



## Department of Energy

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December 16, 2021

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Division of Waste Management  
Kentucky Department for Environmental Protection  
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PPPO-02-10018748-22

Mr. Victor Weeks  
Federal Facility Agreement Manager  
U.S. Environmental Protection Agency, Region 4  
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Dear Mr. Begley and Mr. Weeks:

**TRANSMITTAL OF THE SITE EVALUATION REPORT FOR THE C-611 WATER TREATMENT PLANT ANCILLARY FACILITIES AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY, DOE/LX/07-2467&D2**

References:

1. Letter from B. Begley to T. Duncan, "RE: Submittal of a Comment to the Site Evaluation Report for the C-611 Water Treatment Plant Ancillary Facilities (DOE/LX/07-2467&D1), Paducah Site, Paducah, McCracken County, Kentucky, #KY8-890-008-982," dated November 17, 2021
2. Letter from V. Weeks to T. Duncan, "Re: U.S. Environmental Protection Agency Acknowledgement of Receipt and Review for the Site Evaluation Report for the Site Evaluation Report for the C-611 Water Treatment Plant Ancillary Facilities at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, DOE/LX/07-2467&D1," dated November 17, 2021

Enclosed for approval is the certified *Site Evaluation Report for the C-611 Water Treatment Plant Ancillary Facilities at the Paducah Gaseous Diffusion Plant, Paducah Kentucky, DOE/LX/07-2467&D2* (SER). This version of the SER addresses the comment received from the Kentucky Department for Environmental Protection (KDEP) during its review on November 17, 2021. The U.S. Environmental Protection Agency (EPA) did not have any substantive comments on the D1 version of the primary document, but withholds concurrence until the U.S. Department of Energy responds to the comment submitted by KDEP. Also enclosed to assist with the review is a redline version of the document and a comment response summary.

Consistent with the D1 version of the document, the enclosed SER recommends that a Resource Conservation and Recovery Act facility investigation be conducted for the slabs and underlying soils for each of the ancillary facilities included in this SER based upon past operations, with the exception of C-611-A. The enclosed SER also recommends that a Comprehensive Environmental Response, Compensation, and Liability Act non-time-critical removal action for the demolition of the aboveground structure for each of the ancillary facilities associated with the C-611 Water Treatment Plant is not warranted.

In accordance with Section XX of the Federal Facility Agreement, EPA and KDEP have a 30-day review period to provide comments and/or approval of the document. If additional information is needed, please contact me at (270) 441-6862.

Sincerely,

**Tracey L.  
Duncan**

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Tracey Duncan

Federal Facility Agreement Manager  
Portsmouth/Paducah Project Office

Enclosures:

1. Certification Page
2. *Site Evaluation Report for the C-611 Water Treatment Plant Ancillary Facilities at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, DOE/LX/07-2467&D2—Clean*
3. *Site Evaluation Report for the C-611 Water Treatment Plant Ancillary Facilities at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, DOE/LX/07-2467&D2—Redline*
4. Comment Response Summary

Administrative Record File—ARF-ARR

cc w/enclosures:

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CERTIFICATION

**Document Identification:** *Site Evaluation Report for the C-611 Water Treatment Plant Ancillary Facilities at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, DOE/LX/07-2467&D2*

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Four Rivers Nuclear Partnership, LLC

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(Affiliate)

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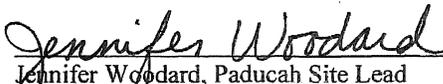
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Four Rivers Nuclear Partnership, LLC

12/16/21

Date Signed

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

U.S. Department of Energy

  
Jennifer Woodard, Paducah Site Lead  
Portsmouth/Paducah Project Office  
U.S. Department of Energy

12-15-2021

Date Signed

**DOE/LX/07-2467&D2  
Primary Document**

**Site Evaluation Report for the  
C-611 Water Treatment Plant  
Ancillary Facilities at the  
Paducah Gaseous Diffusion Plant,  
Paducah, Kentucky**



**CLEARED FOR PUBLIC RELEASE**



**DOE/LX/07-2467&D2  
Primary Document**

**Site Evaluation Report for the  
C-611 Water Treatment Plant  
Ancillary Facilities at the  
Paducah Gaseous Diffusion Plant,  
Paducah, Kentucky**

Date Issued—December 2021

U.S. DEPARTMENT OF ENERGY  
Office of Environmental Management

Prepared by  
FOUR RIVERS NUCLEAR PARTNERSHIP, LLC,  
managing the  
Deactivation and Remediation Project at the  
Paducah Gaseous Diffusion Plant  
under Contract DE-EM0004895

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## ACRONYMS

ACM	asbestos-containing material
AOC	area of concern
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FFA	Federal Facility Agreement
GA	geographical area
GSA	Generator Staging Area
KDWM	Kentucky Division of Waste Management
NAL	no action level
NFA	no further action
NTCRA	non-time-critical removal action
OU	operable unit
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RI	Remedial Investigation
RMA	radioactive material area
ROD	record of decision
SAA	satellite accumulation area
SE	site evaluation
SI	Site Investigation
SMP	Site Management Plan
SWMU	solid waste management unit
UCRS	Upper Continental Recharge System
UST	underground storage tank
WAG	waste area grouping

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## 1. FACILITY/UNIT NUMBER

The C-611 Water Treatment Plant is comprised of various ancillary facilities, a clear well, and four settling basins located within a 15-acre fenced area southwest of the industrialized area of the Paducah Site adjacent to Water Works Road. This site evaluation (SE) report includes those ancillary facilities listed in Appendix 4 and Appendix 6 of the Site Management Plan (SMP) that are located within the 15-acre fenced area (DOE 2020). These ancillary facilities include the following: C-611-A, C-611-A1, C-611-B, C-611-B1, C-611-C, C-611-F1, C-611-F2, C-611-F3, C-611-H, C-611-J, C-611-S, C-611-U, C-611-X, and C-611-Z. The clear well (C-611-I) and the settling basins (C-611-D, C-611-E, C-611-F, and C-611-G) that are located within the 15-acre fenced area are not part of this SE and will be addressed by their appropriate geographical area (GA) or operable unit (OU) as discussed in Appendix 3 of the SMP.

## 2. FACILITY/UNIT NAME

Table 1 provides the facility name for each of the C-611 Water Treatment Plant ancillary facilities evaluated in this SE report.

**Table 1. C-611 Water Treatment Plant Ancillary Facilities**

<b>Facility Number</b>	<b>Facility Name/Description</b>
C-611-A	Building and Shop Storage
C-611-A1	Activated Carbon Storage Facility
C-611-B	Head House
C-611-B1	Polymer Feed System Enclosure
C-611-C	Flocculator Basin
C-611-F1	Secondary Coagulation Basin
C-611-F2	Chemical Feed Building for C-611-F1
C-611-F3	Feed Facility
C-611-H	Filter Building and Pump Station
C-611-J	Pump House (Settled Water)
C-611-S	Storage and Chlorine Facility
C-611-U	Softening Facility (West)
C-611-X	Softening Facility (East)
C-611-Z	Flocculator Basin

## 3. DATE

December 1, 2021

## 4. REGULATORY STATUS

A joint policy issued under a U.S. Department of Energy (DOE) and U.S. Environmental Protection Agency (EPA) Memorandum dated May 22, 1995, *Policy on Decommissioning Department of Energy Facilities Under CERCLA* (DOE 1995), establishes a framework for conducting decommissioning of DOE facilities and provides guidance on the use of Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) response authority to decommission DOE facilities. The Policy states that DOE is required to conduct a removal SE in accordance with the *National Contingency Plan* and interagency agreements [i.e., Federal Facility Agreement (FFA)] to assess site conditions and determine whether a release or substantial threat of release exists at the facility. At any facility for which DOE conducts a removal SE, DOE will consult with EPA and will provide, as requested, EPA with such information

necessary for EPA to review such evaluation. DOE, EPA, and the Commonwealth of Kentucky have agreed to conduct decontamination and decommissioning (D&D) activities at the Paducah Gaseous Diffusion Plant under the existing FFA. Section IX [Site Evaluation(s)] of the FFA requires that DOE conduct integrated SEs that consist of the removal SE, remedial SE, and solid waste management unit (SWMU) assessment report. The integrated SEs are to be documented in a SE report consistent with the format within Appendix D of the FFA (EPA 1998).

Industrial facilities that DOE has determined to pose a potential threat of release of hazardous substances to the environment are listed as part of the facility D&D OU in Appendix 4 of the SMP (DOE 2020). The SE report shall state whether demolition of the facility should be conducted using a CERCLA Non-Time-Critical Removal Action (NTCRA) and will serve to designate any facility, or portions thereof, that are related to any identified release as a SWMU and/or area of concern (AOC).

There is no historical information warranting the designation of the ancillary facilities associated with the C-611 Water Treatment Plant listed in Table 1, or portions thereof, as a SWMU or AOC. Based on historical information associated with past operations of the ancillary facilities associated with the C-611 Water Treatment Plant listed in Table 1, including potential leaks and spills of contaminants into the environment due to the use of water treatment chemicals and chemicals related to equipment maintenance, a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) is recommended for the slabs and underlying soils for all of the ancillary facilities evaluated in this SE report (Table 1), with the exception of C-611-A1 (C-611-A1 was constructed in 1995 as a storage facility, and there is no evidence of spills/releases from the facility). Slabs and underlying soils associated with the C-611 Water Treatment Plant ancillary facilities included in this evaluation may contain possible contaminants related to the water treatment process and from equipment maintenance. The historical information and facility walkdown inspection did not identify any unusual conditions that would pose a potential threat of environmental release during future demolition of the aboveground structures; therefore, the demolition and disposal of the C-611 Water Treatment Plant ancillary facilities listed in Table 1 is recommended to be conducted outside of the FFA and/or CERCLA process and a CERCLA NTCRA is not warranted.

## 5. LOCATION

The ancillary facilities included in this SE report (Table 1) are associated with the C-611 Water Treatment Plant and are located within a 15-acre fenced area southwest of the industrialized area of the Paducah Site adjacent to Water Works Road. Figures 1 and 2 provide the location of the C-611 Water Treatment Plant ancillary facilities at the Paducah Site.

## 6. APPROXIMATE DIMENSION OR CAPACITY

Table 2, derived from a Paducah Site building directory, provides the year of facility construction, general construction materials, and dimensions for each of the C-611 Water Treatment Plant ancillary facilities included in this SE report. Available engineering drawings are provided in Appendix A.

**Table 2. C-611 Water Treatment Plant Ancillary Facility Information**

<b>Facility Number</b>	<b>Facility Name/Description</b>	<b>Year Built</b>	<b>Construction</b>	<b>Area/Capacity</b>
C-611-A	Building and Shop Storage	1950	Prefabricated metal	504 ft <sup>2</sup>
C-611-A1	Activated Carbon Storage Facility	1995	Prefabricated metal	1,640 ft <sup>2</sup>
C-611-B	Head House	1942	Reinforced concrete	1,215 ft <sup>2</sup>

**Table 2. C-611 Water Treatment Plant Ancillary Facility Information (Continued)**

<b>Facility Number</b>	<b>Facility Name/Description</b>	<b>Year Built</b>	<b>Construction</b>	<b>Area/Capacity</b>
C-611-B1	Polymer Feed System Enclosure	1979	Prefabricated metal	285 ft <sup>2</sup>
C-611-C	Flocculator Basin	1982*	Reinforced concrete	742,000 gal
C-611-F1	Secondary Coagulation Basin	1983	Reinforced concrete	110,000 gal
C-611-F2	Chemical Feed Building for C-611-F1	1983	Prefabricated metal	640 ft <sup>2</sup>
C-611-F3	Feed Facility	1994	Prefabricated metal	156 ft <sup>2</sup>
C-611-H	Filter Building and Pump Station	1942	Wood frame	13,067 ft <sup>2</sup>
C-611-J	Pump House (Settled Water)	1942 (est)	Wood frame	Area included in C-611-H
C-611-S	Storage and Chlorine Facility	1963	Prefabricated metal	1,128 ft <sup>2</sup>
C-611-U	Softening Facility (West)	1976	Steel tank	1,174,000 gal
C-611-X	Softening Facility (East)	1964	Steel tank	908,000 gal
C-611-Z	Flocculator Basin	1977	Reinforced concrete	565,000 gal

\*Date is based on the Paducah Site building directory; however, other references indicate the basin predates 1982.

## 7. FUNCTION

The ancillary support facilities included in this SE report function as part of the C-611 Water Treatment Plant for the Paducah Site. The water treatment process at the C-611 Water Treatment Plant is based on conventional water treatment techniques, which include softening, coagulation, flocculation, sedimentation, and chlorination. Raw water is taken from the Ohio River at a pumping station operated by the Tennessee Valley Authority at the Shawnee Fossil Plant (north of the Paducah Site) and pumped via 36-inch lines to the C-611 Water Treatment Plant where the raw water undergoes treatment prior to being separated and distributed to the sanitary water system or previous plant water system. The main users of sanitary water include, but are not limited to, the following: (1) domestic; (2) boiler make-up; (3) once-through cooling water; (4) fire protection system; and (5) decontamination. Plant water was used mainly for recirculating cooling water make-up and Depleted Uranium Hexafluoride Conversion Project cooling tower make-up. The plant water system demands have varied widely based on electrical usage at the Paducah Site. Once the uranium enrichment operations stopped and the cooling towers for that process were shut down, the demand for plant water has decreased significantly.

