit Application in 1984 but was later removed because it was determined to be a "permit-by-rule" wastewater treatment unit authorized under a KPDES Permit of the CWA. Over the years, the following effluents were potentially discharged to this unit:

- Acidic, uranium – bearing solutions
- Hydrostatic test water

- C-400 cleaning solution tanks
- Discharges from some floor drains
- Potential overflow from the storm sewer system when it backed-up from heavy rainfall
- Potential infiltration from contaminated groundwater

The C-403 Neutralization Pit was initially used to neutralize wastewater solutions generated by operations from the C-400 Building. The neutralization process included the storage and treatment of acidic, uranium-bearing waste solutions whereby a lime slurry was added to wastewater to raise the pH and precipitate out the uranium in the form of a low-level radioactive sludge. Once the pH was raised to the proper level (10 to 12), the effluent was discharged via the C-401 transfer line to the C-404 Holding Pond where the sludge was allowed to settle out of the solution. In the late 1950's, the C-401 transfer line was reportedly dismantled when uranium removal equipment was installed in the C-400 facility and consequently, the effluents from the C-403 pit were then re-routed to the NSDD for discharge to Little Bayou Creek via KPDES Outfall 003. In the late 70's, flow from the NSDD was routed through the C-616-F Full Flow Lagoon and to Bayou Creek via KPDES Outfall 001.

According to various documents, the C-403 Pit also received wastewater from hydrostatic testing of clean and empty uranium hexafluoride cylinders, which was conducted at the cylinder wash facility in the C-400 Building. After the wastewater was discharged to the C-403 unit and sufficient time was allowed for settling, the wastewater was then discharged to the NSDD. This operation reportedly ceased in approximately 1990.

In the mid-1980's, there was a TCE leak from one of the degreaser units on the east side of the building which drained into a collection sump in the basement adjacent to the degreaser. At that time, it was believed the sump and the adjacent floor drain discharged to the C-403 Pit via the acid drain system. Therefore, when TCE was subsequently detected in wastewater in the C-403 Pit, it was assumed to be associated with the leak that originated from the degreaser. However, during construction of a subsurface discharge line which ran from the truck loading area to the storm sewer system, significant levels of TCE contamination was discovered in the soils surrounding the connection joints of the storm sewer line. Further investigation determined that the degreaser sump actually discharged into the storm sewer system as opposed to C-403 Pit. A recent review of engineering drawings and procedures, which are discussed in greater detail in a white paper titled, *Process Knowledge Review of Historic Discharges to the NSDD*, December 2001, also concluded there was no direct discharge from the degreaser to the C-403 pit via the adjacent sump or adjacent floor drain. According to plant correspondence dated June 24, 1985, the TCE contaminated wastewater detected in the C-403 Pit was ultimately treated and discharged to the C-616 Full Flow lagoon via the NSDD.

In 1990, a DOE-EH "Tiger Team" requested that sludge in the C-403 Pit be sampled and adequately characterized. While the sample results did detect TCE at concentrations of 3.5 ppm in one of four samples, an extraction procedure (EP) toxicity test of the sludge indicated it was not "characteristically" hazardous under RCRA. At that time, the Department of Energy (DOE) requested its contractor, Martin Marietta, to evaluate whether the sludge could be linked to F-Listed activities associated with a cleaning process in the C-400 Building. Interviews conducted at the time by the Plant Compliance Organization with Chemical Operations personnel identified several potential scenarios regarding the origin of the TCE contaminated sludge, including:

- During the Cascade Improvement/Upgrade Program, which occurred from ~ 1975 to 1980, large converters were degreased with TCE. Converters pulled from the degreaser may have dripped excess TCE on the floor which could have discharged to the C-403 Pit via floor drains;
- Overflow from the storm sewer system during heavy rainfall could potentially backup into the C-403 Unit. Any overflow that may have come in contact with the area of the storm sewer contaminated by the TCE leak in the mid-1980's could have transferred residual TCE to the C-403 Pit; or

- Carry-over of TCE from degreased equipment to the cleaning solutions tanks (e.g., alkali tank) which discharged to the C-403 Pit.

Martin Marietta correspondence to DOE dated December 31st, 1990, further outlined the C-400 cleaning process by which residual TCE drippings could be carried-over from the degreaser to the C-403 pit via the cleaning solution tanks. It explains that equipment designated for cleaning would be suspended over the TCE vapor degreaser until the vapors would condense on the surface of the parts. The resultant condensate would then roll down the surface of the equipment as part of the cleaning process and then drain back into the degreaser for reuse. Attempts to reduce significant solvent accumulation were made by tilting or shifting the equipment while suspended over the degreasing tanks. After degreasing, the parts were moved to the cleaning tank area for further cleaning/processing. The cleaning solutions in these downstream tanks included liquids such as aqueous alkali, sodium bisulphate, chromic acid, hydrochloric acid, nitric acid solutions and hot/cold water. The hot/cold water tanks have a constant overflow to the sewer system. All the other tanks discharge to or overflow to the C-403 Pit.

Further discussion by the Plant Compliance Organization with representatives from the RCRA hotline indicated that residual carry-over of TCE on degreased equipment that was subsequently transferred to the C-403 Pit via the cleaning solution tanks would not be considered a F001 listed hazardous waste but the sludge would still need to be evaluated for RCRA "characteristics". While the sludge did not fail the EP toxicity test that was conducted in 1990, it was later re-tested in 1993 using the TCLP method. The results indicated the sludge was "characteristically" hazardous for TCE. The wastewater and sludge was subsequently removed from the C-403 Pit in the 1995/1996 timeframe and managed as a RCRA "Characteristic"waste (D040). The pit remained dry for approximately one year before water began infiltrating into the Pit from the side. TCE was detected in the water and further investigation suggested the source was either infiltration of TCE contaminated groundwater or water leaking from a nearby water main break that had percolated through TCE contaminated soil or contaminated brick that lined the pit.

While the above historic information is inconclusive regarding the exact source of the TCE contaminated sludge historically detected in the C-403 Pit, recent interviews with plant personnel who worked in the C-400 Facility between 1974 and 1990 indicated they have observed TCE spills entering the floor drains which discharged to the C-403 Pit, with quantities ranging from very small to amounts as great as 25 gallons. Therefore, while the residual TCE drippings that were potentially discharged to the C-403 Pit via carry-over on parts from the degreaser to the downgradient cleaning tanks would not be F-Listed per the RCRA hotline discussions as noted in the above December 31 correspondence, potential spills of 25 gallons into floors drains could potentially constitute sufficient quantities to warrant a F-Listed waste determination.

3.2 C-400 Northwest Sump

The C-400 Northwest Sump (Solid Waste Management Unit 203) was constructed in the 1950's and was reported to be part of a wastewater treatment unit permitted under the KPDES Program pursuant to the CWA. Records indicate it received wastewater from the waste discard system, which drained various C-400 processes located on the west side of the facility. Prior to installation of equipment in C-400 for uranium removal from waste solutions, the northwest sump received and discharged radionuclide-contaminated solutions to the C-404 Holding Pond via the C-401 transfer line. After equipment for the uranium removal was installed in the 1950s, discharges from the sump were routed to the NSDD. A variety of sources contributed effluent to the sump via the waste discard system including sources such as Dissolver Units, the C-400-D Lime precipitation unit, and the Spray Booth and hand tables (used for decontamination of small parts). The makeup of the decontamination solutions varied but typically included water or aqueous solutions of sodium carbonate and nitric acid.

One document titled the *C-400 Process and Structure Review*, May 3, 1995, reported that a small degreaser unit which operated on the west-side of the C-400 facility discharged to the waste discard system. This report indicated that due to the hydrophilic nature of TCE and the presence of

atmospheric moisture, the two would become mixed, thereby reducing the effectiveness of the solvent. Therefore, the degreaser was equipped with a trichloroethylene/water separation system. After the mixed solution went through the separation process, the TCE was returned to the degreaser for reuse and the water was discharged to the waste discard system which drained to the northwest sump. This document also reported that when the degreasers would accumulate a significant amount of sludge, it was a historic practice to scoop out as much sludge as possible and flush the remaining contents. The report further indicated the flushed solutions from the large degreasers on the east-side were discharged to the storm water sewer and those from the small degreaser on the west-side were discharged to the waste discard system. As part of a recent discussion, which is presented in a document titled *Process Knowledge Review of Historic Discharges to the NSDD*, December 2001, a detailed review of readily available operating procedures and as-built engineering drawings was conducted in attempt to verify whether the small degreaser was actually connected to the waste discard system.

The 1987 version of the procedure for the small degreaser directed that sludge from the degreaser be containerized in drums and managed as hazardous waste. No mention of the management of waste from the small degreaser was included in the 1992 operating procedure for that unit, nor was additional information found on the discharge of flushing solutions to the waste discard system.

The engineering drawings as well as information obtained from a visual site inspection indicate there are three (3) floor drains located in the vicinity of the small degreaser. The drains located to the north and east of the degreaser are present on the as-built engineering drawings. The drain to the north is currently associated with a safety shower and drains to the Waste Discard System. On the building prints it is labeled as a safety sink drain. The drain is equipped with a "collar" that extends above floor level. There is no direct route for spills or leaks from this degreaser to enter the Waste Discard System and drain to the C-400 northwest sump.

The drain located approximately five (5) feet to the east of the degreaser is associated with an out-of-service precipitation system and also connects to the Waste Discard System. This drain is fitted with a funnel that extends above floor level and collected liquids from the precipitation unit. The integrity of the funnel seal is unknown and it is not known when the funnel was installed. It is possible that spills of solvent from the degreaser and from materials processed in the degreaser could have entered this floor drain.

The other floor drain, which is located to the west, is not shown on the building prints. This drain was plugged in about 1986 and was sealed using epoxy or by welding in about 1994. The system to which this drain is connected, either the storm sewer or Waste Discard System, cannot be determined without further investigation. If the drain were connected to the Waste Discard System any spills from the degreaser or from equipment processed in the degreaser would have entered the NW sump and then the NSDD. While there is no documented records of any significant spill events associated with the operations of this degreaser, recent interviews with plant personnel familiar with C-400 operations reported that is was not uncommon for small quantities of TCE to be dripped on the floor when parts and equipment were removed from the degreaser.

In late 1994 and early 1995 timeframe, sludge samples from the northwest sump were collected for characterization. The results indicated the presence of TCE and TCA, various radionuclides, metals, and PCBs. The sludge and wastewater was subsequently removed from the sump. No historic records were identified as part of this discussion documenting specific spills or leaks other than general interview statements claiming small quantities may have dripped on the floor when removing parts, nor did the review of the as-built engineering drawings show a direct connection between the degreaser and the northwest sump. However, it is a possible assumption that the TCE/TCA contaminated sludge discovered in the northwest sump could potentially be associated with discharges from degreasing operations (i.e., F-Listed processes).

3.3 OTHER POTENTIAL C-400 SOURCES OF LISTED WASTES

Other activity that produced a listed hazardous waste in C-400 was a plating process. In 1980, small quantities of F007 and F008 wastes from a plating operation were generated in C-400. The Hazardous Waste Annual Report for 1980 indicates that these wastes were shipped for off-site treatment and disposal. The dates of operation of the plating process cannot be determined. No records other than the annual report concerning waste management from the process have been located.

There is no indication that any listed wastes other than F001, F002, F007 or F008 have ever been generated in C-400 or in any of the other buildings with discharges to the NSDD.

3.4 C-410-B HYDROGEN FLUORIDE (HF) NEUTRALIZATION LAGOON

The primary sources of flow into the HF Neutralization Lagoon (C-410-B) were the C-420 HF scrubber and the C-410 fluorine cell electrolyte neutralization operation. The lagoon drained to the NSDD. The contaminants included fluorides and radionuclides. Although small quantities of solvents may have been used, there were no known degreasers located in that facility.

3.5 C-600 STEAM PLANT

In the early 1980s, fly ash from the electrostatic precipitators at the C-600 Steam Plant was routed to the NSDD. Prior to that time, the fly ash was landfilled in the C-746-K on-site landfill. This discharge lasted until approximately 1993. The fly ash is exempt from RCRA regulation per 401 KAR 31:010, Section 4 (2)(b)(d) and 40 CFR 261.4(b) 4.

Although small quantities of solvents may have been used, there were no known degreasers located in that facility. All of the storm sewers from this facility discharged to Outfall 008 and ultimately to Bayou Creek.

4. CONTAINED-IN POLICY—HOW ARE MEDIA IN NSDD CONTAINING LISTED WASTES REGULATED IF MANAGED AS PART OF A CERCLA ACTION?

In accordance with EPA's "Contained-In Policy", when an environmental media exhibits a "characteristic" or has been mixed with a listed waste, the media must be managed as a hazardous waste until it no longer contains the listed waste or no longer exhibits the characteristic.

However, the "Contained-In Policy" also contains guidance on when a determination may be made that the environmental media no longer contains a listed hazardous waste. When such a determination is made, the media thereafter would not be considered to require management as hazardous waste. To support such a determination, the concentrations of the listed wastes in the environmental media must be below health-based standards. If the hazardous constituents are below the health-based standards, then the media may be determined to no longer contain a hazardous waste and the media would therefore not be subject to RCRA Subtitle C requirements. With regard to making such a determination, the guidance recommends the following:

> "... contained-in determinations [should] be made based on direct contact exposure using a reasonable maximum exposure scenario and ... conservative, health-based standards [should] be used to develop the site-specific health-based levels of hazardous constituents below which contaminated environmental media would be considered to no longer contain hazardous wastes."

This approach is also consistent with EPA Region 4 Guidance, Management of Contaminated Media, September 7, 1999.

40 CFR Section 300.430(e)(2) defines acceptable health-based exposure levels for known or suspected carcinogens as concentration levels that represent an excess upper bound lifetime cancer risk between 10-4 to 10-6. For systemic toxicants, EPA guidance defines a Hazard Index (HI) of 1 as

an acceptable health-based exposure level. While the Commonwealth of Kentucky does not have promulgated regulations regarding acceptable health-based levels, the Commonwealth routinely uses 10-6 and a HI of 1 as de-minimus levels. Therefore, for the purpose of determining when an environmental media no longer contains a listed waste, 10-6 for carcinogens and a HI of 1 for toxicants are appropriate health-based standards.

The table below contains a comparison of the maximum levels of TCE and 1,1,1-TCA and the health-based levels.

NSDD DATA COMPARISON TO HEALTH-BASED LEVELS				
CONTAMINANT	FREQUENCY OF DETECTIONS	MAX DETECT	10^{-6}	HI=1
TCE	4/27	.011 MG/KG	39.2 mg/kg	734 mg/kg
1,1,1,TCA	0/28	ND	NA	24,375 mg/kg

Note: The above health-based levels were derived using risk calculations contained in the Risk Methods Document. Appendix 1 to the White Paper, Determination for Contaminated Environmental Media associated with the Excavation of the NSDD, December 2001, contains the site-specific assumptions and identifies references in the Risk Methods Document for the risk calculations used.

Currently available data from the NSDD soils all show concentrations of TCE at levels below the health-based standards. No TCA has been detected. Additional characterization data that will be generated from the excavated soils will also be screened against the above health-based levels prior to disposal. Should any of the screened samples exceed the health-based levels, the contaminated soils for which the samples are representative will be managed as listed hazardous waste and compliance with land disposal restrictions will be required. If it is determined the excavated soils do not contain listed waste at levels above the health-based standards established per the KDEP determination, the media will still need to be evaluated for RCRA characteristics. If the excavated soils do not exhibit a RCRA characteristic, those soils will be managed as non-hazardous wastes. Should any of the NSDD soils exhibit a RCRA characteristic, those specific soils will be managed as a hazardous waste, and land disposal restrictions will apply.

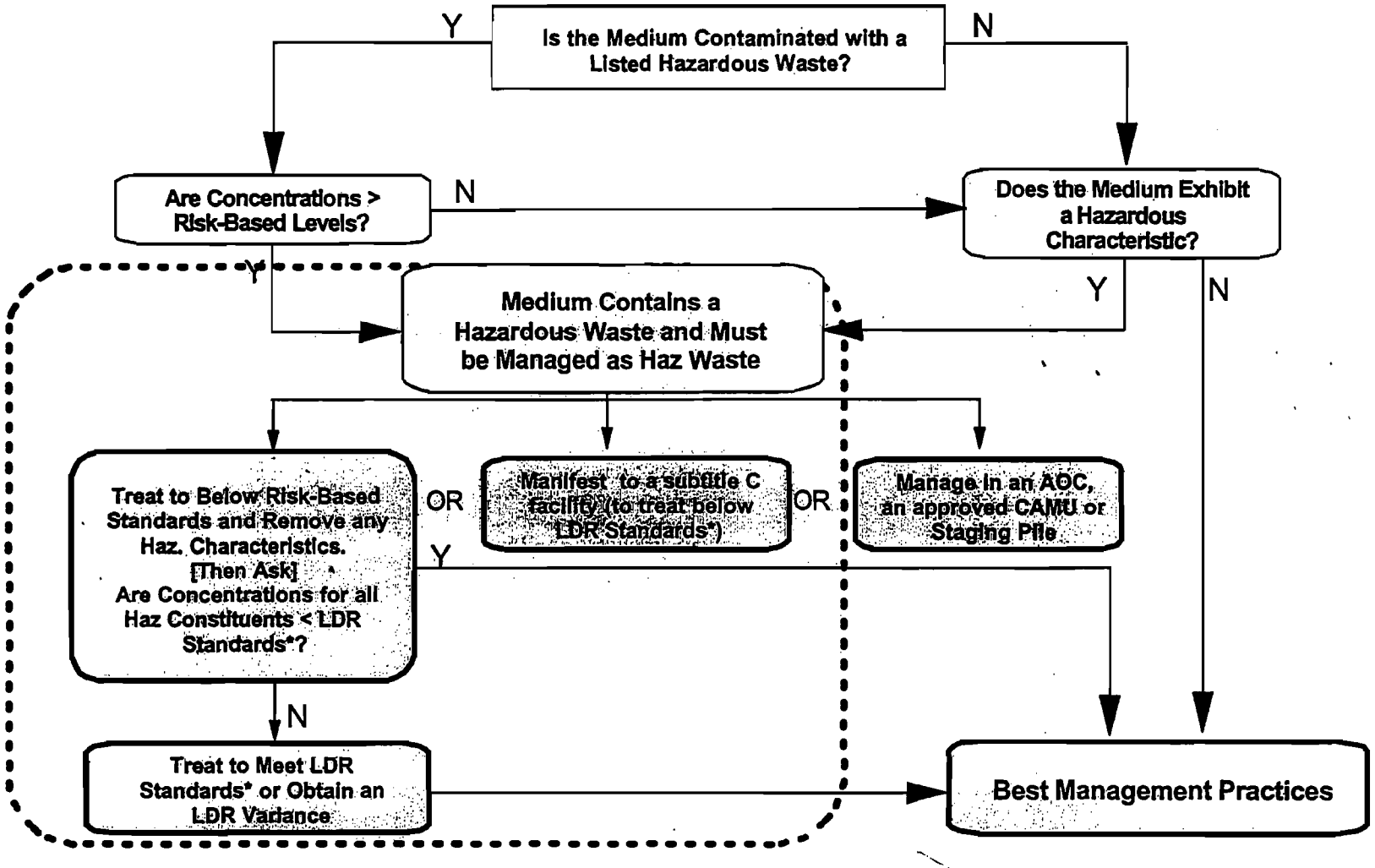
5. LDR TREATMENT STANDARDS—When will Compliance with RCRA Treatment Standards be Required?

In addition to meeting appropriate risk-based concentrations for constituents in a contaminated environmental media, the Region IV Guidance also requires consideration of whether the media meets LDR Treatment Standards or will require treatment to meet these standards, or the generator to obtain a treatability variance to ensure that the contaminated media can be disposed of in a non-RCRA unit (see Figure 1). The appropriate LDR treatment standards for contaminated soils are those that EPA specifically established in a 1998 rulemaking for contaminated soil. These soil treatment standards (set at 10 times the universal treatment standard) are the following for TCE and 1,1,1-TCA:

TCE – 60 mg/kg
1,1,1-TCA – 60 mg/kg

These standards will also have to be met prior to land disposal of the contaminated environmental media from NSDD in the U landfill.

Management of Contaminated Media
EPA, Region 4



* LDR Standards may be the Universal Treatment Standards or, when applicable, the Alternate LDR Treatment Standards for Contaminated Soil (40 CFR 268.49)

Area where LDR Applies

Figure 1

References

C-400 Process and Structure Review, KY/ERWM-38, May 3, 1995.

"C-403 Neutralization Pit Update", DOE Correspondence to Kentucky Division of Waste Management, February 1, 1994.

40 Code of Federal Regulations, Parts 260-270.

Integrated Remedial Investigation/Feasibility Study Work Plan for Waste Area Grouping 6 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, DOE/OR/07-1243&D4, January 1997.

Kentucky Administrative Regulations, Chapters 30-40.

Management of Contaminated Media, EPA Region 4 Guidance, September 7, 1999.

Management of Remediation Waste Under RCRA, EPA530-F-98-026, October 1998.

"PGDP C-403 Neutralization Pit", Interoffice Memorandum, February 1, 1993.

Preliminary Assessment, Paducah Gaseous Diffusion Plant, CERCLA Units (II. A. 1 Format), KY/B-263, July 1987.

"Process Knowledge Review of Historic Discharges to the NSDD", SAIC White Paper, December 2001.

"Processing of Trichloroethylene Contaminated Waste Water", KY/L-1366, June 24, 1985.

Record of Decision for Remedial Action at the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, DOE/OR/07-1948&D0/R1, October 2001.

"Request for Identification of Resource Conservation and Recovery Act (RCRA) Storage Tanks in C-400 and RCRA Surface Impoundment, C-616", Martin Marietta Correspondence to DOE, December 31, 1990.

Solid Waste Management Unit (SWMU) Assessment Report, C-400 Sump (SWMU 203), August 18, 1995.

Appendix 1

Appendix 1

Site-Specific No Action Screening Values for the NSDD

Industrial use no action direct contact risk-based values for the PGDP for TCE and 1,1,1-TCA in soil were calculated as part of the work performed for the Human Health Risk Methods Document (DOE/OR/07-1506&D1/V1/R0, December 2000). In the Methods Document, these no action values are defined as the values below which no action is needed to address contamination in order to be protective of human health. These no action values were calculated using default exposure assumptions and dose equations for ingestion of contaminated soil, inhalation of particulates and vapors emitted by contaminated soil, and dermal contact with contaminated soil. The dose equations are presented in Tables D-29, D-31, and D-33 in Appendix D of the Methods Document. The exposure assumptions used in these equations are presented in Table B.4 in Appendix B of the Methods Document. The method of derivation utilizing these equations and the default exposure assumptions is presented in Section 1 of Appendix B of the Methods Document.

The no action numbers calculated using these materials are in Table A.17 in Appendix A of the Methods Document and are:

For TCE:
Hazard-based value (HI at 0.1) = 4.70 mg/kg
Hazard-based value (HI at 1.0) = 47.0 mg/kg
Cancer-based value (Cancer risk at 1×10^{-6}) = 2.51 mg/kg

For 1,1,1-TCA:
Hazard-based value (HI at 0.1) = 156 mg/kg
Hazard-based value (HI at 1.0) = 1,560 mg/kg
Cancer-based value (Cancer risk at 1×10^{-6}) = None (no cancer slope toxicity value available).

(In the Methods Document, the no action numbers are calculated using a target hazard index (HI) of 0.1 to account for multiple contaminants. For a single contaminant, it is more appropriate to use a target HI of 1.)

For the current purpose, the no action direct contact risk-based value were converted to site-specific values using methods in the baseline risk assessment of the proposed site of the PGDP UF_6 Conversion Facility. These parameters are shown in the following tables. These values match the default exposure assumptions listed in Table B.4 in Appendix B of the Methods Document except that the exposure duration is reduced from the default rate of 250 days per year to 16 days per year. This site-specific exposure duration rate is based upon information provided by PGDP personnel during previous projects (e.g., the WAG 6, 27, and 28 RI Projects). This information indicated that it would not be reasonable to assume that a general maintenance worker would be exposed to any individual site at the PGDP at a rate in excess of 16 days per year.

Using this site-specific exposure duration, increasing the hazard index target to 1, and leaving all other values at their default rate, the site-specific no action screening values become:

For TCE:
Hazard-based value (HI at 1.0) = 734 mg/kg
Cancer-based value (Cancer risk at 1×10^{-6}) = 39.2 mg/kg

For 1,1,1-TCA:
Hazard-based value (HI at 1.0) = 24,375 mg/kg
Cancer-based value (Cancer risk at 1×10^{-6}) = None (no cancer slope toxicity value available).

Exposure Parameters Used for Derivation of Dose from Ingestion of Soil

Parameter	Units	Value used
Concentration in soil = C_s	mg/kg	Calculated value
Ingestion rate = IR	mg/day	50
Fraction ingested = FI	unitless	1
Exposure frequency = EF	day/yr	16
Exposure duration = ED	year	25
Conversion factor = CF	kg/mg	10^{-6}
Conversion factor = CF_{rad}	g/mg	10^{-3}
Body weight = BW	kg	70
Averaging time = AT	yr × day/yr	70 × 365 (carcinogen) ED × 365 (noncarcinogen)

Exposure Parameters Used for Derivation of Dose from Dermal Contact with Soil

Parameter	Units	Value used
Concentration in soil = C_s	mg/kg	Calculated value
Conversion factor-dermal = CF_d	$(kg\text{-}cm^2)/(mg\text{-}m^2)$	0.01
Surface area[c] = SA	m^2/day	0.43
Adherence factor = AF	mg/cm^2	1
Absorption factor[d] = ABS	unitless	0.25
Exposure frequency = EF	day/yr	16
Exposure duration = ED	years	25
Body weight = BW	kg	70
Averaging time = AT	yr × day/yr	70 × 365 (carcinogen) ED × 365 (noncarcinogen)

Exposure Parameters Used for Inhalation of Particulates and Vapors Emitted by Soil

Parameter	Units	Value used
Concentration in soil = C_s	mg/kg	Calculated value
Conversion factor = CF	g/kg	10^3
Exposure frequency = EF	day/year	16
Exposure duration = ED	years	25
Exposure time = ET	hour/day	8
Volatilization factor = VF	m^3/kg	TCE = 3.45×10^3 TCA = 2.34×10^3
Particulate emission factor = PEF	m^3/kg	3.21×10^{10}
Total inhalation rate = IR_{air}	m^3/hour	2.5
Body weight = BW	kg	70
Averaging time = AT	yr × day/yr	70 × 365 (carcinogen) ED × 365 (noncarcinogen)

Toxicity Values for TCE and 1,1,1-TCA

Analyte	Reference Dose [mg/(kg × day)]			Cancer Slope Factor $[mg/(kg \times day)]^{-1}$		
	Oral	Dermal	Inhalation	Oral	Dermal	Inhalation
TCE	6.00×10^{-3}	9.00×10^{-4}	5.97×10^{-3}	1.10×10^{-2}	7.33×10^{-2}	6.00×10^{-3}
1,1,1-TCA	2.00×10^{-1}	1.80×10^{-1}	6.29×10^{-1}	No value	No value	No value

PROCESS KNOWLEDGE REVIEW OF HISTORIC DISCHARGES TO THE NORTH-SOUTH DIVERSION DITCH

EXECUTIVE SUMMARY

The removal of contaminated soils from the North-South Diversion Ditch (NSDD) is planned as a Remedial Action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This report discusses the possible sources of contaminants in the soils to help support a hazardous waste determination under the Resource Conservation and Recovery Act (RCRA).

The NSDD received effluents from the Paducah Gaseous Diffusion Plant (PGDP) from the beginning of site operations in 1951 through the present. The effluent sources have changed as plant configuration changed over the years. Until 1977 the NSDD discharged to the north side of the site through an outfall designated as Outfall 003, which was permitted under the National Pollutant Discharge Elimination System (NPDES) or the Kentucky Pollutant Discharge Elimination System (KPDES). The outfall discharged to a ditch running north from the site to Little Bayou Creek. In 1977 the discharge of the NSDD was routed via a lift station to the C-616 Full Flow Lagoon, which discharged through permitted Outfall 001.

The most significant discharges to the NSDD are as follows:

• Storm water runoff	1951 – present
• C-403 Neutralization Pit	1956 – mid 1990s
• C-400 Northwest Sump	1956 – mid 1990s
• C-410 Neutralization Lagoon	1953 – 1977
• C-600 Steam Plant Fly Ash	Mid 1980s - 1996

The most significant contaminants included primarily metals, acids, fluorides, and radionuclides including uranium and technetium-99. Other contaminants included trichloroethylene (TCE), 1,1,1-trichloroethane (TCA), and trace radionuclides including plutonium and neptunium. TCE was used in the plant from about 1951 until 1993. The beginning of TCA use is not known, but its use also was curtailed in 1993.

TCE and TCA are of concern because they can be "listed" hazardous wastes under RCRA when they are generated from certain processes. These materials were used as degreasing solvents in C-400 and other areas of the plant, which is significant because this type of operation is F-listed under the regulations. The discharge of these materials to the ditch imposes certain regulatory requirements on the handling of these materials once they are removed from the ditch under the CERCLA action.

This report concludes that there were no direct (i.e., engineered) discharges of listed hazardous waste to the NSDD, and it is unlikely that TCE and TCA were discharged to the NSDD directly from the degreasers in C-400. However, spills and other releases to floor drains in the vicinity of the degreasers did occur. Some of these floor drains lead either to the C-403 unit or to the sump at the northwest corner of the building. Both of these sumps ultimately discharged to the NSDD. Most of these discharges were

relatively small and occurred from 1956 until 1993. Some of these releases may have involved as much as 25 gallon quantities of solvent.

1. INTRODUCTION

This document discusses potential sources of discharges, including trichloroethene (or trichloroethylene) (TCE) and 1,1,1-trichloroethane (TCA) to the North-South Diversion Ditch (NSDD) at the Paducah Gaseous Diffusion Plant (PGDP). The discussion is based on an extensive review of the following types of documents in electronic and hard-copy format.

