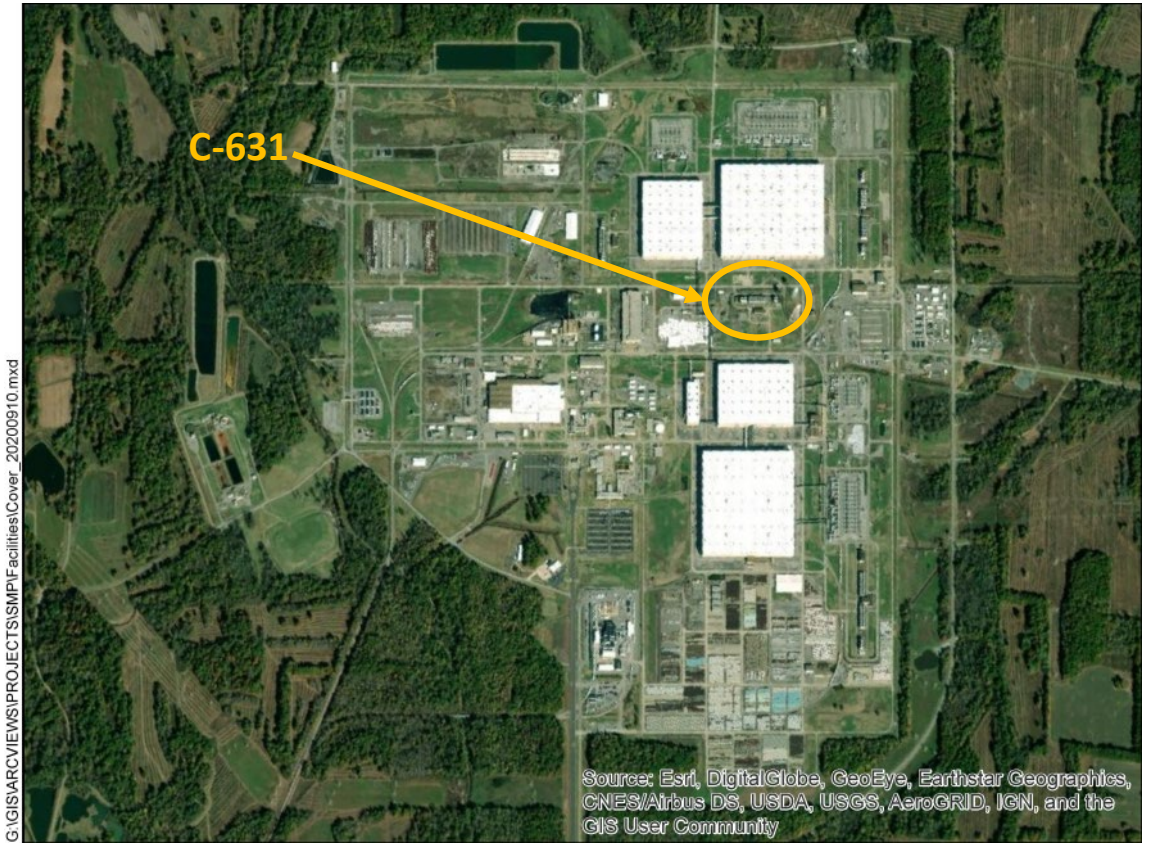
C-631 Pumphouse and Cooling Tower (Solid Waste Management Unit 86)



Facility Overview Briefing

January 24, 2023

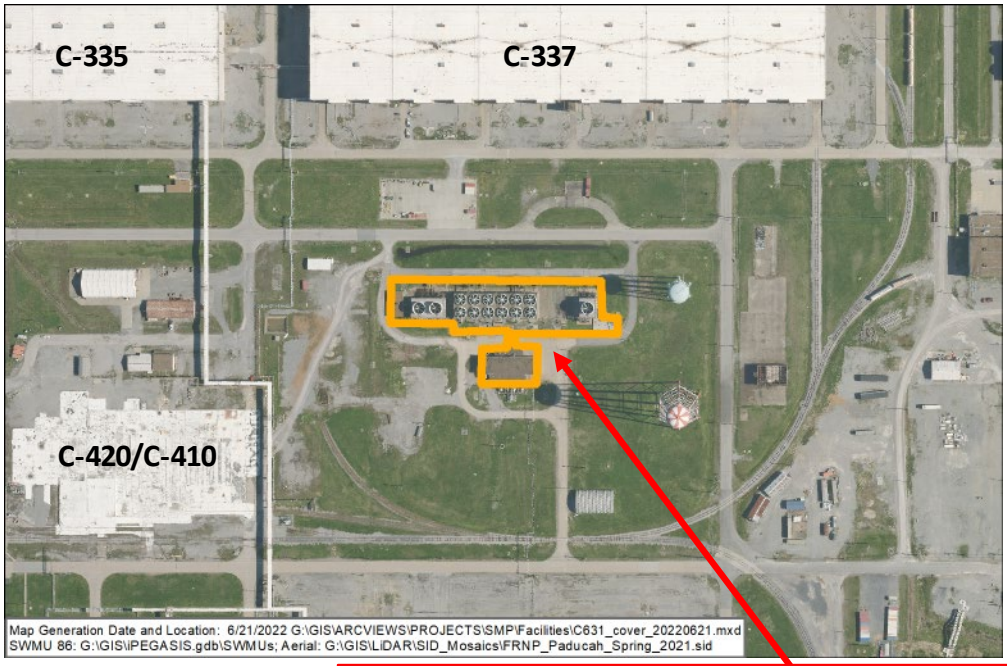
Reflects consultation with EPA and Kentucky in accordance with the Site Management Plan that occurred on January 9, 2023, and includes incorporation of comments from those discussions.

Purpose

- The C-631 Pumphouse and Cooling Tower is discussed in Appendix 4 of the Site Management Plan (SMP) and is designated as Solid Waste Management Unit (SWMU) 86.

- The C-631 Pumphouse and Cooling Tower (SWMU 86) is a candidate for future demolition and disposal, contingent upon funding priorities.

- The current SMP strategy includes the removal of the C-631 Pumphouse and Cooling Tower (SWMU 86) facilities as part of the Facility D&D Operable Unit (OU) and evaluation of underlying soils and slabs as part of the Soils and Slabs OU.



C-631 Cooling Tower Photo: 6/2022

- This presentation is intended to serve as clarification of which C-631 Pumphouse and Cooling Tower facilities are associated with SWMU 86 and to document DOE's consultation with EPA and Kentucky for demolition and disposal of the aboveground structures outside of the FFA/CERCLA process.