The treatment process at the C-611 Water Treatment Plant consists of both mechanical and chemical processes. Calcium oxide (lime) and ferric sulfate are used for water softening; a cation polymer is used as a coagulant, when needed. Water softening is performed in the C-611-U and C-611-X units. Softening is followed by flocculation and pre-disinfection in C-611-C or C-611-Z flocculator basins, where additional ferric sulfate is added, if needed. After flocculation, water flows into settling basins (C-611-D, C-611-E, C-611-F, and C-611-G) for velocity reduction to allow for the flocculated material to settle. Next, the water is sent to C-611-F1, which is a secondary coagulation basin, where more flocculated material is removed. Settled water leaving the basins passes through self-cleaning “traveling” screens prior to being separated into the sanitary water system and previous plant water system. Sodium hexametaphosphate is added to the sanitary water which is then processed through the C-611-H filters to remove suspended solids and then sanitized with the addition of chlorine. A series of four lagoons that are located outside the 15-acre fenced area (not part of this SE) are also used in the overall water treatment process; they include the (1) C-611-V Lagoon (SWMU 23); (2) C-611-Y Overflow Lagoon (SWMU 22); (3) C-611-W Sludge Lagoon (SWMU 21); and; (4) C-611-4 Horseshoe Lagoon (SWMU 185). Sludge from the lime softening process is discharged to the C-611-V Lagoon (SWMU 23) for settling. The C-611-V lagoon overflows into the

C-611-Y Overflow Lagoon (SWMU 22) and then discharges through Outfall 006 to Bayou Creek. The C-611-W Sludge Lagoon (SWMU 21) receives water/sludge when there is a clean out of the C-611-Z flocculator and C-611-E and C-611-G settling basins.

The function of each individual ancillary facility associated with this SE is discussed in further detail in Section 11.

## 8. BRIEF HISTORY

Portions of the C-611 Water Treatment Plant were built around 1942 to support the Kentucky Ordnance Works and the water treatment plant was subsequently expanded to meet the needs of the uranium enrichment operations at the Paducah Site (DOE 1993). From construction to present, the ancillary facilities associated with this SE (Table 1) have been utilized as part of the C-611 Water Treatment Plant. The ancillary facilities that make up the C-611 Water Treatment Plant were leased to the United States Enrichment Corporation in the early 1990s until 2014 when the gaseous diffusion plant was deleased and returned to DOE. Since 2014, the ancillary facilities associated with this SE have continued to be utilized as part of the C-611 Water Treatment Plant.

## 9. OPERATIONAL STATUS

The status of the C-611 Water Treatment Plant is operating. Ancillary facilities listed in Table 3 may be operating or in standby, as necessary.

**Table 3. C-611 Water Treatment Plant Ancillary Facilities  
Operational Status**

<b>Facility Number</b>	<b>Facility Name/Description</b>
C-611-A	Building and Shop Storage
C-611-A1	Activated Carbon Storage Facility
C-611-B	Head House
C-611-B1	Polymer Feed System Enclosure
C-611-C	Flocculator Basin
C-611-F1	Secondary Coagulation Basin
C-611-F2	Chemical Feed Building for C-611-F1
C-611-F3	Feed Facility
C-611-H	Filter Building and Pump Station
C-611-J	Pump House (Settled Water)
C-611-S	Storage and Chlorine Facility
C-611-U	Softening Facility (West)
C-611-X	Softening Facility (East)
C-611-Z	Flocculator Basin

## 10. DATES OPERATED

The C-611 Water Treatment Plant has been in operation from 1952 to present (portions of the facility were operated prior to 1952 to support the Kentucky Ordnance Works). Table 2 provides the specific construction date for each of the ancillary facilities included in this SE report.

## 11. SITE/PROCESS DESCRIPTION

The ancillary facilities included in this SE report function as part of the C-611 Water Treatment Plant. The facility descriptions below are primarily from the *Report for Environmental Audit Supporting Transition of the Gaseous Diffusion Plants to the United States Enrichment Corporation* (DOE/OR/1087&V5) (DOE 1993).

C-611-A is a building and shop storage facility (Figure 3). It was built in 1950 and is constructed of prefabricated metal (approximately 504 ft<sup>2</sup>). It is used for storage of maintenance tools and equipment (Figure 4). The south end of C-611-A includes the housing for a liquid polymer pump (Figure 5). The liquid polymer is stored in a tank on the east side of C-611-A and pumped to C-611-B and C-611-B1 for use in water treatment. During a facility walkdown in April 2021, it was noted that there was staining on the floor from past spills and it appeared the floor had been painted orange in the past. C-611-A1 is a storage facility that contains various materials being used at the C-611 Water Treatment Plant (Figure 6). It was built in 1995 and is constructed of prefabricated metal (approximately 1,640 ft<sup>2</sup>). Materials stored in C-611-A1 include activated carbon, lubricants/oils, and miscellaneous equipment (e.g., hoses, spare parts, etc.) (Figure 7).

C-611-B, built in 1942, is the head house where the first chlorination step occurs. It is constructed of reinforced concrete and consists of 1,215 ft<sup>2</sup> on one floor. C-611-B1, built in 1979, is the polymer feed system enclosure, constructed of prefabricated metal and consisting of 285 ft<sup>2</sup> on one floor. Figure 8 is an exterior view of C-611-B, the dry chemical storage bins, and C-611-B1. Figures 9 through 12 show some of the chemical treatment equipment and controls in C-611-B. Dry chemical storage bins for the water softening chemicals (i.e., ferric sulfate, lime) are located just northwest of the C-611-B building. During a facility walkdown in April 2021, it was noted that there was water on the floor from a leaking pump which is not unusual. Floor trenches (Figure 13) collect water and chemicals from the floor and lead to an outside sump pit. From the sump pit, the collected water was pumped to the C-611-X Softening Facility and reintroduced into the water treatment stream. Figure 14 shows the interior of the C-611-B polymer room.

C-611-C (Figure 15) and C-611-Z (Figure 16) are flocculator basins that were constructed in 1982 and 1977 of reinforced concrete with capacities of 742,000 gal and 565,000 gal, respectively. C-611-F1 (Figure 17), constructed in 1983, is a secondary coagulation basin, constructed of reinforced concrete, with a capacity of 110,000 gal. C-611-F2 (Figures 18 and 19), also constructed in 1983, is a chemical feed building used to historically add polymer and other flocculating chemicals to the C-611-F1 basin during treatment. C-611-F2 is currently used to add flocculating chemicals but is not being used to feed polymer. Figure 19 shows the currently unused polymer mixing tanks inside C-611-F2. C-611-F3 (Figure 18), constructed in 1994, is a feed facility that contains equipment used to feed activated carbon for water treatment as needed. A single activated carbon feeder/hopper in C-611-F3 (Figure 20) is used when needed for the treatment process. Both C-611-F2 and C-611-F3 have floor drains that drain to the C-611-V Lagoon.

C-611-H, built in 1942, is a filter building and pump station; and C-611-J, also estimated to have been built in 1942, is a pump house. Figures 21 and 22 are exterior views of C-611-H and C-611-J. Both are wood frame construction and share of a total of 13,067 ft<sup>2</sup> on one floor. Figure 23 shows the interior walkway connecting C-611-H and C-611-J. A basement is associated with both C-611-H and C-611-J. During a facility walkdown in April 2021, it was noted that there was standing water in the C-611-J portion of the basement. There are no sumps in the basement and water is collected and drained from the basement area to the sludge lagoon. Figures 24 through 27 are interior photographs of C-611-H and C-611-J showing some of the pumps/piping, filter areas, instrumentation, and laboratory area (including laboratory sink) within the facilities. C-611-J includes a diesel power generator that currently is not operable. The diesel fuel is stored outside, northwest of the C-611-J Pump House near a transformer station (Figure 28). Underground diesel

fuel lines lead to the power generator (DOE 1993). These lines to the power generator are now capped. The line was rerouted to the diesel-driven sanitary water pump.

C-611-S (Figure 29) is a storage and chlorine facility built in 1963 that currently contains a variety of stored materials being used at the C-611 Water Treatment Plant including chlorine, sodium hexametaphosphate, and flammable materials (Figure 30). In addition to material storage, C-611-S is used for secondary chlorination of the sanitary water system for disinfection. Figure 31 shows the chlorine cylinders and feeder controls. In the past, C-611-S served as a storage building for corrosion-inhibiting chemicals and mixing tanks for a corrosion inhibitor feed station for the previous plant water system. The mixing tanks are no longer in the facility. Floor drains in the C-611-S facility drain to a pit near the northeast corner of the facility and then to the C-611 septic system.

C-611-U, constructed in 1976, is a softening facility located on the northwest side of the water treatment plant area and consists of a 1,174,000-gal steel tank (Figures 32 and 33) and an auxiliary structure that houses equipment that mixes water softening chemicals with water. The ferric sulfate feeder and mixer and the lime feeder systems in C-611-U are shown in Figures 34 and 35, respectively. Dry chemical storage bins for the water softening chemicals are located just south of the C-611-U tank. Figure 36 shows a floor collection trench in C-611-U. The water is removed from the trench with a suction line and reintroduced into the water treatment stream.

C-611-X, constructed in 1964, is a softening facility located on the northeast side of the water treatment plant area and consists of a 908,000-gal steel tank (Figures 37 and 38).

Historically, most of the ancillary facilities included in this SE report have stored and/or used various chemicals and materials, including flocculating chemicals (e.g., lime and ferric sulfate), chlorine, diesel fuel, oils/lubricants, and trichloroethene (DOE 1993).

## 12. WASTE DESCRIPTION

The primary waste stream that would be generated during D&D of the ancillary facilities associated with the C-611 Water Treatment Plant would be nonhazardous demolition debris. This demolition debris would be comprised primarily of concrete and metal structural components, metal piping, miscellaneous equipment, insulation, and roofing. Wastes such as polychlorinated biphenyl (PCB)-containing liquids and electrical components and/or RCRA mixed waste sludges or liquids, are not anticipated to be generated with exceptions noted below.

Limited infrastructure items remain in the ancillary facilities (e.g., light fixtures, exit lights, alarms) that could contain *de minimis* quantities of regulated items (e.g., mercury, lead, PCBs) which will be removed to the extent practicable during deactivation. Building materials used for construction could contain lead-based paints and asbestos-containing materials (ACMs). Generation of any residual amounts of these materials during demolition will be properly containerized, characterized, and dispositioned in accordance with applicable regulatory requirements.

The ancillary facilities associated with the C-611 Water Treatment Plant store hazardous materials, including flocculating chemicals and chlorine. A satellite accumulation area (SAA) (S-611-01) and a generator staging area (GSA) (G-611-01) are located within ancillary facilities C-611-H and C-611-S, respectively, of the C-611 Water Treatment Plant. The SAA is used for fluorescent lamps, light bulbs, lead gaskets, batteries, and empty aerosol cans while the GSA is used for oil pads, gloves, and other non-hazardous materials. There are no radioactive material areas (RMAs) located within the C-611 Water Treatment Plant ancillary facilities.

### 13. WASTE QUANTITY

Based on the waste forecast information available in the *Remedial Investigation/Feasibility Study Report for CERCLA Waste Disposal Alternatives Evaluation at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE 2018), the projected waste volume associated with demolition of the C-611 Water Treatment Plant ancillary facilities is approximately 9,548 yd<sup>3</sup>. This waste is assumed to be nonhazardous solid waste.

A projected waste volume for the slabs and underlying soils of the ancillary facilities associated with the C-611 Water Treatment Plant is uncertain. The extent of contamination (if any) and volume will be defined during a future investigation.

### 14. SUMMARY OF ENVIRONMENTAL SAMPLING DATA

Environmental data are available from 10 soil sampling stations (7 separate locations) and 4 groundwater sampling locations within 50-ft of the facilities in the C-611 Water Treatment Plant ancillary facilities as shown on Figure 39. These locations were sampled during the CERCLA Phase I and Phase II Site Investigations (SI) (CH2M HILL 1991, 1992), Waste Area Groupings (WAGs) 1 and 7 RFI/Remedial Investigation (RI) (DOE 1996), and the Soils OU RI (DOE 2011).

The WAGs 1 and 7 RFI/RI sampling plan at the C-611 Water Treatment Plant included one soil boring adjacent to each underground storage tank (UST) (SWMUs 130-134) at the C-611 Water Treatment Plant, installation and sampling of two shallow monitoring wells in the Upper Continental Recharge System (UCRS) (the Regional Gravel Aquifer is not present beneath SWMUs 130-134 as they are situated above the upper surface of the buried terrace), and collection of liquid sludge from USTs containing measurable quantities of liquid (DOE 1996). SWMUs 130-134 were designated as requiring no further action and approved by the Kentucky Division of Waste Management (KDWM) on December 6, 1996. Due to their age, and consistent with the use of historical data in Paducah Site projects, no data from locations associated with SWMUs 130-134 were utilized for determining representativeness of current conditions.

The Phase I/Phase II SI and the later sampling for the Soils OU RI in the C-611 Water Treatment Plant area primarily focused on the C-611 PCB Spill Site (SWMU 79) area. Soil data associated with SWMU 79 were evaluated in the Soils OU RI Report (DOE 2011). SWMU 79 will be evaluated as part of the Soils and Slabs OU. Data from locations associated with SWMU 79 were not utilized for determining representativeness of current conditions.