- As Built Engineering Drawings and all available Revisions/Modifications dating to April 5, 1951 (Appendix A).
- Standard Operating Procedures and any Revisions for Industrial processes located within the C-400 and C-710 Facilities dating to February 2, 1987 (Appendix B).
- Correspondence documents pertaining to the use, handling, and disposal of TCE at the PGDP dating to February 1962 (Appendix C).
- Hazardous Waste Annual Reports dating from 1980 through 1996 (Appendix C).
- Occurrence reports dating to 1990 (Appendix E).
- Sampling data from waste and material handling units and from the NSDD dating to 1981.
- Maintenance Work Orders dating to 1989 (Appendix E).
- Other miscellaneous reports and correspondence that was readily available (Appendix E).

Interviews with plant personnel and personal knowledge of the author, who is familiar with plant operations

The availability of some documentation was limited. Procedures are revised regularly and, in order to avoid the possibility of the use of outdated procedures, previous versions were collected and destroyed upon the issuance of the new procedure. This was the practice prior to the 1994 moratorium on document destruction. In the case of Work Orders and Occurrence Reports, the records for dates earlier than those above are in hard-copy only and are not indexed electronically. Hazardous waste reports were generated beginning in 1980. Waste records for previous years are archived in hard-copy only and no index is available. Time did not permit a manual search of archived hard-copy records in order to allow completion of this effort to support the Record of Decision for the NSDD.

Both the Bechtel Jacobs Company LLC, (BJC) and USEC records centers performed searches for documents related to C-400 operations, degreaser operations, solvent usage, etc. Pertinent documents were included in the review.

While TCE and TCA were used throughout the plant, the largest quantities were used in two degreasers in the C-400 Building. None of the other buildings that had effluents that discharged to the NSDD (the C-600 Steam Plant, the C-410/420 Feed Plant complex, or the C-405 Classified Waste Incinerator) contained large degreasers, although TCE, TCA, and other solvents were used in small quantities in these and other buildings in the plant.

The document review did not identify any direct (i.e., engineered) discharge of TCE from the C-400 Degreaser areas to the NSDD. However, personnel familiar with the operation of the degreasers indicated that spills from the degreasers and from equipment processed in the units did reach drain systems in the building that ultimately discharged to the NSDD.

2. SOURCES OF DISCHARGES TO THE NORTH-SOUTH DIVERSION DITCH

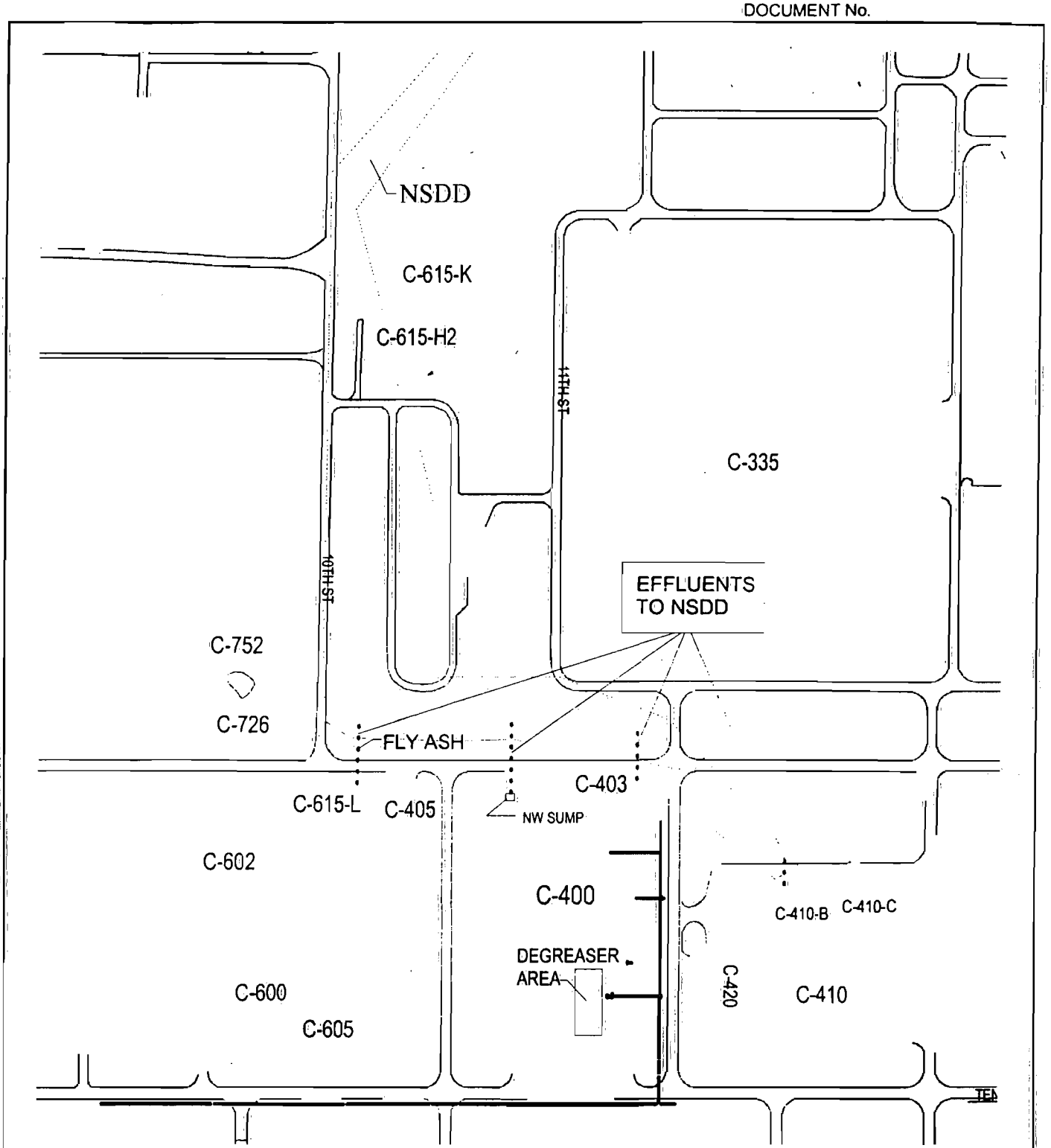
2.1 EFFLUENT SOURCES

The NSDD received effluents from several plant buildings. The most significant discharges were from the C-403 Neutralization Pit (C-403) and a sump at the northwest corner of C-400. Both of these facilities received process effluents from the C-400 building.

Other discharge sources to the NSDD included fly ash from the C-600 Steam Plant and discharges from the C-410-B hydrogen fluoride (HF) Neutralization Lagoon at the C-410/420 Feed Plant complex. The C-410-B facility received neutralized fluorine cell electrolyte generated in C-410 during fluorine cell maintenance activities and discharges from the C-420 HF scrubber system. In addition, there is limited storm water flow into the ditch, as well as some surface run-off from plant areas (e.g., C-635 Cooling Tower, etc.).

The C-405 Incinerator is located in the vicinity of the C-616-L Fly Ash Lift Station. The incinerator, which was used to destroy classified documents, was shut down prior to the construction of the fly ash lift station. The lift station is in a vault, the top of which is slightly elevated. Given these facts, it is unlikely that any materials in the C-405 facility have impacted the NSDD through the lift station. Prior to the operation of the lift station, runoff from the incinerator area flowed through the surface drainage system to Outfall 015.

A general flow schematic is shown in Figure 1.



LEGEND:
- Road
- Surface Water
- Storm Sewer
- Effluents to NSDD
- NSDD
- APPROXIMATE BOUNDARY OF SURFACE RUNOFF AREA TO NSDD

150 0 150 300 Feet

TRUE NORTH 20° PLANT NORTH

U.S. DEPARTMENT OF ENERGY
DOE OAK RIDGE OPERATIONS
PADUCAH GASEOUS DIFFUSION PLANT

BECHTEL JACOBS COMPANY LLC
MANAGED FOR THE US DEPARTMENT OF ENERGY UNDER US GOVERNMENT CONTRACT DE-AC-05-98OR22700
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Fig. 1. Effluents to NSDD.

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FIGURE No. c5ac90001sk107R1.apr
DATE 09-27-01

2.2 NSDD CONTAMINANTS

The NSDD has been subject to various site investigations during the past ten years that have generated a considerable amount of analytical data. A review of the data being used to support remedy selection for the pending Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 action indicates that the primary contaminants of concern are metals, polychlorinated biphenyls (PCBs), and radionuclides. Trace amounts of TCE also have been randomly detected in the NSDD in a few subsurface samples but only at low concentrations. TCE is not considered a primary risk driver for the subject action. Detection of other organic contaminants also is infrequent, and the concentrations in the few samples in which they were detected have been very low.

The analytical data correlates well with the type of processes known to discharge to the NSDD. From C-400, the primary discharges were inorganic solutions of metals such as chromic acid, acidic and caustic decontamination solutions from the cleaning of metal parts, and water from the cleaning tanks and from decontamination activities. The primary source of arsenic in the ditch most likely was the fly ash from the C-600 Steam Plant, along with some arsenic from the decontamination of process equipment. The primary discharge from C-410, neutralized fluorine cell electrolyte, which contained sodium bifluoride and lithium fluoride neutralized with slaked lime, did not contain any organic constituents.

3. C-400 BUILDING

The C-400 Building contained two degreasers that were operational from the early 1950s through the early 1990s. One of the degreasers was located in a pit on the east side of the building and used TCE. The second degreaser was located on the west side of the building at floor level and used TCA.

Some engineering prints indicate the presence of a third degreaser in the pit on the east side of the building. However, none of the personnel interviewed and none of the other documents reviewed indicate that this third degreaser was ever installed.

The cleaning tanks also are located on the east side of C-400.

3.1 BUILDING DRAIN SYSTEM

C-400 has four drainage systems (Sanitary System, Storm Water System, Acid Drain System, and the Waste Discard System). The Storm Water System discharged to the plant storm water drainage system and ultimately to Bayou Creek to the west of the plant site. The Acid Drain System drained the east side of the building interior and flowed to the C-403 Neutralization Tank (C-403). The Waste Discard System drained the west side of the building interior and flowed to a small sump at the northwest corner of the building. The Sanitary System drained the restroom, change house, and laundry areas and flowed to the C-615 Sewage Treatment Plant (see Figure 2 and Drawing E4-11-M).

Prior to the installation of equipment in C-400 for the removal of uranium from waste solutions, the Waste Discard System conveyed radionuclide-contaminated solutions from C-400 to the C-404 Holding Pond via the sump at the northwest corner of the building. The C-401 underground vitrified clay line was used to transfer liquid from the sump to C-404. After equipment for the removal of uranium from these solutions was installed in the 1950s, the discharge of the sump was routed to the NSDD.

The wastes discharged into the Waste Discard System included decontamination solutions from the Spray Booth and hand tables (used for decontamination of small parts). The makeup of the decontamination solutions varied but typically included water or aqueous solutions of sodium carbonate or nitric acid. After the uranium removal systems were installed in the late 1950s, the decontamination solutions were treated prior to discharge and the direct discharge of decontamination solutions ceased.

The Acid Drain System conveyed cylinder wash and some cleaning tank solutions to the C-403 tank. Cleaning tank solutions included aqueous alkali, sodium bisulphate, chromic acid, hydrochloric acid, nitric acid solutions, and water. As was the case with the Waste Discard System, the C-403 tank discharged to the C-404 pond via the underground pipeline until the uranium removal equipment was installed in the late 1950s. After that time, the C-403 tank discharged to the NSDD.

Plumbing drawings of C-400 indicate that the sump in the degreaser pit on the east side of the building discharged to the storm sewer system (Ref. 1,2, App. A). None of the drawing revisions indicate that there was ever any connection between the sump and the Acid Drain System, which discharged to the C 403 Neutralization Tank.

A drawing of the floor drains in C-400 (Ref. 3, App. A) indicates that there are five floor drains in the vicinity of the east-side degreaser pit. One of these drains is in a recessed area of the operating floor immediately adjacent to the degreaser on its north side. Three others are outside of the degreaser pit area at the level of the operating floor (Ref. 1,2 App. A). These four floor drains connect to the Acid Drain System (Figure 3, Ref. 1,2, App. A), which discharges to the NSDD via the C-403 unit

The fifth drain is in the degreaser pit. This drain received steam condensate from the degreaser heating coils and water from the solvent recovery still (Ref. 5, App. A). It appears that this drain discharged to the sump pump pit (Ref. 6, App. A). This conclusion is supported by a procedure for the operation of the degreaser system; a section of this reads as follows:

> Any overflow of the TCE water separator and steam condensate bleed off will enter the degreaser floor drain to the sump pump and be automatically pumped to the underground containment pit for the TCE unloading facility. (Ref. 1, App. B, Section III.A.10.).

This drain is shown on the floor drain drawing (Ref. 3, App. A), but is not shown as being connected to the Acid Drain or storm drain systems (Ref. 1, 2, App. A). The drawing of the sump pit shows an inlet to the sump below floor level (see Figure 4).

The drainage system is discussed in a training manual (Ref. 1, App. C). The manual states that the Acid Drain System serves the converter disassembly, ash handling, test loop, and storage areas north and south of the pipe cleaning area. The pipe cleaning area includes the operating floor in the vicinity of the large degreasers. No mention is made in the manual of any connection from the degreaser basement to the Acid Drain System.

There are a number of floor drains in the fan room basement area adjacent to the degreaser pit area. All of these drains discharge to the storm sewer (Ref. 1&2, App. A).

A number of floor drains are located in the area beneath the cleaning tanks that are found to the north of the degreaser pit. However, the degreaser basement area and the cleaning tank basement area are separated by a concrete wall. The floor drains beneath the cleaning tanks drained to the acid system,

which discharged to the NSDD via the C-403 unit. This drain system did not continue to the degreaser pit area (Ref. 4, App. A).

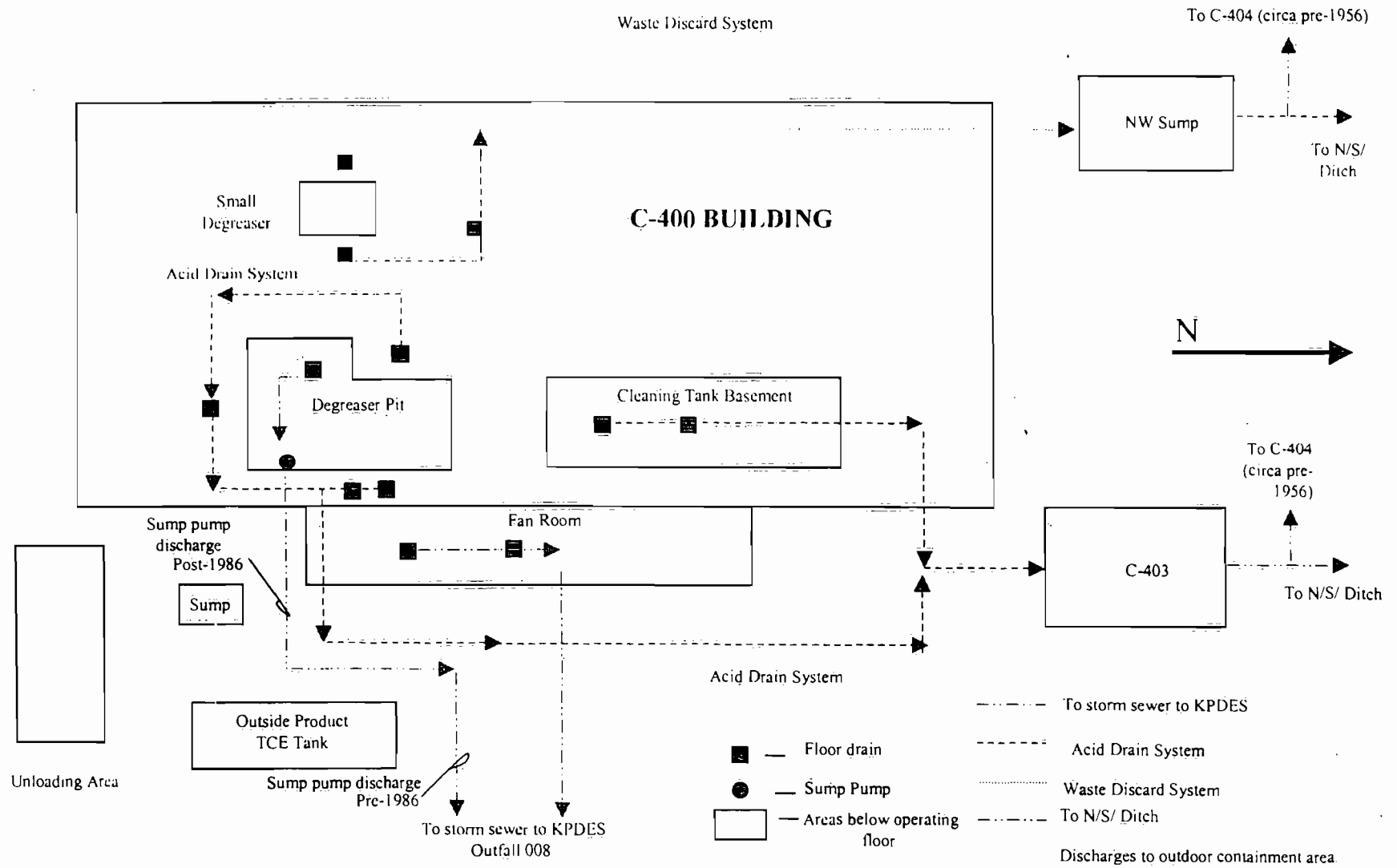

Fig. 2. C-400 Drainage Systems.

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FIGURE No. 400.ppt
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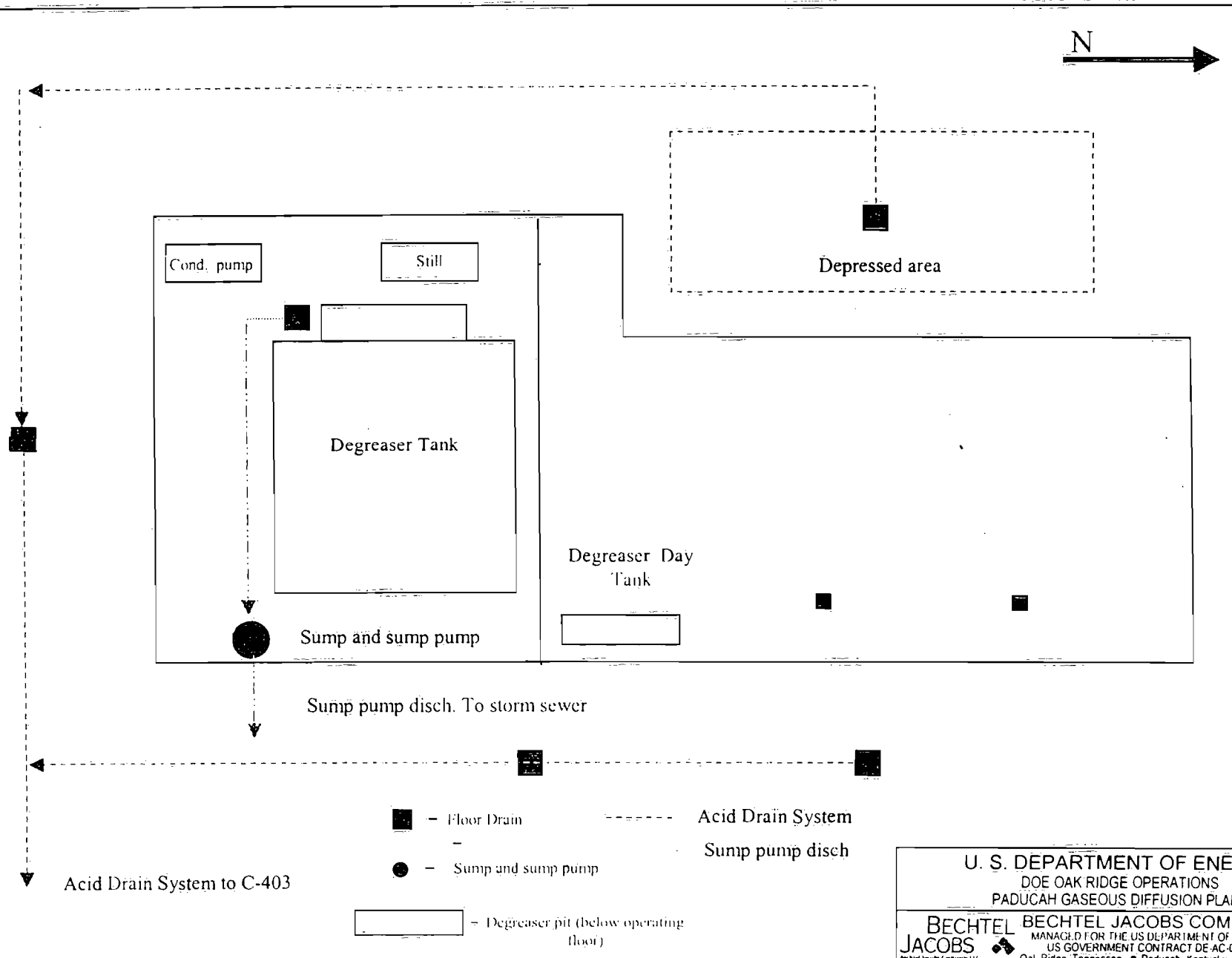

Fig. 3. Degreaser Area Drainage System.

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FIGURE No. degreaserdrain.ppt
DATE 09-27-01

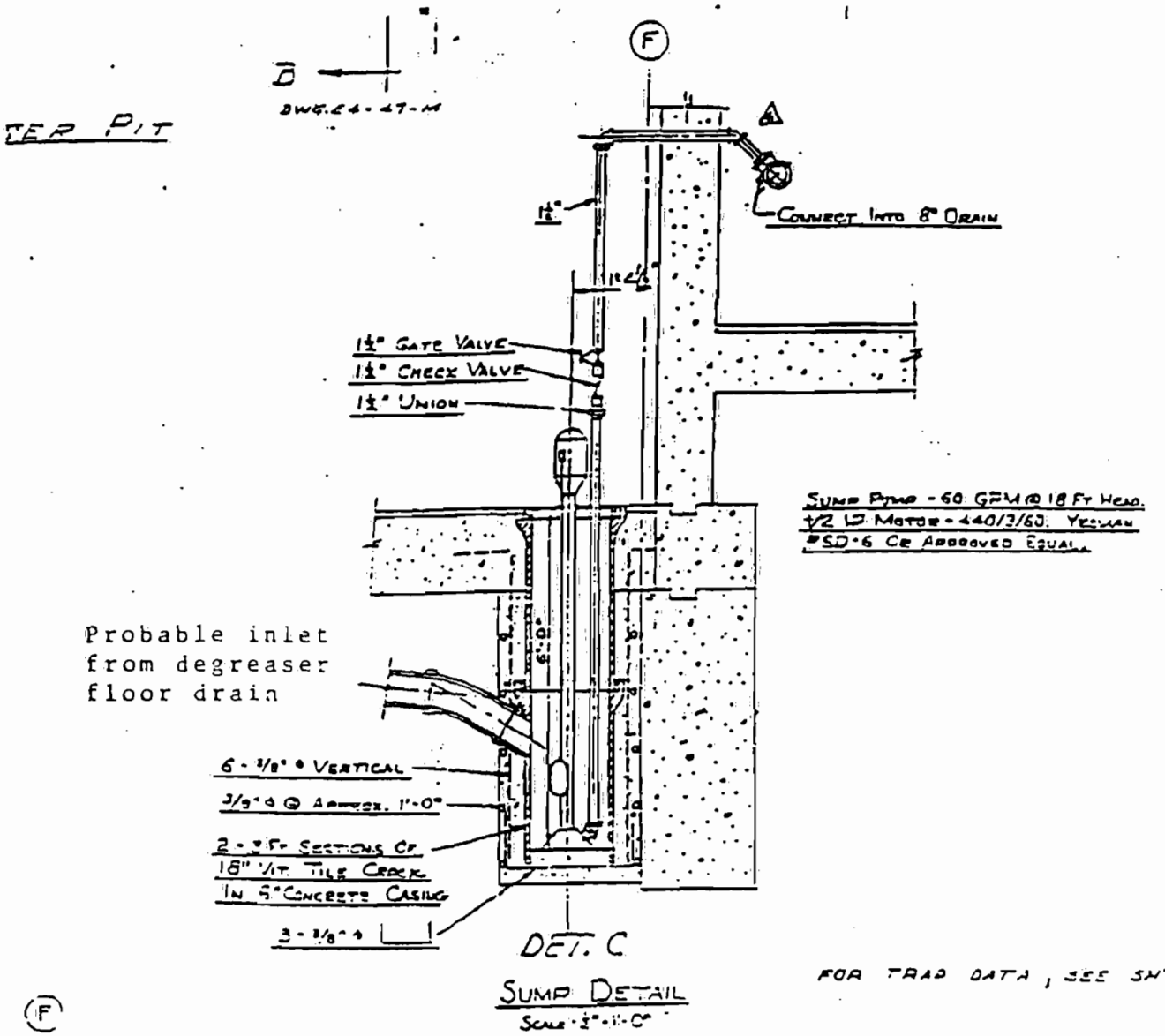
TEP PIT
B
DWG. E4-47-M
F
A
1½"
CONNECT INTO 8" DRAIN
1½" GATE VALVE
1½" CHECK VALVE
1½" UNION
SUMP PUMP - 60 GPM @ 18 FT HEAD.
½ HP MOTOR - 440/3/60. YEOMAN
#SD-6 OR APPROVED EQUAL
Probable inlet
from degreaser
floor drain
6 - 3/8" ø VERTICAL
3/8" ø @ APPROX. 1'-0"
2 - 2'-5" SECTIONS OF
18" VIT. TILE CRock
IN 9" CONCRETE CASING
3 - 3/8" ø
DET. C
SUMP DETAIL
SCALE: 1" = 1'-0"
FOR TRAP DATA, SEE SHT. E4-1
F

Fig. 4

There are also floor drains in the basement area immediately adjacent to the degreaser pit. However, the basement floor level is above the degreaser pit floor, and releases from the degreaser would not have entered these drains. The degreaser day tank is in this area and any leaks from this tank could have entered these drains. No information was discovered indicating that such spills or leaks occurred. Because the day tank was used to store solvent when the degreaser was not in operation so as to reduce losses through evaporation, it contained used TCE. It cannot be determined to which drain system these floor drains are connected.

Hot water from the degreaser heating system on the east side of the building discharged to the cold water cleaning tank (Ref. 4, App. A). The heating system was an enclosed system that did not come in direct contact with TCE.

The only floor drains shown on building prints in the vicinity of the small degreaser on the west side of building are located to the north and east of the degreaser. The drain to the north is currently associated with a safety shower and drains to the Waste Discard System. On the building prints it is labeled as a safety sink drain. The drain is equipped with a "collar" that extends above floor level. There is no direct route for spills or leaks from this degreaser to enter the Waste Discard System and drain to the C 400 northwest sump.

The drain located approximately 5 ft to the east of the degreaser is associated with an out-of-service precipitation system and also connects to the Waste Discard System. This drain is fitted with a funnel that extends above floor level and collects liquid from the precipitation unit. The integrity of the floor to funnel seal is unknown, and it is not known when the funnel was installed. It is possible that spills of solvent from the degreaser and from materials processed in the degreaser could have entered this floor drain. However, there are no documented records of such events.

One floor drain in the vicinity of the small degreaser is not shown on the building prints. This drain was plugged in about 1986 and was sealed using epoxy or by welding in about 1994. The system to which this drain is connected, either the storm sewer or Waste Discard System, cannot be determined without further investigation. If the drain is connected to the Waste Discard System, any spills from the degreaser or from equipment processed in the degreaser that entered this drain would have entered the NW sump and then the NSDD. However, there is no specific information substantiating whether such leaks or spills actually entered this drain.

3.2 SOLVENT USEAGE AND POTENTIAL RELEASES

TCE and TCA were used in two degreaser areas in C-400 and were the source of F001 and F002 listed wastes generated in the building. While other non-halogenated solvents (F003, F004 and F005) were used in the plant, it is uncertain whether they were used in C-400. In any event, they would not have been used in large quantities. No records have been located indicating that such materials were released to either of the drain systems, which ultimately lead to the NSDD.

In May 1985, there was a leak from one of the degreasers on the east side of the building. The quantity of TCE lost was not determined. Sampling results from the C-403 pit indicated the presence of low concentrations of TCE (0.24 mg/l maximum) in the water (Ref. 2, App. C). Originally, it was assumed that the TCE drained to the C-403 pit via the acid drain system through the floor drain in the degreaser pit; but later it was determined that the floor drain discharged into the sump, which was pumped to the storm sewer system. This determination was based on a review of engineering drawings and procedures, which indicated no direct discharge to the C-403 pit from the sump or floor drain. The water from the C-403 pit was treated to remove the TCE prior to discharge.

In 1986, TCE was detected in the storm drain system on the east side of C-400 (Ref. 3, App. C). This system drains to Bayou Creek via Outfall 008 ditch to the west. The source of the TCE was the sump in the degreaser pit. The TCE entered the sump through the water separator, which is shown as discharging to a floor drain (Ref. 5, App. A). Following this event, the discharge of the sump was re-routed from the storm sewer system to the TCE unloading containment area pit. Sump lockout/manual operation was implemented at this time as well. An engineering drawing showing this modification was not located during the research for this document.

The 1992 version of the operating procedure for the large degreaser (Ref. 2, 3, App. B, Section 10.3) directs that the sump pump breaker be locked open to prevent discharges from the sump. If the sump was to be pumped, the material was to be discharged directly into containers and not into the unloading area holding pit. Also, the procedure for TCE handling (Ref. 10, App. A) directs that liquid in the containment pit be sampled prior to discharge to the storm sewer.

As indicated in personnel interviews and as observed by the author TCE and TCA also were dispensed in buckets for use at remote work sites when it was impractical to bring the parts to C-400 for degreasing. While the author did not specifically observe this practice in C-400, C-600, or C-410/420, this practice was common throughout the plant. Prior to the early 1980s the disposal of this material was not regulated. Based on practices observed by the author in other buildings, it is possible that solvents were spilled or purposely discharged into floor drains in these buildings.