Construction History

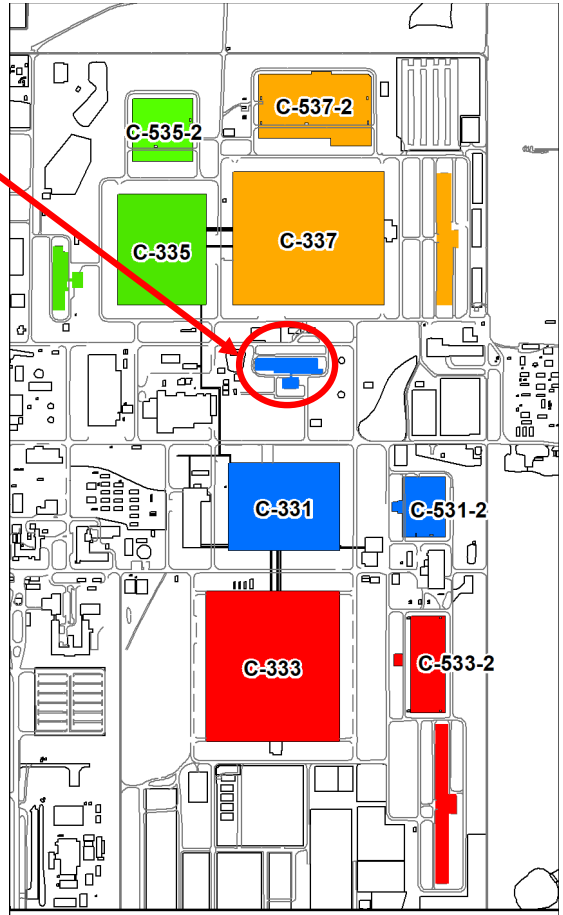
- The C-631 Pumphouse and Cooling Tower (SWMU 86) is located within the Paducah Site security fence, north of the C-331 process building and south of the C-337 process building.

- Construction of the C-631 Pumphouse and Cooling Tower began in 1951/1952; with additional facilities added in 1958/1959, 1975/1976, and 1988/1989.

- The C-631 Pumphouse and Cooling Tower is one of four similar sets of facilities designed to support the process buildings (C-331, C-333, C-335, and C-337).
  - The C-631 Pumphouse and Cooling Tower supported the C-331 process building, C-310, C-315, C-340, C-410, C-420, C-620, and 12 condensers in the C-333 process building.

- In addition to the process buildings, the four cooling tower and pumphouse facilities also supported additional plant facilities (e.g., switchyards).
  - The C-631 Pumphouse and Cooling Tower supported the C-531 Switchyard synchronous condensers and C-532 Relay House.

- The cooling tower and pumphouse facilities were, often referred to as "recirculating cooling water (RCW) plants"
  - Designed to continuously pump cooling water through the process and auxiliary building heat exchangers associated with the gaseous diffusion process.



Construction History

- RCW Cycle:
  - Cooled water was pumped from the pump house through underground supply headers to the process building and into heat exchanger units where the water temperature rose as the water absorbed heat from the process equipment. Heated water was then returned through underground return mains (gravity feed) to the cooling towers where the heated water was distributed through various sections of the cooling tower and released via evaporation. The cooled water was then collected into the cooling tower basin where it flowed by gravity via a flume into the wet well located underneath the pump house.
    - Cooled water from the pump house was also pumped through underground supply headers to the synchronous condensers located in the switchyard; where the water was heated and then returned through underground return mains (gravity feed) to the cooling towers
  - Approximately 500 million gallons per day (MGD) of water was recirculated through the four cooling tower and pumphouse facilities with nearly 8-25 MGD of water loss to evaporation each day depending on the plant load or power level.

- Each pumphouse and cooling tower contained the following.
  - Pump house
  - Main cooling tower(s)
  - Blending pump house
  - Blending cooling towers
  - Other support buildings

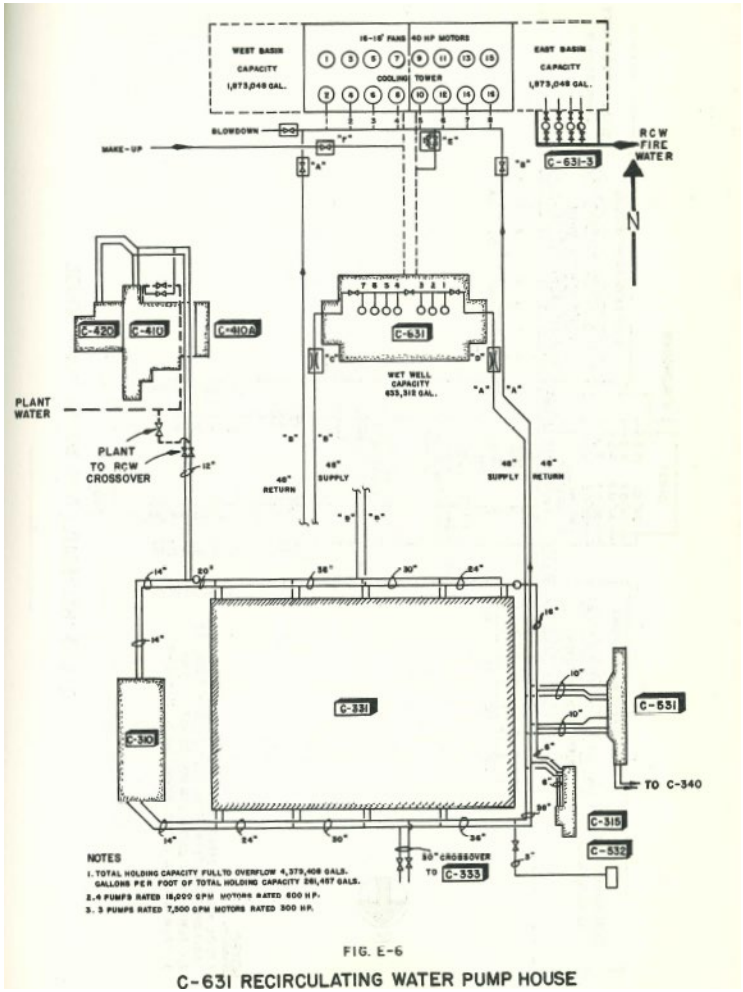
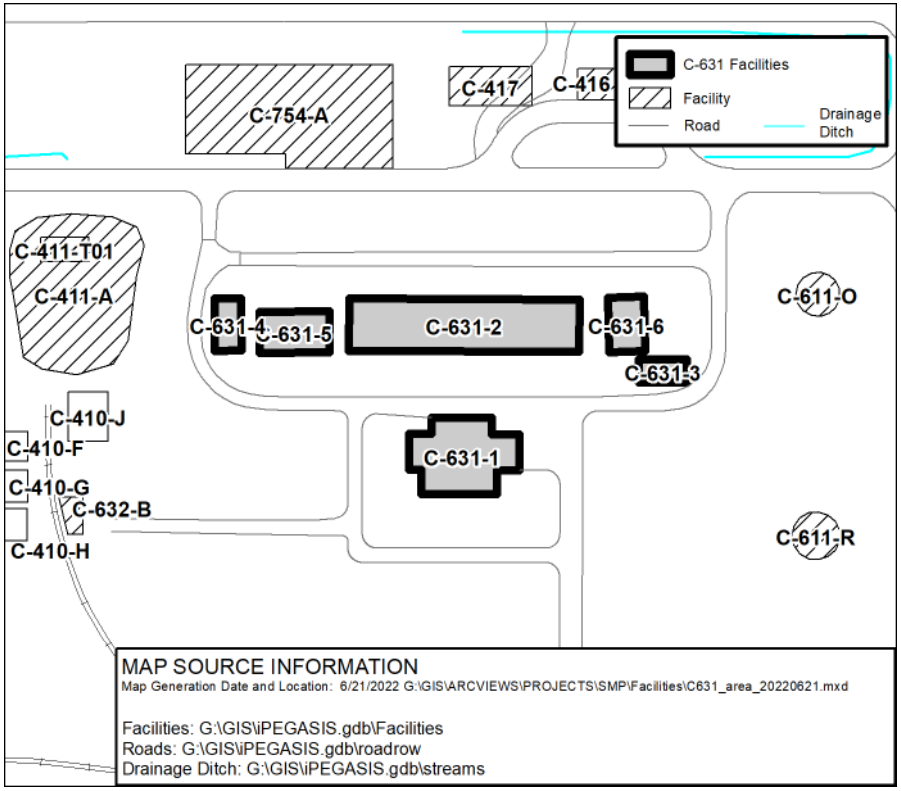