### 15. DESCRIPTION OF RELEASE AND MEDIA AFFECTED

<u>Groundwater:</u>	Yes
<u>Surface Water:</u>	Yes
<u>Soil:</u>	Yes
<u>Ecology Affected</u> (i.e., threatened/endangered species):	None Known <sup>1</sup>
<u>Air:</u>	Yes

There have been documented spills or releases of materials reported in the past that can be linked to the C-611 Water Treatment Plant ancillary facilities listed in Table 1 of this SE Report to the environment. Examples of these releases are as follows.

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<sup>1</sup> No known threatened/endangered species affected; however, a fish kill is noted in the examples of releases.

- In the early 1990s, a soda ash release from one of the water softening facilities (C-611-U or C-611-X) into the C-611-V Lagoon and C-611-Y Overflow Lagoon significantly elevated the pH levels in the lagoons and resulted in a fish kill (MMES 1993).
- Also in the early 1990s, a fuel line fitting failed, releasing approximately 20 gal of diesel fuel into the basement of the C-611 Water Treatment Plant. Area drains were isolated and the free liquid was cleaned up with absorbent materials. Some diesel did reach the plant drainage system, as evidenced by a sheen on the sludge and secondary lagoons into which the building effluents drain. Absorbent booms/pads were used to contain and clean up the release (MMES 1991).
- In the early 1990s (circa 1994), a chlorine release occurred at C-611-S Storage and Chlorine Facility from a defective cylinder (Appendix B).
- In March 1991, one gal of waste oil was reported being spilled at C-611 Water Treatment Plant. The spill was contained and the affected soil was excavated and drummed (Appendix B).
- In May 2021, 10 lb of ferric sulfate was spilled onto the ground at C-611-C Flocculator Basin when a pump discharge line developed a leak. The pump discharge line was repaired immediately and the spill was cleaned up that same day (Appendix B).

There also have been spills and releases associated with other SWMUs within 50-ft of the C-611 Water Treatment Plant ancillary facilities evaluated in this SE, that are discussed below. The locations of the SWMUs are shown in Figure 39.

SWMU 79 was investigated during the Phase I and Phase II SIs (CH2M HILL 1991; CH2M HILL 1992), during the WAG 23 RI (DOE 1994b), and during the Soils OU RI (DOE 2011). The C-611 PCB Spill Site is related to the transformer bank at the C-611 Water Treatment Plant (shown in Figure 28) that may have released oils containing PCBs to the soils surrounding the transformers. SWMU 79 is not part of this SE and will be further evaluated as part of the Soils and Slabs OU.

There were five USTs related to the C-611 Water Treatment Plant. These storage tanks, identified in Table 4 as SWMUs 130-134, were investigated during the WAGs 1 and 7 RFI/RI (DOE 1996). Groundwater samples collected near the USTs identified low levels of organic contaminants (1,4-dichlorobenzene and naphthalene). These SWMUs have been designated as requiring no further action (NFA) in the SMP (DOE 2020). Their NFA approval by EPA and the KDWM also are noted in Table 4.

**Table 4. Storage Tanks Located Within the 15-Acre Fenced Area of the C-611 Water Treatment Plant**

<b>SWMU No.</b>	<b>Description</b>	<b>NFA Approval By</b>
130	C-611 550-gal gasoline UST	KDWM 12/6/1996; EPA and KY via WAG 1&7 Record of Decision (ROD), 8/10/1998
131	C-611 50-gal gasoline UST	KDWM, 12/6/1996; EPA and KY via WAG 1&7 ROD, 8/10/1998
132	C-611 2,000-gal oil UST	KDWM 12/6/1996; EPA and KY via WAG 1&7 ROD, 8/10/1998
133	C-611 (unknown size) grouted UST	KDWM 12/6/1996; EPA and KY via WAG 1&7 ROD, 8/10/1998
134	C-611 1,000-gal diesel/gasoline tank	KDWM 12/6/1996; EPA and KY via WAG 1&7 ROD, 8/10/1998

SWMU 491 is result of a mercury spill that occurred in a vault at the water treatment plant. During construction activities to replace a sanitary water valve associated with the C-611-I Clear Well, a contractor was boring a hole through the west wall of the sanitary water flow meter vault when mercury flowed out of the vault. Previously, the vault was used to hold flow measurement instruments that contained mercury. The mercury was contained within the vault and the release was immediately cleaned-up. There was no evidence of release to the environment. SWMU 491 was determined as requiring no further action and approved by KDWM in March 2004 (DOE 2020). The C-611-I Clear Well is not evaluated in this SE and will be addressed as part of its appropriate GA or OU in accordance with the SMP.

As discussed in Section 7, there are four lagoons, identified as SWMUs 21 through 23 and SWMU 185, that are also used as part of the overall water treatment process. These four lagoons are not evaluated as part of this SE. SWMUs 21 through 23 will be evaluated as part of the Lagoons OU, and SWMU 185 will be evaluated as part of the Surface Water OU (DOE 2020).

Historically, the floor in C-611-A was determined to be radiologically contaminated as a result of the installation of a contaminated pump. The contaminated part of the pump was subsequently replaced, but the underlying floor remained radiologically contaminated (DOE 1993). The radiological contamination associated with the underlying floor has been removed. During an April 2021 facility walkdown, there were no radiological postings or markings in C-611-A.

During April and May 2021 walkdown inspections of the C-611 Water Treatment Plant ancillary facilities, no evidence of oil leaks or visible staining from oils on the floor was found; however, the inspection did note the presence of water leaks and water softening chemicals such as ferric sulfate and lime on the floor, which are typical for water treatment facilities. The chemicals in the water softening treatment facilities are periodically washed into the buildings' collection trenches for subsequent reintroduction into the water treatment stream. Other identified floor drains are either routed to the C-611-V Lagoon or to the C-611 septic system.

## **16. DOCUMENTATION OF NO RELEASE**

Examples of spill events as noted in Section 15 indicate potential environmental releases from the C-611 Water Treatment Plant ancillary facilities identified in Table 1. Additionally, large volumes of chemicals used in these facilities, combined with floor stains and uncertainty regarding the integrity of the aging piping, floor trenches/drains, sump pits, and basins support further investigation to verify whether any such environmental releases may exist. Section 19 provides a recommendation to conduct an RFI for all ancillary facilities evaluated in this SE report with the exception of C-611-A1. C-611-A1 was constructed in 1995 as a storage facility, and there is no evidence of spills/releases from the facility. Based on the results of the RFI sampling data, a future decision will be made as to whether to designate any or portions of the soils and slabs associated with any of the C-611 Water Treatment Plant ancillary facilities as a new AOC.

## **17. IMPACT ON OR BY OTHER SWMU/AOC**

There is no evidence that these ancillary facilities impact, or are being impacted by, SWMUs and/or AOCs not related to the water treatment plant. SWMUs in the vicinity of the C-611 Water Treatment Plant are identified and discussed in Section 15.

## **18. PRELIMINARY REMEDIATION GOAL COMPARISON**

Sample locations were identified within a 50-ft boundary of the C-611 Water Treatment Plant. Samples associated with SWMU 79 will be evaluated as part of the Soils and Slabs OU. Historical data from other sample locations were related to NFA determinations by KDWM. Due to their age, and consistent with the

use of historical data for Paducah Site projects, no data from sample locations shown on Figure 39 were utilized for determining representativeness of current conditions or compared to preliminary remediation goals.

## **19. RCRA FACILITY INVESTIGATION NECESSARY**

An RFI is recommended for the slabs and underlying soils associated with the ancillary facilities evaluated in this SE that make up the C-611 Water Treatment Plant, with the exception of C-611-A1. C-611-A1 is the most recently constructed facility at the C-611 Water Treatment Plant (finished in 1995), has only been used for storage, and there is no evidence of spills/releases from the facility. Due to the historical spills listed in Section 15, in addition to the large volumes of chemicals used in the C-611 Water Treatment Plant ancillary facilities, combined with floor stains and uncertainty regarding the integrity of the aging piping, floor trenches/drains, sump pits, and basins, further investigation is recommended to verify whether any such environmental releases may exist. Based on the results of the RFI sampling data, a future decision will be made as to whether to designate any or portions of the soils and slabs associated with any of the C-611 Water Treatment Plant ancillary facilities as a new AOC.

## **20. CERCLA NTCRA NECESSARY**

A CERCLA NTCRA is not recommended as necessary for demolition of the aboveground portions of the C-611 Water Treatment Plant ancillary facilities evaluated in this SE Report (Table 1) following facility shut-down and completion of deactivation. The April and May 2021 walkdown inspections of the facilities, employee interviews, and other reviewed historical information did not identify any unusual conditions that would pose a potential threat of environmental release during future demolition of the aboveground structures; therefore, the demolition and disposal of the facility is recommended to be conducted outside of the FFA and/or CERCLA process.

Limited infrastructure items potentially containing *de minimis* quantities of regulated items remaining in the facilities will be removed, to the extent practicable, during deactivation. Construction materials could contain lead-based paints and ACM, both of which can be verified effectively during a pre-demolition inspection, contained, and properly managed using standard demolition and waste management practices. Deactivation will include removal of water treatment chemicals, equipment, and any accessible loose items being stored to the extent practicable prior to demolition.

While measures to be implemented during D&D are not a part of this SE, the demolition of the ancillary facilities associated with the C-611 Water Treatment Plant would identify any necessary best management practices to prevent and/or minimize contaminated storm-water runoff, and to prevent any debris from pooling and collecting in any areas that are below-grade to the surface slab, including basements, pits, drains, and other openings to the subsurface.

## **21. OU ASSIGNMENT**

The ancillary facilities associated with the C-611 Water Treatment Plant evaluated in this SE Report (Table 1) currently are assigned to the Facility D&D OU, Other Buildings (non-SWMUs) (SMP Appendix 4) or Facilities Undergoing CERCLA Determination (SMP Appendix 6) (DOE 2020).

## **22. REFERENCES**

CH2M HILL 1991. *Results of the Site Investigation, Phase I, at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, KY/ER-4, CH2M HILL, Paducah, KY.

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- MMES (Martin Marietta Energy Systems, Inc.) 1991. *Paducah Gaseous Diffusion Plant Environmental Report for 1990*, KY/ES/ESH-18/V3, Martin Marietta Energy Systems, Inc., Paducah, KY, September.
- MMES 1993. *Paducah Gaseous Diffusion Plant Environmental Report for 1992*, KY/E-164, Martin Marietta Energy Systems, Inc., Paducah, KY, September.