3.3 DEGREASER OPERATIONS

The cleaning area located on the east side of C-400 consisted of a TCE degreaser and several cleaning tanks, including hot and cold water tanks, an alkali tank, a trioxide tank, a chromic acid tank, and hydrochloric acid tanks. The basic layout of the cleaning operation is pictured in Figure 2. This area was used to remove foreign contaminants, such as hydrocarbon oils and greases, mill scale, acid and caustic residues, rust, and other oxidation products from new and used materials. A wide variety of parts were degreased on a routine basis.

Procedures for the operation of the degreasers address primarily the degreaser systems themselves, with minimal reference to the handling of parts after cleaning. The 1987 version of the procedure for the operation of the large Detrex degreaser states, "Rig items to allow maximum drainage of liquid TCE back into the degreaser" (Ref. 1, App. B, Section II.G). Later versions of the procedure do not contain this statement, but do direct that equipment be allowed to drain before removal (Ref. 2,3 App. B, Section 8.2.7).

The 1987 procedure for the operation of the small Blakelsee degreaser on the west side of the building also contained the statement on rigging equipment for drainage (Ref. 4, App. B, Section II.G). Later versions of the procedure do not contain this statement, but do direct that equipment be allowed to drain before removal (Ref. 2,3 App. B, Section 8.2.7).

Interviews with plant operating personnel (Appendix F) indicate that some quantities of TCE and TCA were carried out of the degreasers when parts were removed. In most cases, these were small (less than one gal) quantities. Because the solvents react with alkali solutions, large quantities of solvent carried into the alkaline tank would present safety and operational problems. Consequently, care was taken to minimize such carryover. According to operating personnel, however, small quantities were carried into the alkali tank as reactions were observed on occasion. It is therefore likely that similar quantities were carried into the other cleaning tanks when the alkali tank was bypassed.

Interviews also indicate that larger quantities, up to approximately 25 gal, of solvent were occasionally carried from the east side degreaser in equipment with complex geometries, which prevented complete draining. In the case of the east side degreasers, these spills were observed entering the floor drains leading to the Acid Drain system in the vicinity of the degreaser. Because smaller equipment was degreased in the smaller degreaser on the west side, the carryover quantities were probably smaller; however, the interviews did not quantify the carryovers. Depending on the configuration of the floor drains in the area the spilled material may or may not have entered the sump at the northwest corner of the building.

3.4 WASTE SOLVENT MANAGEMENT

Sludge from the large degreaser was removed at regular intervals. In accordance with the operating procedures (Ref. 1, 2, 3, 6, 7, and 8, App. B), the material removed was containerized and was managed as hazardous waste. The 1987 version of the procedure for the small degreaser (Ref. 4, App. B. Section D.8) directed that sludge from the degreaser was to be containerized and managed as hazardous waste. No mention of the management of waste from the small degreaser was included in the 1992 operating procedure for that unit (Ref. 5, App. B).

In 1995, the sludge in the C-400 northwest sump was removed. The sludge contained relatively high levels of TCE (up to 1200 ug/ml). The sludge was managed as a characteristic hazardous waste (D040). As was discussed in Sect. 3.1, there is no direct connection between the degreaser on the west side of

N

Cleaning Tank Configuration

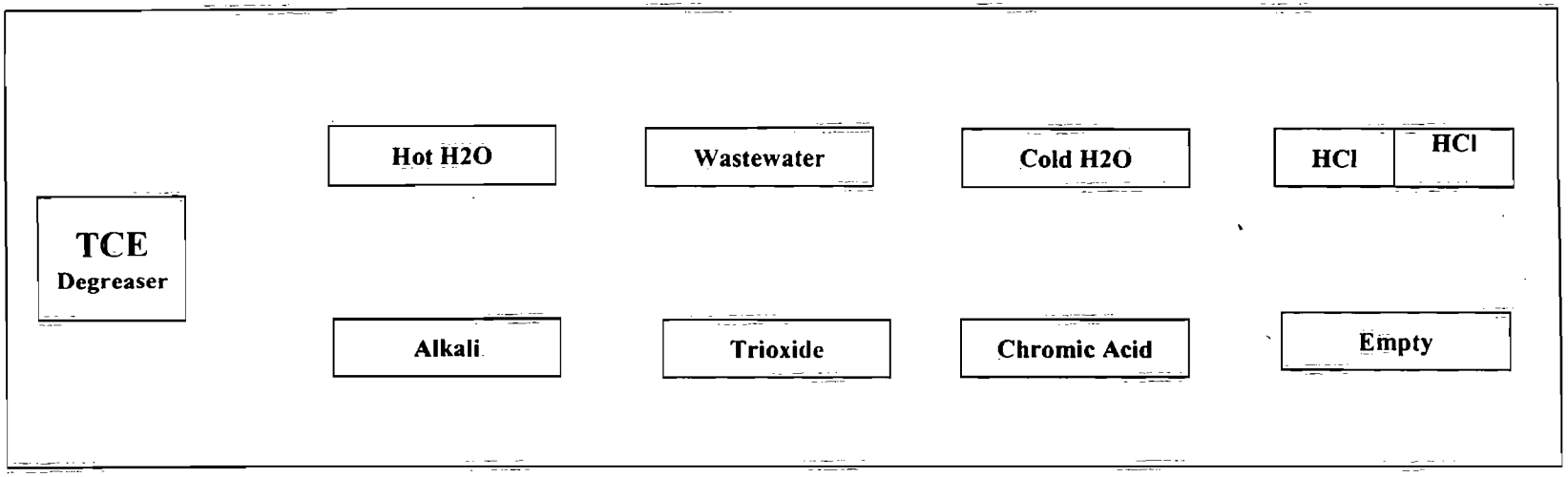

Fig. 5. C-400 Cleaning Area Floor Plan.

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FIGURE No. nsddfig5.ppt
DATE 09-27-01

the building and the Waste Discard System leading to the sump.

Prior to the early 1980s the disposal of small quantities of solvents transported in small containers to work sites throughout the plant was not regulated. There are no records as to how these quantities of solvents were disposed of. While the author did not specifically observe this practice in C-400, C-600, or C-410/420, based on practices observed by the author in other buildings, it is possible that some of this material was spilled or deliberately discharged into floor drains leading to the NSDD.

3.5 CLEANING TANK OPERATIONS

Various solutions are used in the large tanks on the east side of the building. These tanks are located immediately to the north of the large degreaser area. The solutions include aqueous solutions of alkali, chromic acid, trioxide (sodium bisulphate), nitric acid, and hydrochloric acid. Two tanks also contain water. The hot and cold water cleaning tanks are used to rinse parts or cool/warm equipment. Both tanks can drain to the storm drain system. The hot and cold water tanks can have continuous overflow to the storm drain.

The remaining cleaning tanks do not have routine discharges. They do have connections to the Acid Drain System. Sludge that accumulates in the tanks is cleaned out occasionally. To remove the sludge, the tanks were emptied by pumping the liquid to the C-403 pit until the 1980s after which the liquid was pumped to drums for treatment and disposal (Ref. 9, App. B). The date when drums were used for the liquid instead of the C-403 cannot be determined but mostly like occurred in the mid-1980s. The sludge was placed in drums for disposal.

The cleaning tanks were used for various metal cleaning operations. After TCE degreasing, parts were moved to the cleaning tank area for further cleaning/preparation. The cleaning process essentially consisted of washing and rinsing the part(s) by dipping or soaking in tanks containing the proper cleaning solutions. Perhaps the most complex cleaning operation involved the cleaning of steel pipe and materials. During this process, equipment would contact most of the tanks in the cleaning area. As such, this operation would be considered a worst-case scenario. In general, this cleaning process would proceed as follows:

1. Suspend over TCE vapors in such a manner as to maximize TCE drainage;
2. Suspend in alkali solution;
3. Water rinse over alkali tank;
4. Dip in hot water tank;
5. Suspend in trioxide tank;
6. Water rinse over trioxide tank;
7. Dip in cold water tank;
8. Suspend in hydrochloric acid tank;
9. Water rinse over hydrochloric acid tank; and
10. Dip in hot water tank.

The current tank configuration is depicted in Figure 5.

The hot and cold water tanks had a constant overflow to the sewer system. The cold water tank overflow was due to the discharge of plant water into the tank from a single pass through the degreaser condensing coils. This flow ceased when the degreaser ceased operation in about 1993. The overflow of the hot water tank was the result of condensate generated in heating the alkali tank being routed to the tank. This overflow still occurs. The other tanks are batch-operated and have no constant inputs.

The solutions used in the tanks have varied over the years. The tank currently used for wastewater contained trioxide in the past. The divided tank with HCl in both sides had hot water in the north half of the tank in the past. The empty tank on the north end is divided into several smaller units which held sulfuric, nitric, hydrofluoric, and hydrochloric acid solutions used for cleaning metal for the plating process. This tank has been empty since the 1970's. The exact dates at which these changes occurred cannot be determined.

3.6 OTHER ACTIVITIES AND POTENTIAL SOURCES OF LISTED WASTES

One other activity that produced a listed hazardous waste in C-400 was a plating process. In 1980, small quantities of F007 and F008 wastes from a plating operation were generated in C-400. The Hazardous Waste Annual Report for 1980 indicates that these wastes were shipped for off-site treatment and disposal. The dates of operation of the plating process cannot be determined. No records other than the annual report concerning waste management from the process have been located.

There is no documentation suggesting that any of the other operations listed in 401 KAR 31.040 (the "K" waste listing) have ever operated in C-400. There is no indication that any listed wastes other than F001, F002, F007, or F008 have ever been generated in C-400 or in any of the other buildings with discharges to the NSDD.

4. OTHER DISCHARGES

4.1 FLY ASH

In the early 1980s, fly ash from the electrostatic precipitators at the C-600 Steam Plant was routed to the NSDD. Prior to that time, the fly ash was landfilled in the C-746-K on-site landfill. This discharge lasted until 1996. The fly ash is exempt from RCRA regulation per 401 KAR 31:010, Section 4 (2)(b)(d) and 40 CFR 261.4(b) 4.

There were no known degreasers used in C-600. Although small quantities of solvents may have been used, no procedures were found documenting any such use. All of the storm sewers from this facility discharged to Outfall 008 and ultimately to Bayou Creek (Ref. 13, App. A).

There is no documentation suggesting that any of the other operations listed in 401 KAR 31.040 have ever operated in C-600.

4.2 C-410-B HF NEUTRALIZATION LAGOON

The primary sources of flow into the HF Neutralization Lagoon (C-410-B) were the C-420 HF scrubber and the C-410 fluorine cell electrolyte neutralization operation. The lagoon drained to the NSDD. The contaminants included fluorides and radionuclides (Ref. 4, App. C). There were no known degreasers located in the C-410 complex. Although small quantities of solvents may have been used, no procedures were found documenting any such use.

There is no documentation suggesting that any of the other operations listed in 401 KAR 31.040 have ever operated in C-400.

5. SUMMARY AND CONCLUSIONS

The C-400 degreasers were identified in a previous report (Ref. 5, App. C) as being a potential source of listed (F001 and F002) hazardous wastes discharged to the C-403 pit and C-400 northwest corner sump, and these wastes were ultimately discharged to the NSDD. According to the report, spills from the degreasers would enter floor drains and flow through the Acid Drain System to the C-403 pit and through the Discard Waste System to the sump at the northwest corner of the building.

As discussed in Section 3, another review of the drawings and procedures relating to the operation of the degreaser indicates that the floor drain in the east side degreaser pit did not discharge to the Acid Drain System, but instead discharged to the sump in the pit which was automatically pumped to the storm sewer system area. This would indicate that the TCE lost due to the leak in 1985 did not enter C-403, but instead it was pumped to the storm sewer as discussed in Section 3.2. The Acid Drain System beneath the cleaning tanks does not extend into the degreaser pit and the two areas are separated by a concrete partition. Therefore, there is no direct connection between the degreasers on the east side of the building and the NSDD.

Following the shutdown of the automatic sump pump in the mid-1980s, the sump was manually pumped to the holding pit near the outside TCE holding tank at the southeast corner of the building. Liquid in the pit was routinely sampled prior to discharge and was discharged to the storm sewer system.

One floor drain, which is connected to the Acid Drain System, is located in a recessed area immediately adjacent to the Detrex degreaser on its west side. Presumably, this area was used to set equipment prior to transfer to the cleaning tanks. Another floor drain to the south of the degreaser is in the area that was used to stage degreased parts and equipment for further processing. Procedures called for allowing TCE in the equipment to drain back into the degreaser prior to removal.

There are three floor drains in the immediate vicinity of the small degreaser on the west side of the building. One of these drains is connected to the Waste Discard System and was used for the discharge of water from a filter unit. This drain is equipped with a funnel that would, to some extent, prevent the discharge of solvent from this degreaser from entering the drain. The history and integrity of the funnel cannot be determined, so the possibility exists that solvent entered this floor drain in the past. A second floor drain exists on the west side of the degreaser. The drain system to which it is connected cannot be determined. There is also a connection to the Waste Discard System approximately 10 ft north of that location. This connection, which is associated with a safety shower, has an air gap and is equipped with a collar at floor level. Only very large spills from the small degreaser would have entered this drain. There is no record of any such spills.

Consequently, there were no direct connections between the C-400 degreasers and the NSDD. The only potential, indirect discharges of materials containing TCE to the ditch may have been releases from degreased equipment through the floor drains near the large degreaser into C-403, releases from equipment degreased in the small degreaser through floor drains to the northwest sump, and liquid from the cleaning tanks.

Some quantities of solvents were released to floor drains in the vicinity of the east side degreaser as indicated by interviews with operating personnel familiar with the degreasing process and as observed by the author. These drains are connected to the Acid Discharge System and would have flowed to C-403 and subsequently to the NSDD. Releases to the floor drains near the west side degreaser were not indicated, although there were releases to the floor area.

Interviews also indicate that small quantities of solvents would have been carried over into the cleaning tanks in degreased parts and equipment. Because the hot and cold waters tank had continuous overflows into the C-403 sump, some solvents would have been carried into the sump with the overflow. Solvents in equipment placed in the other tanks would have, as in the case of the alkali tank, reacted with the cleaning solutions and may or may not have been discharged as solvent to the C-403 sump.

Discharges from C-600 and C-410-B would not have contained spent solvents from any degreaser, as there were no such facilities in these areas.

Some quantities of approximately 5 gallons of solvents were taken from C-400 to various work sites throughout the plant including within the C-400 and other buildings with discharges to the NSDD as indicated by personnel interviews and as observed by the author. No records concerning the management and disposal of this material have been located. While the author did not specifically observe this practice in C-400, C-600, or C-410/420, based on practices observed by the author in other buildings, it is possible that solvents were spilled or purposely discharged into floor drains in these buildings.

Appendix A

ENGINEERING DRAWINGS REFERENCES

1.	E4-11-M, Rev. 10, 19 and 20	Plumbing System Plans and Details
2.	E4-11-M1 and M2	Plumbing System Plans and Details, redrawn 1987
3.	E4-37-M	Plumbing – Floor Drains
4.	E4-44-M	Miscellaneous Details Cleaning Tanks – Piping
5.	E4-112b-M	A-10 Degreaser Piping
6.	E4-24-M	Degreaser Piping & Chromic Acid & Trioxide Tanks Circulating System
7.	E4-47-M	Service Piping for Degreaser Plans and Sections
8.	E4-49-M	Piping at Cleaning Tanks – Sections
9.	E4-50-M	Piping at Cleaning Tanks – Plans and Details
10.	E4-74-M, Rev. 1, A1	Cleaning Tanks Flow Diagram
11.	E4-17-A	Degreaser Pit Plans
12.	E4-18-A	Degreaser Pit Details
13.	C14-101-C	Storm Sewer Plan

Appendix B

STANDARD OPERATING PROCEDURES

1.	CH-208	Operation of the Detrex Large Degreaser, 06/22/87
2.	CH-208	Operation of the Detrex Large Degreaser, 02/18/92
3.	CH-208	Operation of the Detrex Large Degreaser, 09/16/92
4.	CH-200	Operation of the Blakesee Degreaser, 02/02/87
5.	CH-200	Operation of the Blakesee Small Degreaser, 02/18/92
6.	CH-114	Resource Conservation and Recovery Act (RCRA) for C-400, 3/24/88
7.	CH-114	Resource Conservation and Recovery Act (RCRA) for C-400, 2/3/93
8.	CH-201	Chemical Cleaning Operation, 04/16/87
9.	CH-352	TCE Handling, C-400, 02/24/89

Appendix C

BIBLIOGRAPHY
OTHER DOCUMENTS REVIEWED

Operations Division Training Manual, Volume IV, Chemical Processing, DY/D-1483, February 1962.

"Processing of Trichloroethylene Contaminated Waste Water," KY/L-1366, June 24, 1985.

"Trichloroethylene Release – Paducah Gaseous Diffusion Plant," July 1, 1986.

"Plant Liquid Effluent Pollution Control Facilities, Gaseous Diffusion Plants," December 6, 1973.

C-400 Process and Structure Review, KY/ERWM-38, May 3, 1995.

Hazardous Waste Annual Reports, 1980 through 1996.

"Request for Identification of Resource Conservation and Recovery Act (RCRA) Storage Tanks in C-400 and RCRA Surface Impoundments, C-616," December 31, 1990.

APPENDIX D

ENGINEERING DRAWINGS

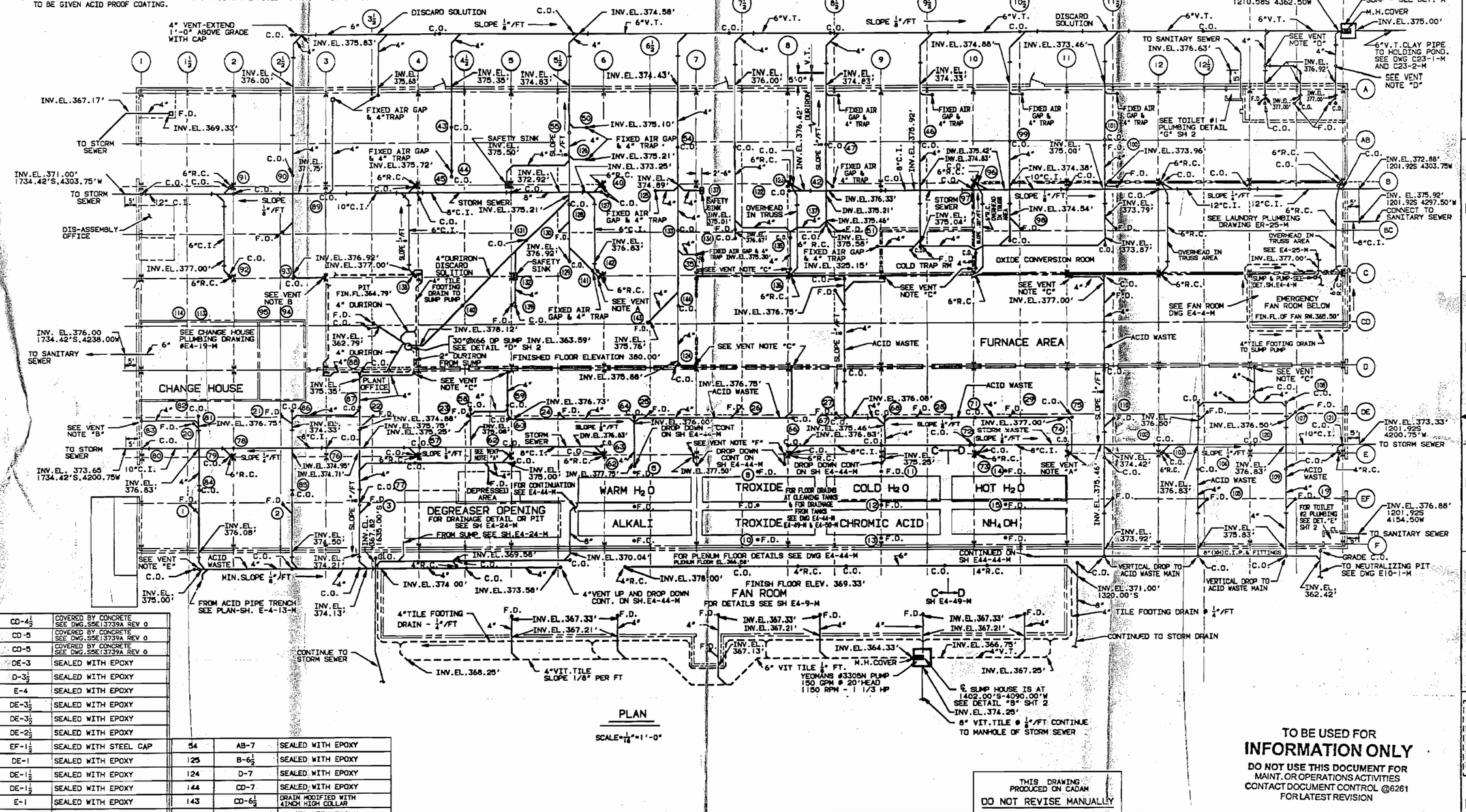
NEXT ASS'Y. FINAL ASS'Y.

NOTE:

1. DISCARD WASTE BELOW FLOOR TO BE DURIRON.
2. DISCARD WASTE OUTSIDE OF BUILDING TO BE VITRIFIED TILE.
3. CLEANING TANK WASTE WATER LINES TO BE STEEL AND EXTERIOR COATED WITH "CORROSITE."
4. STORM DRAINS TO BE CAST IRON TO A POINT FIVE FEET BEYOND BUILDING WALL.
5. CONNECTIONS TO PLANT STORM DRAINS TO BE VITRIFIED TILE.
6. ALL VITRIFIED CRAIN TILE TO BE PITCHED 1/4" PER 1'-0" (APPROX.).
7. SEAL ALL ACID FLOOR DRAINS WITH OIL.
8. ALL SEWERS ARE TO PITCH 1/8" PER FOOT MINIMUM.
9. FOR ALL SEWERS UNDER 4" THE CLEANOUT CONNECTIONS ARE TO BE THE SAME SIZE AS THE LINE.
10. FOR ALL SEWERS 4" AND OVER - THE CLEANOUTS ARE TO BE 4".
11. FOR ROOF CONDUCTOR AND VENT DETAILS - SEE SHEET E4-34-M.
12. EXTERIOR OF ALL ROOF CONDUCTORS AND STORM SEWERS EXPOSED TO ACID FUMES IN PLENUM ARE TO BE GIVEN ACID PROOF COATING.

VENT NOTES:

NOTE A. - 3" VENT - EXTEND UP COLUMN TO 2'-0" ABOVE ROOF INCREASE TO 4" JUST BEFORE ENTERING ROOF - ALL DURIRON.
NOTE B. - 4" VENT - EXTEND UP COLUMN TO 2'-0" ABOVE ROOF INCREASE TO 6" JUST BEFORE ENTERING ROOF - ALL DURIRON.
NOTE C. - 3" VENT -EXTEND UP ON EXTERIOR OF TRANSITE WALL CLOSE TO COLUMN TO 2'-0" ABOVE ROOF INCREASE TO 4" JUST BEFORE ENTERING ROOF -ALL DURIRON.
NOTE D. - 3" VENT - EXTEND TO 1'-0" ABOVE GRADE - WITH VENT CAP.
NOTE E. - 4" VENT - EXTEND TO 1'-0" ABOVE GRADE - WITH VENT CAP.
NOTE F. - 4" VENT - FROM CLEANING TANK SEWER - EXTEND TO 2'-0" ABOVE ROOF - ALL DURIRON.



DRAIN NO.	NEAREST COL. NO.	COMMENTS
140	CD-4½	COVERED BY CONCRETE SEE DWG.S5E13739A REV 0
145	CD-5	COVERED BY CONCRETE SEE DWG.S5E13739A REV 0
139	CD-5	COVERED BY CONCRETE SEE DWG.S5E13739A REV 0
76	DE-3	SEALED WITH EPOXY
88	D-3½	SEALED WITH EPOXY
56	E-4	SEALED WITH EPOXY
87	DE-3½	SEALED WITH EPOXY
22	DE-3½	SEALED WITH EPOXY
86	DE-2½	SEALED WITH EPOXY
84	EF-1½	SEALED WITH STEEL CAP
83	DE-1	SEALED WITH EPOXY
82	DE-1½	SEALED WITH EPOXY
81	DE-1½	SEALED WITH EPOXY
80	E-1	SEALED WITH EPOXY
79	E-2	SEALED WITH EPOXY
78	DE-2	SEALED WITH EPOXY
77	EF-3½	SEALED WITH EPOXY
21	DE-2½	SEALED WITH EPOXY
20	DE-1½	SEALED WITH EPOXY
3	EF-3½	SEALED WITH EPOXY
85	EF-2½	SEALED WITH EPOXY
2	EF-2½	SEALED WITH EPOXY
1	EF-1½	SEALED WITH EPOXY

DRAIN NO.	NEAREST COL. NO.	COMMENTS
54	AB-7	SEALED WITH EPOXY
125	B-6½	SEALED WITH EPOXY
124	D-7	SEALED WITH EPOXY
144	CD-7	SEALED WITH EPOXY
143	CD-6½	DRAIN MODIFIED WITH 4INCH HIGH COLLAR
142	C-6	SEALED WITH EPOXY
141	C-6	SEALED WITH EPOXY
131	BC-5	SEALED WITH EPOXY
130	BC-5½	SEALED WITH EPOXY
126	B-5½	SEALED WITH EPOXY
127	B-6	SEALED WITH EPOXY
40	B-6	SEALED WITH EPOXY
132	C-5	SEALED WITH EPOXY
147	B-5	COVERED BY CONCRETE

SECTION AND DETAIL KEY

TOLERANCES UNLESS OTHERWISE SPECIFIED
FRACTIONS ±1/16"
DECIMALS .XX ±.01 .XXX ±.005
ANGLES ±1/2°
BREAK SHARP EDGES .005 MAX. FINISH

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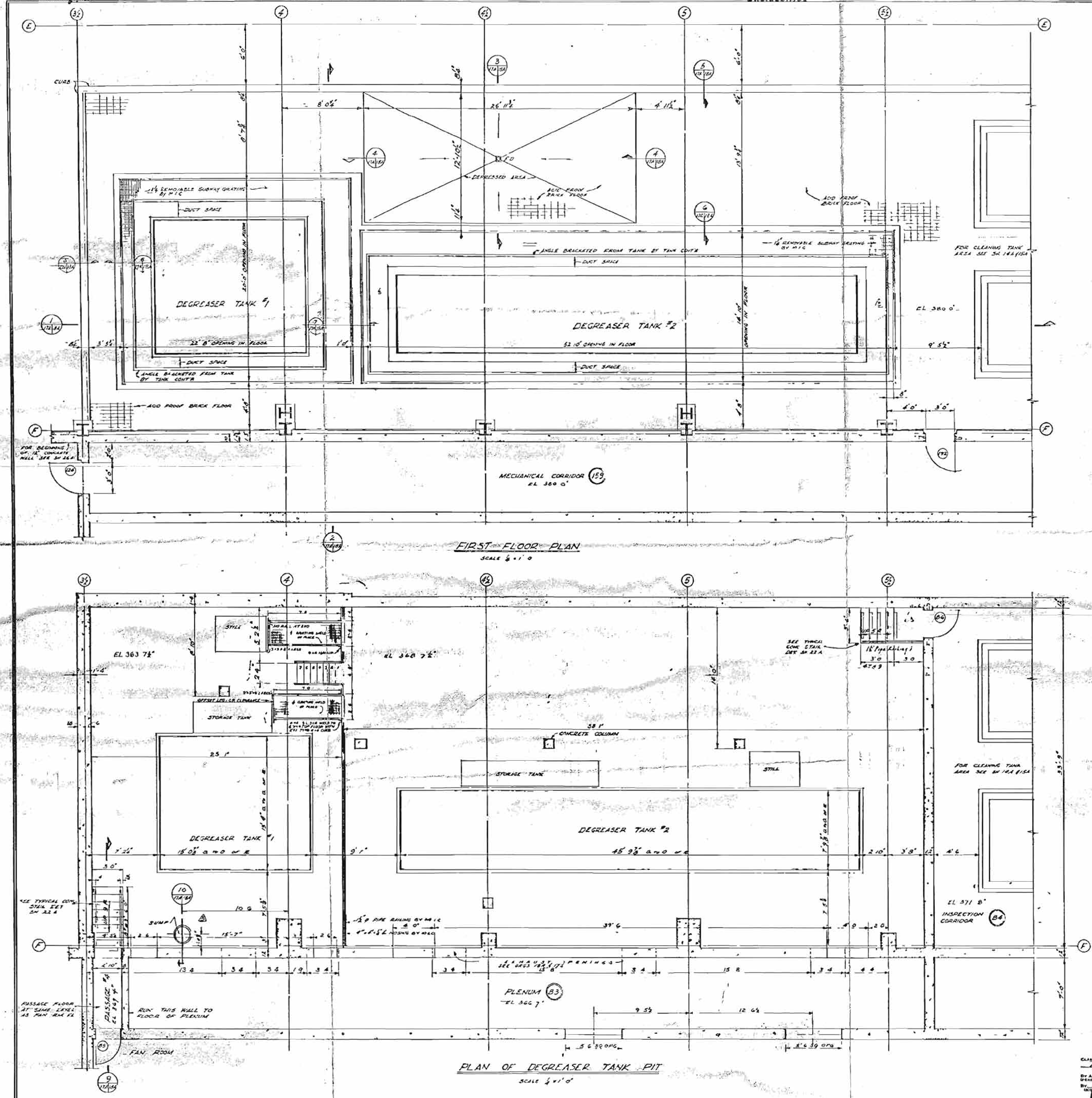