FIG. E-6
C-631 RECIRCULATING WATER PUMP HOUSE

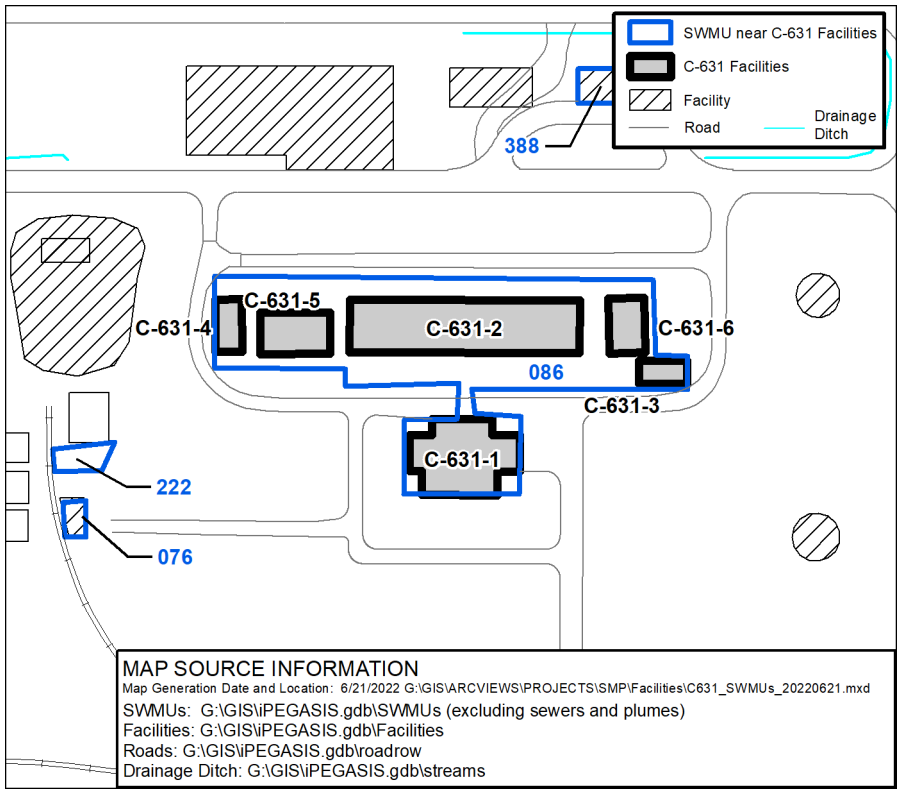
C-631 Cooling Tower Diagram: 7/1962

Construction History

- The C-631 Pumphouse and Cooling Tower is made up of multiple facilities generically referred to as the C-631 Cooling Tower.
  - C-631-1 Pump House and Piping
  - C-631-2 Cooling Tower
  - C-631-3 Pump House (Firewater)
  - C-631-4 Blending Pump House
  - C-631-5 Blending Cooling Tower (West)
  - C-631-6 Blending Cooling Tower (East)
- The total area for all the main structures associated with C-631 Cooling Tower is approximately 31,591 ft^2; with construction details, operational history, and current status for each facility discussed in subsequent slides.



Environmental Impacts (Solid Waste Management Units)



- The current SAR (SWMU 86) for the C-631 Pumphouse and Cooling Tower does not identify the specific facilities that are included in SWMU 86.

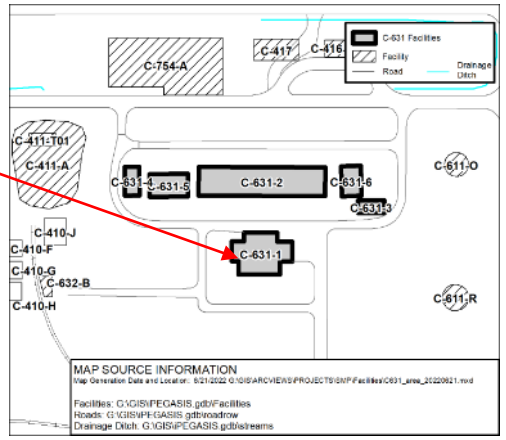
SWMU No.	Facility Name	Current Status
076	C-632-B Sulfuric Acid Storage Tank	Soils OU
086	C-631 Pumphouse and Cooling Tower (slab and underlying soils)	Soils and Slabs OU; Facility D&D OU
222	OS-11	Soils OU
388	C-416 Decontamination Pad	No Further Action; KDWM 4/12/2004

C-631-1 Pump House and Piping

C-631-1 Pump House and Piping

C-631-1 Pump House and Piping - Construction History

- C-631-1 Pump House and Piping facility is one of six facilities located in SWMU 86.
- The facility was constructed in 1951/1952.
- C-631-1 is composed of three main structures (center structure, north wing, and south wing) on poured concrete foundations that vary from 6 to 21 inches in thickness.
  - The center structure is a two-story, one level, steel frame building with a built-up flat roof and exterior transite walls.
    - Garage-like structure with a roll-up door and pedestrian entrance.
    - Houses RCW pumps.
    - Wet well runs beneath the concrete floor.
    - Contained a laboratory bench area with sink; drained to wet well.
  - The south wing is a one-story concrete block building attached to the south side of the center structure.
    - South wing contains electrical switchgear room, battery room, restroom/shower/change area, and eyewash station.
    - External to the south wing is a separate exterior concrete block wall with attached electrical transformers.
  - The north wing is a one-story concrete block building attached to the north side of the center structure.
    - North wing served as a chemical feed area with a loading dock/area.
    - Contains an acid platform, Calgon room (e.g., chemical feed room), and a chlorine room.
    - Influent flume runs beneath the floor; connecting the cooling tower basin to the wet well.
    - External to the north wing is an electrical manhole.