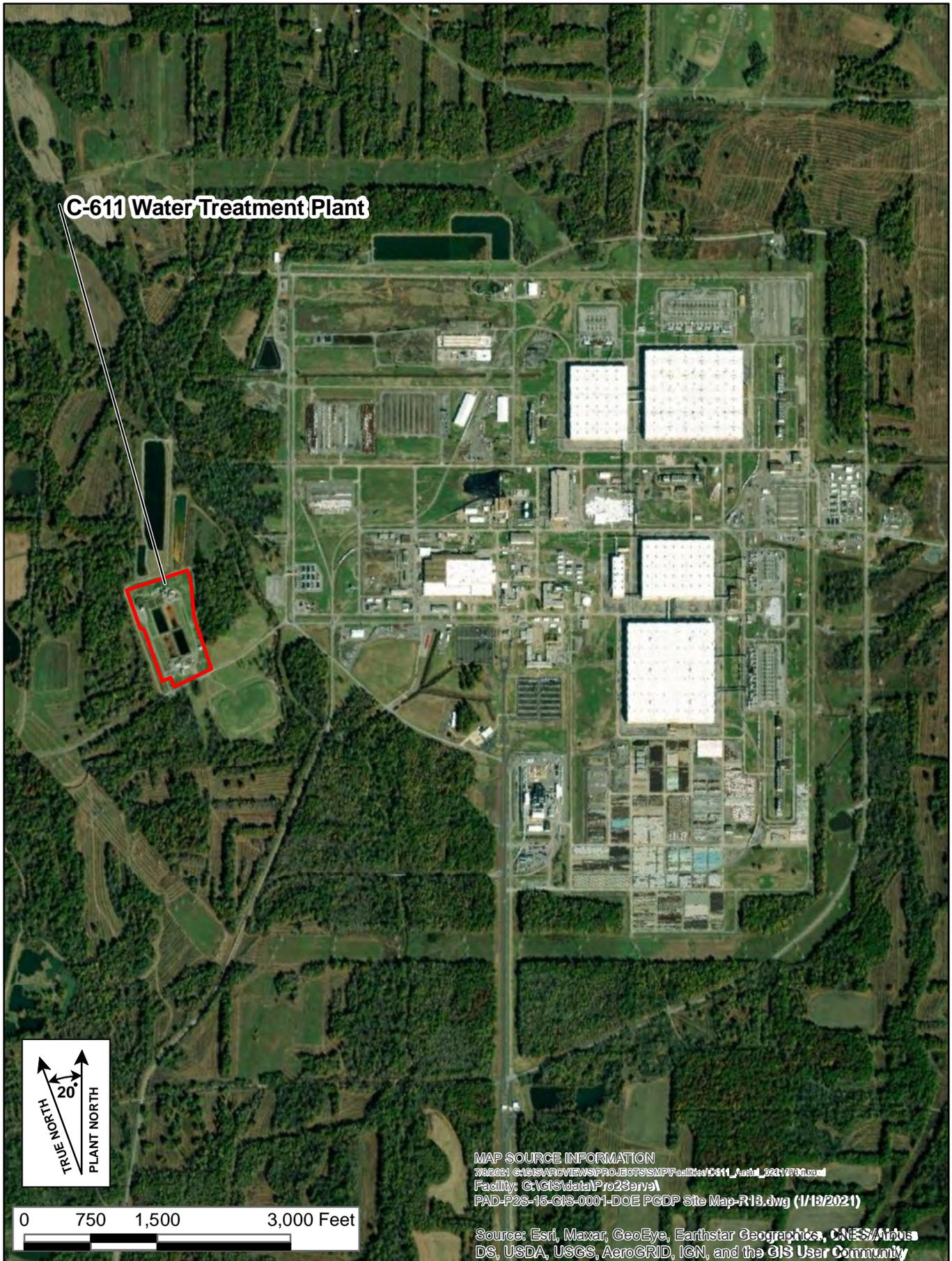
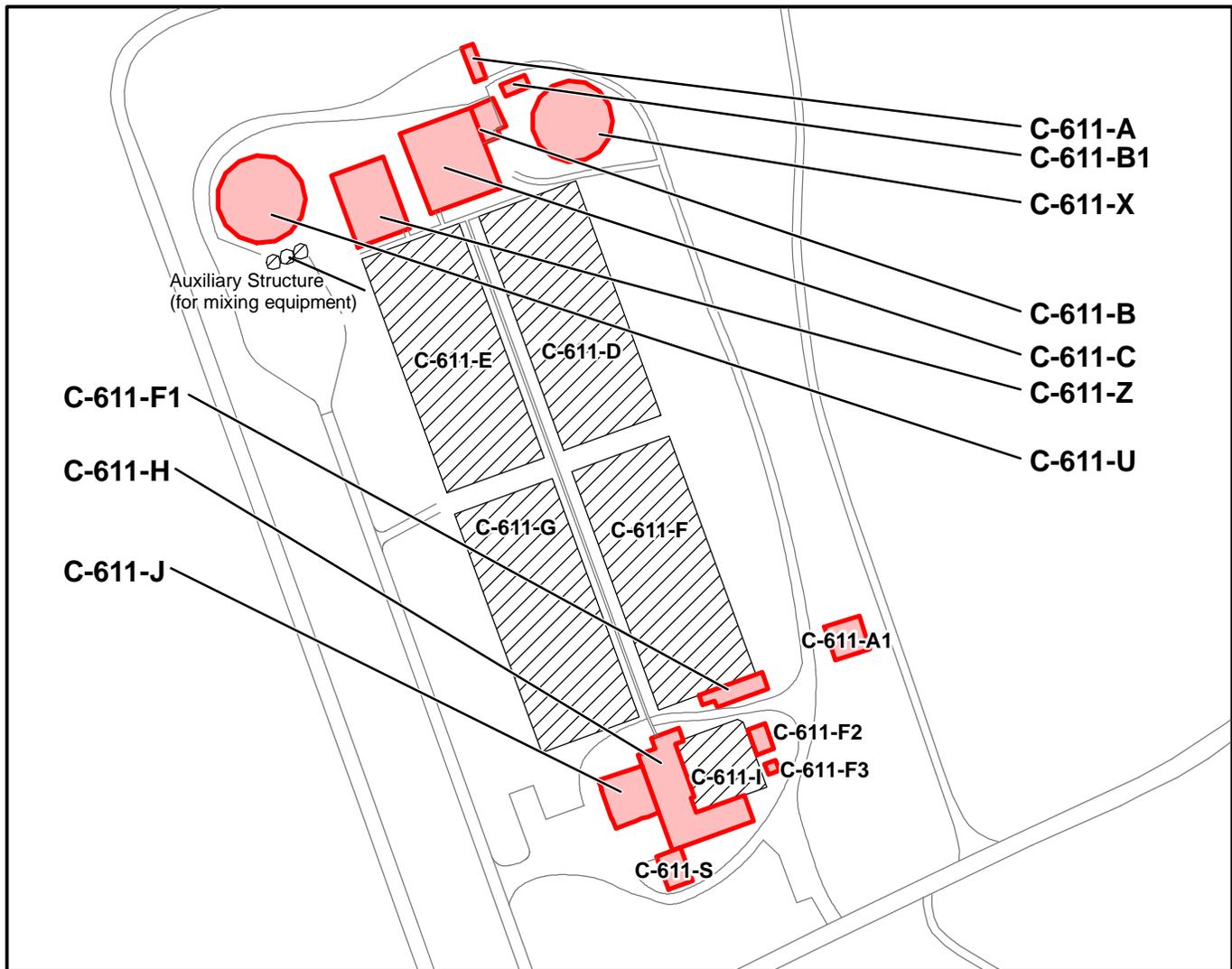
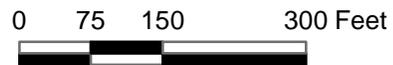
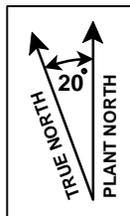
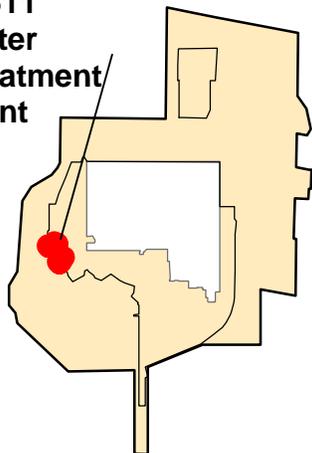


Figure 1. Aerial Photograph Showing the Location of the C-611 Water Treatment Plant



**C-611  
Water  
Treatment  
Plant**



**LEGEND**

- C-611 Water Treatment Plant Ancillary Facility
  - Facility\*
  - DOE Property, outside Limited Area
  - Road
- \*Note: Some structures not shown.

**U.S. DEPARTMENT OF ENERGY**  
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE  
PADUCAH GASEOUS DIFFUSION PLANT



**MAP SOURCE INFORMATION**

Map Generation Date and Location: 7/8/2021 G:\GIS\ARCVIEWS\PROJECTS\SMP\Facilities\C611\_Location\_20210630.mxd

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Roads: G:\GIS\PEGASIS.gdb\roadrow;

DOE Property Boundary: G:\GIS\PEGASIS.gdb\doebnd; Limited Area: G:\GIS\PEGASIS.gdb\limited\_area; 229 Boundary: G:\GIS\PEGASIS.gdb\Security\_229

**Figure 2. Map Showing C-611 Water Treatment Plant Ancillary Facilities Location**



**Figure 3. Exterior View of C-611-A Building and Shop Storage (Looking North)**



**Figure 4. Interior View of C-611-A Building and Shop Storage**



**Figure 5. C-611-A Pump Enclosure and Polymer Storage Tank (Looking North)**



**Figure 6. Exterior View of the C-611-A1 Activated Carbon Storage Facility (Looking North)**



**Figure 7. Interior View of C-611-A1 Activated Carbon Storage Facility**



**Figure 8. Exterior View of C-611-B and C-611-B1 (Looking Southeast)**



Figure 9. Chlorine Room in C-611-B (Looking West)



Figure 10. Chemical Feed Room in C-611-B (Looking East)



Figure 11. Water Flow Charts and Valve Controls in C-611-B



Figure 12. Ferric Sulfate Feeder System in C-611-B



**Figure 13. Floor Collection Trench in C-611-B (Leads to an Exterior Sump Pit)**



**Figure 14. Polymer Room in C-611-B**



**Figure 15. Overhead View of the C-611-C Flocculator Basin (Looking Northwest)**



**Figure 16. Overhead View of the C-611-Z Flocculator Basin (Looking Northwest)**



**Figure 17. C-611-F1 Secondary Coagulation Basin (Looking East)**



**Figure 18. C-611-F2 Chemical Feed Building for C-611-F1 and C-611-F3 Feed Facility (Looking West)**



**Figure 19. Interior of C-611-F2 Showing Polymer Mixing Tanks**



**Figure 20. Interior of C-611-F3 Showing the Activated Carbon Feeder**



**Figure 21. Exterior View of the West Side of C-611-J and C-611-H (Looking East)**



**Figure 22. Exterior View of the South Side of C-611-H and C-611-J (Looking North)**



Figure 23. Walkway between C-611-H and C-611-J



Figure 24. View of the Interior of C-611-J Showing Pumps, Piping, and Switchgear Room



Figure 25. Interior View of the C-611-H Showing the Filter Area



Figure 26. Water Treatment Plant Controls in C-611-H



**Figure 27. Laboratory Sink in C-611-H**



**Figure 28. Electrical Transformers and Diesel Storage Located West of C-611-J**



Figure 29. Exterior View of the C-611-S Storage and Chlorine Facility (Looking South)



Figure 30. Interior of C-611-S Showing Storage Areas



Figure 31. Chlorine Cylinders and Feeder Controls in C-611-S



Figure 32. Exterior View of the C-611-U Softening Facility (Looking Northwest)



**Figure 33. Overhead View of the C-611-U Softening Facility Tank**



**Figure 34. Ferric Sulfate Feeder and Mixing Tank in C-611-U**



**Figure 35. Lime Feeder and Slaker in C-611-U**



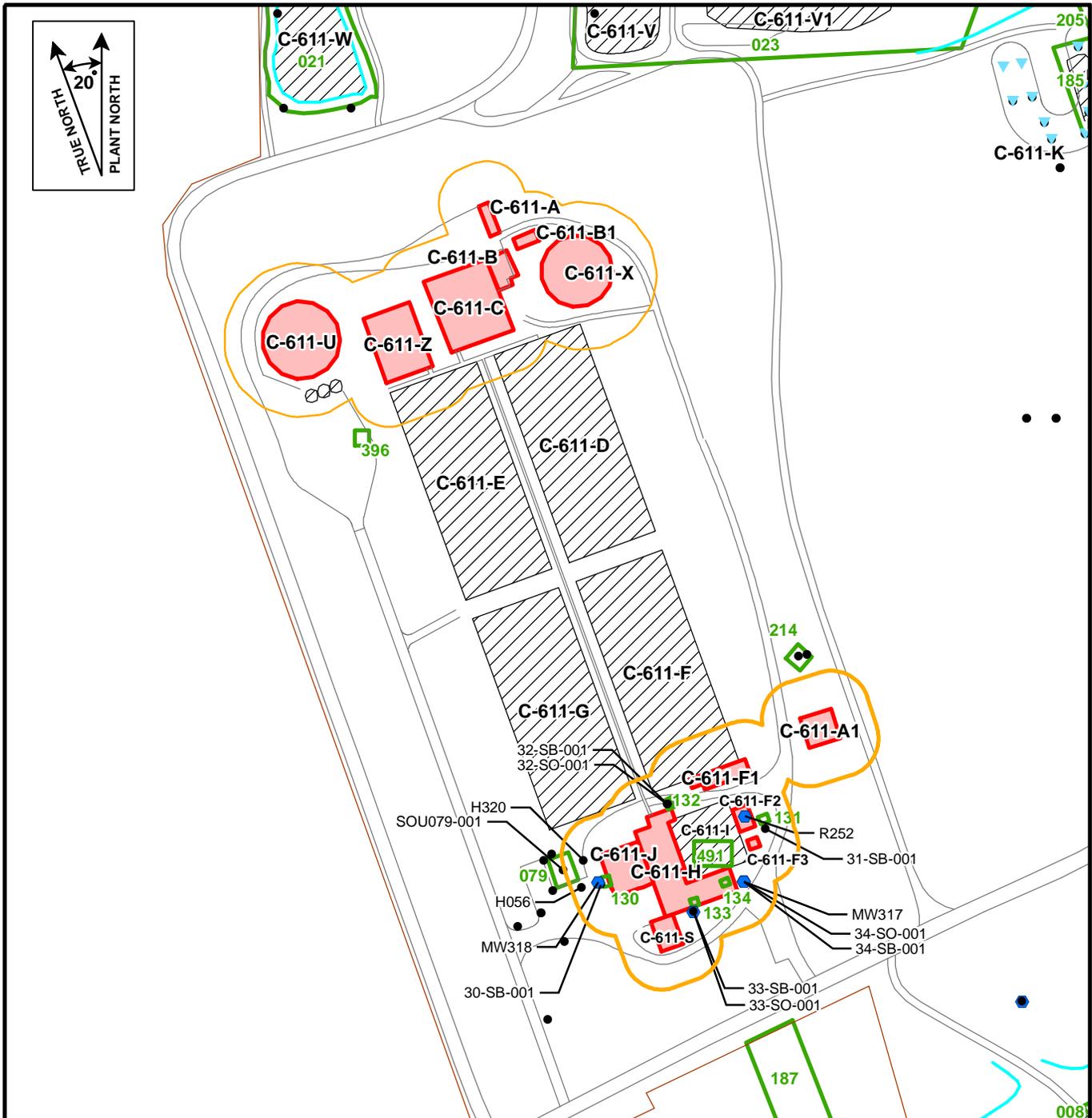
**Figure 36. Floor Trench with Suction Line in C-611-U**



**Figure 37. Exterior View of C-611-X Softening Facility (Looking East)**



**Figure 38. Overhead View of the C-611-X Softening Facility Tank (Looking Southeast)**



<b>LEGEND</b>		<b>SAMPLES</b>	
C-611 Water Treatment Plant Ancillary Facility	50-ft Boundary	Sediment	Groundwater
Facility	229 Boundary	Soil	Surface Water
SWMU/AOC	Stream	Solid Waste	
<p>NOTE: Some outdoor structures are not shown. Storm sewers (SWMUs 102A and 102B), sanitary sewers (SWMU 179), and groundwater plumes (SWMUs 201, 202, and 210) are not shown.</p>			