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PROJECT: "C" PLANT — BUILDING: CLEANING C-400 — SHEET: E4-17-A

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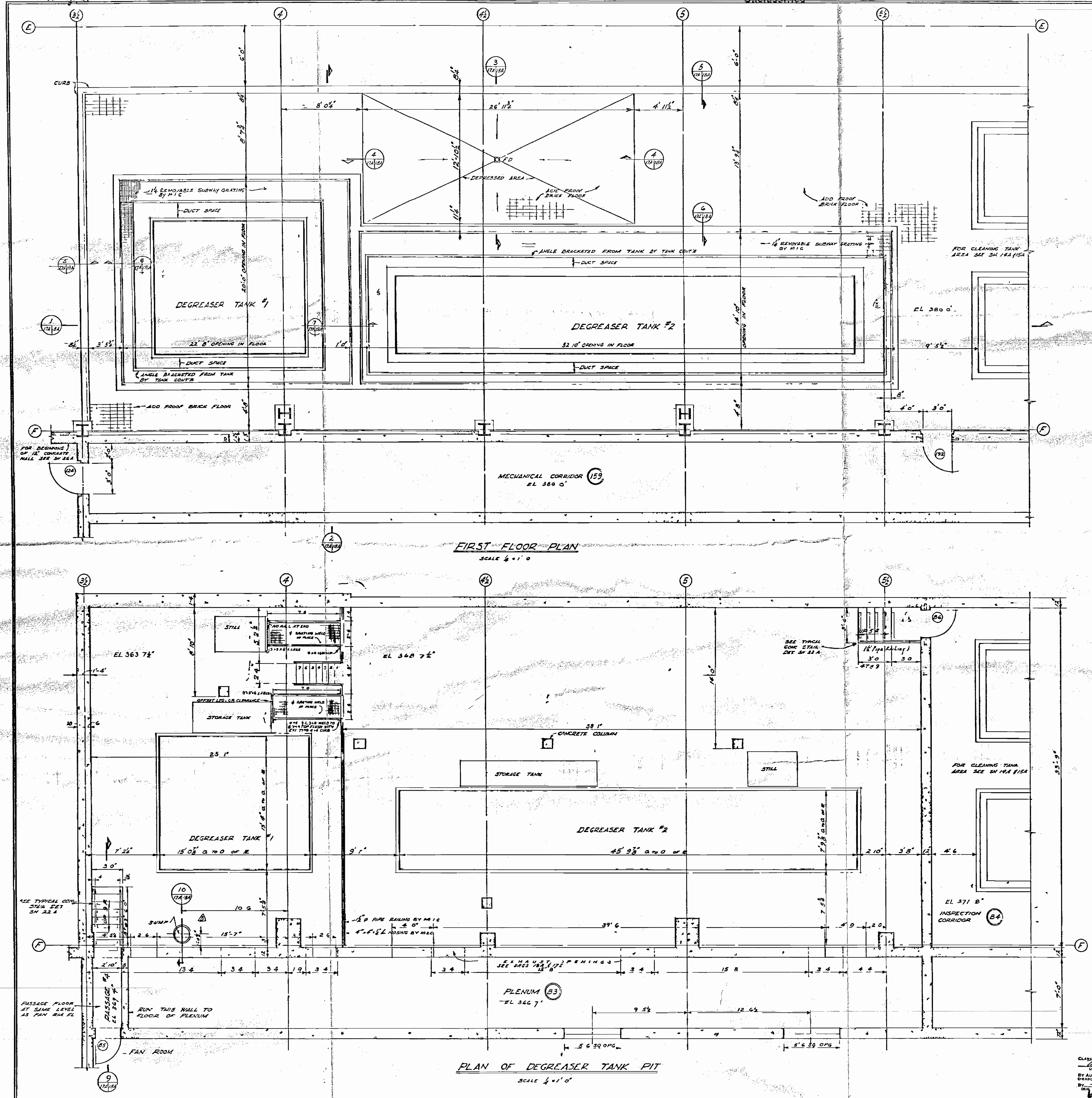

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ARCHITECT ENGINEER	CARBIDE CARBON CHEM DIV	A E C ENGINEER

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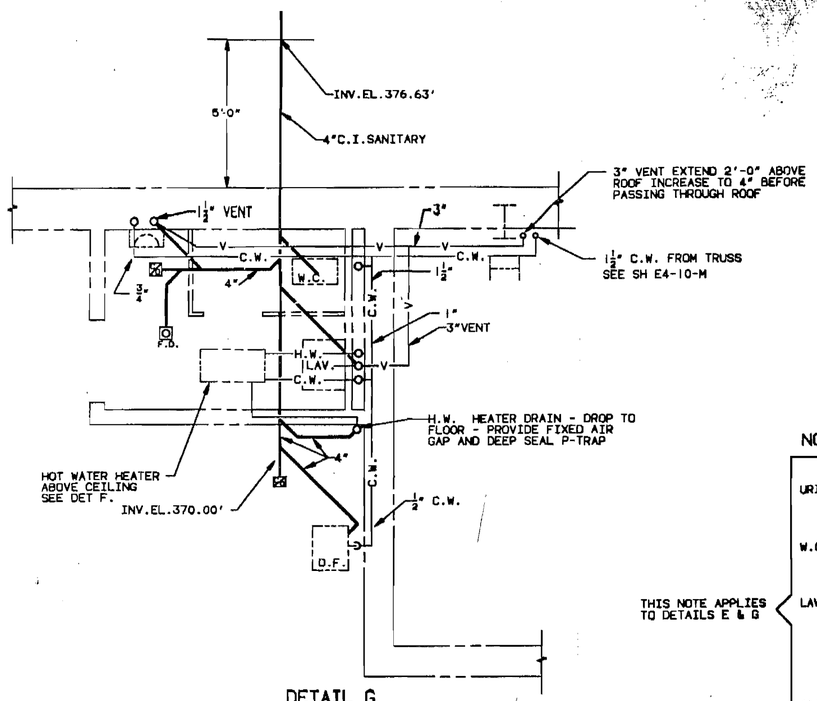


DETAIL G
TOILET #1

SCALE ½" = 1'-0"

NOTE:

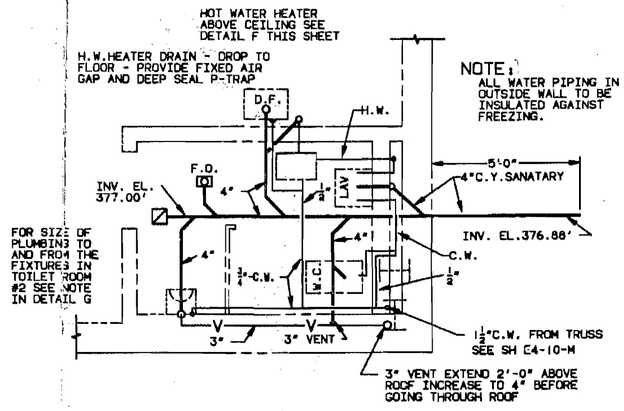
THIS NOTE APPLIES TO DETAILS E & G

URINAL - 2" WASTE ABOVE FL
¾" C.W.
1½" VENT

W.C. - FLOOR MOUNTED
4" SOIL
1¼" C.W.

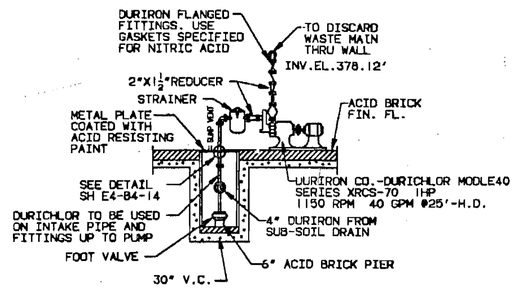
LAV. - 1½" WASTE ABOVE FL.
½" C.W.
¾" H.W.

ALL HORIZONTAL C.W./H.W. & VENT PIPING TO BE RUN ABOVE TOILET CEILING



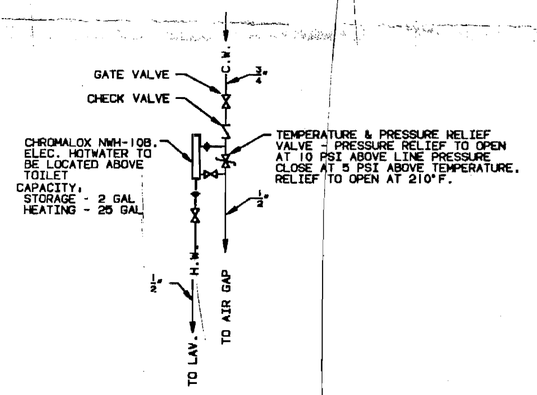
DETAIL E
TOILET #2

SCALE ½" = 1'-0"



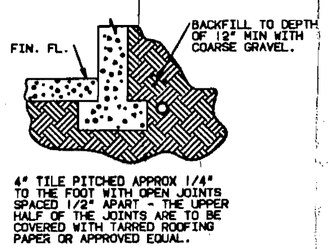
DETAIL D
SUMP AT COL.D-4

SCALE ¼" = 1'-0"



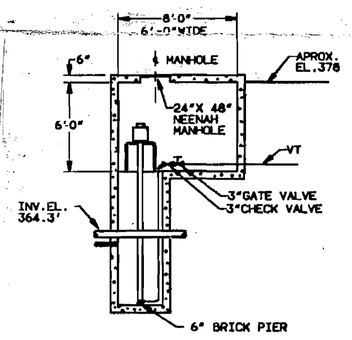
DETAIL F
DETAIL OF WATER HEATER

SCALE ¾" = 1'-0"



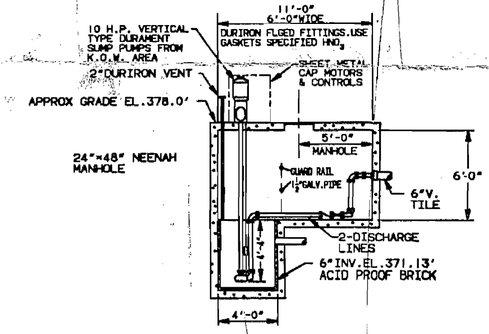
DETAIL C
TYPICAL FOOTING DRAIN
DETAIL

SCALE ½" = 1'-0"



DETAIL - DRAIN TILE
SUMP PUMP HOUSE

NOT TO SCALE



DETAIL A
DISCHARGE WASTE
SUMP PUMP HOLE E

SCALE ¼"-1'-0"

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REV. NO.	ISSUE / REVISION DESCRIPTION	REVISION OR ISSUE APPROVALS	DRAWING APPROVALS	DATE
21	APPROVED FOR RELEASE FOR ESO-Z91060, CONVERSION TO CAD.		DRW CHKR RED TR APPO A-E	

AS BUILT SIGNATURES FOR REV 20

LOCKHEED MARTIN UTILITY SERVICES, INC.
P.O. BOX 1410 PADUCAH, KENTUCKY 42001
ACTING UNDER CONTRACT USEC-HQ-93-C-0001 WITH THE U.S. ENRICHMENT CORPORATION

PLUMBING SYSTEM PLAN & DETAILS
~~SHEET 2 OF 2~~

SCALE	PLANT	BLDG	FL	SHEET	OF	CLASS
AS NOTED	PGDP	C-400	X	02	02	U

ID		REV
XXXXX	E4-11-M2	21

NUMBER OF MODELS IN THIS DRAWING= 1

APPENDIX E

INFORMATION SOURCES

Source	Type of Document
C-710 Records Management	Procedures, other documents
C-400	Engineering drawings, degreaser specifications
C-100 Document Control	Engineering drawings
Bechtel Jacobs Document Center	Misc. documents
SAIC Files	Misc. documents
USEC Personnel	Misc. documents

SUBJECT: OPERATION OF THE DETREX DEGREASER

INTRODUCTION

This procedure establishes the method of operation of the Detrex degreaser located in the chemical cleaning area of C-400. Associated equipment, such as the day tank, Detrex still, water separator, and various components of the Detrex degreaser will be discussed.

The purpose of the Detrex degreaser is to clean the grease and oil from metal parts using trichloroethylene as the cleaning solvent. A wide variety of parts are normally degreased. These parts must be suspended down inside the degreaser. They must be positioned in such a manner that will permit intimate contact with the trichloroethylene vapors. The vapors will condense on the surface of the part(s) and the liquid trichloroethylene will roll down the surface cleaning the part. In addition, two trichloroethylene pumps and a spray hose are available for spraying liquid trichloroethylene on the metal parts if desired.

Approved lifting devices, racks, slings, baskets, and rigging methods are used to suspend the parts into the degreaser. Two 7 1/2-ton P&H cranes and one 23-ton Whiting crane are available for this purpose. These cranes are equipped with both cab and pendant controls. The method used to suspend the part(s) will depend on the shape, size, and configuration of the particular piece(s) of equipment to be degreased.

Figure 1 shows a drawing of the Detrex degreaser, still and associated piping and valving.

There are several safety-related control devices designed into the system:

(1) Vapor level control probes are located above the cooling coils. If the vapors rise above the cooling coils contacting the probes, the steam supply will automatically shut off. The temperature switch is set at 120°F on the degreaser and 150°F on the still.

(2) The Detrex still has a temperature switch to turn off the steam supply. This switch is set at 190°F.

(3) Safety relief valves are located in all steam supply lines. These valves are set at 20 psig.

(4) An automatic solvent level pump control will control the solvent level in the still.

(5) Exhaust fans continually pull any vapors that exist from around the top of the degreaser.

(5) Exhaust fans continually pull any vapors that exist from around the top of the degreaser.

In essence, operation of the degreaser is not very complex. Trichloroethylene is admitted to the boiling chamber as the solvent. Steam is admitted to the heating coils in the boiling chamber to heat the trichloroethylene until it vaporizes. The cooling coils are supplied with water to condense the trichloroethylene vapors to keep them from rising out of the degreaser. As the trichloroethylene condenses, it drains by gravity back into the water separator. The water separator allows the water, if any, to rise to the top of the trichloroethylene and be drained off. Trichlor is continually pumped from the degreaser to the Detrex still which is designed to separate the solvent from the contaminating residues inside the degreaser proper. The residues can be cleaned from the still periodically, eliminating the need to clean the degreaser itself. The clean trichloroethylene then returns by gravity to the water separator eventually returning to the holding tank or degreaser.

II. SAFETY PRECAUTIONS

A. Trichloroethylene vapors under certain conditions are flammable. When overheated, a by-product of phosgene gas is generated. No smoking, welding, open flames, sparks or excessive heat of any kind should be permitted near the degreaser. (R

B. A Hazardous Work Permit is required for all maintenance work.

C. Neoprene gloves and face shield must be worn when operating the degreaser liquid spray pump.

D. Avoid inhalation and contact with the solvent vapors and liquids.

E. Never admit steam to the boiling chamber until the cooling water is turned on and the exhaust system is in operation.

F. Never place a piece of equipment into the degreaser that contains aqueous decontamination solution or appreciable amounts of uranium.

G. Rig items to allow maximum drainage of liquid trichloroethylene to avoid excess vapors.

H. Exercise extreme care when large parts are lowered into the degreaser to avoid rubbing the sides.

I. Refer to Standard Operating Procedure CH-1, "Safety, Health Physics, Environmental and Criticality Control Practices, C-400", for general safety and health physics practices.

J. Refer to Job Hazard Analysis II-P-1, "Large Degreaser Operation", for general precautions for all job steps.

SUBJECT: OPERATION OF THE DETREX DEGREASER

PROCEDURE

A. Degreaser Start Up

1. Start the exhaust blowers. The start buttons are located at Column F-5 for exhaust blowers #90 and #91. The north and south blowers are fed from MCC-KK, located in the fan room basement.

2. Turn on the water supply to the cooling coils. The main water supply valves are located on the north side of the degreaser wall under the platform. Recommended water outlet temperature is 90°F to 110°F. Normal operating pressure is 32 psig.

3. Admit trichloroethylene from the day tank to the degreaser until the level is just above the heating coils. The day tank block valve T-10 is located in the basement on the northeast corner of the still. Valve T-2 is located on the southwest corner going into the bottom of the degreaser. Valve T-3 is located beneath the bottom of the water separator going into the degreaser supply line. Distillation end point is approximately 190°F to 215°F.

4. Open the steam supply block valves S-1 and S-2 to admit steam to the heating coils. Steam pressure is controlled by a steam regulator set at approximately 4-7 psig. A safety relief valve set at 20 psig is located in the steam supply. There are two solenoid-operated valves which will automatically close if the trichloroethylene vapors rise too high above the cooling coils in the degreaser. The steam supply is designed with two separate pressure regulators. One is set to reduce the steam pressure to approximately 4-7 psig. The second pressure regulator can be operated by opening a small petcock (S-6) located on top of the degreaser platform. This allows more steam to enter the coils for a more rapid heat-up. It will also cause the relief valve to pop off until the petcock is closed. The condensate system will have to operate properly before the steam can be controlled properly.

NOTE: It will take approximately 2-3 hours for the degreaser to reach operating temperature. This depends largely on the amount of sludge accumulated on the coils and in the boiling chamber. The covers are to be kept closed as much as possible at all times. The east and west covers are operated separately from the pushbutton station on top of the degreaser platform. The covers are to be fully open when moving equipment in or out of the degreaser.

5. The water inlet valves on the degreaser water separator must be open to provide cooling water to the cooling coils.

6. Open block valves T-7 or T-8 for the liquid spray pump. Only one valve at a time should be open depending on which pump you are using, the east or west.

7. Trichlor valves T-5, T-9, T-10 and T-11 should be open. This will allow trichloroethylene to be pumped to the still from the boiling changer and then back to the degreaser water separator.

B. Detrex Still Start Up

1. Open the water supply valves on the still and water separator.

2. Trichlor valves T-5, T-9, and T-11 should all be open. Valve T-4 should be kept closed.

3. Open the steam supply valve S-1. Steam is regulated at approxiately 4-7 psig. A momentary over-ride switch is provided to give increased steam pressure for rapid heat-up if needed.

4. Set the selector switch (3) on the still panel to automatic. This will allow the still pump to maintain the proper level of liquid trichloroethylene in the still.

5. The still pump will pump the trichloroethylene from the boiling chamber of the degreaser to the still. The trichloroethylene level is controlled by a float switch.

6. After the still has operated for approximately one hour, adjust the water flow by pinching down on the water inlet valves until the outlet water is warm to the hand. This will help to avoid too much condensing of water on the outside of the cooling coils inside the still.

7. The visi-flow in the trichloroethylene discharge line from the still water separator can be used to observe the flow of clean trichloroethylene returning to the degreaser water separator located in the south wall of the degreaser.

8. At regular intervals, it will be necessary to drain off some of the sludge accumulation collected on the bottom and around the steam coils. A valve (T-6) and drain hose are provided for this purpose.

9. Periodically, it will be necessary to shut down the still, open the clean-out port and remove the solids and sludge accumulated around the steam coils. This will avoid this material becoming "baked on" the steam coils.

10. Any overflow of the TCE water separator and steam condensate bleed off will enter the degreaser floor drain to the sump pump and be automatically pumped to the underground containment pit for the TCE unloading facility. If the accumulated water is contaminated with TCE it can be aerated for discharge. Do not pump the underground pit out until sample results are verified.

C. Degreaser Shutdown

1. Close the two steam supply block valves S-1 and S-2 going to the degreaser steam coils.
2. Close the steam supply valve S-1 going to the still steam coils.

3. Close the trichloroethylene block valve T-2 going into the degreaser boiling chamber.

4. Close the trichloroethylene block valve T-11 going to the still and turn off the still pump.

5. Turn the still selector switch to "off" position.

6. Valve off the main water supply to the degreaser still.

7. Turn off both exhaust fans at Column F-5.

D. Drain and Clean Degreaser

1. Open trichloroethylene valves T-4, T-9 and T-10. Close T-11.

2. Set the still selector switch on manual and start the still pump. This will allow the remaining trichloroethylene to be pumped from the boiling chamber into 50-gallon drums. The hose and block valve are located at the northwest corner of the degreaser platform.

SUBJECT: OPERATION OF THE DETREX DEGREASER

E. Hazardous Waste Disposal

Sludge or solid accumulations generated as a result of draining or cleaning out the Detrex still and Detrex degreaser must be disposed of in accordance with SPP-68 "Disposal of Hazardous Materials, Askarel, Waste Oil and Scrap Materials".

Normal operations consist of draining the sludge accumulation from the Detrex still at regular intervals. Periodically, the Detrex degreaser must also be shut down and solids and sludge accumulations be cleaned out. All this material must be collected in 55-gallon drums. Use a 17C open top drum for degreaser solids and a 17E drum with a "bung" on still bottoms and still sludge (liquid).

All wastes generated frc. this system are hazardous wastes, and must be disposed of by filling out a Request for Disposal form (UCN-12463-A).

Manager - Power, Utilities and Chemicals

Manager - Operations Division

PADUCAH GASEOUS DIFFUSION PLANT

Chemical and Waste Services
Chemical Operations

Operation of the Detrex Large Degreaser
CH-208
Rev. 0

Prepared by: Steve Bauer
Steve Bauer

Approved by: S L Shell 2/18/92
S. L. Shell, Division Manager Date

Effective Date: 3-11-92

Procedure Abstract:

In Hand: Yes __ No x
___ Safety-Related/Safety Systems
_x_ Quality-Related
___ Nonquality-Related
___ Temporary/Expiration Date _____

Record of Changes

Change Letter	Affected Pages	Effective Date	Expiration Date

Next 3 -year review required no later than: 2/18/95

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CONTENTS

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1.0 PURPOSE

To establish the operation of the Detrex degreaser located in the chemical cleaning area of C-400.

2.0 APPLICABILITY

This procedure applies to the large Detrex degreaser used to clean metal parts with trichloroethylene.

3.0 DEFINITIONS/ACRONYMS

3.1 **Trichloroethylene (TCE)** - A nonflammable liquid used as a solvent to remove grease from metal.

3.2 **Trichloroethylene Still** - A vaporization chamber to remove residues and impurities from the trichloroethylene.

3.3 **Day Tank** - A 1041-gallon tank located in the degreaser basement used to supply trichloroethylene to the degreaser boiling chamber.

3.4 **Boiling Chamber** - A 500-gallon area in the bottom of the degreaser containing steam coils to vaporize the trichloroethylene.

4.0 REFERENCES

4.1 Standard Operating Procedure (SOP) CH-1, "Safety, Health Physics, Environmental, and Criticality Control Practices, C-400"

4.2 SOP CH-E-8, "Chemical Releases, C-400"

4.3 SOP CH-352, "Trichloroethylene Handling, C-400"

5.0 PRECAUTIONS AND LIMITATIONS

5.1 Trichloroethylene vapors, when overheated, produce phosgene gas and are flammable. Sparks or open flames shall not be allowed around the degreaser at any time.

5.0 PRECAUTIONS AND LIMITATIONS (Continued)

5.2 Wear Viton gloves, face shield, and chemical goggles when operating the degreaser liquid spray pump.

5.3 Avoid inhalation and contact with solvent vapors and liquids.

5.4 A self-contained breathing apparatus is required for entry into unknown concentrations of trichloroethylene.

5.5 The exhaust system shall be on at all times when the degreaser is in operation.

5.6 All slings used on the overhead crane shall have a current inspection date. Without prior engineering approval, wire rope shall not be used to suspend equipment into the degreaser while it is in operation.

5.7 Hard hats are required when the overhead crane is in operation.

5.8 Exercise care when lowering large objects into the degreaser to avoid contacting the sides or ends.

5.9 Uranium contaminated equipment shall not be cleaned in the degreaser.

5.10 Refer to SOP CH-1 for general safe work practices.

6.0 PREREQUISITES

6.1 Start exhaust fan.

6.1.1 Start buttons for fans 90 and 91 are located at column F-5 on main floor.

6.1.2 The red light on start switch should illuminate to indicate that fan contactor is engaged.

6.1.3 Visually check the fan (located in basement) for missing or loose belts, unusual vibrations, and hot bearings. Check that canvas is in place and in good condition between exhaust fan and louvers.

6.0 PREREQUISITES (Continued)

6.2 Start cooling water.

6.2.1 Check that main water valve is open. This valve is located on the east wall at the northeast corner of the degreaser approximately 8 feet above floor level.

6.2.2 Open valves W-1 and W-2 located in basement.

6.2.3 Adjust regulator PR-1 to control water pressure at 32 psig (the system relief valve is set at 40 psig). The regulator is located on the north side of the degreaser near the TCE day tank, between water valves W-1 and W-2.

6.2.4 Check that the degreaser cooling water is returning into the south end of the cold water tank.

6.3 Check TCE Level in the Boiling Chambers.

NOTE: The TCE level in the boiling chambers must be 2 to 3 inches above the steam coils to provide heat transfer from the steam coils to the TCE.

6.3.1 If TCE level in boiling chambers is low, add TCE to the boiling chambers from the day tank.

6.3.1.1 Open valves T-2 (normally open) and T-10 to start TCE flow to the southwest corner of the south boiling chamber. Continue filling until the north boiling chamber reaches 2 to 3 inches above the steam coils.

6.3.1.2 Close valve T-10.

6.4 Check Steam Pressure Gauge at Northwest Corner of Degreaser. Adjust steam regulator located at southwest corner at building main steam station to obtain a minimum of 25 psig.

6.4.1 Turn regulator adjustment stud clockwise to increase pressure.

6.4 **Check Steam Pressure Gauge at Northwest Corner of Degreaser (Continued)**

6.4.2 Turn regulator adjustment stud counterclockwise to decrease pressure.

6.5 **Check the East and West Condensate Pumps Located at the Southwest Corner of the Degreaser at the Lower Basement Level.**

NOTE: If the condensate pumps are not operating properly, the system will waterlog and there will be no heat transfer from the steam coils to the TCE.

6.5.1 Check that east and west condensate breakers are closed.

6.5.2 Pumps should alternate operation and run intermittently.

6.5.3 Ensure that condensate outlet valves C-16 for the east pump and C-15 for the west pump are open.

6.5.4 Ensure that condensate inlet valve C-14 is open.

7.0 TEST EQUIPMENT, TOOLS, AND SUPPLIES

None

8.0 ACTION STEPS

8.1 **Degreaser Start-up**

NOTE: Refer to Appendix A, "Degreaser Troubleshooting" for any problems encountered during start-up, or operation of the Detrex Degreaser or Still.

8.1 Degreaser Start-Up (Continued)

8.1.1 Open condensate valves.

8.1.1.1 Ensure that condensate valves C-6, C-7, C-8, C-9, C-10, C-11, C-12, and C-13 are open (normally open). See Appendix B.

8.1.2 Valve on steam.

8.1.2.1 Open steam supply block valve S-1. Check that valves S-2, S-3, S-4, and S-5 are open (normally open).

8.1.2.2 Close steam trap bypass valves C-7 and C-12 approximately thirty minutes after start-up to allow purging of water from system.

NOTE: The vapor level in the degreaser must reach the proper level in order to condense TCE vapors back into the water separator tank. The water separator tank provides liquid TCE to the east and west spray pumps. When the liquid level reaches 150 gallons in the water separator tank, it will provide a constant TCE feedback to the boiling chambers.

8.1.2.3 Open petcock valve S-6. Open the west retractable door on top of the degreaser and observe vapor level. When the vapor level in degreaser reaches the first coil of the cooling coils above the gutters, close petcock valve S-6 and close the west door.

NOTE: When TCE in the boiling chambers becomes dirty (cloudy, murky, etc.) the Detrex Still shall be put into operation to purify the TCE.

8.1 Degreaser Start-Up (Continued)

8.1.3 Start-up Detrex Still

8.1.3.1 Turn control power on. Knife switch is located on west wall near the Detrex Still.

8.1.3.2 Open water supply valve W-3, W-4, W-5, and W-6.

8.1.3.3 Open steam valve S-7.

8.1.3.4 Set PR-2 valve to maintain steam pressure at 5 psig. Turn regulator knob clockwise to increase pressure, and counterclockwise to decrease the pressure.

8.1.3.5 Open condensate valves C-3 and C-4.

8.1.3.6 Open condensate bypass valve C-5.

8.1.3.7 Close condensate bypass valve C-5 after approximately 30 minutes to allow purging of water from system.

8.1.3.8 Open TCE suction valves T-9, T-16, and T-17.

8.1.3.9 Open TCE discharge valves T-4, T-5, and T-18.

8.1.3.10 Set TCE pump selector switch to "auto."

8.1.3.11 Close knife switch SP-1 to energize TCE pump.

NOTE: When draining "still bottoms," if sludge becomes too thick to drain freely, drain more often.

8.1.3.12 After every 24 hours of operation, open drain valve T-6 and drain approximately 2 gallons of "still bottoms" into a 3-gallon bucket.

8.1 Degreaser Start-Up (Continued)

8.1.3.13 Deposit "bottoms" into the stainless steel 55-gallon drum provided for this hazardous waste. This drum is located in a Satellite Accumulation Area east of the Detrex Still. Contact supervision immediately when the drum is full. A "Request for Disposal" form shall be completed and the drum moved by waste management to an approved storage area within 3 days.

8.1.3.14 Shut down Detrex Still when TCE in north boiling chamber is clear.

- Close steam supply valve S-7.
- Open knife switch SP-1.
- Close TCE suction valves T-16 and T-17.
- Close TCE discharge valve T-18.

8.2 Equipment and Parts Cleaning

8.2.1 Open retracting doors on top of degreaser by pushing east and west door operator buttons. Close main knife switch breaker PPE-7 located on east side of column E-4.

CAUTION

Without prior engineering approval, slings made of wire rope shall not be used to lower equipment into the degreaser, while the degreaser is in operation.

8.2.2 Rig equipment to be degreased with appropriate lifting devices.

8.2.3 Use overhead crane to suspend equipment to be degreased in such a manner to allow proper drainage of TCE back into the boiling chambers.

8.2.4 Lower equipment slowly into degreaser to avoid contacting the sides or ends of the degreaser.

8.2 Equipment and Parts Cleaning (Continued)

8.2.5 Allow equipment to vapor degrease until TCE vapors stop condensing on surface of equipment. This will indicate that equipment has heated and degreasing is complete. Degreasing time will depend on size and weight of equipment to be degreased.

8.2.6 If equipment is extremely dirty, use TCE spray pumps (east and west) and spray equipment with hand-held spray nozzle located at south side of degreaser.

8.2.6.1 Open TCE discharge valves T-7 (west pump) and T-8 (east pump) located on top of water separator tank on southeast wall of degreaser.

8.2.6.2 Close east and west pump breakers 23 (west pump) and 24 (east pump) at lighting panel E-4 located on north side of column E-4.

WARNING

The hand-held spray nozzle should be directed into the degreaser before energizing the spray pumps to prevent TCE from spraying on personnel or surrounding area.

8.2.6.3 Energize pumps by pushing red start buttons for east and west TCE spray pumps.

8.2.6.4 Direct stream of TCE from nozzle to surface of equipment to be degreased. Continue to spray until surface is adequately cleaned.