C-631-1 - Pump House Center Structure

C-631-1 - Pump House North Wing

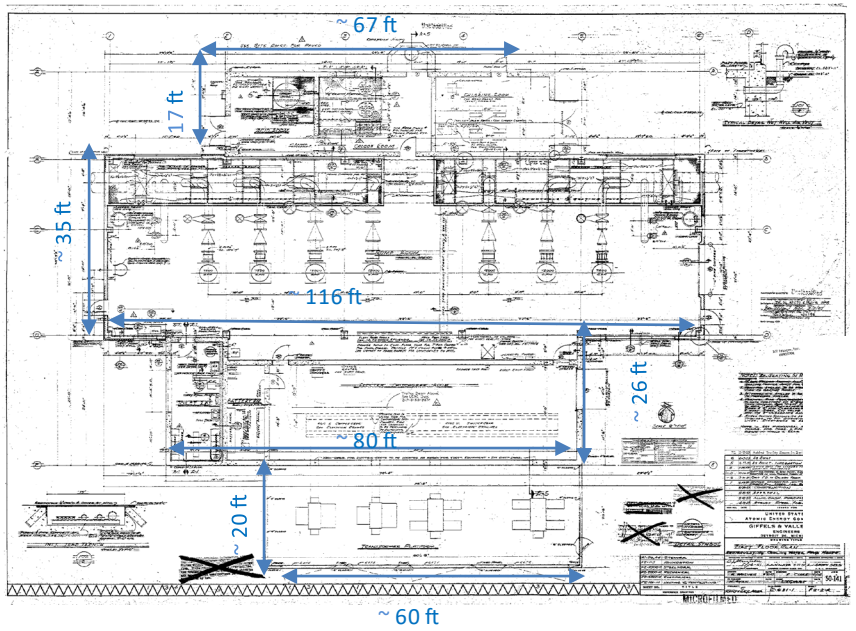
C-631-1 - Pump House South Wing

External Electrical Transformers

C-631-1 Facility Photos: 6/2022

C-631-1 Pump House and Piping - Construction History

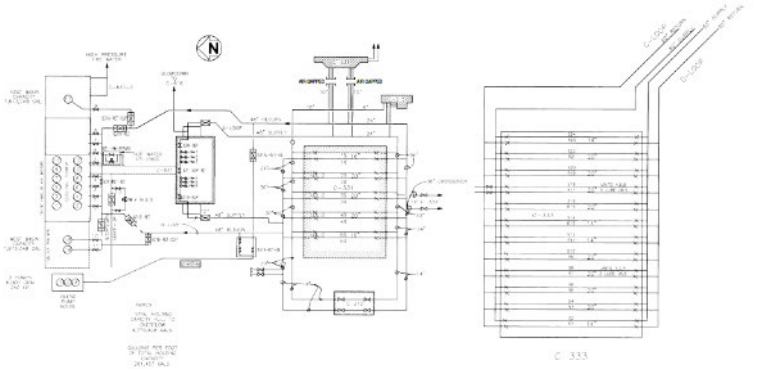
- The C-631-1 facility is approximately 8,479 ft^2 (includes external section that houses the transformers).
  - The center structure is approximately 4,060 ft^2; measuring ~35 ft x ~116 ft.
    - Wet well beneath the entire center structure measuring ~24 ft (~ 666,312 gal capacity).
    - Sump measuring ~1½ ft x ~1½ ft x ~1 ft that drains to the storm drain system.
    - Three floor drains that drain to the sanitary sewer system and a laboratory sink that drains into the wet well.
    - Two pressure relief valves located along the bottom of the wet well floor.
  - The south wing is approximately 2,080 ft^2; measuring ~26 ft x ~80 ft.
    - Multiple floor drains associated with battery room and restroom/shower/change area, and drinking fountain that drain to the sanitary sewer system.
    - External to the south wing is an additional outside concrete area approximately 1,200 ft^2; measuring ~20 ft x ~60 ft that houses four electrical transformers.
  - The north wing is approximately 1,139 ft^2; measuring ~17 ft x ~67 ft.
    - Contains an influent flume area measuring approximately ~12 ft x ~17 ft x ~5 ft located at a depth of ~24 ft (flume runs underground from the cooling tower to the pump house).
    - External to the north wing is an electrical manhole that measures ~6 ft x ~9 ft x ~8 ft that drains into the center sump and subsequently to the storm drain system.
    - Three floor drains that drain into the influent flume.



Floor Plan View: Excerpt from Engineering Drawing C-631-1 F2-2-A, dated 1951

C-631-1 Pump House and Piping - Operational History

- C-631-1 was originally built and operated as a pump house from its construction in 1951/1952 to 2013. [Note: One pump in C-631-1 continued to serve as ancillary support to C-620 and the high pressure fire water system (HPFWS) until 2021].
  - Pumped RCW from the wet well located beneath the pump house through 48-inch underground supply headers to the C-331 process building, C-310, C-315, C-340, C-410, C-420, C-620, 12 condensers in the C-333 process building, C-531 Switchyard synchronous condensers, and C-532 Relay House.
  - Utilized 4 – 36-inch and 3 – 32-inch multi-stage deep well turbine pumps with 600 and 300 hp motors capable of 15,000 gallons per minute (gpm) and 7,500 pgm pumping rate, respectively.
    - The pumps, motors, and associated valves have been upgraded and/or replaced as needed to support operations.
  - Chlorine, sulfuric acid, and corrosion inhibitors were routinely fed into the RCW system via the wet well located beneath C-631-1.
    - Chorine was fed to control the growth of algae and other microbiological organisms.
    - Sulfuric acid was fed to control the pH or hydrogen ion concentration (Note: Soda ash was occasionally used on a non-routine basis for pH correction.)
    - Corrosion inhibitors were fed to help maintain piping and equipment integrity.
      (Note: For a brief period, prior to 1962, corrosion inhibitors also were dissolved in 500-gal stainless steel tanks; pumped into the plant water line at C-611, and introduced into the RCW system with make-up water.)



Excerpt from M5E-Z66150-E01, Rev 2

C-631-1 - Center Structure Pumps

Wet Well (located beneath the concrete)

C-631-1 - Center Structure Pump Discharge Lines

C-631-1 Facility Photos: 6/2022

C-631-1 Pump House and Piping - Operational History

- Corrosion of the piping and heat exchanger units became a reoccurring problem within two years of cooling tower startup.
  - 1952 -1956 – a polyphosphate inhibitor (e.g., Calgon), focused on steel corrosion, was introduced into the RCW system.
    - Within two years severe pitting of the copper condenser tubes had progressed to complete penetration of the tube wall resulting in the loss of Freon-114 into the RCW.
  - 1956 – the RCW system was switched over to a polyphosphate-chromate inhibitor (dianodic inhibitor) effective against both steel and copper corrosion, but prone to fouling.
  - 1957 – an A-line cooling program was initiated to clean the condenser tube bundles; at this time the RCW system was switched to a zinc dianodic inhibitor (Orocol 155-Z), a polyphosphate-chromate inhibitor that contained about half the phosphate content and added zinc.
  - 1962 – further testing of the corrosion inhibitors was conducted in a pilot plant corrosion test loop in C-631; resulting in change to Betz Orocol TL, a polyphosphate-chromate inhibitor, which was used until the RCW system was converted to a phosphate system.
  - 1992/1993 – the RCW system (one cooling tower at a time) was converted from a chromate system to a phosphate system. [Note: In 1996 and 2000/2001 the RCW system was adjusted based on vendor product changes/updates (use of dispersant to help with the calcium phosphate depositing/scaling)].