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PADUCAH GASEOUS DIFFUSION PLANT



**MAP SOURCE INFORMATION**  
Map Generation Date and Location: 7/8/2021 G:\GIS\ARCVIEWS\PROJECTS\SMP\Facilities\C611\_Samples\_20210707.mxd  
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Streams: G:\GIS\PEGASIS.gdb\streams; 229 Boundary: G:\GIS\PEGASIS.gdb\Security\_229;  
Samples: G:\GIS\PEGASIS.gdb\Locations; SWMUs: G:\GIS\PEGASIS.gdb\SWMUs (as noted)

Figure 39. SWMU and Sample Locations near the C-611 Water Treatment Plant

**APPENDIX A**  
**ENGINEERING DRAWINGS**

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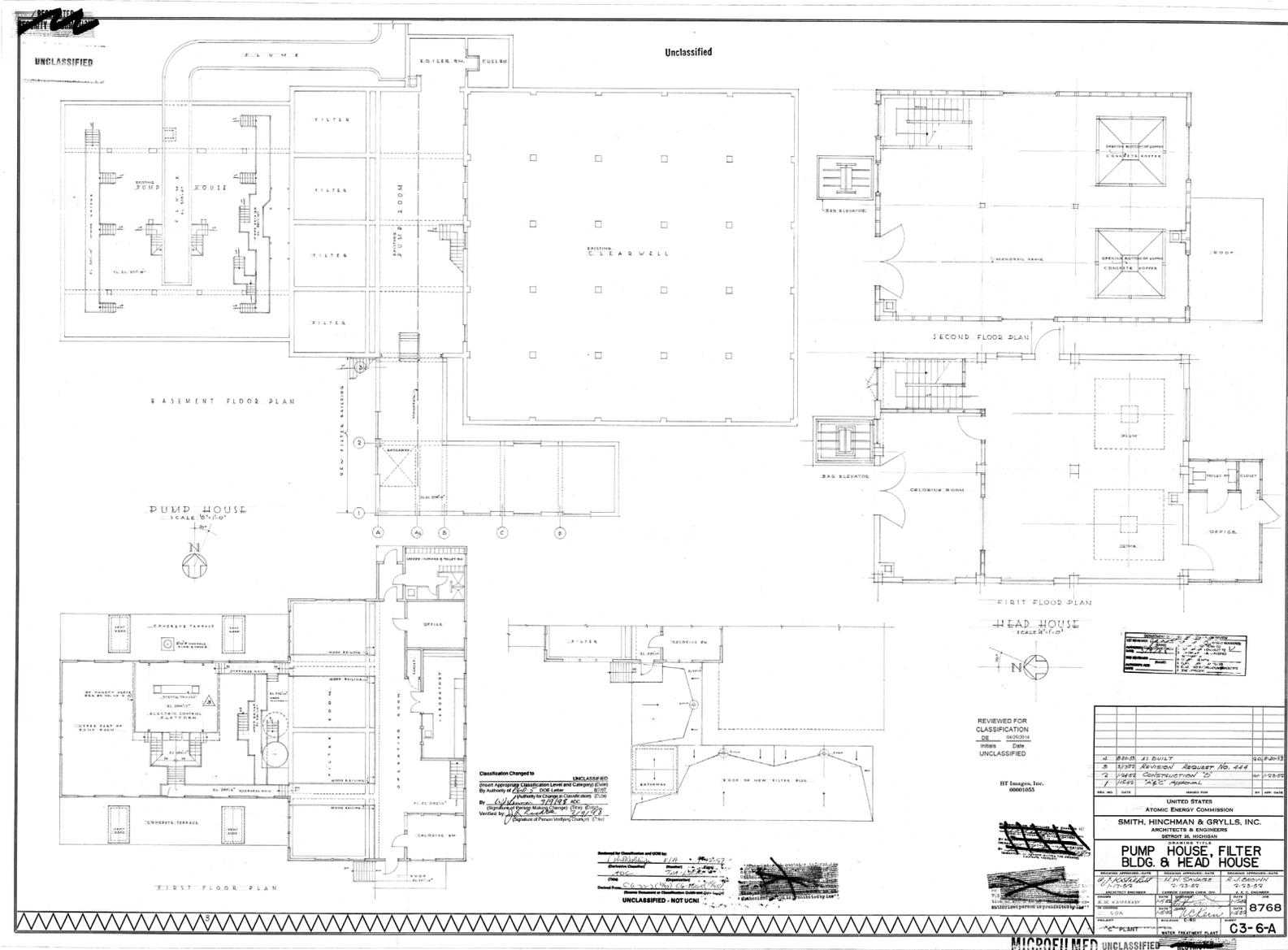


Figure A.1. Engineering Drawing C3-6-A (C-611-H and C-611-J Layout)

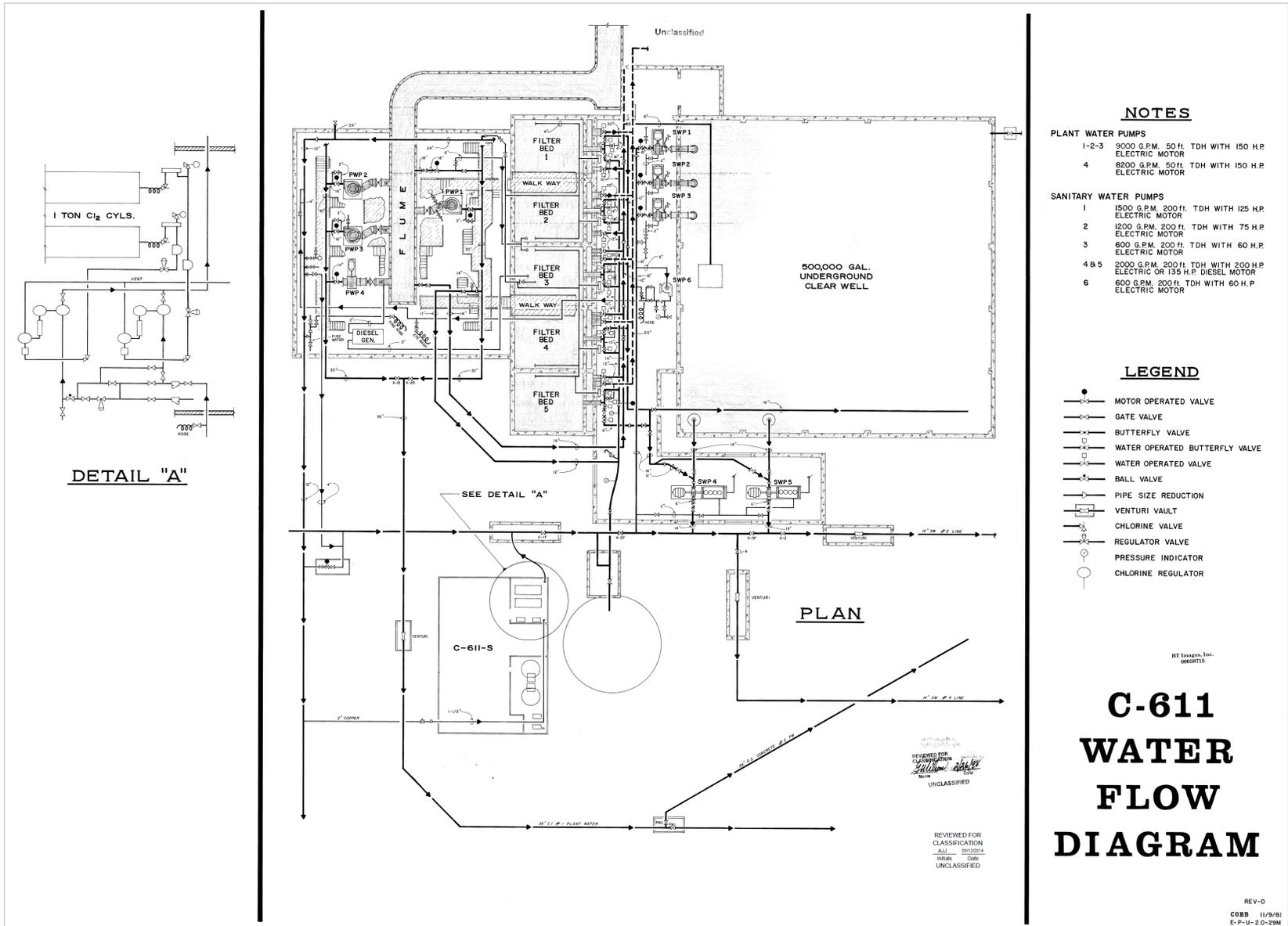


Figure A.2. Engineering Drawing E-P-U-2.0-29M (C-611-H / C-611-J Water Flow Diagram)



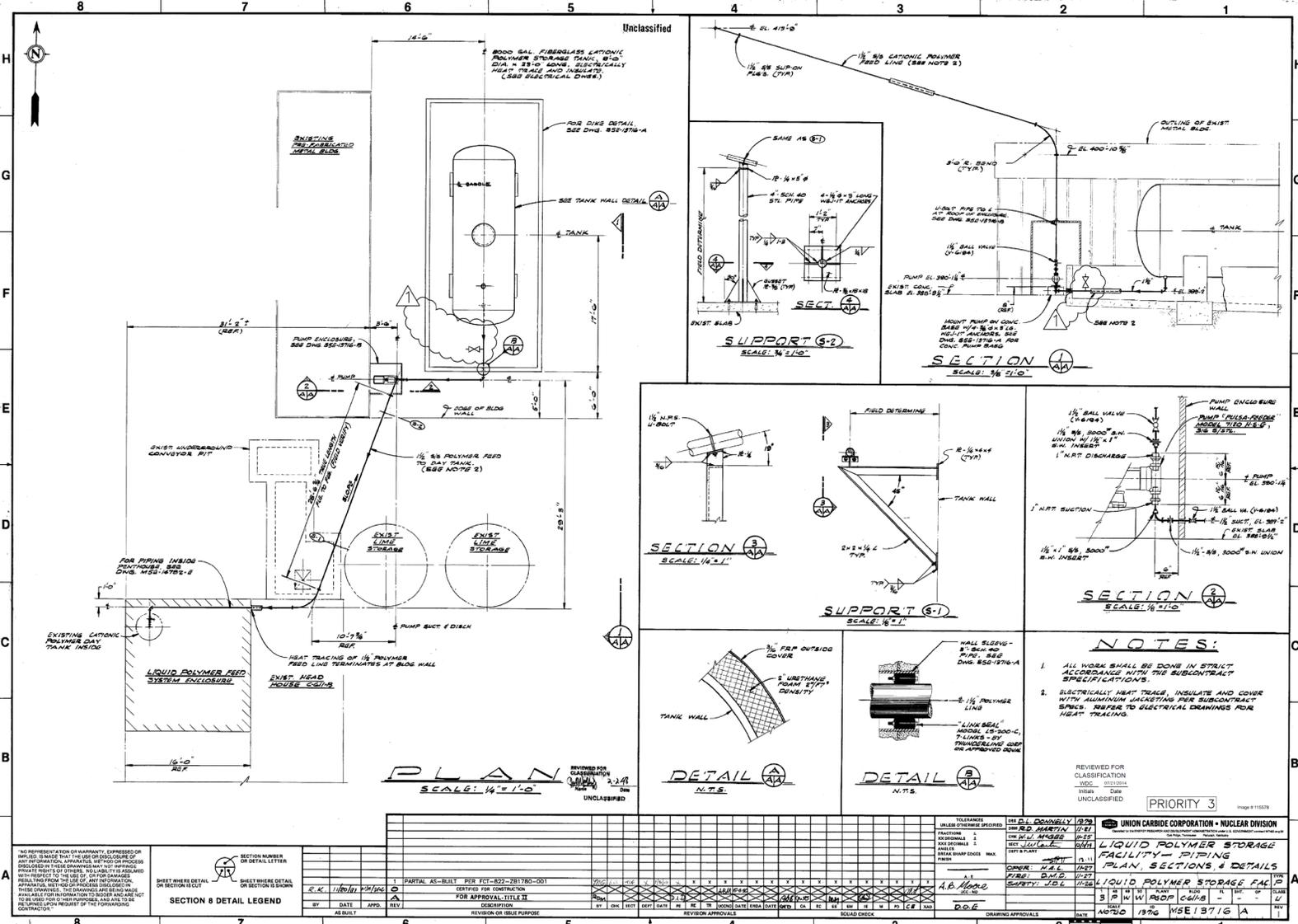


Figure A.4. Engineering Drawing M5E-13716-A (Liquid Polymer Storage Adjacent to C-611-A)