8.2.6.5 Shut down spray pumps by pushing stop buttons for east and west TCE spray pumps.

8.2.7 Allow equipment to drain thoroughly back into the boiling chambers before removing from degreaser.

Equipment and Parts Cleaning (Continued)

WARNING

Equipment removed from the degreaser may be hot and gloves should be worn to prevent burns.

8.2.8 Remove equipment from degreaser slowly to avoid "dragging the vapors" out of the degreaser into the operating area. The correct crane lifting speed is 11 feet per minute.

8.2.9 Close retractable doors on top of degreaser by pressing east and west operator buttons.

8.3 Degreaser Shutdown

8.3.1 Close steam valves S-1 and S-2.

8.3.2 Leave exhaust fan and cooling water on if boiling chambers contain TCE.

9.0 ACCEPTANCE CRITERIA

9.1 Inspect cleaned equipment for grease or oil and reclean as necessary.

10.0 POSTPERFORMANCE WORK ACTIVITIES

10.1 Removing TCE From the Boiling Chambers to Basement Day Tank

10.1.1 Check sight glass on TCE day tank to ensure adequate storage space is available.

10.1.2 Open valves T-9, T-16, T-17, T-18, and T-12.

10.1.3 Close valves T-11 and T-4.

10.1.4 Close knife switch SP-1

10.1.5 Place TCE pump selector switch to "run" position.

10.1 Removing TCE From the Boiling Chambers to Basement Day Tank (Continued)

10.1.6 Stop TCE pump when boiling chambers are empty.

10.1.7 Close valves T-9, T-16, T-17, T-18, and T-12.

10.1.8 Open valves T-11 and T-4.

10.2 Removing TCE From the Boiling Chambers to 55-Gallon Drums

NOTE: Two operators are required to transfer TCE from the boiling chambers to 55-gallon drums.

10.2.1 Open valves T-9, T-16, T-17, T-18, and T-11.

10.2.2 Close valves T-4 and T-12.

10.2.3 The number 2 operator shall place flex hose nozzle (located at northwest corner of degreaser on the upper level) into 55-gallon DOT approved 17E drums or approved containers.

10.2.4 Open valve T-15.

10.2.5 The number 1 operator shall close knife switch SP-1 and place TCE still pump into the "run" position.

10.2.6 The number 2 operator shall communicate to the number 1 operator when the filling drum reaches approximately 4 inches from the top. The number 1 operator shall open SP-1 immediately to stop filling.

10.2.7 Place flex hose into empty drum and repeat step 10.2.6 until all TCE is removed from the boiling chambers.

10.2.8 Close valves T-9, T-16, T-17, T-18, and T-11.

10.2.9 Open valves T-4 and T-12.

10.3 Operation of the Basement Sump Pump. The sump pump is located in the southeast corner of the degreaser basement, and is used to pump any

10.3 Operation of the Basement Sump Pump (Continued)

accumulated liquid to the outside southeast corner of C-400 adjacent to the holding pit.

10.3.1 Position drums or approved containers at discharge line.

10.3.2 Remove pipe cap from discharge line and attach flexible hose.

10.3.3 Insert flexible hose into drum or approved container. Check that discharge gate valve is closed.

10.3.4 Open the sump pump discharge valve located on the discharge line of the pump in the degreaser basement.

NOTE: The sump pump breaker is open, locked, and tagged to prevent unauthorized discharge of any solution from the degreaser basement area. Contact supervision for prior approval to operate the pump.

10.3.5 Contact supervision for key, and unlock and close the sump pump breaker (located in the degreaser basement). The pump operates automatically and will start when the breaker is closed if the liquid level is high enough to actuate the float switch.

10.3.6 Open discharge line gate valve and fill drums or approved containers.

10.3.7 Open sump pump breaker and replace lock and tag.

10.3.8 Close discharge line gate valves.

10.3.9 Remove flexible hose and replace discharge line pipe cap.

10.3.10 Contact supervision for disposition of pumped solution.

10.3 Operation of the Basement Sump Pump (Continued)

NOTE: The TCE day tank should not be filled to more than 50 percent to allow pumping of TCE back into the day tank from the boiling chambers in the event of a leak or required maintenance.

10.4 Filling the TCE Day Tank

10.4.1 Refer to SOP CH-352.

11.0 RECORDS

11.1 The following nonquality assurance record is completed by this procedure.

11.1.1 UCN-4468, "C-400 Pipe Cleaning Area Daily Log Sheet" (Appendix C)

Appendix A
Page 1 of 2

Degreaser Troubleshooting

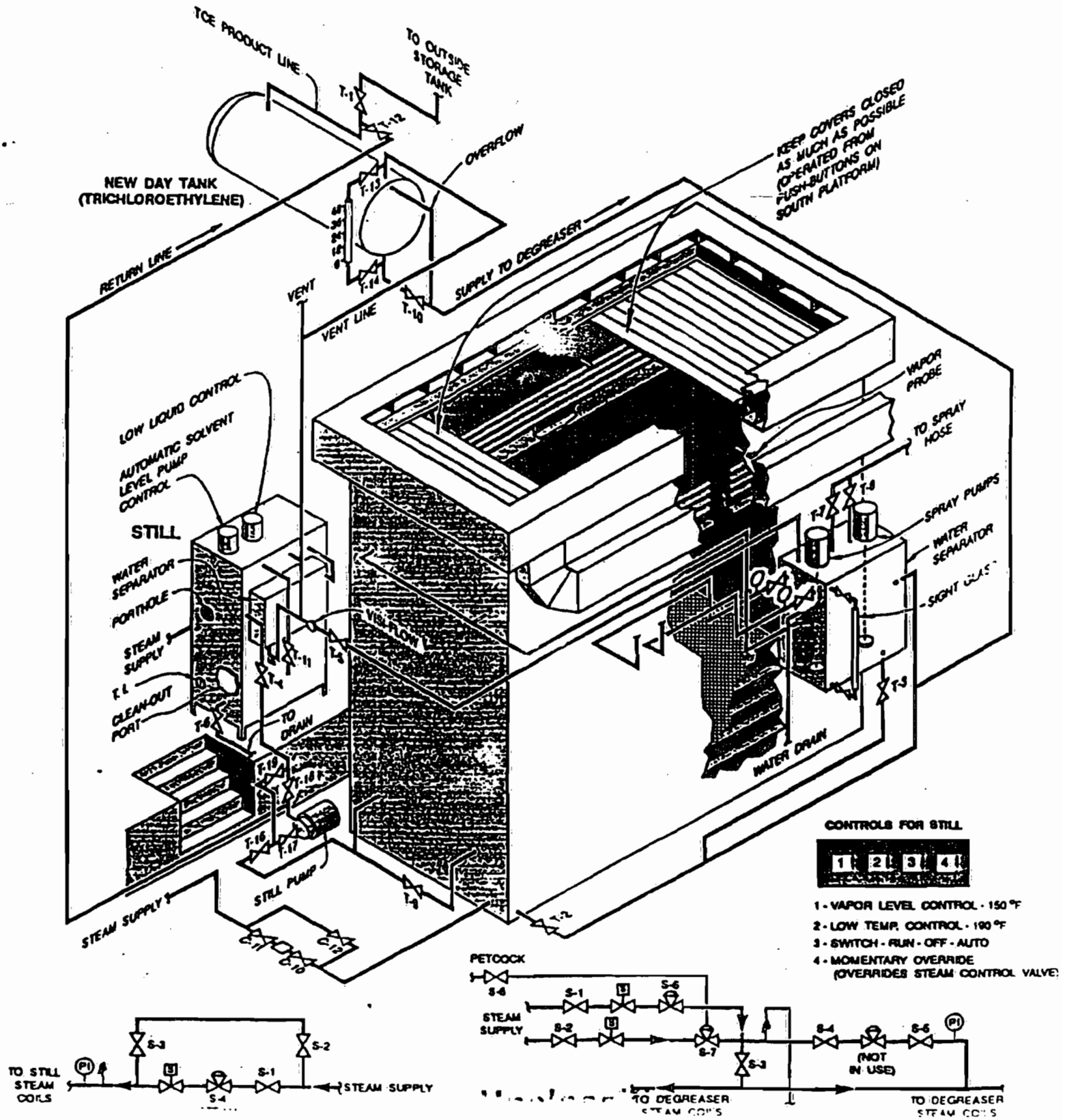
PROBLEM	POSSIBLE CAUSE/CORRECTIVE ACTION
Steam relief valve operates.	Low-level in TCE boiling chambers. Add TCE to boiling chambers.
Vapor level falls below normal operating level.	**Building steam pressure low.** Adjust building steam regulator valve to a minimum of 25 psig. **Petcock valve S-6 has been open too long and high temperature solenoid valve has actuated and shut steam off.** A cool-down period is required before steam can be returned to normal. System Waterlogged. Open petcock valve S-6 and steam trap bypass valves C-7 and C-12 for approximately 30 minutes, then close.
TCE spray nozzle plugging often.	**Nozzle plugged with rust or debris.** Open valve T-3 and leave open for 2-3 hours with degreaser and/or still operating at correct vapor level. Close valve T-3 and allow water separator tank to refill.
Spray pumps will not pump.	**Water separator tank empty.** Operate degreaser at proper vapor level to allow water separator tank to fill.
Detrex still will not heat.	**System is waterlogged.** Open steam trap bypass valve C-5. Turn steam regulator adjustment knob on PR-2 clockwise until steam pressure reaches 10 psig. This will purge water from system in approximately 30 minutes.
Detrex still pump runs too long, (5 min.) and does not pump TCE into still.	**TCE Still pump suction or discharge line plugged.** Unplug suction line from TCE pump to degreaser. Close valves T-12, T-17, T-18, and T-4. Open T-19, T-16, T-9. Open valve A-1 for 5 seconds, then close. Unplug suction line through pump and seal. Close valves T-4 and T-19. Open valves

Appendix A (Continued)
Page 2 of 2

PROBLEM	POSSIBLE CAUSE/CORRECTIVE ACTION
	T-16, T-17, ET-18, and T-9. Open valve A-1 for 5 seconds, then close. Unplug TCE still discharge line. Close valves T-18 and T-19. Open valve T-4. Open valve A-1 for 5 seconds, then close.
Still pump runs too long and pumps TCE into still, raising level above the porthole sight glass.	Pump level control switch inoperable. Contact Instrument Maintenance to check switch. If switch is operable, remove cover on top of still and remove and clean float.

Appendix B

DETREX DEGREASER AND STILL



Appendix C

C-400 PIPE CLEANING AREA

DAILY LOG SHEET

CH-208

DATE ____________________

ITEM DESCRIPTION	NUMBER OF ITEMS			WORK ORDER NUMBER
	DEGREASED	CLEANED	PICKLED	

ADDITIONAL REMARKS:

UCN-4468 (5 10-91)

PADUCAH GASEOUS DIFFUSION PLANT

Chemical and Waste Services
Chemical Operations

Operation of the Detrex Large Degreaser
CH-208
Rev 1

Prepared by: Steve Bauer
Steve Bauer

Approved by: S L Shell 9/16/92
S. L. Shell/Division Manager Date

Effective Date: 1-4-92

In-Hand Procedure: Yes__ NO x_	___ Safety System
Total: ___	___ Safety-Related
Partial: ___	x_ Quality-Related
Appendix: ___	___ Nonquality/Nonsafety-Related
(See Applicability Section For Details)	
Redlined _____ Upgraded __x____	___ Temporary/Expiration Date ___

Record of Changes

Change Letter	Preparer's Initials	Affected Pages	Effective Date	Date for Review

Next 3 -year review required no later than: SEP 95

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CONTENTS

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1.0 PURPOSE

To establish the operation of the Detrex degreaser located in the chemical cleaning area of C-400.

2.0 APPLICABILITY

This procedure applies to the large Detrex degreaser used to clean metal parts with trichloroethylene.

3.0 DEFINITIONS/ACRONYMS

3.1 Definitions

3.1.1 Trichloroethylene (TCE) - A nonflammable liquid used as a solvent to remove grease from metal.

3.1.2 Trichloroethylene Still - A vaporization chamber to remove residues and impurities from the trichloroethylene.

3.1.3 Day Tank - A 1041-gallon tank located in the degreaser basement used to supply trichloroethylene to the degreaser boiling chamber.

3.1.4 Boiling Chamber - A 600-gallon area in the bottom of the degreaser containing steam coils to vaporize the trichloroethylene.

3.2 Acronyms

None

4.0 REFERENCES

4.1 Use References

4.1.1 Standard Operating Procedure (SOP) CH-352, "Trichloroethylene Handling, C-400"

4.0 REFERENCES (Continued)

4.2 Source References

4.2.1 Standard Operating Procedure (SOP) CH-1, "Safety, Health Physics, and Environmental Practices, C-400"

4.2.2 SOP CH-E-8, "Chemical Releases, C-400"

5.0 PRECAUTIONS AND LIMITATIONS

5.1 TCE vapors, when overheated, produce phosgene gas and are flammable. Sparks or open flames shall not be allowed around the degreaser at any time.

5.2 Wear Viton gloves, face shield, and chemical goggles when operating the degreaser liquid spray pump.

5.3 Note the location of eye baths/safety showers in area around the degreaser for use in the event TCE is splashed on the skin or in the eyes..

5.4 Avoid inhalation and contact with solvent vapors and liquids.

5.5 A self-contained breathing apparatus is required for entry into unknown concentrations of TCE.

5.6 The exhaust system shall be on at all times when the degreaser is in operation.

5.7 All slings used on the overhead crane shall have a current inspection date. Without prior engineering approval, wire rope shall not be used to suspend equipment into the degreaser while it is in operation.

5.8 Hard hats are required when the overhead crane is in operation.

5.9 Exercise care when lowering large objects into the degreaser to avoid contacting the sides or ends.

5.10 Uranium contaminated equipment shall not be cleaned in the degreaser. Have all equipment surveyed by HP before placing in degreaser unless equipment has a UCN-14, "Green Tag," already attached. Maintain this tag in close proximity to the equipment so Health Physics (HP) can use for equipment past history.

5.11 Refer to SOP CH-1 for general safe work practices.

6.0 PREREQUISITES

6.1 Start exhaust fan.

6.1.1 Start buttons for fans 90 and 91 are located at column F-5 on main floor.

6.1.2 The red light on start switch should illuminate to indicate that fan contactor is engaged.

6.1.3 Visually check the fan (located in basement) for missing or loose belts, unusual vibrations, and hot bearings. Check that canvas is in place and in good condition between exhaust fan and louvers.

6.2 Start cooling water.

6.2.1 Check that main water valve is open. This valve is located on the east wall at the northeast corner of the degreaser approximately 8 feet above floor level.

6.2.2 Open valves W-1 and W-2 located in basement.

6.2.3 Adjust regulator PR-1 to control water pressure at 32 psig (the system relief valve is set at 40 psig). The regulator is located on the north side of the degreaser near the TCE day tank, between water valves W-1 and W-2.

6.2.4 Check that the degreaser cooling water is returning into the south end of the cold water tank.

6.3 Check TCE Level in the Boiling Chambers.

NOTE: The TCE level in the boiling chambers must be 2 to 3 inches above the steam coils to provide heat transfer from the steam coils to the TCE.

6.3.1 If TCE level in boiling chambers is low, add TCE to the boiling chambers from the day tank.

6.3 Check TCE Level in the Boiling Chambers (Continued)

6.3.1.1 Open valves T-2 (normally open) and T-10 to start TCE flow to the southwest corner of the south boiling chamber. Continue filling until the north boiling chamber reaches 2 to 3 inches above the steam coils.

6.3.1.2 Close valve T-10.

6.4 Check Steam Pressure Gauge at Northwest Corner of Degreaser. Adjust steam regulator located at southwest corner at building main steam station to obtain a minimum of 25 psig.

6.4.1 Turn regulator adjustment stud clockwise to increase pressure.

6.4.2 Turn regulator adjustment stud counterclockwise to decrease pressure.

6.5 Check the East and West Condensate Pumps Located at the Southwest Corner of the Degreaser at the Lower Basement Level.

NOTE: If the condensate pumps are not operating properly, the system will waterlog and there will be no heat transfer from the steam coils to the TCE.

6.5.1 Check that east and west condensate breakers are closed.

6.5.2 Pumps should alternate operation and run intermittently.

6.5.3 Ensure that condensate outlet valves C-16 for the east pump and C-15 for the west pump are open.

6.5.4 Ensure that condensate inlet valve C-14 is open.

7.0 TEST EQUIPMENT, TOOLS, AND SUPPLIES

None

8.0 ACTION STEPS

8.1 Degreaser Start-up

NOTE: Refer to Appendix A, "Degreaser Troubleshooting" for any problems encountered during start-up, or operation of the Detrex Degreaser or Still.

8.1.1 Open condensate valves.

8.1.1.1 Ensure that condensate valves C-6, C-7, C-8, C-9, C-10, C-11, C-12, and C-13 are open (normally open). See Appendix B.

8.1.2 Valve on steam.

8.1.2.1 Open steam supply block valve S-1. Check that valves S-2, S-3, S-4, and S-5 are open (normally open).

8.1.2.2 Close steam trap bypass valves C-7 and C-12 approximately 30 minutes after start-up to allow purging of water from system.

NOTE: The vapor level in the degreaser must reach the proper level in order to condense TCE vapors back into the water separator tank. The water separator tank provides liquid TCE to the east and west spray pumps. When the liquid level reaches 150 gallons in the water separator tank, it will provide a constant TCE feedback to the boiling chambers.

8.1 Degreaser Start-Up (Continued)

8.1.2.3 Open petcock valve S-6. Open the west retractable door on top of the degreaser and observe vapor level. When the vapor level in degreaser reaches the first coil of the cooling coils above the gutters, close petcock valve S-6 and close the west door.

NOTE: When TCE in the boiling chambers becomes dirty (cloudy, murky, etc.) the Detrex Still shall be put into operation to purify the TCE.

8.1.3 Start-up Detrex Still

8.1.3.1 Turn control power on. Knife switch is located on west wall near the Detrex Still.

8.1.3.2 Open water supply valves W-3, W-4, W-5, and W-6.

8.1.3.3 Open steam valve S-7.

8.1.3.4 Set PR-2 valve to maintain steam pressure at 5 psig. Turn regulator knob clockwise to increase pressure, and counterclockwise to decrease the pressure.

8.1.3.5 Open condensate valves C-3 and C-4.

8.1.3.6 Open condensate bypass valve C-5.

8.1.3.7 Close condensate bypass valve C-5 after approximately 30 minutes to allow purging of water from system.

8.1.3.8 Open TCE suction valves T-9, T-16, and T-17.

8.1.3.9 Open TCE discharge valves T-4, T-5, and T-18.

8.1.3.10 Set TCE pump selector switch to "Auto."

8.1 Degreaser Start-Up (Continued)

8.1.3.11 Close knife switch SP-1 to energize TCE pump.

NOTE: When draining "still bottoms," if sludge becomes too thick to drain freely, drain more often.

8.1.3.12 After every 24 hours of operation, open drain valve T-6 and drain approximately 2 gallons of "still bottoms" into a 3-gallon bucket.

8.1.3.13 Deposit "bottoms" into the stainless steel 55-gallon drum provided for this hazardous waste. This drum is located in a Satellite Accumulation Area east of the Detrex Still. Contact supervision immediately when the drum is full. A "Request for Disposal" form shall be completed and the drum moved by Waste Management to an approved storage area.

8.1.3.14 Shut down Detrex Still when TCE in north boiling chamber is clear.

- Close steam supply valve S-7.
- Open knife switch SP-1.
- Close TCE suction valves T-16 and T-17.
- Close TCE discharge valve T-18.

8.2 Equipment and Parts Cleaning

8.2.1 Open retracting doors on top of degreaser by pushing east and west door operator buttons. Close main knife switch breaker PPE-7 located on east side of column E-4.

8.2 Equipment and Parts Cleaning (Continued)

CAUTION

Without prior engineering approval, slings made of wire rope shall not be used to lower equipment into the degreaser while the degreaser is in operation.

8.2.2 Rig equipment to be degreased with appropriate lifting devices.

8.2.3 Use overhead crane to suspend equipment to be degreased in such a manner to allow proper drainage of TCE back into the boiling chambers.

8.2.4 Lower equipment slowly into degreaser to avoid contacting the sides or ends of the degreaser.

8.2.5 Allow equipment to vapor degrease until TCE vapors stop condensing on surface of equipment. This will indicate that equipment has heated and degreasing is complete. Degreasing time will depend on size and weight of equipment to be degreased.

8.2.6 If equipment is extremely dirty, use TCE spray pumps (east and west) and spray equipment with hand-held spray nozzle located at south side of degreaser.

8.2.6.1 Open TCE discharge valves T-7 (west pump) and T-8 (east pump) located on top of water separator tank on southeast wall of degreaser.

8.2.6.2 Close east and west pump breakers 23 (west pump) and 24 (east pump) at lighting panel E-4 located on north side of column E-4.

8.2 Equipment and Parts Cleaning (Continued)

WARNING

The hand-held spray nozzle should be directed into the degreaser before energizing the spray pumps to prevent TCE from spraying on personnel or surrounding area.

8.2.6.3 Energize pumps by pushing red start buttons for east and west TCE spray pumps.

8.2.6.4 Direct stream of TCE from nozzle to surface of equipment to be degreased. Continue to spray until surface is adequately cleaned.

8.2.6.5 Shut down spray pumps by pushing stop buttons for east and west TCE spray pumps.

8.2.7 Allow equipment to drain thoroughly back into the boiling chambers before removing from degreaser.

WARNING

Equipment removed from the degreaser may be hot and gloves should be worn to prevent burns.

8.2.8 Remove equipment from degreaser slowly to avoid "dragging the vapors" out of the degreaser into the operating area. The correct crane lifting speed is 11 feet per minute.

8.2.9 Close retractable doors on top of degreaser by pressing east and west operator buttons.

8.3 Degreaser Shutdown

8.3.1 Close steam valves S-1 and S-2.

8.3 Degreaser Shutdown (Continued)

8.3.2 Leave exhaust fan and cooling water on if boiling chambers contain TCE.

8.4 Monthly TCE Inventory

8.4.1 Complete a monthly TCE inventory the last working day of the month using the Degreaser Inventory Sheet (Appendix D). The following is a guide for completion of the form:

8.4.1.1 Degreaser Boiling Chamber - Approximate the amount of TCE in the boiling chamber of the degreaser. The boiling chamber holds approximately 600 gal when liquid covers the steam coils.

8.4.1.2 TCE Storage Tank - Take the inch reading on the tank sight glass and use the conversion table to convert to gallons.

8.4.1.3 TCE Still Tank - Estimate the TCE level in the still tank by observing the sight glass. The tank holds 40-gal when full.

8.4.1.4 Day Tank - Observe the tank sight glass and convert the inch reading to gallons.

8.4.1.5 Total Inventory - Total all readings.

8.4.1.6 Previous Month Inventory - List the figure from the previous month "Total Inventory."

8.4.1.7 Present Inventory - List figure from 8.4.1.5.

8.4.1.8 Product Used - Subtract "Present Inventory" from "Previous Month Inventory."

8.4.1.9 Product Received - List any TCE received during the inventory month.

8.4.1.10 Date Received - List the date shipment was received.

8.4.2 The area supervisor signs the inventory form and makes distribution noted on bottom of form.

9.0 ACCEPTANCE CRITERIA

9.1 Inspect cleaned equipment for grease or oil and reclean as necessary.

10.0 POST-PERFORMANCE WORK ACTIVITIES

10.1 Removing TCE From the Boiling Chambers to Basement Day Tank

10.1.1 Check sight glass on TCE day tank to ensure adequate storage space is available.

10.1.2 Open valves T-9, T-16, T-17, T-18, and T-12.

10.1.3 Close valves T-11 and T-4.

10.1.4 Close knife switch SP-1

10.1.5 Place TCE pump selector switch to "run" position.

10.1.6 Stop TCE pump when boiling chambers are empty.

10.1.7 Close valves T-9, T-16, T-17, T-18, and T-12.

10.1.8 Open valves T-11 and T-4.

10.2 Removing TCE From the Boiling Chambers to 55-Gallon Drums

NOTE: Two operators are required to transfer TCE from the boiling chambers to 55-gallon drums.

10.2.1 Open valves T-9, T-16, T-17, T-18, and T-11.

10.2.2 Close valves T-4 and T-12.

10.2.3 The number 2 operator shall place flex hose nozzle (located at northwest corner of degreaser on the upper level) into 55-gallon DOT approved 17E drums or approved containers.

10.2 Removing TCE From the Boiling Chambers to 55-Gallon Drums (Continued)

10.2.4 Open valve T-15.

10.2.5 The number 1 operator shall close knife switch SP-1 and place TCE still pump into the "run" position.

10.2.6 The number 2 operator shall communicate to the number 1 operator when the filling drum reaches approximately 4 inches from the top. The number 1 operator shall open SP-1 immediately to stop filling.

10.2.7 Place flex hose into empty drum and repeat step 10.2.6 until all TCE is removed from the boiling chambers.

10.2.8 Close valves T-9, T-16, T-17, T-18, and T-11.

10.2.9 Open valves T-4 and T-12.

10.3 Operation of the Basement Sump Pump. The sump pump is located in the southeast corner of the degreaser basement, and is used to pump any accumulated liquid to the outside southeast corner of C-400 adjacent to the holding pit.

10.3.1 Position drums or approved containers at discharge line.

10.3.2 Remove pipe cap from discharge line and attach flexible hose.

10.3.3 Insert flexible hose into drum or approved container. Check that discharge gate valve is closed.

10.3.4 Open the sump pump discharge valve located on the discharge line of the pump in the degreaser basement.

NOTE: The sump pump breaker is open, locked, and tagged to prevent unauthorized discharge of any solution from the degreaser basement area. Contact supervision for prior approval to operate the pump.

10.3 Operation of the Basement Sump Pump (Continued)

10.3.5 Contact supervision for key and unlock and close the sump pump breaker (located in the degreaser basement). The pump operates automatically and will start when the breaker is closed if the liquid level is high enough to actuate the float switch.

10.3.6 Open discharge line gate valve and fill drums or approved containers.

10.3.7 Open sump pump breaker and replace lock and tag.

10.3.8 Close discharge line gate valves.

10.3.9 Remove flexible hose and replace discharge line pipe cap.

10.3.10 Contact supervision for disposition of pumped solution.

NOTE: The TCE day tank should not be filled to more than 50 percent to allow pumping of TCE back into the day tank from the boiling chambers in the event of a leak or required maintenance.

10.4 Filling the TCE Day Tank

10.4.1 Refer to SOP CH-352.

11.0 RECORDS

11.1 The following nonquality record is generated by this procedure.

11.1.1 UCN-4468, "C-400 Pipe Cleaning Area Daily Log Sheet" (Appendix C)

11.2 The following quality records are generated by this procedure.

11.2.1 Monthly inventory forms.

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Appendix A
Page 1 of 2

Degreaser Troubleshooting

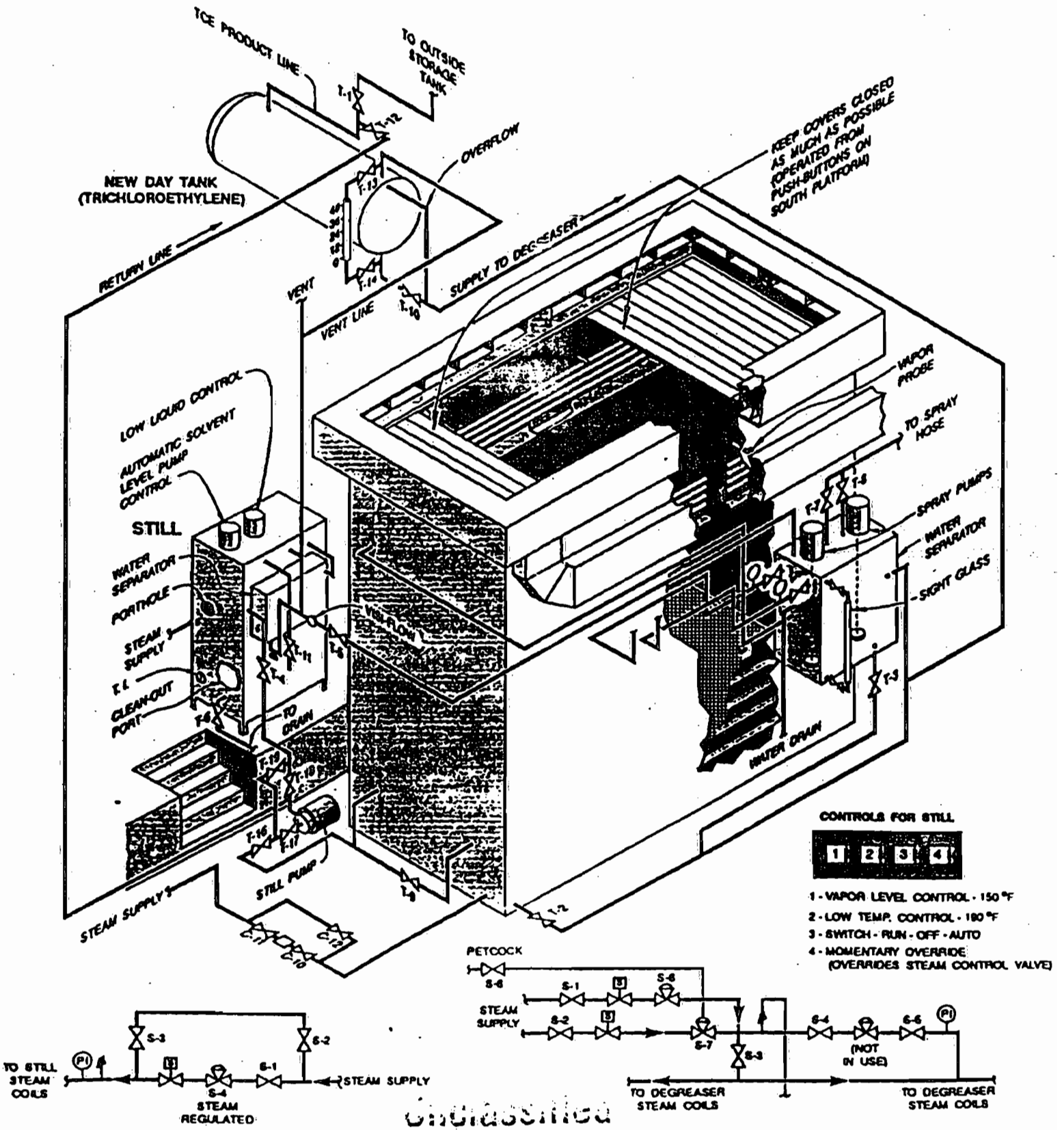
PROBLEM	POSSIBLE CAUSE/CORRECTIVE ACTION
Steam relief valve operates.	Low-level in TCE boiling chambers. Add TCE to boiling chambers.
Vapor level falls below normal operating level.	Building steam pressure low. Adjust building steam regulator valve to a minimum of 25 psig. Petcock valve S-6 has been open too long and high temperature solenoid valve has actuated and shut steam off. A cool-down period is required before steam can be returned to normal. System Waterlogged. Open petcock valve S-6 and steam trap bypass valves C-7 and C-12 for approximately 30 minutes, then close.
TCE spray nozzle plugging often.	Nozzle plugged with rust or debris. Open valve T-3 and leave open for 2-3 hours with degreaser still operating at correct vapor level. Close valve T-3 and allow water separator tank to refill.
Spray pumps will not pump.	Water separator tank empty. Operate degreaser at proper vapor level to allow water separator tank to fill.
Detrex still will not heat.	System is waterlogged. Open steam trap bypass valve C-5. Turn steam regulator adjustment knob on PR-2 clockwise until steam pressure reaches 10 psig. This will purge water from system in approximately 30 minutes.
Detrex still pump runs too long, (5 min.) and does not pump TCE into still.	TCE Still pump suction or discharge line plugged. Unplug suction line from TCE pump to degreaser. Close valves T-12, T-17, T-18, and T-4. Open T-19, T-16, T-9. Open valve A-1 for 5 seconds, then close. Unplug suction line through pump and seal. Close valves T-4 and T-19. Open valves

Appendix A (Continued)
Page 2 of 2

PROBLEM	POSSIBLE CAUSE/CORRECTIVE ACTION
	T-16, T-17, ET-18, and T-9. Open valve A-1 for 5 seconds, then close. Unplug TCE still discharge line. Close valves T-18 and T-19. Open valve T-4. Open valve A-1 for 5 seconds, then close.
Still pump runs too long and pumps TCE into still, raising level above the porthole sight glass.	Pump level control switch inoperable. Contact Instrument Maintenance to check switch. If switch is operable, remove cover on top of still and remove and clean float.