C-631-1 - North Wing Calgon Room (Corrosion Inhibitor Feed Area)

C-631-1 - North Wing Chlorine Feed Header

C-631-1 – North Wing Sulfuric Acid Dock

C-631-1 Facility Photos: 6/2022

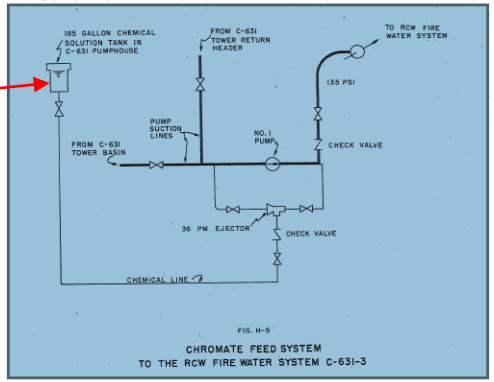
C-631-1 Pump House and Piping - Operational History

- In 1961, high chromate treatment of the recirculation fire water system was implemented.
  - A 185-gal chemical chromate-soda ash solution tank was added to C-631-1 and fed over to the C-631-3 fire water pump house.
  - Contained a solution of 800 – 1000 ppm chromate at a pH value between 6.5 – 7.5.
  - Tank has been removed and is no longer located in C-631-1. (Date removed unknown.)

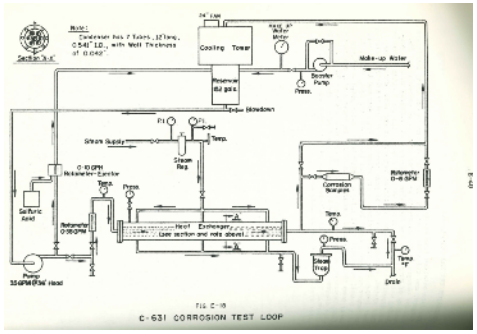
- From 1960 – 1962 the Pilot Plant Corrosion Test Loop operated.
  - Test loop was a small scale system located within the center section of C-631-1
  - Designed to simulate conditions encountered in the actual process system.
  - Tested corrosion inhibitors prior to their introduction into the RCW plants. (Five inhibitors were tested.)
  - One floor drain that drained into the influent flume and/or sump.
  - Test loop has been removed and is no longer located in C-631-1. (Date removed unknown.)

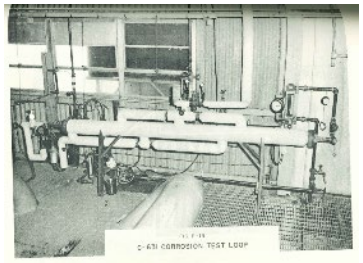
C-631-1 - North Wing Historical Location of 185-gal Tank

C-631-1 Facility Photo: 9/2022



High Chromate Feed System Diagram Excerpt - Operations Division Training Manual – Utilities Operations, KYD-1482, July 1962





Pilot Plant Corrosion Test Loop Diagram and Historical Photos
Excerpt - Operations Division Training Manual – Utilities Operations, KYD-1482, July 1962

C-631-1 Pump House and Piping - Operational History

- In 1969, concrete walls were installed in between each of the transformers located outside of the west wing of C-631-1.
  - Walls were installed for fire protection.
- Around 1977, the RCW supply line from C-631-1 that supplied the C-532 Relay House was isolated and capped.
- In 1986, a backup HPFWS was added to C-631-1. (Note: Original HPFWS is located in C-631-3 and was installed in 1958/1959.)
  - The system consisted of two turbine pumps [pump #5 (electric driven) and pump #6 (diesel driven)], a diesel engine (diked), an electric motor, piping, 550-gal diesel tank, and control panels.
  - RCW pump #7 was removed to allow for the HPFWS to be installed.
  - A lean-to wing was added to south side of the center structure in 1988/1989 to house the 550-gal diesel tank and diked area. (Tank was drained, air-gapped, and marked as "permanently closed" in 2022.)
    - Lean-to measures ~9 ft x ~11 ft x ~12 to 14 ft.
- In 1988, approximately 3–5 gal of transformer oil containing 22 ppm polychlorinated biphenyls (PCBs) leaked from a hose fitting on a transformer during maintenance operations (1988 ASER).
  - All of the oil was contained on the concrete transformer pad.
  - The spill was cleaned up in accordance with PCB regulations.
- USEC leased the facility in the early 1990s and continued to use C-631-1 as a pump house until enrichment operations ceased at C-331/C-333 in 2013 and ancillary support required for C-620 and the HPFWS was no longer needed (2021).

C-631-1 - South Wing External Transformers

C-631-1 – Lean-to Wing Diesel Tank

C-631-1 Facility Photos: 6/2022

C-631-1 Pump House and Piping - Operational History

- In 2010, a chlorine leak was identified in some piping that enabled chlorine gas to travel in the conduits that lead back into the switchgear.
  - Breakers, terminals, and bus work were corroded.
  - Leak was repaired; switchgear was cleaned and repaired/replaced as needed.

- In 2013, C-631-1 was shutdown from an enrichment support standpoint; however, one RCW pump (RCW Pump #6) remained operational and continued to recirculate water in support of C-620 and the HPFWS until 2021.
  - Subsequent RCW leaks from pumps and associated lines occurred with some impact to the pad and surrounding drainage ditches.
  - The wet well and influent flume were not drained and remained full of water. (Note: Draining has not occurred in order to prevent hydrostatic pressure changes that could cause collapse or floating of the subsurface structure.)

- C-631-1 transitioned from USEC to DOE in 2014.

- In 2014, a chlorine leak occurred at the #1 feed position in the chemical feed room during chlorine feed rate adjustments.
  - Leak was isolated by the E-squad.
  - Chlorine feed was suspended; sodium hypochlorite (bleach) was brought on as an alternate to chlorine.

- In February 2017, motor oil was observed on the floor near the base of the #5 HPFWS pump.
  - Oil spill was contained within the facility and properly addressed.

C-631-1 - South Wing Interior Switchgear Room

C-631-1 - Center Wing High Pressure Fire Water System

C-631-1 - North Wing Chlorine Feed Header

C-631-1 Facility Photos: 6/2022

C-631-1 Pump House and Piping - Operational History

- In November 2017, solid waste exceeding Toxicity Characteristic Leaching Procedure (TCLP) limits for chromium, mercury, and lead was discovered in the bottom of the diked areas located within the cooling tower pump houses.
  - Waste was associated with the chemical tanks that contained corrosion inhibitors (including sulfuric acid).
  - Waste included crusty residues, sludges, liquids or a combination thereof.
  - Waste was removed and disposed in 2018.
- In May 2018, a small amount of sodium hypochlorite (bleach) leached from a pump hose fitting located in the chlorine feed room.
  - Pump used to transfer bleach from a tote to the C-631 wet well.
  - Spill was contained within the chlorine feed room and evaporated.
- In January 2021, support of C-620 was discontinued and in November 2021 the HPFWS pumps were removed from service.
- In 2022, the RCW supply and return lines to the synchronous condensers in the C-531-1 switchyard were drained and air-gapped.
- As of 2022, sulfuric acid pigs and tanks are still present; marked as empty with valves in the open position.