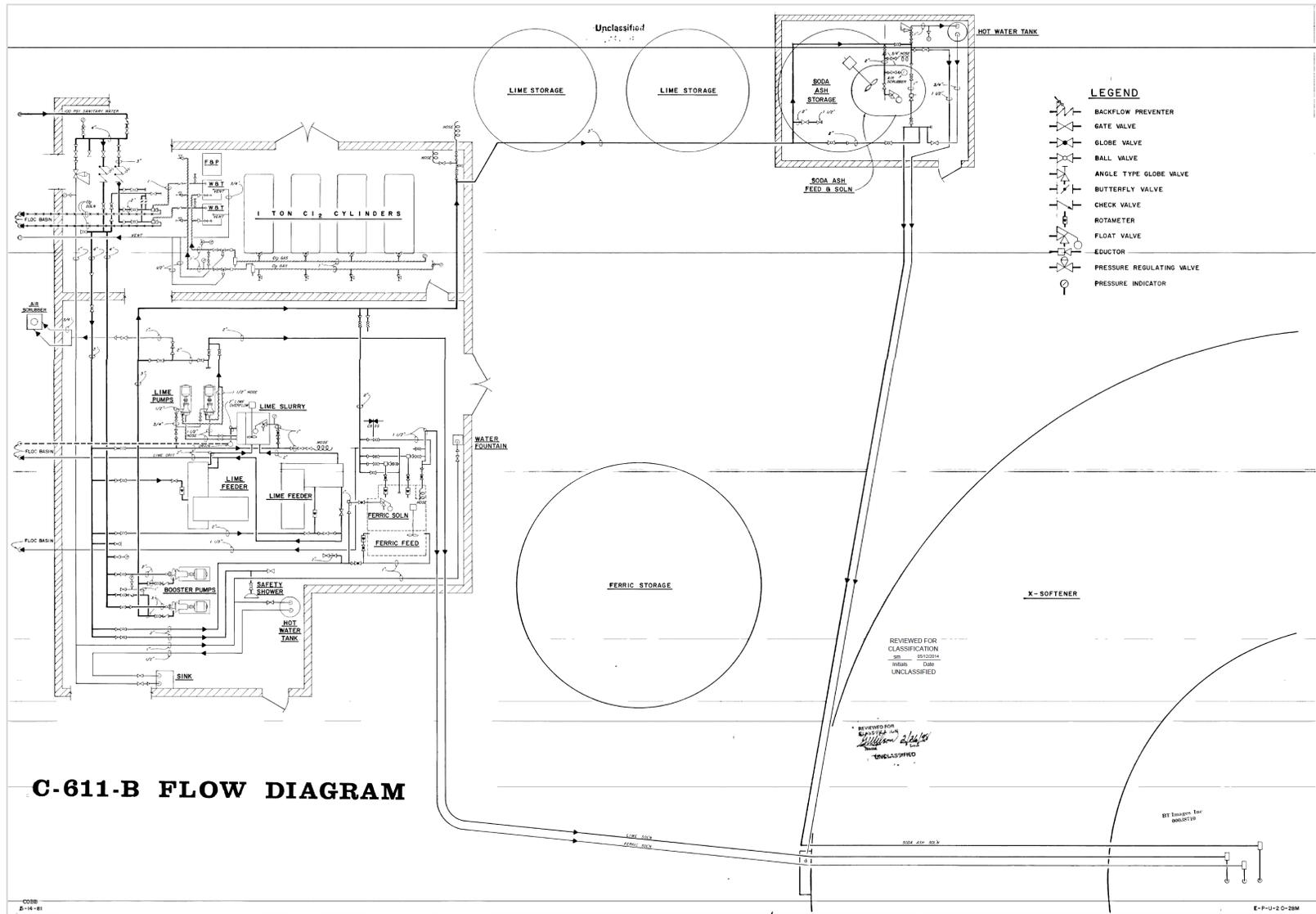


Figure A.5. Engineering Drawing E-P-U-2.0-28M (C-611-B Flow Diagram)

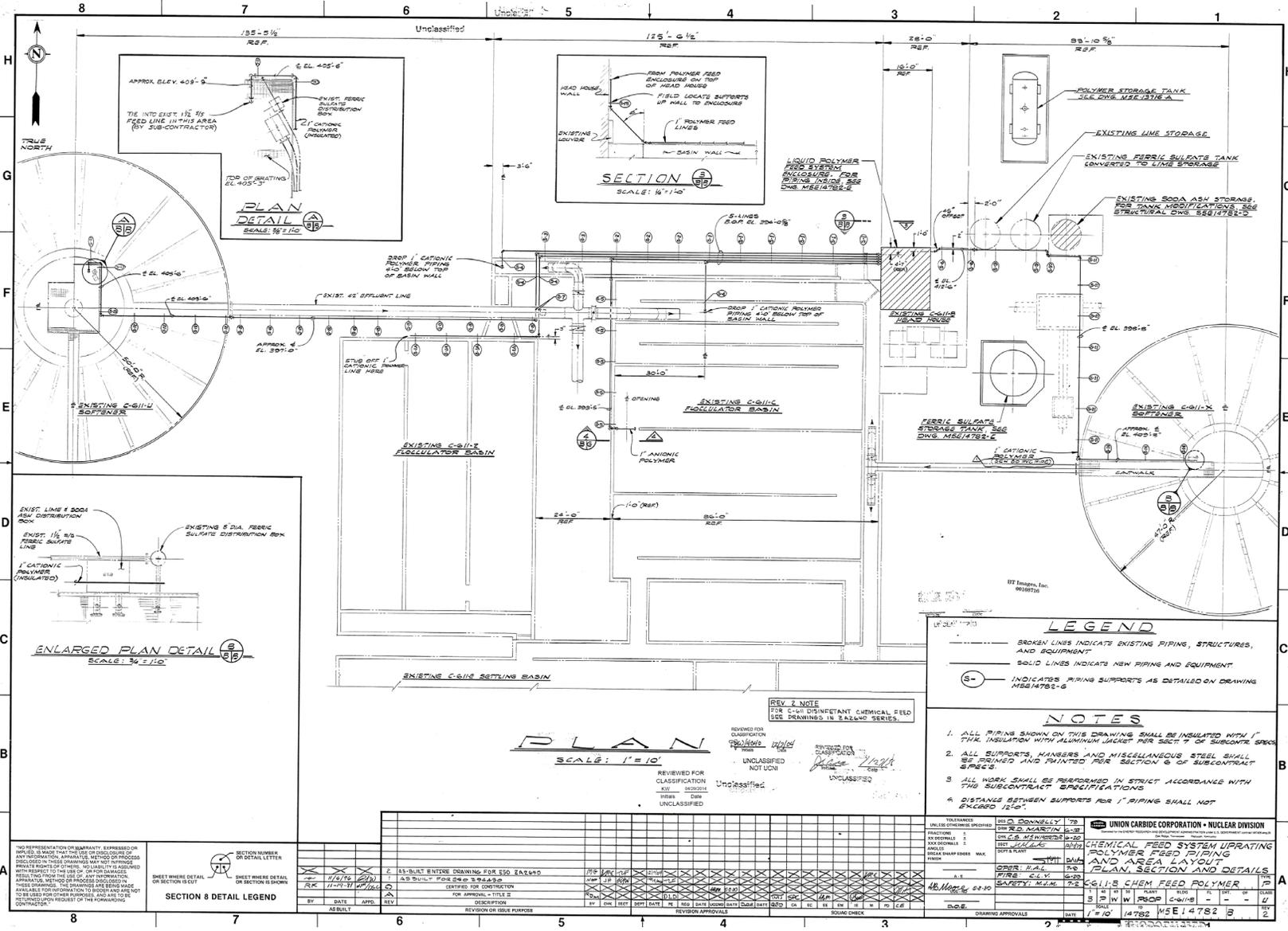


Figure A.6. Engineering Drawing M5E-14782-B (Chemical Feed System Layout Associated with C-611-B and C-611-B1)

6-V

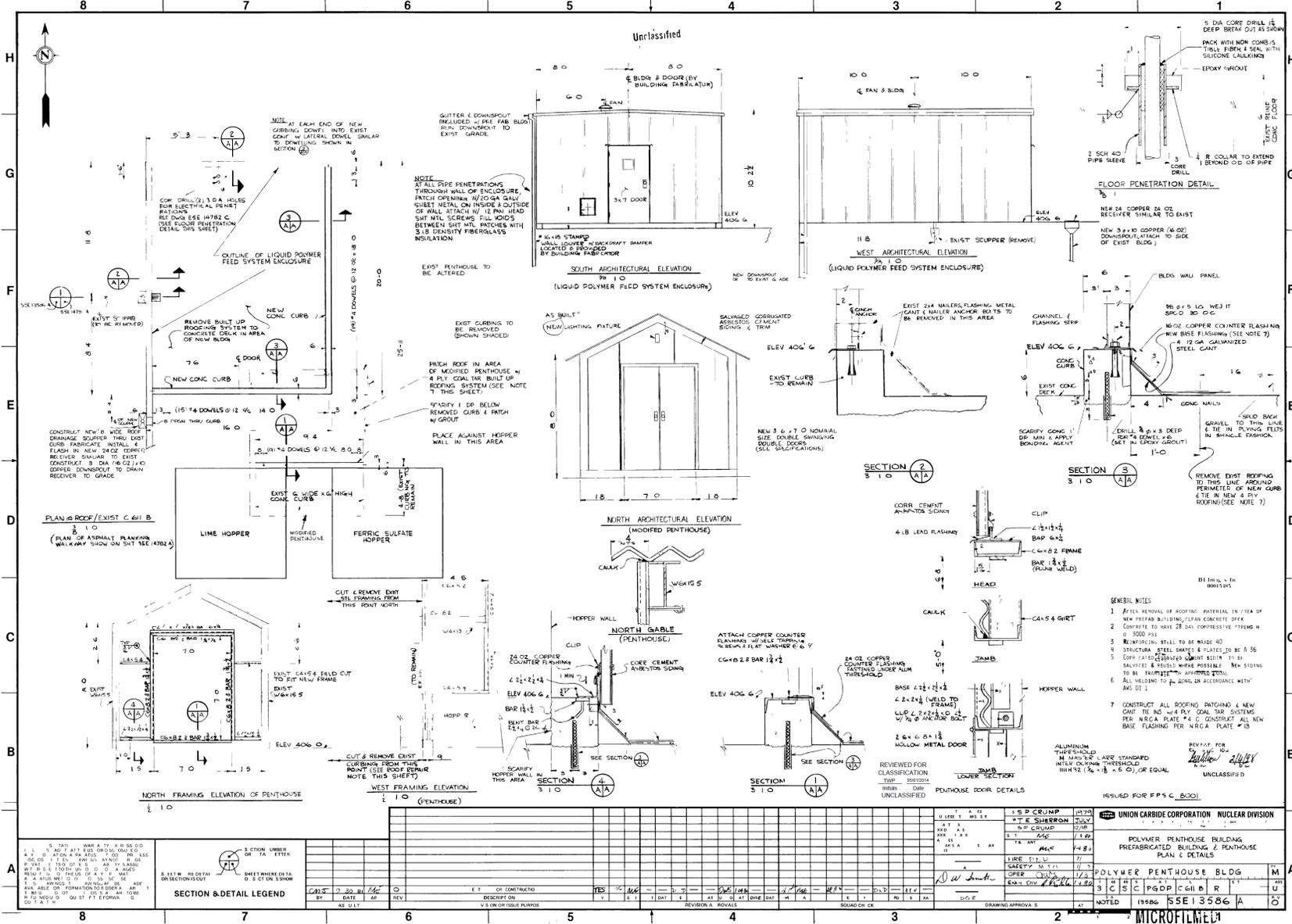


Figure A.7. Engineering Drawing S5E-13586-A (Polymer "Penthouse" on C-611-B Roof)



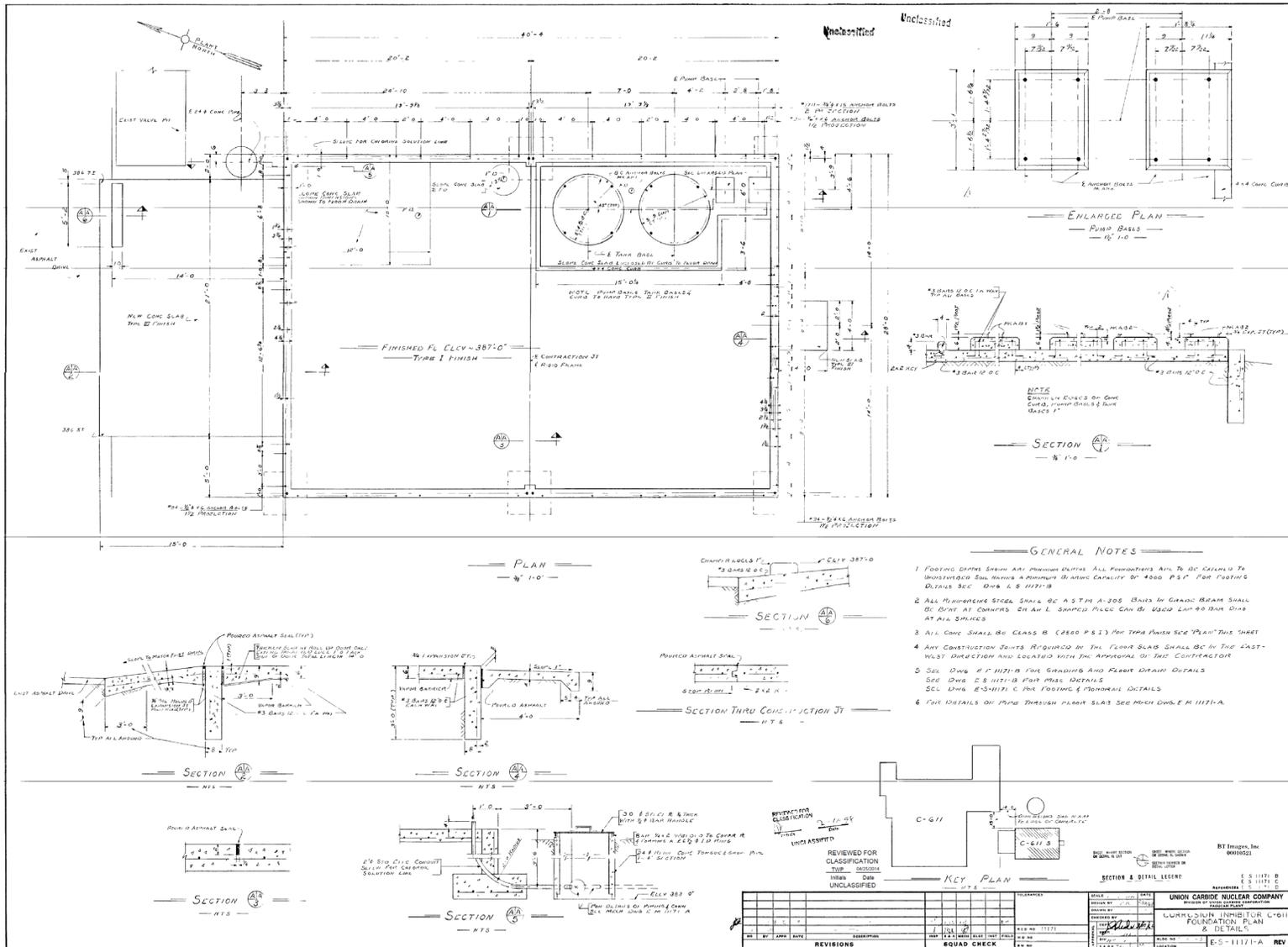


Figure A.9. Engineering Drawing E-S-11171-A, Rev. 1 (C-611-S)