Appendix B

DETREX DEGREASER AND STILL



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Appendix C

C-400 PIPE CLEANING AREA DAILY LOG SHEET

C-400 PIPE CLEANING AREA

DAILY LOG SHEET

CH-208

DATE ____________________

ITEM DESCRIPTION	NUMBER OF ITEMS			WORK ORDER NUMBER
	DEGREASED	CLEANED	PICKLED	

ADDITIONAL REMARKS:

UCN-4468 (5 10-91)

Unclassified

Appendix D

DEGREASER MONTHLY INVENTORY

DEGREASER MONTHLY TCE INVENTORY

DATE: _____ CH-208

DEGREASER BOILING CHAMBER	_____	GAL
TCE STORAGE TANK	_____	GAL
TCE STILL TANK	_____	GAL
DAY TANK	_____	GAL
TOTAL INVENTORY	_____	GAL
PREVIOUS MONTH INVENTORY	_____	GAL
PRESENT INVENTORY	_____	GAL
PRODUCT USED	_____	GAL
PRODUCT RECEIVED	_____	GAL

DATE RECEIVED: _____

SIGNATURE: _____

REMARKS: _____

_____

_____

_____

DISTRIBUTION: *Original* - *Area supervisor file*
Copy - *Finance, Materials & Services*
Copy - *Environmental Compliance*

UCN-19031 (5 6-92)

MARTIN MARIETTA ENERGY SYSTEMS, INC.
Paducah, Kentucky

Operations Division

STANDARD OPERATING PROCEDURE

Number	CH-200
Date	Rev. 2-2-8
Page	1 of

SUBJECT: OPERATION OF THE BLAKESLEE DEGREASER

INTRODUCTION

This procedure establishes the method of operation of the Blakeslee degreaser located in the decontamination area near column B-4. A pictorial diagram (Figure 1) shows the Blakeslee degreaser and associated equipment, such as the storage tank, water separator, spray nozzle and pump. The piping configuration and valve for the water and steam supply, and condensate system are also shown.

The purpose of the Blakeslee degreaser is to clean the grease and oil from metal parts using trichloroethylene as the cleaning solvent.

A variety of parts are normally degreased in this unit, including any parts which might have become slightly contaminated. The Blakeslee degreaser also serves as a backup unit for small items in the event the large degreaser (Detrex) is out of service. To degrease parts position them in such a manner that will permit intimate contact with the trichlor vapors. The vapors will condense on the surface of the parts and the liquid trichlor will roll down the surface cleaning the part. If the parts are in drums, special instructions are usually needed as outlined later in this procedure. A trichlor pump and spray hose is also available for spraying liquid trichlor on the metal parts if desired. Approved lifting devices, racks, sling, baskets, and rigging methods are used to suspend the parts down into the degreaser. Two 10-ton P&H cranes are available for this purpose. These cranes are equipped with both cab and pendant controls. The method used to suspend the parts will depend on the shape, size and configuration of the particular pieces of equipment you wish to degrease.

SAFETY PRECAUTIONS

1. Trichloroethylene vapors under certain conditions are flammable. When overheated, a by-product of phosgene gas is generated. No smoking, welding, open flames, sparks or excessive heat of any kind should be permitted near the degreaser.

2. A Hazardous Work Permit is required for all maintenance work.

3. Neoprene gloves and face shield must be worn when operating the degreaser liquid spray pump.

4. Avoid inhalation of and contact with the solvent vapors and liquids.

E. Never admit steam to the boiling chamber until the cooling water is turned on and the exhaust system is in operation.

F. Never place a piece of equipment into the degreaser that contains aqueous decontamination solution or appreciable amount of uranium.

G. Rig items to allow maximum drainage of liquid trichlor to avoid excessive loss of trichloroetylene.

H. Criticality control in this facility is to be maintained by administrative control of the solvent level at less than 3 1/2 inches.

I. The exhaust system shall be in operation at all times.

J. Exercise care when parts are lowered into the degreaser to avoid scraping the sides of the unit.

K. Refer to Standard Operating Procedure CH-1, "Safety, Health Physics, Environmental and Criticality Control Practices, C-400", for general safety and health physics practices.

L. Refer to Job Hazard Analysis II-N-2, "Blakeslee Degreaser", for general precautions for all job steps.

III. PROCEDURE

A. Startup Operations

1. Turn off #5 heater unit near roof to prevent vapors from being blown out of degreaser.

2. Start the exhaust blower. A local start button is located on Column B-4.

3. Remove lid covers.

4. Open the solvent charging valves S-1 and S-5.

5. Solvent can be added when needed directly into the top of the degreaser. Solvent must be over heating coils for proper operations.

6. Admit water to the cooling coils by opening valves W-1 and W-2.

7. Admit steam to the heating coils by opening valve ST-1. A small steam reducing station is located downstream of ST-1 and should be adjusted between 3 and 5 psig depending on the condition of the degreasing unit.

NOTE: If the cooling water fails, or if for any reason the solvent vapor level rises above the cooling coils, safety valve SC-1 will ~~trip closing off the steam supply~~. Correct the problem and reset the valve SC-1 by pressing the stem up until it catches. The degreaser should heat up to operating temperature (160°F) in about two hours normally.

B. Degreasing

1. Remove gross amounts of uranium contamination from the equipment to be degreased in the C-400 spray booth or hand table area.

2. Rig the equipment for proper drainage to prevent solvent carryover.

3. Lower the work load slowly into the degreaser until the work load is just below the vapor level and leave until the solvent no longer condenses on it.

4. To ~~remove excessive grease, spray clean solvent on the equipment by holding the spray lance nozzle~~ below the vapor level and depressing button S-4.

5. After the equipment has been cleaned, raise it slowly from the degreaser, tilting if necessary to drain any liquid solvent.

6. The degrease storage tank is filled through condensing of the vapors back into storage tank area.

C. Shutdown Procedure

1. Close steam supply valve ST-1.

2. Wait until vapors have fallen below the cooling coils and shut off cooling water by closing W-1 and W-2.

3. Replace lids to prevent solvent from going into the building.

D. Distilling the Solvent

NOTE: The solvent will require distilling when sufficient impurities have been dissolved in it to raise the boiling point to 210 degrees as indicated by TI-1.

1. Close solvent valves S-1 and S-5.

2. When the solvent vapors no longer condense on the cooling coils, close steam valve ST-1 and allow the degreaser to stand for six hours.

3. Open valve S-3 and drain the impure solvent into a 55-gallon drum.

4. Close valve S-3 to prevent further drainage.

5. Open valve S-1 and spray sufficient solvent into the boiling chamber to flush the residual oil from the steam coils.

6. Open valve S-3 and drain as in step 3.

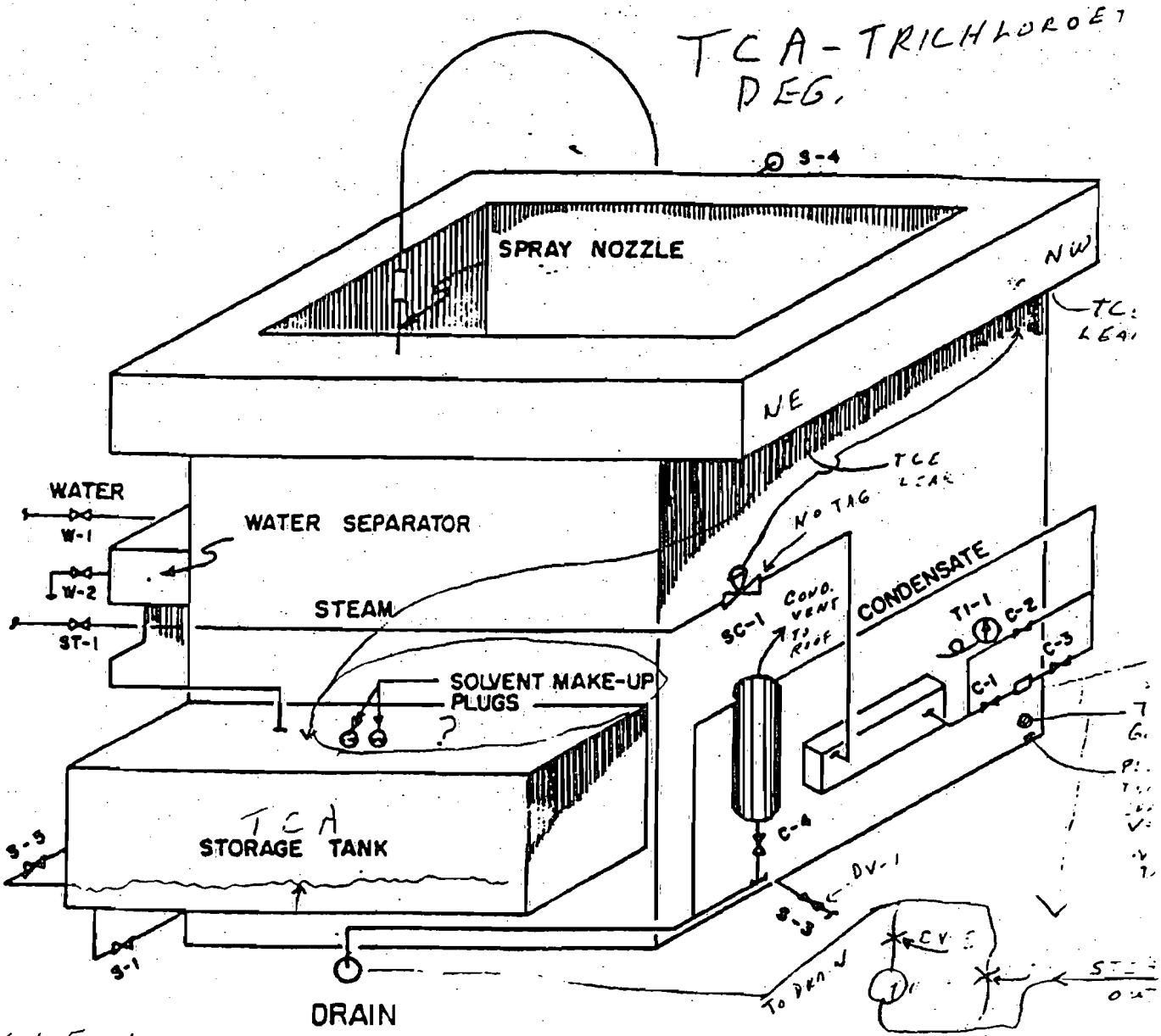
7. Contact the supervisor in charge to set up time to recycle solution in large degreaser still. The small amount of uranium in the solution will remain in the sludge after the solvent has been reclaimed.

8. Trichloroethylene sludge is a hazardous waste and shall not be stored over 90 days in C-400. A request for disposal (UCN-12463A) shall be filled out and sent to Material Terminal Management for final disposal. A sample for uranium and assay shall be taken.

Manager - Power, Utilities, and Chemical

Manager - Operations Division

Unclassified



SMALL DEGREASER

BLAKESLEE DEGREASER

Figure 1

OP
1-23-93

Unclassified

INFORMATIO ONLY

PADUCAH GASEOUS DIFFUSION PLANT

Chemical and Waste Services
Chemical Operations

Operation of the Blakeslee Degreaser
CH-200
Rev. 0

Prepared by: Steve Bauer
Steve Bauer

Approved by: S L Shell 2/18/92
S. L. Shell/Division Manager Date

Effective Date: 3-11-92
Procedure Abstract:
In Hand: Yes __ No x
__ Safety-Related/Safety Systems
x Quality-Related
__ Nonquality-Related
__ Temporary/Expiration Date _____

Record of Changes

Change Letter	Affected Pages	Effective Date	Expiration Date

Next 3 -year review required no later than: 2/18/95

Unclassified

1.0 PURPOSE

To establish the operation of the Blakeslee degreaser located on the west side of C-400 near column B-4.

2.0 APPLICABILITY

This procedure applies to the small Blakeslee degreaser used to clean uranium contaminated metal parts with trichloroethane.

3.0 DEFINITIONS/ACRONYMS

3.1 **Trichloroethane (TCA)** - A colorless liquid or vapor with a mild, sweetish, pleasant, ether-like odor. TCA is used in the Blakeslee degreaser as a degreasing solvent.

3.2 **Boiling Chamber** - A 150-gallon area in the bottom of the degreaser containing steam coils to vaporize the TCA.

4.0 REFERENCES

4.1 Standard Operating Procedure (SOP) CH-1, "Safety, Health Physics, Environmental, and Criticality Control Practices, C-400"

4.2 SOP CH-E-8, "Chemical Releases, C-400"

5.0 PRECAUTIONS AND LIMITATIONS

5.1 TCA vapors, when overheated produce phosgene gas and are flammable. Sparks or open flames are not allowed around the degreaser at any time there is TCA in the boiling chamber.

5.2 Sight glass Valves SGV-3 and SGV-4 can be opened to check the level of TCA in the boiling chamber, but should be closed under normal operation to prevent a spill of TCA should the sight glass be broken.

5.3 Drain Valves DV-1 and DV-2 are used to drain TCA from the boiling chamber. These valves should remain closed at all times except when draining TCA from the boiling chamber.

6.0 PREREQUISITES (Continued)

6.2 Start Cooling Water

6.2.1 Open cooling water Valves W-1 and W-2 and observe cooling water returning to the drain, located on the east side (middle) of the degreaser at floor level. This indicates a proper flow of cooling water through the cooling water coils.

6.3 Check TCA Level in Boiling Chamber

6.3.1 Remove degreaser lids and check that TCA level is 2 to 3 inches above the steam coils in the bottom of the degreaser boiling chamber. The correct TCA level will allow proper heat transfer from the steam coils to the TCA.

6.3.2 If level in the boiling chamber is low, add TCA from a 55-gallon drum directly into the boiling chamber using a stainless steel "Lutz" pump or the following pouring method directly from the drum.

WARNING

Viton gloves, face shield, and safety glasses should be worn when there is the possibility of contact with TCA.

6.3.2.1 Loosen both bungs on top of 55-gallon drum of TCA with a bung wrench.

6.3.2.2 Position 10-ton overhead crane above the 55-gallon drum. Hard hats are required when operating the crane.

NOTE: The drum rotating device and all slings must have a current inspection date affixed.

8.0 ACTION STEPS

8.1 Steam Valving

8.1.1 Open steam supply block valves SV-1 and SV-2.

NOTE: If steam pressure is maintained above 5 psig, it will cause excessive overflow from the water separator through the orifice on the discharge side, and will cause TCA to flow into the overflow drum.

If the cooling water fails, or if the solvent vapor level rises above the cooling coils, a temperature sensing probe will cause steam control Valve SC-1 to trip, closing the steam supply. A cooling period is required before operation can return to normal.

8.1.2 Adjust steam regulator Valve STR-1 to maintain steam pressure at 3 to 5 psig as indicated on steam pressure gauge PSIG-1. Turn regulator stud clockwise to increase pressure and counterclockwise to decrease pressure.

8.1.2.1 If fast start-up is desired, partially open steam bypass Valve BP-1 until the vapor level reaches the first cooling water line immediately above the TCA return gutter, then close Valve BP-1.

8.1.2.2 Open Valve S-5 to allow return of condensed TCA from the storage tank to the boiling chamber.

8.2 Degreasing Equipment

CAUTION

Slings made of wire rope shall not be used to lower equipment into the degreaser while the degreaser is in operation, without prior engineering approval.

8.2 Degreasing Equipment (Continued)

WARNING

The hand-held spray nozzle should be directed into the degreaser before energizing the spray pump to prevent TCA from spraying on personnel or the surrounding area.

8.2.5.3 Start spray pump by depressing and holding the spring-loaded start switch. This is a "dead man switch," and must be held in to operate the pump.

8.2.5.4 Direct the stream of TCA to the surface of equipment to be degreased. Continue to spray until the surface is adequately cleaned.

8.2.5.5 Shut down the spray pump by releasing pressure on the spring-loaded switch.

8.2.6 Allow equipment to drain thoroughly back into the boiling chamber before removing from the degreaser.

WARNING

Equipment removed from the degreaser may be hot and gloves should be worn to prevent burns.

8.2.7 Remove equipment from the degreaser slowly to avoid "dragging the vapors" out of the degreaser into the operating area. The correct crane lifting speed is 11 feet per minute.

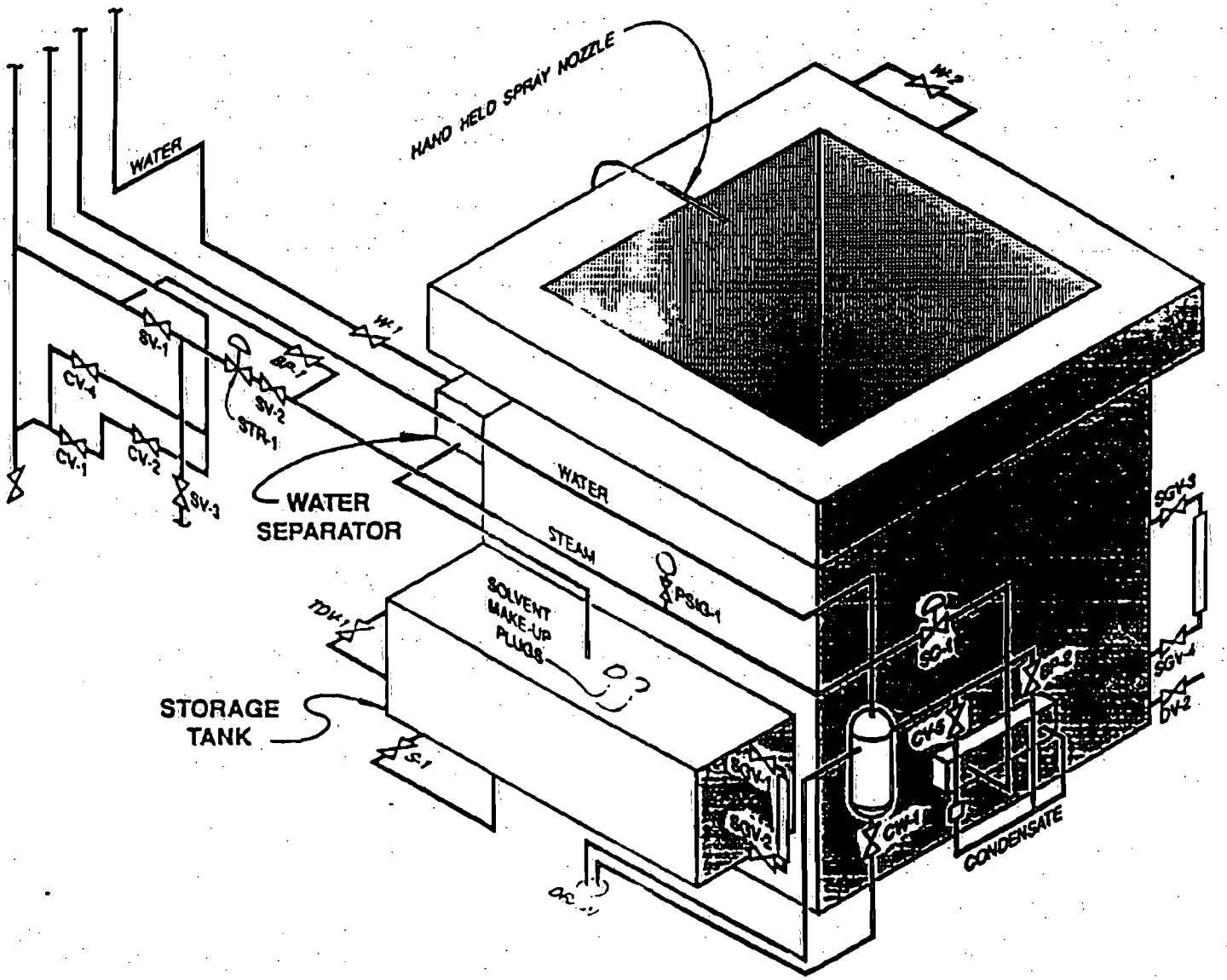
8.2.8 Replace the three sections of the cover on top of the degreaser.

8.3 Degreaser Shutdown

8.3.1 Close steam supply block Valves SV-1 and SV-2.

Appendix A

BLAKESLEE DEGREASER



SUBJECT: RESOURCE CONSERVATION RECOVERY ACT (RCRA) FOR C-400

I. INTRODUCTION

Detailed instructions on each of the three RCRA facilities in C-400 can be found in the back section of each of the logbooks set up for recording the required data from each unit's inspections. This procedure is intended to aid the operator in understanding the basic requirements for Chemical Operations compliance with RCRA.

All hazardous wastes generated and/or treated at C-400 must be inventoried before and after treatment. Only wastes referenced in the Part B permit for that particular unit will be treated. A list of waste that can be treated in each unit is under the section pertaining to that unit in this standard operating procedure.

All hazardous waste unit operators must receive the training specified in the Part B permit on an annual basis and before the operator can be allowed to operate the unit.

No unknown waste shall be accepted for treatment. All waste must be characterized in advance in accordance with Section C of the Part B permit. A copy of the waste characterization must accompany any waste shipment. Any waste not meeting these requirements must be rejected and returned to the shipper before the end of the day. The minimum for waste characterization that is acceptable is uranium, assay, pH, and the EP toxic metals.

Analysis of the treated waste must be obtained before it is discharged. The lab waste treated in #5 dissolver is the only routine hazardous waste treated in C-400 that has a discharge. In addition to the routine analyses of uranium, neptunium, plutonium, thorium, technetium, and assay, chromium analysis shall be obtained before discharge of any filtrate containing lab waste solution as a constituent. No discharge should occur during evaporation of the nickel stripper solution. No discharge should occur from the Waste Solution Storage tank. Contact Environmental Compliance and Monitoring if there are any questions regarding the analyses needed.

II. PROCEDURE

A. Waste Solution Storage Tank C-400-B

1. This system has not been used and was originally intended for gold dissolver solution which is no longer processed at Paducah. No planned uses of this tank are envisioned except for an unforeseen spill situation.

2. The hazardous wastes that could be put into the ~~waste solution~~ or storage tank ~~are~~ cleaning ~~tank acids and bases~~, nickel stripper solution, ~~spent~~ tricnloroethylene/~~trichloroethane, waste acids,~~ and/or miscellaneous aqueous solutions containing toxic metals. All of these solutions are legal in this tank at any time; however, operational concerns would prevent that mixture from occurring. Normal operation would be one of these wastes in the tank at a time to avoid cross contamination or incompatible waste solution mixtures.

Tropide, Chromic acc Tank liquid Hydrochlor Tank liquid, spent solver

3. Drums or ~~tanks~~ containers of liquid moved to C-400 for hazardous waste storage are held in the area specified in the Part B Permit and emptied in an area out of the way of vehicular traffic. An inspection shall be made on receipt of the containers using the inspection form on Figure F-3 (pages F-~~32~~ 29, F-~~33~~ 30 and F-~~34~~ 31 of the Part B permit). Adequate forms are in the record logbook.

The tank condition, tank leve Containment general appea security de and unloadi areas show checked p to use and o when in use

4. All drums or tanks of hazardous waste received at C-400 should have the standard hazardous waste label already applied. If they do not, refuse the shipment.

5. Containers of hazardous waste shall be emptied into the waste solution storage tank the day they are received. No containers of hazardous waste shall be left overnight. The operational log shall be filled in completely for each time hazardous waste is emptied into the Waste Solution Storage Tank. An inspection shall be made on the storage facility prior to use, using the inspection form on Figure F-3 (pages F-~~32~~ 29, F-~~33~~ 30 and F-~~34~~ 31 of the Part B permit). Adequate forms are in the record logbook.

B. Nickel Stripper Evaporation Unit C-400-C

1. Spent nickel stripper solution is transported to the evaporation unit in a 17C drum. The drum is inspected before each use. A red and yellow hazardous waste label is attached to the drum. The waste nickel stripper solution in the drum is transferred to the evaporation tank before the end of the working day on which the waste is taken out of the stripping tank. The purpose of emptying the drum the same day is to prevent the drum from being used as an overnight storage container. The operational log shall be filled in completely for each time hazardous waste is emptied into or treated by heating the Nickel Stripper Evaporation Unit.

2. Inspection of the nickel stripper evaporation unit should be made every day prior to use of the system and weekly, when in use, to check for structural deterioration, operating problems, and discharges. Figure F-4 (pages F-~~45~~, F-~~46~~, and F-~~47~~ of the Part B permit) shows the pages of the inspection sheets and the requirements for the daily and weekly inspection. Adequate forms are in the record logbook.

The tank level, temper... Controls, gener... appearance, ... should be che... prior to use ... daily when ... use.

3. Waste nickel stripper solution that does not evaporate is scooped out of the evaporation unit and placed in a plastic lined 17C drum and held as mixed waste awaiting incineration at ORGDP. During the interim time period before sending the wastes to incineration, wastes are held on-site at the C-746-Q hazardous waste storage area. Chemical Operations is responsible for filling out the request for disposal so that Material Terminal Management can remove the waste from C-400.

C. Lime Precipitation System C-400-D

1. The C-400-D Lime Precipitation System is designed to neutralize and remove dissolved metals from acidic process waste solutions. The waste in C-400 is transferred to the precipitation unit in a permanent piping system. During this type of processing, the unit is operating in a "totally enclosed" manner and meets the permit-by-rule criteria. Record-keeping requirements are not in effect during such operations.

SUBJECT: RESOURCE CONSERVATION RECOVERY ACT (RCRA) FOR C-400

2. Aqueous waste materials (such as lab waste) requiring the removal of metals are generated in other areas of the plant. These wastes are transferred to C-400 in containers from which the waste is pumped into the precipitation tank for treatment. The lab waste was found to be a "characteristic" hazardous waste because the extraction procedure testing found chromium above the guideline. During these operations, the system is functioning as a hazardous waste treatment facility subject to RCRA permitting requirements.

3. Drums or containers moved to C-400 for treatment are held in the area specified in the Part B Permit and emptied in an area out of the way of vehicular traffic. An inspection shall be made on receipt of the drums or containers using the inspection form on Figure F-5 (pages F-55, F-56, and F-57 of the Part B permit). Adequate forms are in the record logbook.

4. All drums of hazardous waste received at C-400 from the lab should have the standard hazardous waste label already applied. If they do not, refuse the shipment.

5. Containers shall be emptied the day they are received. No drums or containers of hazardous waste shall be left overnight. The operational log shall be filled in completely for each time hazardous waste is emptied into the Lime Precipitation System. An inspection shall be made on the treatment facility prior to use, using the inspection form on Figure 5 (pages F-55, F-56, and F-57 of the Part B permit). Adequate forms are in the record logbook.

6. The containers are to be returned to Technical Services by the Material Terminal Management group after they are emptied.

7. Weekly inspection of the tank condition shall be made using the inspection form on Figure 5 (pages F-55, F-56 and F-57 of the Part B permit). Adequate forms are in the record logbook.

8. Any problems found on any inspection shall be noted and answered in the C-400-D general inspection record.

9. The resulting sludge generated from the treatment of the hazardous waste was found to be non-hazardous from another extraction procedure testing. Periodic retesting of the sludge to verify its non-hazardous status will be done by Technical Services.

D. C-400 Degreaser Still

Waste solution from the degreaser still is drained out of the bottom of the still and put in a 17E drum. Once the drum has accumulated 55 gallons of solution, then a request for disposal will be filled out and sent to Material Terminal Management to dispose of the hazardous waste solution. The drum must be removed from the area within three days of being filled.