C-631-1 North Wing
Diked Area Beneath Corrosion Inhibitor Tanks

C-631-1 North Wing
Sulfuric Acid Pig and Tanks

C-631-1 Facility Photos: 6/2022

C-631-1 Pump House and Piping - Current Status

- C-631-1 is shutdown; however, one transformer (2PH2) is still active that provides power to C-631-1, C-631-3, C-631-5, and to ancillary equipment at C-611-O and C-611-R.

- Walkdown inspection conducted in June 2022 and employee interviews confirmed no unusual conditions.
  - Center Structure:
    - Houses RCW pumps.
    - Cement corrugated siding (transite).
    - Both asbestos-containing materials (ACM) and lead-based paints are known to be present.
    - Wet well runs beneath the concrete floor; chlorine, sulfuric acid, and corrosion inhibitors (including chromate) were routinely fed into the RCW system via the wet well (wet well remains full of water).
    - Laboratory bench area with sink and associated drain to the to wet well is still present.
    - Three floor drains and a single sump are present.
    - Diesel tank located within a diked area; drained, air-gapped, and marked "permanently closed".
    - Not used for radiological storage; the center structure of the facility does not contain any radiological postings.
    - No generator staging area (GSA) or satellite accumulation area (SAA).
    - Minor oil staining around several of the RCW and HPFWS pumps.
    - Chromated water leaks have occurred within the center structure of the facility.
    - Oil spill in February 2017 associated with #5 HPFWS pump (see slide 14).
    - No known chemical spills except for the above noted chromated water leaks and oil spill.

C-631-1 - Center Structure Pump Relief Surge Entry to Wet Well

C-631-1 - Center Structure HPFWS Diesel Engine

C-631-1 - Center Structure Laboratory Sink

C-631-1 - Center Structure Control Panel

C-631-1 - Center Structure HPFWS Pump Oil Stain

C-631-1 - Center Structure Pump Oil Stain

C-631-1 - Center Structure Typical Floor Drain

C-631-1 Facility Photos: 6/2022

C-631-1 Pump House and Piping - Current Status

- Walkdown inspection conducted in June 2022 and employee interviews confirmed no unusual conditions (Continued).
  - South Wing:
    - Houses electrical switchgear room, battery room, and restroom/shower/change area.
    - Multiple floor drains associated with battery room and restroom/shower/change area, and drinking fountain.
    - 125-volt lead calcium batteries (60 cells) used for relay protection; RCW and HPFWS control; and emergency lighting.
    - In 2010, a chlorine leak was identified in some piping that enabled chlorine gas to travel in the conduits that lead back into the switchgear (see slide 14).
    - Five transformers (two – 480 V and three - 4160 V) with associated electrical switchgear [one operational (2PH2), two air-gapped (2PH1 and 2PH3), and two out-of-service (2PH4A and 2PH4B)].
      - Three of the five transformers contain PCBs (2PH1, 2PH2, and 2PH3)
      - In 1988, a 3-5 gal transformer oil spill containing 22 ppm PCBs occurred (see slide 13).
      - Note: Transformers have been upgraded and replaced over the years.
    - No known chemical spills except for the above noted oil spill in 1988 (see slide 13).
    - Not used for radiological storage; the south wing of the facility does not contain any radiological postings.
    - No GSA or SAA.
    - Both ACM and lead-based paints are known to be present.

C-631-1 - South Wing Transformer Sprinkler System

C-631-1 – South Wing Switchgear Room – Looking East

C-631-1 – South Wing Lead Calcium Batteries

C-631-1 - South Wing Water Heater

C-631-1 - South Wing Restroom/shower/change area

C-631-1 – South Wing Eyewash

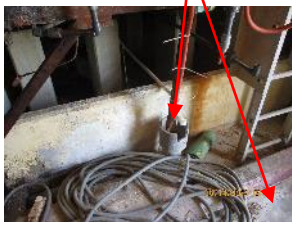
C-631-1 Facility Photos: 6/2022

C-631-1 Pump House and Piping - Current Status

- Walkdown inspection conducted in June 2022 and employee interviews confirmed no unusual conditions (Continued).
  - ❑ North Wing:
    - Houses chemical feed area which is divided into three main sections: acid platform (with loading dock), Calgon room, and a chlorine room.
    - Loading dock/area housed sulfuric acid pigs/day tanks.
    - Calgon room housed tanks of corrosion inhibitors including the 185 –gal tank for high chromate treatment for C-631-3; area within the dike contained solid waste exceeding TCLP limits for chromium, mercury, and lead that have been removed.
    - Chlorine room housed chlorine tanks; chlorine leak occurred in 2014
    - Sodium hypochlorite (bleach) was brought in as an alternate to chlorine in 2014; sodium hypochlorite leak occurred in 2018.
    - Three floor drains are present.
    - Contains an influent flume located beneath the concrete (flume remains full of water).
    - External to the north wing is an electrical manhole.
    - Both ACM and lead-based paints are known to be present.
    - Sulfuric acid pig and tank are still present; marked as empty with valves in the open position.
    - No GSAs or SAAs.
    - Not used for radiological storage.
    - No known chemical spills except for the above noted chlorine leak in 2014 (see slide 14) and sodium hypochlorite (bleach) leak in 2018 (see slide 15).

C-631-1 - North Wing Calgon Area

Feed Point to Influent Flume (beneath concrete floor)



C-631-1 - North Wing Chlorine Area

C-631-1 - North Wing Sulfuric Acid Pig and Tank

Gray pipe from chemical area feeding into to wet well

C-631-1 - North Wing Platform –Historical Location of 185-gal chromate-soda ash solution Tank

C-631-1 - North Wing Entry to Chlorine Room

C-631-1 Facility Photos: 6/2022 and 9/2022

C-631-1 Pump House and Piping – Environmental Impacts

- No information to indicate a release or threatened release of a hazardous substance that would require a CERCLA evaluation for a potential response action for demolition of the aboveground structure to protect future public health or welfare or the environment.
  - C-631-1 has exclusively operated as a pump house that pumped RCW from the wet well located beneath the pump house through 48-inch underground supply headers to the C-331 process building, C-310, C-315, C-340, C-410, C-420, C-620, 12 condensers in the C-333 process building, C-531 Switchyard synchronous condensers, and C-532 Relay House from its construction in 1951/1952 to 2013; with one pump continuing to serve as ancillary support to C-620 and HPFWS until 2021.
  - Building materials used for construction could contain lead-based paints, ACM, and PCB-containing materials [e.g., C-631-1 has cement corrugated siding (transite), PCB transformers].
  - Building debris generated from demolition of the aboveground structures can be properly managed using standard demolition and waste management practices.

- Process knowledge and employee interviews indicate that the historical construction and system processes at C-631-1 involved equipment and chemicals that could have the potential to pose a release threat to the concrete pad and underlying soils. (See slide 6 for SWMU 86 details.)
  - Chromated water leaks have occurred; making the slab, underlying soils and surrounding area suspect for potential chromium contamination.
  - A wet well (currently full of water) runs beneath the concrete floor where chlorine, sulfuric acid, and corrosion inhibitors (including chromate) were routinely fed into the RCW system via the wet well.
    - Two pressure relief valves located along the bottom of the wet well floor.
  - An influent flume (currently full of water) runs beneath the concrete floor where floor drains from the chlorine room, Calgon room, and acid room drained.
  - Transformers located on the south side of the building contain PCBs; making the slab, underlying soils, and surrounding area suspect for potential PCB contamination.
  - Solid waste exceeding TCLP limits for chromium, mercury, and lead was discovered in the diked area located within the cooling tower pump house (waste was removed and disposed in 2018).