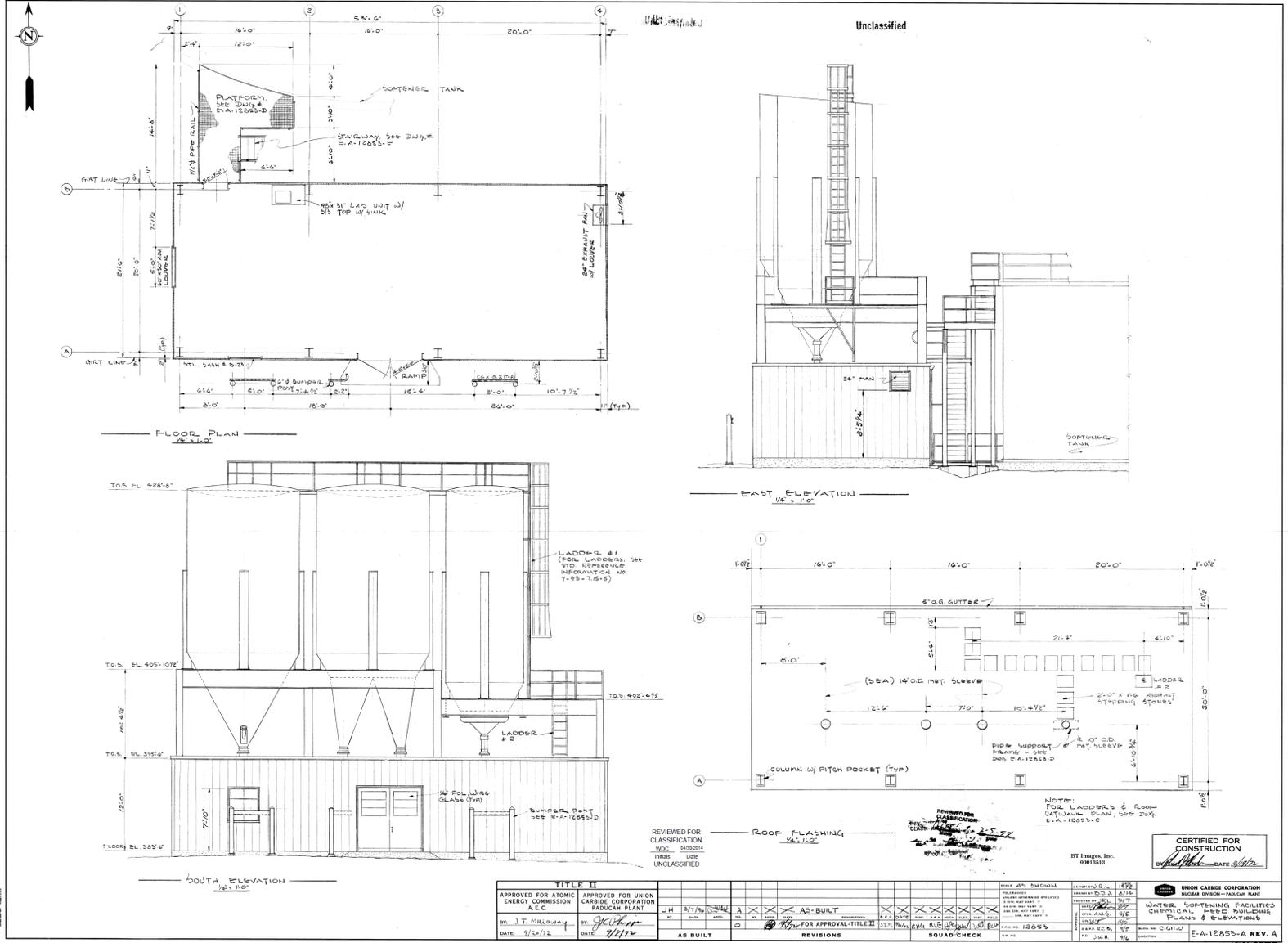


Figure A.10. Engineering Drawing E-A-12853-A (C-611-U)

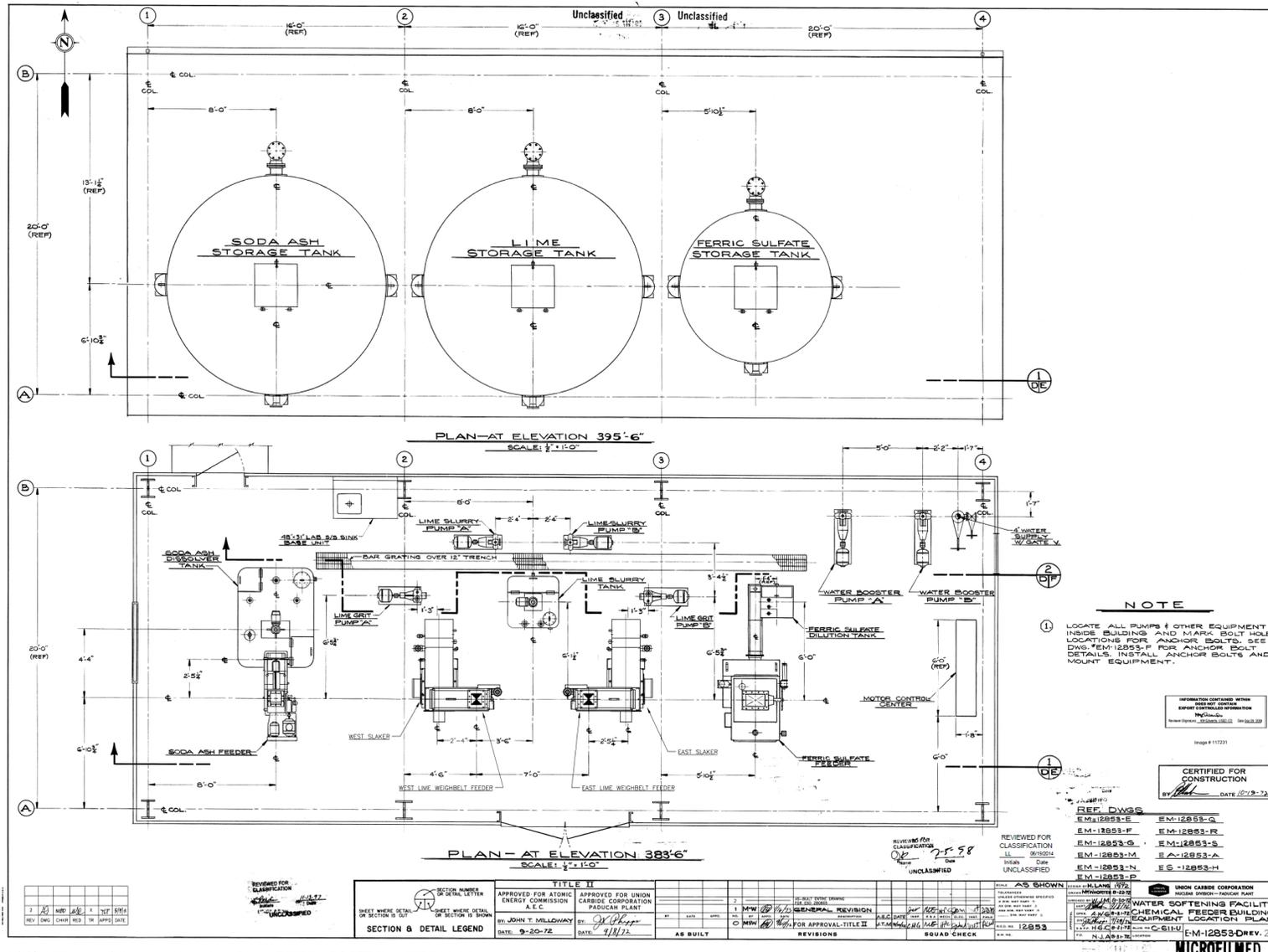
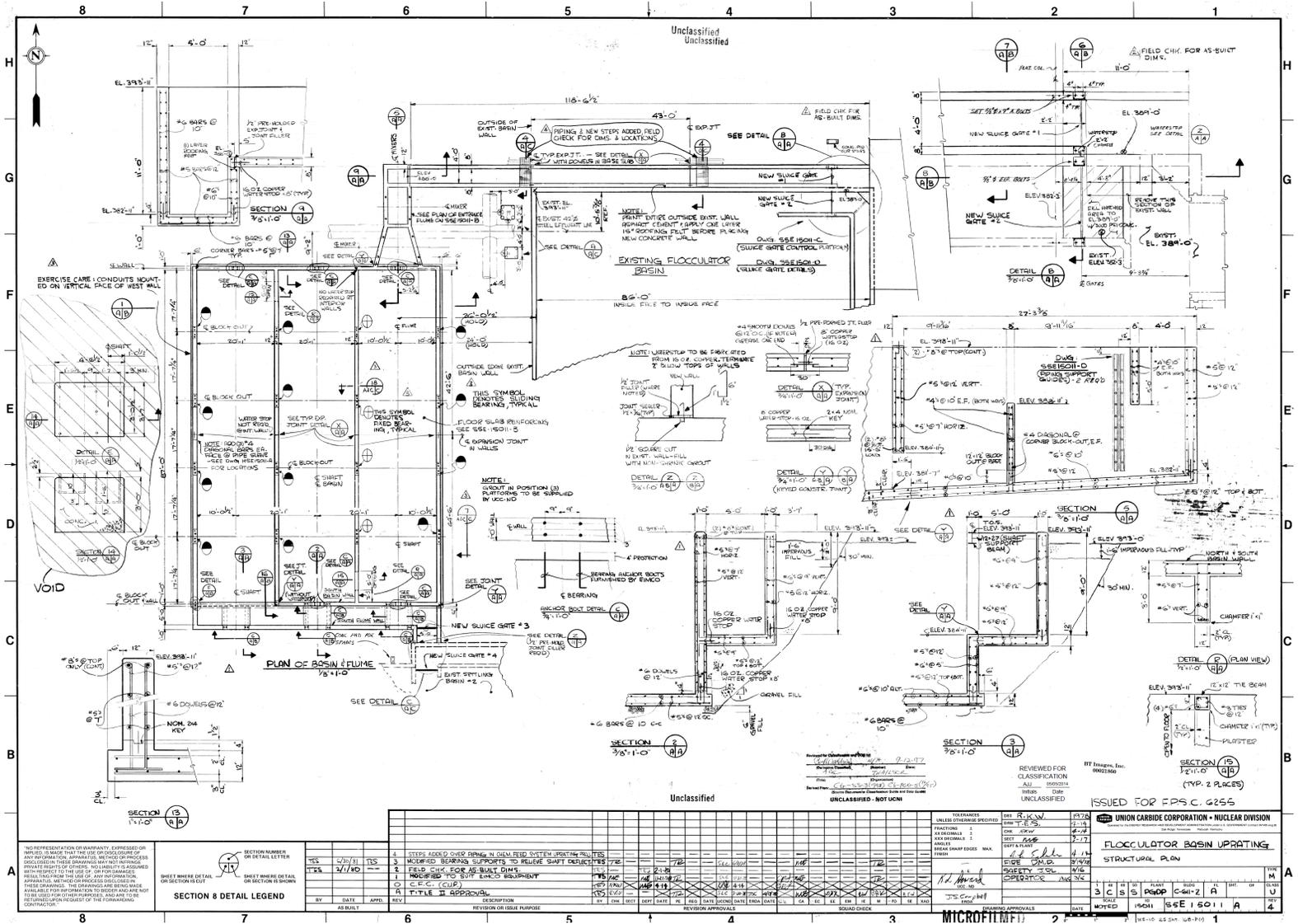


Figure A.11. Engineering Drawing E-M-12853-D (C-611-U)

A-14



NO REPRESENTATION OR WARRANTY, EXPRESSED OR IMPLIED, IS MADE THAT THE USE OF THESE DRAWINGS OR INFORMATION THEREIN WILL BE SUCCESSFUL OR THAT THE RESULTS THEREOF WILL BE AS REPRESENTED. THE DRAWINGS ARE FOR INFORMATION ONLY AND ARE NOT TO BE USED FOR CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS.