E. C-410-C Neutralization Tank

The logsheet for the disposal of waste solutions at C-410-C is shown in Figure 1. The logsheet shall be filled in completely when Material Terminal Management authorizes waste solution to be neutralized in the tank. The solutions treated in this neutralization tank are hazardous only due to the pH of the solution.

a n Sevi
Manager - Utilities and Chemical

W. E Sykes
Manager - Operations Division

Unclassified

PADUCAH GASEOUS DIFFUSION PLANT

Chemical, Utilities, and Power Operations Division
Chemical Operations

Resource Conservation Recovery Act (RCRA) for C-400
CH-114
General Revision

Prepared by: Steve Bauer
Steve Bauer

Approved by: _____ 11/3-92
J. C. Massey/Division Manager Date

Effective Date: 2-3-93

In-Hand Procedure: Yes__ NO X	__ Safety System
Total: __	__ Safety-Related
Partial: __	X Quality-Related
Appendix: __	__ Nonquality/Nonsafety-Related
(See Applicability Section For Details)	
Redlined _____ Upgraded X	__ Temporary/Expiration Date ___

Record of Changes

Change Letter	Affected Page(s)	Effective Date	Change Approved by

Next 5 JAW-year review required no later than: ~~31 JAN 95~~ JAW ~~11/30/95~~ JAW 7-1-01
Date

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CONTENTS

1.0 PURPOSE

To detail instructions for each of the 3 RCRA facilities in C-400 to aid the operator in understanding the basic requirements for Chemical Operations compliance with RCRA.

2.0 APPLICABILITY

This procedure deals only with the RCRA, Part B, permitted operations in C-400 and does not address maintenance of satellite accumulation areas (SAAs) which is covered in Standard Operating Procedure CH-1, "Safety, Health Physics, and Environmental Practices, C-400."

3.0 DEFINITIONS/ACRONYMS

3.1 Definitions

A. RCRA - The Resource Conservation and Recovery Act which is approved by congress and signed into law by the president. This statute mandates the Environmental Protection Agency (EPA) to develop regulations governing the control of hazardous waste.

B. Division Training Coordinator (DTC) - A person appointed in each division to provide input in the development of plans and to assist during training lectures.

C. Hazardous Waste - Any waste that is identified under 40 CFR, Part 261, as being a listed waste, exhibits any one of the characteristics (ignitability, corrosivity, reactivity, toxicity characteristic), or is considered hazardous by the "mixture or derived from rules."

D. Solid Waste - Any waste that does not meet the definition of a hazardous waste and exhibits little or no harm to human health and the environment (for example, household waste, etc.)

3.2 Acronyms

None

4.0 REFERENCES

4.1 Use References

A. PGDP Leak Detection and Repair Plan

B. 40 CFR, Parts 261 through 268

C. PGDP RCRA, Part B Permit KY/B-269, January 31, 1991

4.2 Source References

A. Standard Plant Practice (SPP) P-ESH-119, "Resource Conservation and Recovery Act (RCRA) Training"

B. SPP P-ESH-120, "Phase I of the Resource Conservation Recovery Act Air Emissions Standards"

C. SPP P-ESH-131, "Resource Conservation and Recovery Act - Operating Record"

5.0 RESPONSIBILITIES

5.1 Area Supervisors

A. Provide DTCs written notice of all new personnel entering their work area and schedule employees for training.

B. Visually inspect and repair areas as identified in the Leak Detection and Repair Plan.

C. Maintain records of:

- The description and quantity of each hazardous waste received from either on-site or off-site sources.
- The method(s) and date(s) of treatment or storage (in accordance with Appendix I to 40 CFR 264).

5.1 Area Supervisors (Continued)

- The location of each hazardous waste within the facility, and the quantity in each location.
- Specific manifest document number cross-references, if the waste was accompanied by a manifest.
- The results of waste analyses performed as specified in 40 CFR 264.13, 264.17, and 268.7.
- Records of any test results, waste analyses, or other determinations made in accordance with 40 CFR 262.11.
- Records detailing the results of inspections in their area of responsibility as required by 40 CFR 264.15(d).
- A record of annual certification (by PGDP) that the facility has an economically practicable program in place to reduce the volume and toxicity of hazardous waste generated.

6.0 ACTION STEPS

6.1 Waste Solution Storage Tank C-400-B

6.1.1 This system was originally intended for gold dissolver solution which is no longer processed at Paducah. No planned uses of this tank are envisioned except for an unforeseen spill situation.

6.1.2 Hazardous waste that could be put into the waste solution storage tank are troxide, chromic acid tank liquid, hydrochloric acid tank liquid, spent solvents, nickel stripper solution, trichloroethylene and/or miscellaneous aqueous solutions containing toxic metals. These solutions are legal in this tank at any time; however, operational concerns would prevent that mixture from occurring. Normal operation would be one of these wastes in the tank at a time to avoid cross contamination or incompatible waste solution mixtures.

6.1.3 Hold drums or containers of liquid moved to C-400 for hazardous waste storage in the area specified in the Part B Permit and empty in an area out of the way of vehicular traffic. Make an inspection on receipt of the containers using the inspection form on Figure F-3 (pages F-28,

6.1 Waste Solution Storage Tank C-400-B (Continued)

F-29, and F-30 of the Part B permit). Check the tank condition, tank level, containment area general appearance, and security devices. Make inspections prior to unloading and daily when in use. Adequate forms are located in the area record logbook. Note any inspection problems on these forms.

6.1.4 Refuse to accept any drums or tanks of hazardous waste that are not properly labeled with hazardous waste labels.

6.1.5 Empty containers of hazardous waste into the waste solution storage tank the day they are received. Do not leave containers of hazardous waste overnight. Fill in the operational log completely for each time hazardous waste is emptied into the waste solution storage tank. Make an inspection of the storage facility prior to use, using the inspection form on figure F-3 (pages F-28, F-29, and F-30 of the Part B permit). Adequate forms are located in the area record logbook.

6.2 Nickel Stripper Evaporation Unit C-400-C

6.2.1 Transport spent nickel stripper solution to the evaporation unit in a 17C drum. Inspect the drum before each use. Attach a red and yellow hazardous waste label to the drum. Transfer the waste nickel stripper solution to the evaporation tank before the end of the working day on which the waste is taken out of the stripping tank. Do not use the drum for overnight storage. Fill in the operational log completely for each time hazardous waste is emptied into or treated by heating the nickel stripper evaporation unit.

6.2.2 Inspect the nickel stripper evaporation unit every day prior to use of the system, and daily when in use, and check for structural deterioration, operating problems, and discharges (leaks). Check the tank level temperature controls, general appearance, and security devices prior to use and daily when in use. Figure F-4 (pages F-37, F-38, and F-39 of the Part B permit) shows the pages of the inspection sheets and the requirements for the daily and weekly inspection. Adequate forms are located in the area record logbook. Note any inspection problems on these forms.

6.2 Nickel Stripper Evaporation Unit C-400-C (Continued)

6.2.3 Scoop waste nickel stripper solution that does not evaporate out of the evaporation unit and place in a plastic lined 17C drum as a mixed waste for incineration at ORGDP. Prepare a Request for Disposal (RFD) to Waste Management to remove the waste from C-400.

6.3 Lime Precipitation System C-400-D

6.3.1 The C-400-D lime precipitation system is designed to neutralize and remove dissolved metals from acidic process waste solutions. The waste solutions in C-400 are transferred to the precipitation unit in a permanent piping system. During this type of processing, the unit is operating in a "totally enclosed" manner and meets the permit-by-rule criteria. Record-keeping requirements are not in effect during such operations.

6.3.2 Aqueous waste materials (such as lab waste) requiring the removal of metals are generated in other areas of the plant. These wastes are transferred to C-400 in containers from which the waste is pumped into the precipitation tank for treatment. The lab waste was found to be a "characteristic" hazardous waste because the extraction procedure testing found chromium above the statutory level. During these operations, the system is functioning as a hazardous waste treatment facility subject to RCRA permitting requirements.

6.3.3 Hold drums or containers received for treatment in the area specified in the Part B Permit and empty in an area out of the way of vehicular traffic. Make an inspection on receipt of drums or containers using the inspection form on Figure F-5 (pages F-46, F-47, and F-48 of the Part B permit). Adequate forms are located in the area record logbook. Note any inspection problems on these forms.

6.3.4 Refuse to accept any drums or tanks of hazardous waste that are not properly labeled with hazardous waste labels.

6.3.5 Empty drums or containers the day they are received. Do not leave containers of hazardous waste overnight. Complete the operational log each time hazardous waste is emptied into the lime precipitation system. Make an inspection of the treatment facility prior to use, and daily during use, using the inspection form on Figure F-5 (pages F-46, F-47 and F-48 of the Part B permit). Adequate forms are located in the area record logbook.

6.3 Lime Precipitation System C-400-D (Continued)

6.3.6 Complete an RFD to waste management for empty drums.

6.4 C-400 Degreaser Still

6.4.1 Waste solution from the degreaser still is drained out of the bottom of the still and put in a 17E drum. Complete an RFD before the drum has accumulated 55-gallons of solution. The drum must be removed from the area immediately upon being filled.

6.5 C-410-C Neutralization Tank

6.5.1 The logsheet for the disposal of waste solutions at C-410-C is shown in Appendix A. Fill in the logsheet completely when Environmental Compliance authorizes waste solution to be neutralized in the tank. Generally, solutions treated in this neutralization tank are hazardous only due to the pH of the solution.

6.6 Wastestreams Treated in C-400

6.6.1 Contact the Waste Compliance Department to review treated solution analytical data for approval to discharge to the north-south diversion ditch.

7.0 RECORDS

7.1 The following are quality records generated by this procedure.

7.1.1 All inspection reports and logsheets

7.2 There are no nonquality records generated by this procedure.

Appendix A

HAZARDOUS WASTE INVENTORY SHEET FOR ACID NEUTRALIZATION TANK, C-410-C

HAZARDOUS WASTE INVENTORY SHEET
FOR ACID NEUTRALIZATION TANK, C-410-C

CH-114

DATE RECEIVED/ SHIPPED	INVENTORY DATA		WASTE TYPE	NUMBER OF CONTAINERS	DATE UNLOADED	DATE TREATED
	VOLUME	WEIGHT				

UCN-19004
(5 10-92)

SUBJECT: CHEMICAL CLEANING OPERATION

INTRODUCTION

The critical operating conditions of the plant process systems require that all materials of construction, new and used, be completely free of any foreign contaminants. Located on the east side of C-400 is an area referred to as the pipe cleaning area which is used for this purpose. The pipe cleaning area consists of several large cleaning tanks and a large degreaser. This area is used to remove foreign contaminants, such as hydrocarbon oils and greases, mill scale, acid and caustic residues, rust and other products of oxidation. Any piping or equipment cleaned in this area which has previously been in contact with UF_6 must be decontaminated in the spray booth before being processed through the pipe cleaning area.

The cleaning process essentially consists of washing and rinsing the equipment by dipping or soaking in tanks containing the proper cleaning solutions. Various cleaning solutions are required for the different metals encountered and the various materials to be removed. The cleaning area equipment consists of a large Detrex degreaser (see CH-208) and eight wash and rinse solution tanks located on the east side of the C-400 building.

The purpose of this procedure will be to discuss the purpose of each tank and the preparation of the various solutions. Since the degreaser operation differs considerably, it has been covered in a separate procedure, CH-208, in detail. Data for the chemical cleaning tanks are shown in Table 1, and a guide for chemical cleaning is shown in Table 2.

SAFETY PRECAUTIONS

1. Refer to SOP CH-1 for general building safety practices.

2. Wear face shield and rubber gloves when preparing solutions or making additions to the solutions.

3. Avoid contact with chemical solutions. If it should contact the skin, flush thoroughly with water.

4. Wear safety glasses and composition palm gloves for normal operations.

5. Do not place items exceeding 20 feet in length in the tanks.

6. Practice proper rigging to avoid dropping load in solution tanks. Sling QE.1812 is for a 000 compressor with a C4 discharge. Use only in degreaser. Do not use in chemical cleaning tanks.

SUBJECT: CHEMICAL CLEANING OPERATION

The equipment must be inspected before cleaning to remove all blanks in lines, loose foreign materials, and to determine the metals of construction. All items should be properly rigged before lifting with the crane. Baskets are provided for small items. Only the chains provided in this area should be used for rigging. Items should be rigged so maximum draining is accomplished. All items should be thoroughly drained between solutions and rinses. A hot water rinse is used as the last step and aids in the drying time. Some special precautions are listed below:

a. Nickel-plated equipment must be handled with care to prevent damage to the thin nickel plate.

b. Under no condition should steel items remain in the troxide tank in excess of 40 minutes. This will etch the metal sufficiently to cause carbon to appear on the surface.

c. Monel items, when removed from the troxide tank, should show a black smudge. Rinse and dip in chromic acid to remove black smudge.

d. The alkali soak time for aluminum materials must be carefully controlled to minimize attack on the aluminum. Do not leave aluminum parts suspended in the alkali, but move them in and out of alkali frequently and spray off for visual inspection. The part should be thoroughly rinsed immediately. A black smut will form on the aluminum from the alkali and a spray rinse and a chromic acid dip is required for removal of smut.

e. A new tank has been fabricated and filled with a nitric acid and hydrofluoric acid solution for stainless steel only.

f. The hydrochloric acid (HCl) pickling tank should be used for steel items only.

g. Inspect all steel pipe before treatment in the HCl tank to make sure all the varnish coating on the steel pipe is removed. If it is not, rerun the pipe in the alkali tank.

Preparation of the Solution

This portion of the procedure establishes the methods for the preparation of the various cleaning tank solutions. A cleaning tank log is maintained in the C-400 office for the purpose of logging the solution sample results from the laboratory.

A. Alkali Tank - The alkali solution is used to remove hydrocarbon oils and greases which have not previously been removed by degreasing, soaps, and other residues, and to neutralize most acids and similar agents.

Alkali Chemical Precautions

Alkalis are one of the most common causes of occupational dermatitis acting on the skin as a primary irritant. The alkalis characteristically impart a soapy taste and feel to aqueous solutions. Alkaline solutions soften and dissolve the top skin layer and it becomes white and soggy, wrinkled, and macerated. Repeated exposure frequently results in the development of chronic eczematous skin condition. Stronger caustics may produce chemical burns which are often deep and slow in healing.

Alkali contains sodium hydroxide (60%) and sodium carbonate (35%). Emergency treatment for skin or eye exposure is to flush the exposed area with water for 15 minutes.

Initial Alkali Solution Preparation

1. Fill tank half full of water, which will be approximately 12,450 gallons.

2. Heat the water to 200°F.

3. Add one pound of alkali per gallon of water and air agitate until the powder is completely dissolved. Three commercial products are used on low bid: Wyandotte 1268, Wyandotte CSR, and Pennwalt 81.

4. Finish filling the tank with cold water to operating level and allow alkali solution to reach 190°F before starting cleaning operations. Additional agitation should continue if possible to further dissolve the alkali powder.

5. Request the laboratory to take a sample and analyze. The desired concentration should be between 14 to 16 ounces of alkali per gallon of water.

After continued operation, it will be necessary to have the alkali solution sampled by the laboratory at least once per year to determine the concentration. If the concentration is below the desired level (14 to 16 ounces/gallon), it will be necessary to replenish the solution as follows:

Replenish Alkali Solution

1. Request the laboratory to take samples form the alkali tank. An air sparger should be used to agitate the solution prior to taking the sample. Data requested should be ounces/gallon of alkali and ppm U. Data should be filed in log book in office.

2. Subtract the actual ounces/gallon of alkali obtained from the lab sample from the desired ounces/gallon of alkali, which is 16.0. The difference between the actual and desired will be the ounces/gallon of alkali needed.

3. Multiply the difference in step 2 times the alkali tank volume, which is 24,900. This is the <u>total</u> ounces of alkali needed.

4. Divide the <u>total</u> ounces of alkali needed obtained in step 3 by 16.0 (16 ounces per pound). This will give you the <u>total</u> pounds of alkali which needs to be added.

5. Add the alkali to this solution and air agitate until the powder is completely dissolved.

6. Request the lab to come back and sample the alkali solution again to verify ounces/gallon. Data from the sample results should be placed in log book in office.

B. <u>Troxide Tank</u> - Troxide is used to neutralize strong caustic residues and to remove rust, mill scale, and similar oxidized products. Troxide is actually a trade name of McDermid, Inc., for their sodium bisulphate; however, Wyandotte 1189 can be used just as well.

Troxide Chemical Precautions

Troxide is a trade name of McDermid for their sodium bisulphate. Sulfuric acid is liberated on contact with water. If taken to the decomposition temperature of >315°C, Troxide emits highly toxic fumes of the oxide of sulphur. Do not attempt to neutralize the acid in contact with the skin until all areas of contact have been thoroughly irrigated with running water.

Initial Troxide Solution Preparation

1. Fill the tank half full of water, which will be approximately 9,200 gallons.

2. Heat the water to 150°F.

3. Add 41,450 pounds of troxide and air agitate until the powder is completely dissolved. Troxide contains soap and will foam excessively if agitated too vigorously.

4. Fill the tank with cold water to operating level and allow troxide solution to reach 150°F before starting cleaning operation.

5. Request the laboratory to take a sample and analyze. The desired concentration should be between 32 to 36 ounces of troxide per gallon of water.

After continued operation, it will be necessary to have the troxide solution sampled by the laboratory at least once per year to determine the concentration. If the concentration is below the desired level (32 to 36 ounces/gallon), it will be necessary to replenish the solution as follows:

Replenish Troxide Solution

1. Request the laboratory to take samples from the troxide tank. An air sparger should be used to agitate the solution prior to taking the samples. Data requested should be ounces/gallon of troxide, ounces/gallon of copper (Cu), percent iron (Fe), ounces/gallon of suspended solids and ppm U.

2. Subtract the actual ounces/gallon of troxide obtained from the lab sample from the desired ounces/gallon of troxide, which is 36.0. The difference between the actual and desired will be the ounces/gallon of troxide needed.

3. Multiply the difference in step 2 times the troxide tank volume which 18,400. This is the total ounces of troxide needed.

4. Divide the total ounces of troxide needed obtained in step 3 by 16.0 (16 ounces per pound). This will give you the total pounds of troxide which needs to be added.

5. Request the lab to come back and sample the troxide solution again to verify ounces/gallon. Data from the sample results should be placed in the log book in office.

C. Chromic Acid Tank - The chromic acid tank utilizes a solution of sodium dichromate ($Na_2Cr_2O_7$) and sulfuric acid (H_2SO_4). This solution acts as a strong pickling agent for copper bearing metals and some aluminum parts, leaving the parts shiny and bright.

Chromic Acid Precautions

Chromic acid is a very powerful oxidizing agent. In contact with organic matter or reducing agents, it causes violent reactions. Chromic acid solid crystals will react with oils, greases, and paper rapidly enough to ignite. On skin contact, wash with soap and water and remove contaminated clothing.

Initial Chromic Acid Solution Preparation

1. Fill the tank half full of water, which will be approximately 9,250 gallons.

2. Add 3.5 to 4.5 ounces of sodium dichromate per gallon and agitate until all the dichromate has dissolved. A total of 4,500 pounds should be added.

3. Then add 675 gallons of sulfuric acid and fill tank with water to eight inches below weir. A lag period of 30 minutes is allowed before starting cleaning operations.

4. Request the laboratory to take a sample and analyze. The desired concentration of sodium dichromate should be 3 1/2 to 4 1/2 ounces/gallon. The desired percent by volume of sulfuric acid should be 3 1/2 to 4.

After continued operation, it will be necessary to have the concentration of sodium dichromate and sulfuric acid analyzed at least once per year, or as required. Replenish if necessary as follows:

Replenish Chromic Acid Solution

1. Request the lab to take samples from the chromic acid tank. An air sparger should be used to agitate the solution prior to taking the samples. Data requested should be ounces/gallon of sodium dichromate ($Na_2Cr_2O_7$), ounces/gallon of copper (Cu), ounces/gallon of suspended solids, percent iron (Fe), percent by volume of sulfuric acid (H_2SO_4) and ppm U.

2. Subtract the actual ounces/gallon of sodium dichromate obtained from the lab samples from the desired ounces/gallon (3 1/2 to 4 1/2) of sodium dichromate. The difference between the actual and the desired will be the ounces/gallon of sodium dichromate needed.

3. Multiply the difference in step 2 times the chromic acid tank volume which is 18,500. This is the <u>total</u> ounces of sodium dichromate needed.

4. Divide the <u>total</u> ounces of sodium dichromate obtained in step 3 by 16.0 (16 ounces in pound). This will give you the total pounds sodium dichromate which needs to be added.

5. After the proper amount of sodium dichromate has been added (as in steps 1 through 4), the sulfuric acid must be added as follows.

6. The desired percent by volume of sulfuric acid (H_2SO_4) is 3 1/2 to 4. Divide this number by 100 to get percentage.

7. Subtract the actual percent by volume of sulfuric acid obtained from the lab sample from the desired 3.65% by volume of sulfuric acid. The difference between the actual and the desired will be the percent by volume sulfuric acid needed.

8. Multiply the number in step 7 times the chromic acid tank volume which is 18,500. This is the gallons of sulfuric acid which should be added to the tank.

NOTE: A more accurate volume can be obtained if the specific gravity and percent purity of the sulfuric acid are considered. All sulfuric acid dosages are in gallons of 66° Be acid.

D. <u>Hydrochloric Acid Tank (HCl)</u> - The HCl tank is used for a pickling process to remove rust, heat treating scales, and mill scales from steel items.

<u>Hydrochloric Acid Precautions</u>

Hydrochloric Acid (HCl) is an irritant to the mucous membranes of the respiratory tract and eyes. HCl is a colorless fuming liquid which is strongly corrosive in the concentrated state. Reaction with most metals will produce flammable hydrogen gas. HCl is incompatible with materials

such as cyanides, sulfides, and sulfites (due to release of HCN, H_2S, and SO_2). Contacted area should be flushed with water for 15 minutes.

Initial HCl Solution Preparation

1. Fill the tank to 4 feet depth with water.
2. Add 18 gallons of Armohib-28 inhibitor to the water.
3. Add 3,600 gallons 31% hydrochloric acid to the water using a dip leg below the water level to minimize fuming. The desired hydrochloric acid concentration is 12% by weight.
4. Do not allow the solution temperature to exceed 170°F during the addition of the acid to the water.
5. After the acid has been added, fill the tank to an 8-foot depth with water.
6. Agitate the solution thoroughly with an air sparger.
7. Allow the solution to stand 16 to 24 hours before heating. Then heat the solution to 130°F and maintain with temperature controller.
8. Request lab to analyze solution to verify concentration.

Pickling of Steel

1. Degrease the item in the vapor degreaser.
2. Clean the item thoroughly in the alkali cleaning solution. Make sure no alkali is carried over into the acid tank by recessed areas in item.
3. Inspect all steel pipe before treatment in the HCl tank to make sure all the varnish coating on the steel pipe is removed. If it is not, rerun the pipe in the alkali tank.
4. Submerge the item in the pickling tank solution for 10 minutes and then inspect the item for removal of rust and/or scale. If further pickling is needed, replace item in the solution and inspect at 10-minute intervals.
5. Rinse the item thoroughly in the warm water rinse tank immediately after removal from pickling solution, to aid in drying.

After continued operation, it will be necessary to have the concentration analyzed at least once per year. Replenish, if necessary, as follows:

Replenish HCl Solution

1. Request the lab to take samples from the HCl tank. The desired concentration should be 12% by weight.

2. When the acid concentration is depleted to about 8% by weight, drain part of the solution and add sufficient 31% HCl to bring the concentration to about 12% HCl (Table 1).

3. Add 1/8 gallon of Armohil-28 per 100 gallons of acid whenever the solution is replenished.

E. Nitric Acid Dip Tank - The acid dip tank is a much smaller tank than those discussed previously in this procedure. It was constructed for stainless steel use only. The tank is approximately 97" x 85" x 60" steel tank with a 1/4-in. PVC plate inside acting as a liner. The tank also has a PVC flexible molded liner which fits inside the existing PVC liner. The desired concentration should contain 3% by volume hydrofluoric acid (HF), 20% nitric acid (HNO_3), and the balance H_2O.

Nitric Acid-Hydrofluoric Acid Dip Tank Precautions

Nitric acid-hydrofluoric acid (HF) is extremely irritating and corrosive to the skin and mucous membranes. HF produces severe skin burns which are slow in healing. Nitric Acid is corrosive to the teeth. Nitric Acid is a powerful oxidizing agent. The solution is dangerous if heated to decomposition because the evolution of oxides of nitrogen and highly corrosive fumes of fluorides.

Initial Nitric Acid Solution Preparation

Before preparation begins, the concentration of the HNO_3 and HF should be known. If there is any doubt, take a sample of each and have the lab check the concentration.

1. Fill the tank with approximately 1,126 gallons of water (31" deep).
2. Add 293 gallons of 56% nitric acid (HNO_3).
3. Add 44 gallons (1 drum)of 70% hydrofluoric acid (HF).
4. Using the air hose, circulate the solution thoroughly and then take a sample.
5. Request the laboratory to analyze for percent HNO_3 by volume and percent HF by volume.
6. IF the solution in the tank does not meet the desired 3% HF and 20% HNO_3, add additional chemicals and sample again.

F. Rinse Tanks - Two rinse tanks are provided to remove the alkali, troxide, chromic acid, HCl and HNO_3 cleaning solutions before proceeding to the next cleaning step. One of the rinse tanks is cold water and the other is a hot water tank which is maintained 180°F.

G. Disposal - All of the chemical tanks contain traces of uranium. Some contain chemicals which are highly toxic and corrosive. In the event a spill occurs, or it becomes necessary to empty any of the chemical tanks, the liquid must be pumped to the neutralization pit for treatment or off-plant site disposal. The Material Terminal Management Department should be notified and material disposed of in accordance with SPP-68, "Disposal of Hazardous Waste, Askarel, Waste Oil, and Scrap Materials."

Manager, - Power, Utilities, and Chemicals

W. E Sykes

Manager - Operations Division

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	ALUM DIP	NITRIC / HYDROFLUORIC	ROOM / ROOM	20 % / 3 %	% BY VOLUME	1,800	—	8'	7'	5'	—	—	500 GAL. / 50 GAL.	977	—	—
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 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

Operations Division

STANDARD OPERATING PROCEDURE

Number	CH-352
Date	2-24-89
Revised	
	Page 1 of 4

SUBJECT:

TRICHLOROETHYLENE HANDLING, C-400

I. INTRODUCTION

This procedure establishes the methods used for transferring trichloroethylene (TCE) from the outside storage tank (10,800 gallon) to either the degreaser day tank, or into 55-gallon drums at the TCE drumming station. The preparation and unloading of TCE from tank trucks to the storage tank is covered in Standard Operating Procedure (SOP) CH-350 "Preparation and Unloading of Chemical Tank Vehicles", Part 3.

Storage and handling of TCE includes a 10,800 gallon storage tank and pump station on the southeast corner of C-400. The storage tank is diked and aluminum-lined to protect the environment in case of a spill. (R
The dike has an overflow line that goes into the underground containment pit. Also located at the northeast corner of the dike is valve #23 to empty water or small TCE spills to underground containment pit. Do not open valve until contacting supervision. There is an unloading facility (southeast corner) also which is diked and a drain going into an underground containment pit. Inside the C-400 building is a drumming station (located at Col. F-3), a day tank, and the degreaser. The area surrounding the day tank and degreaser is served by a ~~sump pump~~ which ~~will transfer any liquids spilled to the underground containment pit~~. Any liquid which accumulates in the underground containment pit must be ~~sampled for TCE, and approval given by Environmental Control before it~~ can be pumped out to the storm sewer.)

Pumped to

All valves in the system (Figure 1) are normally closed except for 9, 10, 11, and 14. Valve 6 (3-way) is normally in the position to allow flow from the outside storage tank to the day tank.

NOTE: Any spills or leaks that require treatment or disposal (N
shall be handled in accordance with guidelines set forth in SPP P-ESH-28 "On Site Handling and ~~Handl~~ing of Waste Materials."

Disposal

II. SAFETY PRECAUTIONS

A. Refer to SOP CH-1 "Safety, Health Physics, Environmental, and (R
Criticality Control Practices in C-400" for general building safety precautions.

B. Refer to Job Hazard Analysis II-P-4 "TCE Unloading and Transfer."

C. If TCE comes in contact with the eyes, irrigate for at least ten minutes. The first treatment given at the dispensary is irrigation; therefore, good irrigation at the scene of the accident is essential.

1. A safety shower and face bath is located at Column E-2.

2. Wear face shield and plastic palm gloves when filling drums.

III. PROCEDURE

A. Transfer from the Outside Storage Tank to the Degreaser Hold Tank.

1. Open valves 20, 22, 7, and 12 and check to be sure the three-way valve (6) handle is in horizontal (east) position. Valve number 8 is blanked off - do not use.

2. Open valves 2 and 3 if using the south pump or valves 4 and 5 if using the north pump.

3. Check and be sure valves 1 and 13 are closed.

4. Start the pump and transfer the TCE.

5. Stop the pump when the degreaser hold tank is full. COMMENT

6. Close valves 20, 22, 7, and 12 and the valves to the pump used in Step 2. Leave the three-way valve (6) handle in the horizontal (east) position.

7. An alternative means of transferring TCE to the hold tank and preferred means is by use of air pressure.

8. When using air pressure, go to Steps B.1, B.2, B.3, B.4, B.7, and B.8.

B. Transfer From The Outside Storage to 55-Gallon Drums at Drumming Station.

All drums are to be inspected for cleanliness and leaks before being filled. Drums found containing substances are to be emptied and cleaned. Drums that develop leaks after filling are to be emptied immediately into the degreaser.

1. Close valve 10 and open valves A-1 and A-2.

SUBJECT: TRICHLOROETHYLENE HANDLING, C-400

2. Adjust regulator to control storage tank pressure at approximately ~~5~~ 10 psig.

3. Open valves 22, 20, 7, D-1, D-2, and D-3. Handle of three-way valve (6) should be in horizontal (east) position. Be sure valves 1, 13, and 12 are closed. Do not open 8.

4. Open valves 2 and 3 to go through south pump or valves 4 and 5 to go through north pump. Do not run the pumps while filling drums.

5. Close valves A-1 and A-2 and open vent valve 10 to bleed pressure off tank.

6. Close valves 22, 20, 7, D-1, D-2, D-3, and the valves to the pump used in Step 4. Leave the three-way valve (6) in the horizontal (east) position. Do not open 8.