C-631-1 Pump House and Piping - Conclusion and Recommendations

- Walkdown inspection of the facility, 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 structure.
  - Deactivation will include removal of any accessible loose items being stored and certain equipment (e.g., pumps, motors, valves, electrical transformers and switchgear, etc.) (to the extent practicable) prior to demolition.
  - Separate power source/system(s) will be evaluated for the data gathering panel which provides communication to C-755 and the C-360 annex prior to shutdown of the active transformer.
  - Any floor drains (along with the wet well, sump, influent flume, electrical manhole, and supply/return lines) will be delineated, documented, and isolated prior to demolition.
  - An evaluation will be made to determine if any measures may be appropriate to stabilize and/or isolate the basement (or portions thereof) from the main floor prior to demolition. [Note: Measures other than mechanical isolation (one example of a measure other than mechanical isolation would be the addition of flowable fill) will require additional consultation with EPA and Kentucky.]
  - Water from the wet well and influent flume will be evaluated for removal and proper disposal as part of deactivation and/or predemolition activities. (Note: Because the wet well and influent flume are part of the underlying slab and soils that constitutes the SWMU, a SWMU notification, along with a SAR revision, will be performed documenting removal and disposal of the water associated with deactivation and/or predemolition activities.)

- Pending completion of deactivation and availability of funding, proceeding with demolition and disposal of the C-631-1 facility (aboveground structure) outside of the FFA/CERCLA process, contingent upon the fact that no additional changes have occurred that would affect the CERCLA determination of the facility prior to demolition, is recommended.

- All applicable laws, regulations, and DOE procedures/protocols will be followed to ensure the demolition and disposal of the aboveground structure occurs in a safe, compliant manner, including conducting any additional radiological characterization through confirmation radiological surveys (as necessary) to support demolition and waste disposition.

C-631-1 Pump House and Piping - Conclusion and Recommendations

- Based on the construction and historical use at C-631-1, demolition and disposal of the aboveground structure for C-631-1 is recommended to be conducted outside of the FFA/CERCLA process.

- As part of the demolition of the aboveground structure, the appropriate best management practices (BMPs) will be evaluated and implemented (as needed) to prevent/minimize the pooling and/or migration of storm water that may come into contact with any contamination that may exist on the pad/subsurface structure(s). For example, the following BMPs will be implemented as necessary:
  - Radiological surveying will occur following demolition.
  - Decontamination and/or application of fixatives and/or barriers to contaminated surfaces above regulatory posting limits.
  - Isolation measures and other types of barriers to minimize and/or control runoff/pooling of contaminated storm water [e.g., seal inlets to drains/sumps/subsurface structure(s)].

- Removal of the C-631-1 facility from the Facility D&D OU will be documented in the appropriate annual SMP revision.

- Based on the construction and historical use at C-631-1, it is recommended that the underlying slab and soils undergo further CERCLA evaluation as part of Soils and Slabs OU as currently identified in Appendix 4 of the SMP.
  - The SAR for SWMU 86 will be updated to clarify that the C-631-1 underlying slab and soils constitutes the SWMU and will undergo a remedial field investigation as part of the Soils and Slabs OU.
  - Consideration will be given to coordinate the timing for issuance and finalization of a revised SAR for SWMU 86 that includes updated information on C-631-1 prior to removal of the aboveground structure.

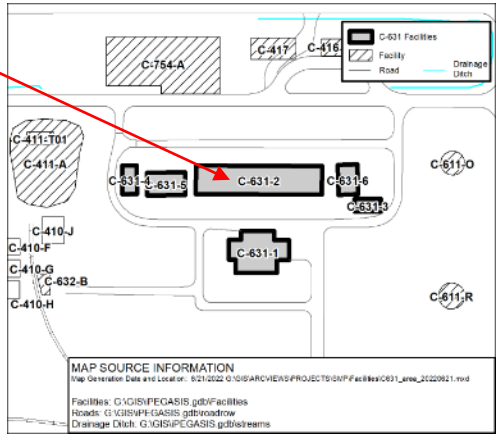
C-631-2 Cooling Tower

C-631-2 Cooling Tower

C-631-2 Cooling Tower - Construction History

- C-631-2 Cooling Tower facility is one of six facilities located in SWMU 86.
- The facility was originally constructed in 1951/1952.
- The facility is a wood frame structure (originally approximately 40 ft tall) resting on a 1-ft thick poured concrete pier-type foundation; a deck roof with railing and fan shrouds; and exterior walls of corrugated panels.
  - Often referred to as the "main cooling tower."
  - Supports 8 pairs of back-to-back cooling tower cells; total of 16 cooling tower cells. (Note: Modified in 1992 to 6 pairs of back-to-back cooling tower cells; total of 12 cooling tower cells; decreasing the number of fans/risers.)
    - Each cell operates independently of the other cells.
    - Each cell has a fan and driving motor; total of 16 fans/driving motors (modified to 12 in 1992).
    - Fans are enclosed by protective shrouds.
    - One riser serves each pair of back-to-back cells; total of 8 risers (modified to 6 in 1992).
    - The tower contains a water distribution system (including lateral flush lines), cold water fill (system of baffles), and mist eliminators.
    - Center wall that divides the cooling tower (e.g., east and west).
    - Piping and sprinklers for fire protection throughout.
  - Cools RCW and returns it to the below grade collection basin.
    - Footprint of the basin is larger than the aboveground footprint of the cooling tower; extending an additional 109 ft on each side of the cooling tower (these sections have a concrete slab top).
    - Basin is open and visible.
    - Four v-notch overflow weirs located between the wall that divides the collection basin into two portions (e.g., east and west).
    - Two drop down areas that connect to influent flume; one on each side of dividing wall.
    - Five pressure relief valves located along the bottom of basin floor.

C-631-2 Main Cooling Tower



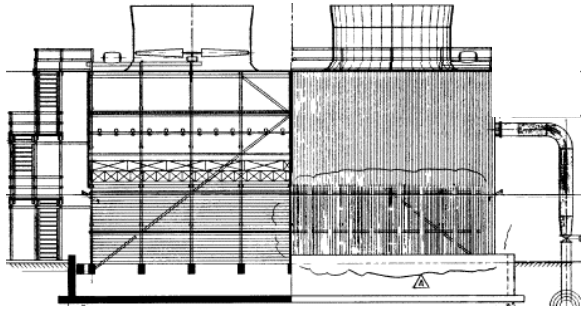
C-631-2 Cooling Tower – South Side

C-631-2 Facility Photo: 6/2022

C-631-2 Cooling Tower - Construction History

- C-631-2 Cooling Tower facility (Continued)
  - Houses the beginning of an influent flume.
    - Flume exits at the bottom the basin of the cooling tower; connecting the cooling tower basin to the wet well located in C-631-1 pump house.
  - South side infrastructure.
    - Eight water riser pipes (modified to 6 in 1992); connect into the below grade piping system.
    - Nine vaults located within the footprint of the cooling tower.
      1. Plant Water Station
      2. B-Loop Return to Blending Tower
      3. B-Loop Return (Valve Vault A)
      4. Make-up Water Venturi (Valve Vault F)
      5. Return Cross Over
      6. Flume/Sluice Gate/Dewatering Basin
      7. Hot Water Bypass (Vault E)
      8. A-Loop Return (Valve Vault B)
      9. A-Loop Return to Blending Tower
    - V-notch Overflow Basin/Blowdown Basin
  - North side infrastructure.
    - Two exterior wood staircases; one located on the east end and one located on the west end.
    - Two external concrete buildings; house the fire sprinkler system.
  - Roof infrastructure.
    - Wood decking with railing that extends the circumference of the tower.
    - Support fans enclosed with protective shrouds.