SECTION NUMBER OR DETAIL LETTER	SECTION NUMBER OR DETAIL LETTER
SECTION 8	SECTION 8

NO.	DATE	APP'D.	REV.	DESCRIPTION	REVISION OR ISSUE PURPOSE
1	11/10			4. STEPS ADDED OVER PIPING IN CHEM FEED SYSTEM UPSTREAM OF THIS	
2	11/10			5. UNIFORM BEARING SUPPORTS TO RELIEVE SHAFT DEFLECTIONS	
3	11/10			6. FIELD CHECK FOR AS-BUILT DIMS.	
4	11/10			7. REQUIRED TO STOP LINDS SURVEYING	
5	11/10			8. C.F.C. (C.F.P.)	
6	11/10			9. FUTURE 22 APPROVAL	

NO. CHANGES UNLESS OTHERWISE SPECIFIED	DATE	BY	DESCRIPTION	APPROVED
1	11/10			
2	11/10			
3	11/10			
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Figure A.12. Engineering Drawing S5E-15011-A (C-611-Z Structural Plan)

**APPENDIX B**  
**SPILL REPORTS**

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United States Enrichment Corporation  
EVENT - FINAL REPORT  
Integrated Resource Management System (IRMS)  
Paducah Gaseous Diffusion Plant

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## RESPONSIBLE DIVISION/ORGANIZATION:

PGDPCUPOPS - 16 - Chemical, Utilities &amp; Power Ops. (PAD)

## RESPONSIBLE FACILITY MANAGER/DESIGNEE:

Name: COLLINS JM

Title: MANAGER CHEMICAL, UTILITIES AND POWER

Telephone No.: 502 441-6030

1. EVENT REPORT NUMBER: PAD-1994-0020
  2. TITLE OF EVENT: LEAKING CHLORINE CYLINDER AT C-611 WATER PLANT
  3. REPORT TYPE: FINAL REPORT  
NOTIFY DATE: 02/24/1994  
NOTIFY TIME: 2230
  4. EVENT CATEGORY: Level 3
  5. SYSTEM, BUILDING, OR EQUIPMENT: C-611-S
- 

6. UCNI: NO

## 7. PLANT AREA:

J-1 on the Plant Grid

8. DATE AND TIME DISCOVERED: 02/24/1994 0818

9. DATE AND TIME CATEGORIZED: 02/24/1994 0930

## 10. VERBAL NOTIFICATIONS (Category 1 &amp; 2 only):

	NAME	DATE	TIME
DIV MGR	J. M. Collins	2/24/94	1400
PLT MGR	H. Pulley	2/24/94	1845
USEC SITE	C. Martin	2/24/94	1530
NATIONAL RESPONSE CENTER	P.O. Maulein	2/24/94	1140
KY. Dept. for Env. Prot.	Bill Burger	2/24/94	1200
Ky. Emergency Response Commission	Jeff Cummings	2/24/94	1030
DOE Notification	J. Hodges	2/24/94	2215

(EVENT Report continues ...)

United States Enrichment Corporation  
EVENT - FINAL REPORT  
Integrated Resource Management System (IRMS)  
Paducah Gaseous Diffusion Plant

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11. NATURE OF EVENT:

2E - Environmental - Agreement/Compliance Activities

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12. DESCRIPTION OF EVENT:

On 2/23/94, during routine connecting of a chlorine valve yoke on a full one ton chlorine cylinder at the C-611-S Corrosion Inhibitor Building, a small leak was detected near the threads on the pipe nipple. The operator attempted to close the cylinder valve and the valve stem broke. The chlorinator was placed in service pulling chlorine from the cylinder and this significantly reduced the leak (to a point it could not be detected with ammonia vapors which is highly sensitive to very small concentrations of chlorine). The leak rate was calculated to be less than 0.2 lbs. per day and the level inside the building, which houses the cylinder, was detected at 0.3 ppm. No personnel were inside the building without proper personal protective equipment (PPE).

This event is classified as a LEVEL 3 OFF-NORMAL due to its being reported to an outside agency in a format other than routine monthly or quarterly reports.

This event is also being reported to DOE via the ORPS database as a CATEGORY III OFF-NORMAL occurrence, because it was reported to an outside agency.

---

13. IMMEDIATE ACTIONS TAKEN AND RESULTS:

Discussion with PB&S, the chlorine vendor, and Paducah Plant utility personnel resulted in a decision to feed the cylinder until the vendor could arrive on 2/24/94. At that time recovery of the cylinder would be made.

The National Response Center and the Kentucky Emergency Response Commission was notified of the actual and potential chlorine leak.

On 2/24/94, with concurrence of MMUS Management, the vendor, and the State of Kentucky EPA; measures were taken to draw liquid from the defective cylinder into on-site empty cylinders to reduce the pressure and volume of liquid in the leaking cylinder.

Approximately 30 minutes after connecting the empty cylinder to the leaking cylinder the vendor noted a leak around the packing nut of the

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(EVENT Report continues ...)

United States Enrichment Corporation  
EVENT - FINAL REPORT  
Integrated Resource Management System (IRMS)  
Paducah Gaseous Diffusion Plant

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failed upper valve and attempted to tighten it when the threads appeared to be distorting. The vendor personnel initiated and completed capping the cylinder valve.

All activities were conducted under the oversight of the State of Kentucky EPA. Proper PPE was worn during all evolutions and there was no personnel exposure.

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Press Release Anticipated: No

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14. CONTRIBUTING CAUSE(S):

6E - Policy Def/Commun/Enforce

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15. ROOT CAUSE(S):

1A - Defective/Failed Part

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16. DESCRIPTION OF CAUSE:

The subject chlorine cylinder was removed from the plant by PB&S personnel and taken to PB&S in Henderson, Kentucky where the failed valve was inspected. The valve had been reconditioned by PB&S, which is a normal practice for this type of valve. PB&S records indicated the valve was rated "good" after reconditioning. PB&S stated that valve ratings range from "good" to "excellent" after reconditioning. Reconditioned valves rated less than "good" are not returned to service. Further inspection of the valve revealed that the threads were stripped, indicating that the valve had possibly been over-torqued during operation. There are no existing torque specifications for reconditioned valves.

The PB&S incident report stated that "the condition of the valve was found to be within the tolerances of acceptance for a reconditioned valve under the guides set forth by the Chlorine Institute." However, it further stated "the reconditioned valve in this ton may have been on the last or next to last cycle as a reconditioned valve." Use of a reconditioned valve which met the lower end of the acceptance criteria was the root cause of this incident. It was also noted in the PB&S incident report that "after consulting with both Superior and Sherwood, the two major valve manufacturers for chlorine containers, there was no definite number available relating to the pounds of torque it took to strip a reconditioned valve." It is believed that the contributing cause was a lack of existing torque specifications for reconditioned valves. Though it cannot be positively determined, overtightening of the reconditioned valve may have been a contributing cause.

PB&S indicated that this type of incident has not occurred in their service area in several years. However, it was stated that this

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(EVENT Report continues ...)

United States Enrichment Corporation  
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incident is not uncommon and occurs nation wide about ten times a year. In order to help prevent reoccurrence, PB&S plans to modify valve inspection criteria to a more stringent level. This action should help prevent reoccurrence of this type incident.

As previously stated, all personnel involved, including representatives of the Kentucky Environmental Response Team (ERT), had mutually agreed on the course of action that was taken on 2/24/94. PB&S personnel performed the required actions to mitigate the incident. No personnel exposure occurred and the public was not endangered. Personnel entering the leak area wore the agreed upon PPE. Additional personnel stood by in self-contained breathing apparatus (SCBA) with emergency equipment to control a worst case leak less than 30 feet from the leak site. Personnel access to the scene was limited to essential personnel.

PGDP plans corrective actions to enhance our emergency response to chlorine leaks, should they occur. The corrective actions listed below will enhance personnel response and provide additional training if required. They also provide for a system review to help assure safe chlorine valving operations. In addition, the PB&S action previously mentioned will significantly reduce the probability of reoccurrence.

## 17. CORRECTIVE ACTIONS:

ACTION PLAN	SCHEDULE DATE	COMPLETION DATE	DV - RESP. PERSON	STATUS
001 Develop Utility Department emergency chlorine leak procedure from existing information contained in SOP U-420.	06/01/1994	/ /	16 - VALENTINE LC	OPEN
002 Review chlorine cylinder valving operations to determine if additional direction to personnel or system changes are required and implement as necessary to assure safe operation.	06/01/1994	/ /	16 - ADAMS JK	OPEN

## 18. IMPACT ON ENVIRONMENT, SAFETY, AND HEALTH:

None.

## 19. PROGRAMMATIC IMPACT:

None.

(EVENT Report continues ...)

United States Enrichment Corporation  
EVENT - FINAL REPORT  
Integrated Resource Management System (IRMS)  
Paducah Gaseous Diffusion Plant

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20. LESSONS LEARNED:

Even though the failed valve had been re-conditioned and was only considered "good", the possibility of failure caused by overtightening during operation re-emphasizes the need to assure that personnel responsible for operating valves/components use the proper tools and refrain from using excessive force when positioning components.

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21. SIMILAR EVENT REPORT NUMBERS:

None.

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(EVENT Report continues ...)

COST RECOVERY ENVIRONMENTAL RESPONSE INCIDENT REPORT  
CASE ( ) DEPARTMENT FOR ENVIRONMENTAL PROTECTION  
ERT NO.: 34,543 SARA TITLE III INCIDENT: \_\_\_\_\_ COUNTY: McCracken

1. Recorded by: M. L. Morris Date/Time: 3/6/91 - 4:55pm

2. Reported by: ( ) Resp. Party ( ) Complainant ( ) DES ( ) Other \_\_\_\_\_  
Name: Greg Barnett Phone: ( ) \_\_\_\_\_  
Address: \_\_\_\_\_

3. Responsible Party: U.S. Dept. of Energy Phone: (502) 441-6800  
Address: P.O. Box 1410, Paducah, Ky. 42001

4. Location: Nearest Community: Revit, Ky Watercourse: N/A  
Directions: C-6011 area of Paducah Gas Diffusion Plant

5. Occurrence:  Spill ( ) Release ( ) Complaint ( ) Abandoned Drums ( ) Illegal Dumping ( ) Fire/Exp.  
( ) Fish Kill ( ) Underground Storage Tank ( ) Other \_\_\_\_\_

Description: \_\_\_\_\_  
Date: \_\_\_\_\_ Time: \_\_\_\_\_

6. Material/Quantity: 1 Gallon waste oil - contained at site

7. Other Agencies Contacted/Involved:
- |   |  |   |
|---|--|---|
| <input type="checkbox"/> ORSANCO            | <input type="checkbox"/> EPA               | <input type="checkbox"/> State Police     |
| <input type="checkbox"/> Coast Guard        | <input type="checkbox"/> Fire Marshal      | <input type="checkbox"/> Air Quality      |
| <input type="checkbox"/> Corps of Engineers | <input type="checkbox"/> Fish and Wildlife | <input type="checkbox"/> Waste Management |
| <input type="checkbox"/> DES                | <input type="checkbox"/> Health Department | <input type="checkbox"/> Water            |
| <input type="checkbox"/> Other _____        |  |   |

8. ERT Action taken:  
( ) On-Scene Investigation  
( ) No Action Necessary  
ERT Investigator \_\_\_\_\_ Date Investigated \_\_\_\_\_  
 Referred to: Waste-Pad  
Date: \_\_\_\_\_

9. Division Action Requested:  
( ) Emergency On-Scene Investigation ( ) Routine or Follow-up Inspection  
 For Information Only ( ) Other \_\_\_\_\_  
( ) Investigator \_\_\_\_\_ Date Investigated \_\_\_\_\_



10. Additional Information/Comments: Drumming affected soil

**SPILL REPORT**  
**Form CP3-ES-0003-F01**

<b>SPILL REPORT FORM</b>	
Project:	FRNP
Date/Time spill discovered:	5/26/2021 @ 0811
Brief Description of Event:	Pump discharge line developed a leak causing a spill.
Has the release been controlled:	Yes
Location of the spill:	C-611-C Flocculator
What material was spilled?	Ferric Sulfate
What is RQ for material?	1,000 lbs
Amount of material released:	~10 lbs
Medium or media into which the release occurred (i.e., air, water, etc.):	Ground
Any injuries/exposures	None
Equipment involved in the spill (if applicable)	Pump at flocculator
Notifications made:	PSS 0811 Env. 0813 FM text 0924
Immediate measures/controls to clean-up/mitigate release:	Pump discharge line was repaired immediately.
Clean-up complete?	YES - See Below
Other information:	CAPA CA-003299  Sonny Summers confirmed that the spill would be cleaned-up on 5/26/21. Bill Clark, Field Compliance
Person reporting spill:	R. Summers
Contact for additional info:	None

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