A N Sari
Manager - Utilities and Chemical

L. F. Sykes
Manager - Operations Division

APPENDIX F

PERSONNEL INTERVIEWS

Name: _____

Position: Front Line Supervisor

Date of Hire: April 1974 **Date assigned to C-400:** April 1974

Period worked in degreaser area: 1974 – 1990, intermittently

Large Releases/Leaks: None observed from degreasers. Not involved in truck unloading.
When:
Quantities released:
Release point: "Box drain" near column B-4 welded over in about 1990, probably for cooling water drain from degreaser [west side] cooling coils. Work from the small degreaser [west side] was always to the south of the degreaser.

Carryover of TCE to cleaning tanks:
Frequency: Unknown.
Quantity: Small. Large quantities would have caused problems [see Vaughn interview about TCE/alkali reactions].

Carryover of TCE to floor drains:
Frequency: Frequent for small quantities, infrequent for large quantities.
Quantity: Doesn't know of any pathway to get TCA into the northwest sump. Equipment degreased in west side degreasers set down between columns E2-F2-E3-F3 and less often north of the degreaser between column lines 5 and 6. Never observed the depressed area in the vicinity used for setting equipment down after degreasing and doesn't know why it was there.

Disposal of degreaser sludge:
Frequency: Annually
Disposal point: Unknown.

Disposal of cleaning tank sludge:
Frequency: One time.
Disposal point: Liquid and sludge pumped to drums.

Additional information: Transition pieces and process piping – tried to handle equipment so it would drain. Some equipment (including aluminum) taken from degreaser to HCl or trioxide tank – no reaction with TCE carried over in equipment. Same care taken in draining this equipment. TCE not used elsewhere in building.

Interviewer: SEE ORIGINAL **Date:** _____
Interviewee (Optional): _____

Name: _____

Position: Front Line Supervisor

Date of Hire: April 1974 **Date assigned to C-400:** April 1974

Period worked in degreaser area: 1974 – 1990, intermittently

Large Releases/Leaks: None observed from degreasers. Not involved in truck unloading, although suspects there were drips from hoses when disconnecting trucks.
When:
Quantities released:
Release point:

Carryover of TCE to cleaning tanks:
Frequency: Unknown, but probably frequent for small quantities.
Quantity: Max. of 1 gal. Transition piece bellows would have had the most. They hung these pieces at an angle or they would drop to the floor. Freon piping with elbows would have had some carryover.

Carryover of TCE to floor drains:
Frequency: Infrequent, but sometimes large quantities from the east side degreasers.
Quantity: Very small quantities to floor from west degreaser. 25 gal at the most to floor drain south of east side degreasers. Other than that, very little. The west side degreaser was used for machine shavings. They were set on the floor close to column B-3 when degreased. Four holes were punched in the bottom of each drum and they tried to drain the drums well. No reason for TCA to be in northwest sump.

Disposal of degreaser sludge:
Frequency: Annually
Disposal point: Sludge placed in drums. Disposal method/location unknown.

Disposal of cleaning tank sludge:
Frequency: One time except for alkali tank, which was cleaned twice.
Disposal point: Liquid and sludge pumped to drums.

Additional information: When material that contained some TCE was placed in the alkali tank, there was a reaction (acid/base type) involving bubbling and foaming. Every effort was made to drain the TCE out – it was expensive. TCE/TCA not used elsewhere in the building, although maintenance would get buckets of TCE and take back to work areas.

Interviewer: SEE ORIGINAL **Date:** _____
Interviewee (Optional): _____

INTERVIEW FORM

Name:
Position: Chemical Operations, C-400

Information: Degreaser run daily during upgrade. 1970s to early 1980s. After upgrade, ran regularly but usually on day shift.

TCA: Oily Stokes Pumps. Various small jobs. Parts put into a basket and lowered into bath. Many parts were washed with TCA from the recirculating pump and then left in the vat to remove more oil.

TCE: Used two cranes. Sometimes would let the material sit on the floor. Material going on to the other tanks would be set on the depressed area. Things like compressors that would not go to the other tanks would be put on a cart in the "Parking Area" on the main floor. Thinks this drain went to the neutralization pit.

Name:
Information: In 1970s there were always parts lined up on the floor following degreasing. A lot of the shells would have material in them that would run onto the floor. Parts were drained back into the tanks but there was always some material that leaked onto the floor. Recessed area was used sometimes to put parts and sometimes pipes while waiting for the cranes to move on.

Name:
Information: Large parts would be set on the floor/cart after degreasing if it didn't need to be pickled. Believe that they placed pipe in the recessed area awaiting going to the alkali bath. Happened very seldom. Said there were drips from removed parts, but doesn't recall any large releases from the degreased parts. Small degreasers didn't have a still so it had to be shut down and the sludge shoveled out. Small parts would be taken out and placed in a lay-down area near the tank.

Interviewer:
Date of Interview: October 21, 2001

INTERVIEW FORM

Name:
Information: Piping, compressor parts were degreased during the upgrade program of the 1970s and early 1980s. Converters (fins) would retain TCE.

Stoker pumps were typically degreased in the TCA tank. Typically, piping, etc., was degreased and placed in the depressed area prior to movement to the alkali bath. Didn't recall any spills or releases

Name:
Information: Supervisors transported TCE out in 5 gal buckets. One time a converted shell without a hole was drained on the floor.

Name:

Information: Doesn't remember setting pipes, etc. in the recessed area. Doesn't remember when the degreaser was shutdown. Doesn't know of any other releases.

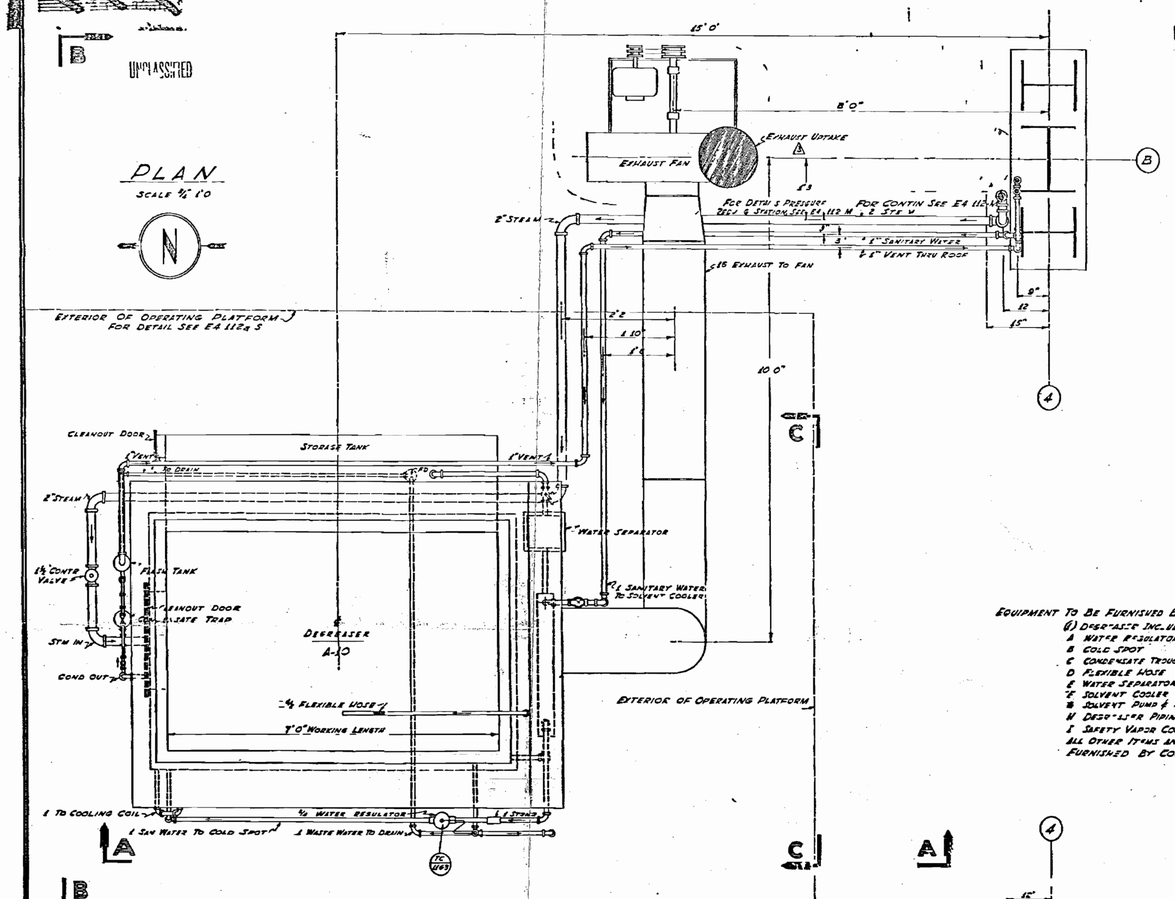
Name:
Information: Provided information on when the drains may have been plugged in C-400. He mentioned that headed the drain plugging project. The plan to plug drains was written in December 1986. Based on the date of the plan, it is believed the drains were plugged in 1987.

Interviewer:
Date of Interview: October 23, 2001

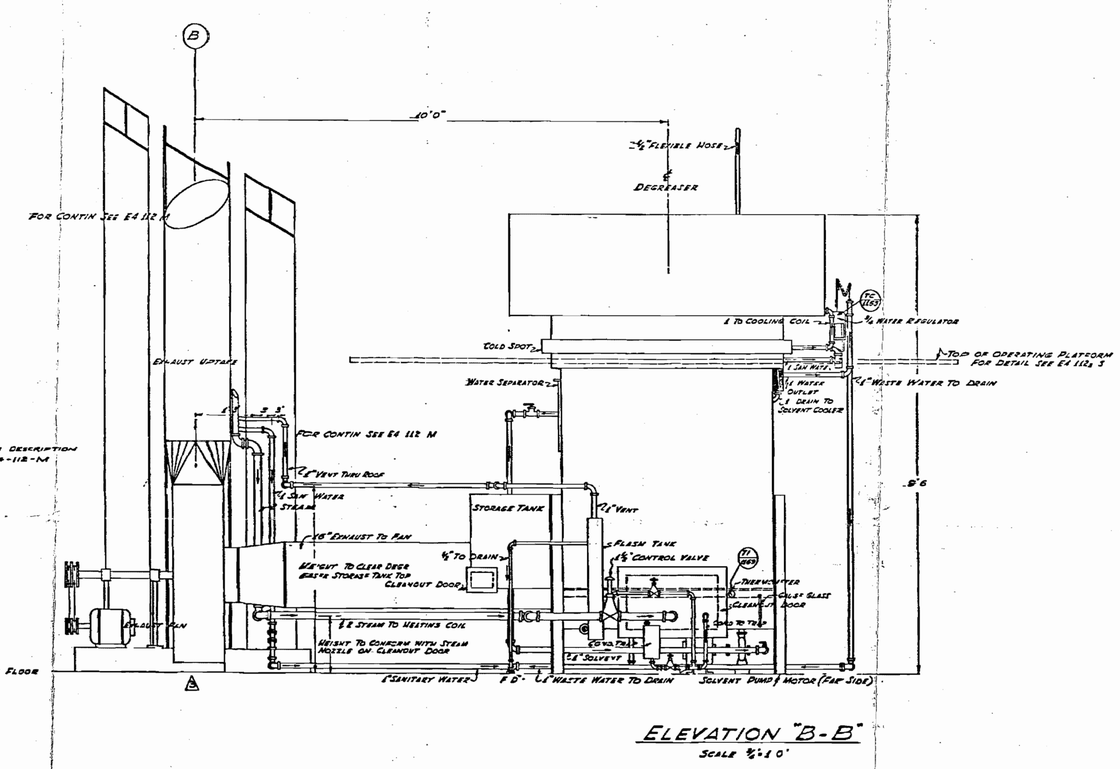
Unclassified

UNCLASSIFIED

PLAN
SCALE ¾" 1'0



EQUIPMENT TO BE FURNISHED BY CECCC
(B) DEGREASER INCLUDING -
A WATER REGULATOR
B COLD SPOT
C CONDENSATE TROUGH
D FLEXIBLE HOSE
E WATER SEPARATOR
F SOLVENT COOLER
G SOLVENT PUMP & MOTOR
H DEGREASER PIPING
I SAFETY VAPOR CONTROL VALVE
ALL OTHER ITEMS AND PIPING TO BE FURNISHED BY CONTRACTOR



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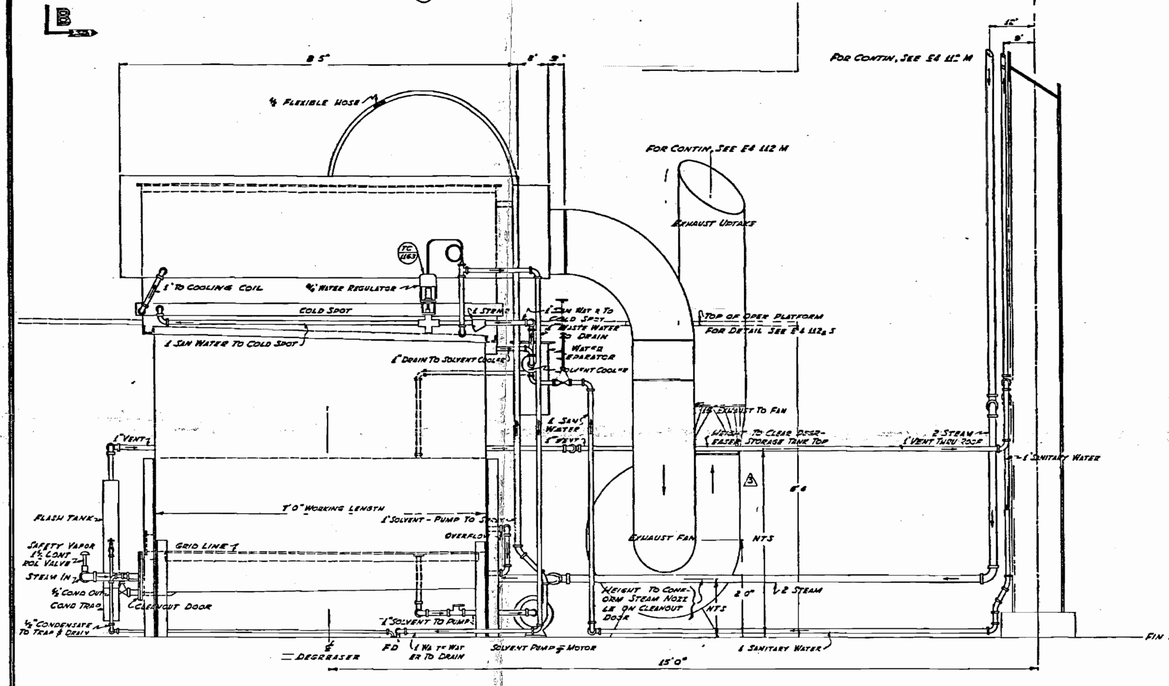

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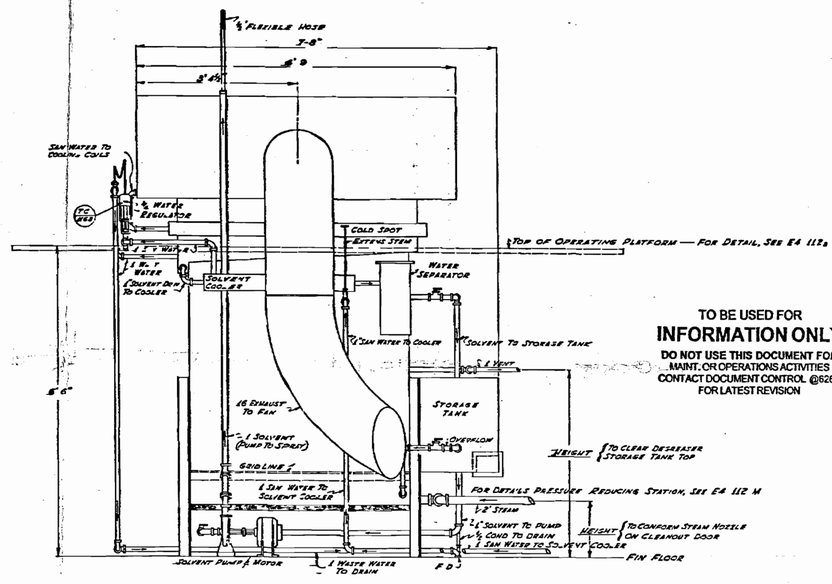

ELEVATION "C-C"
SCALE ¾"=1'0"

FOR CONTINUATIONS DEGREASER PIPING, SEE E4 112-M
FOR DETAILS OPERATING PLATFORM, SEE E4 112a 5

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3	6 18 53	Deviation Request No 427 M	MK	
2	7 23 53	Construction B	NP	7 14 52
1	6-20-52	Approval A+C	NP	

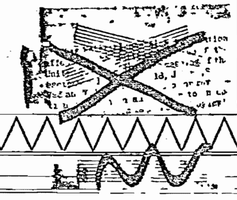
UNITED STATES
ATOMIC ENERGY COMMISSION

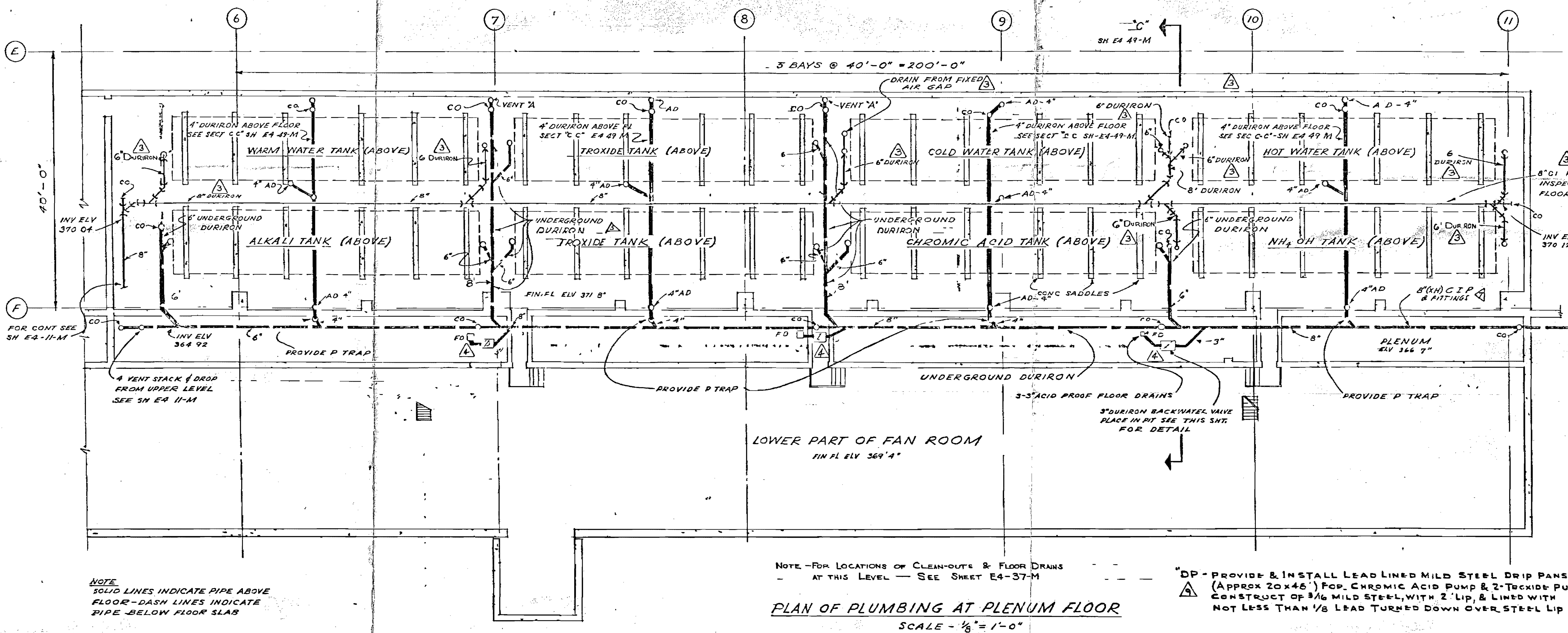
SMITH, HINCHMAN & GRYLLS, INC
ARCHITECTS & ENGINEERS
DETROIT 26 MICHIGAN

DRAWING TITLE
ITEM A - 10
DEGREASER PIPING

DRAWING APPROVED—DATE	DRAWING APPROVED—DATE	DRAW ING APPROVED—DATE
P J Ketzlach 6-23-52	W L Griffin 7-11 52	K C Brooks 7-14 52
ARCHITECT ENGINEER	CARBIDE CARBON CHEM DIV	A E C ENGINEER

DRAWN	DATE	CHECKED	DATE	JOB
A K Keown	6 12 52	N A P	6/19/52	8768
IN CHARGE	DATE	CH EP	DATE	
N A P	6/19/52	T W Arenick	6/19/52	
PROJECT	BUILDING	SHEET		
"C" PLANT	CLEANING C 400	E4-112b-M		



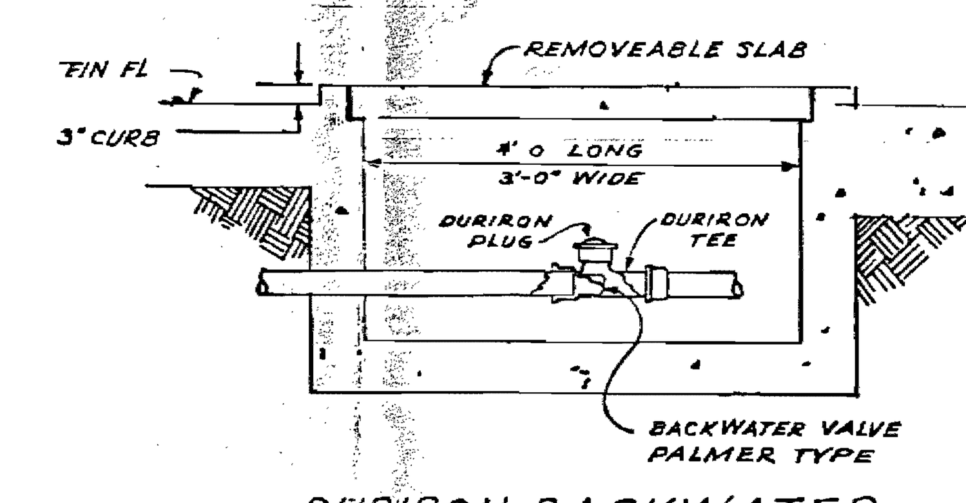


NOTE
SOLID LINES INDICATE PIPE ABOVE FLOOR - DASH LINES INDICATE PIPE BELOW FLOOR SLAB

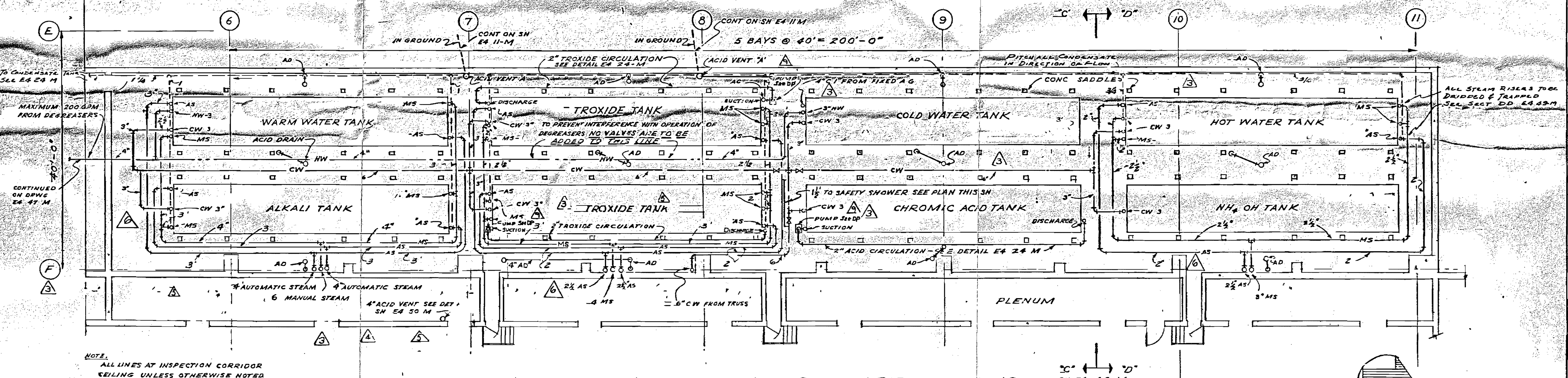
NOTE - FOR LOCATIONS OF CLEAN-OUTS & FLOOR DRAINS AT THIS LEVEL — SEE SHEET E4-37-M

PLAN OF PLUMBING AT PLENUM FLOOR
SCALE - 1/8" = 1'-0"

"DP - PROVIDE & INSTALL LEAD LINED MILD STEEL DRIP PANS (APPROX 20x48") FOR CHROMIC ACID PUMP & 2-TROXIDE PUMPS CONSTRUCT OF 3/16 MILD STEEL, WITH 2" LIP, & LINED WITH NOT LESS THAN 1/8 LEAD TURNED DOWN OVER STEEL LIP 1/4".

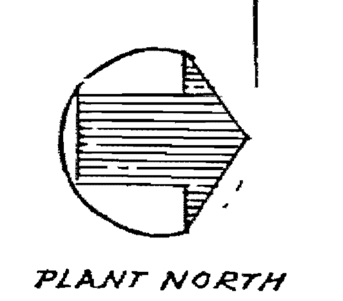


DURIRON BACKWATER VALVE IN PIT
SCALE - 1/2" = 1'-0"



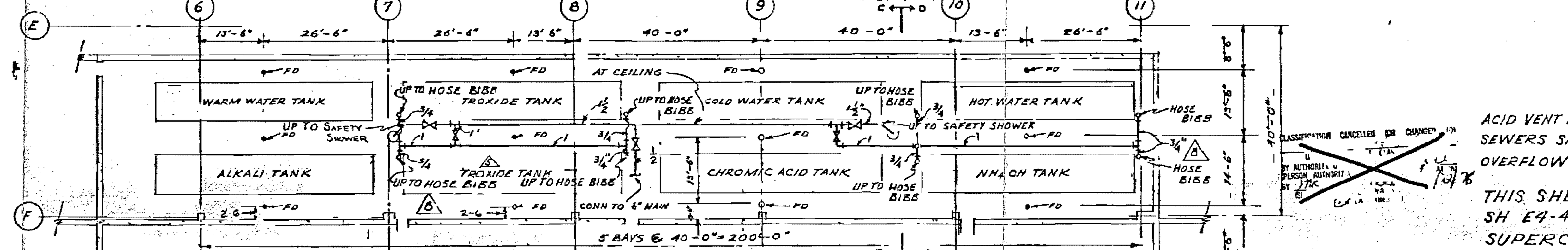
NOTE.
ALL LINES AT INSPECTION CORRIDOR CEILING UNLESS OTHERWISE NOTED
DRAINS FROM TANKS OMITTED ON THIS PLAN

PLAN OF PIPING AT INSP CORRIDOR CEILING
SCALE - 1/8" = 1'-0"



LEGEND

COLD WATER	CW
HOT WATER FROM DEGREASER CONDENSER DISCHARGE	HW
AUTOMATIC STEAM	AS
MANUAL STEAM	MS
ACID DRAIN FROM FD	AD
SULFURIC ACID	H_2SO_4
CONDENSATE	— — —



PLAN OF CLEANING TANKS AT INSP CORRIDOR FLOOR
SHOWING FLOOR DRAINS & INDEPENDENT CW SYSTEM FOR SAFETY SHOWERS
SCALE - 1/16" = 1'-0"

ACID VENT "A" DESIGNED TO AFFORD RELIEF TO TANK SEWERS SHOULD AN ACID AND ALKALI TANK OVERFLOW OR BE DUMPED AT SAME TIME

THIS SHEET IN CONJUNCTION WITH SH E4-49-M AND SH E4 50 M SUPERCEDES SH E4-8 M

NOTE
ADDITIONAL DETAILS REQUIRED BY FIELD FOR CLARIFICATION PURPOSES

REV NO	DATE	ISSUED FOR	BY	APP DATE
10	7 21 53	AS BUILT	GE	7 21 53
9	6 29 53	DEVIATION REQUEST NO 766-M	NP	
8	6 3 53	DEVIATION REQUEST # 337-M	NP	
7	5 ‑ 2	DEVIATION REQUEST # 205-M		
6	2 25 52	REVISION REQUEST NO 385	RR	
5	12 4 51	H_2SO_4 LINE REMOVED — DEV REQU. # 77 M		
		REV REQ # 83 HCL ITEMS REMOVED	CSL	
4	10-26 51	REMOVED HCL LINE FROM OUTSIDE STORAGE TANK ADDED FROM E4 11	JL	RJB 11 1 51
	10 26 51	REMOVED DRAIN LINE AND VENT STACK, ADDED BA F-VALVE & ... EACH FD IN PLENUM CHAMBER		RAW 10 31 51
3	9 29 51	ADDED HYDROCHLORIC ACID AND SULPHURIC ACID LINES — CHANGED 6 & 8 C I TO DURIRON — MOVED HW FROM HOT TO COLD WATER TANK	HWM	RJB 10 8 51 KAW 10 6 51
2	9 28 51	CONSTRUCTION "B"		9 26 51
1	9-21 51	APPROVAL A & C		

UNITED STATES
ATOMIC ENERGY COMMISSION

SMITH, HINCHMAN & GRYLLS, INC
ARCHITECTS & ENGINEERS
DETROIT 26 MICHIGAN

DRAWING TITLE
MISCELLANEOUS DETAILS
CLEANING TANKS-PIPING

DRAWING APPROVED—DATE	DRAWING APPROVED—DATE	DRAWING APPROVED—DATE
RJ Kittelhut 9-22-51 ARCHITECT ENGINEER	R A WALKER 9-25-51 CARBIDE CARBON CHEM DIV	R J BROWN 9-26-51 A E C ENGINEER

DRAWN: KORIN DATE: 8/24/51 CHECKED: [illegible] DATE: [illegible] JOB: 8768
IN CHARGE: [illegible] CHIEF: [illegible]
PROJECT: "K" PLANT
BUILD NO: CLEANING C-400
SHEET: E4-44-M