Historical Photo of Cooling Tower Roof Deck and Shrouds



Internal Cooling Tower Components
Excerpt from Engineering Drawing HUC3403-001-01

C-631-2 Cooling Tower North Side

C-631-2 Facility Photo: 6/2022

C-631-2 Cooling Tower - Construction History

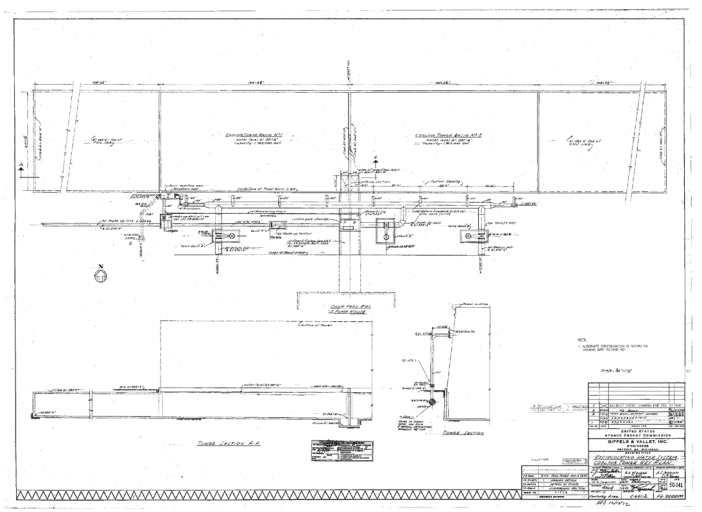
- The C-631-2 facility (aboveground structure) is approximately 15,840 ft^2; measuring ~66 ft x ~240 ft.

  - Collection basin (underground) measuring ~66 ft x ~458 ft x ~15 ft.
    - Footprint is larger than the aboveground footprint of C-631-2; extending an additional 109 ft on each side of C-631-2 (these sections have a concrete slab top).
    - Two drop down areas to influent flume located at the bottom of collection basin measuring ~6 ft x ~10 ft x ~5 ft each.
    - Four overflow weirs located at the top of the basin; between wall that divides the collection basin into two portions (e.g., east and west) measuring ~3 ft 4 inches x ~3 ft 8 inches each.
    - Water withdrawal systems located on southeast and northeast corner of basin used for firefighting purposes.

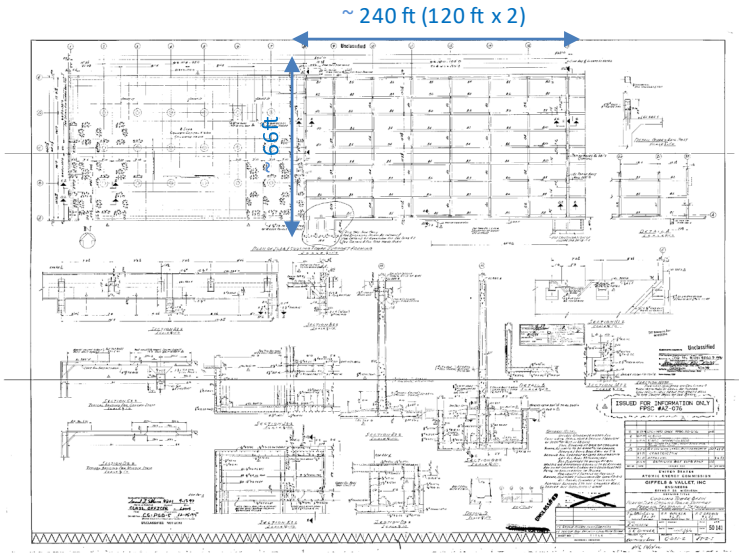
  - Influent flume exiting the basin measuring ~12 ft x ~74 ft x ~5 ft located at a depth of ~21 ft.
    - Runs underground from the cooling tower basin to the C-631-1 pump house wet well.

  - Two external concrete buildings measuring ~6 ft 8 inches x ~10 ft 8 inches x ~9 ft.
    - Houses the fire sprinkler system.
    - Located within footprint of main cooling tower.

  - V-notch Basin Overflow/Blowdown Basin measuring ~5 ft 8 inches x ~13 ft 4 inches x ~5 ft.
    - Houses the basin overflow and blowdown basin separated by a v-notch weir.
    - Dewatering drain (from dewatering basin) enters into the basin overflow.
    - Water from the basin overflow drains to the storm drain system.



Excerpt of Engineering Drawing of C-631-2 Layout; F3-2000-M, dated 1951



Excerpt of Engineering Drawing of C-631-2 Layout; F3-2-S, dated 1951

C-631-2 Cooling Tower - Construction History

- The C-631-2 facility is approximately 13,200 ft^2. (Continued)
  - Nine header/system vaults: (in order from west to east)
    1. Plant Water Station (Make-up Weir Pit) measuring ~7 ft 8 inches x ~10 ft x ~13 ft 11 inches.
       a. Contained a sump measuring ~12 inches x ~12 inches x ~6 inches; drained to ground or back to basin.
    2. B-Loop Return to Blending Tower measuring ~7 ft 6 inches x ~10 ft 6 inches x ~11 ft 6 inches.
       a. Located within footprint of main cooling tower; installed as part of blending towers in 1975/1976.
       b. Contained a sump measuring ~18 inches in diameter x ~18 inches deep; drained to ground or back to basin.
    3. B-Loop Return (Valve Vault A) measuring ~8 ft 8 inches x ~18 ft 2 inches x ~12 ft 8 inches.
       a. Contained a sump measuring ~12 inches x ~12 inches x ~6 inches; drained to ground or back to basin.
    4. Make-up Water Venturi (Valve Vault F) measuring ~6 ft x ~10 ft 4 inches x ~8 ft 2 inches.
    5. Return Cross Over measuring ~11 ft 6 inches x ~15 ft x ~14 ft 10 inches.
       a. Contained a sump measuring ~18 inches in diameter x ~ 3 ft deep; drained to ground or back to basin.
    6. Flume/Sluice Gate/Dewatering/Tower Bypass Basin measuring ~14 ft x ~11 ft 8 inches x ~25 ft 10 inches.
       a. Housed two flume sluice gates and dewatering basin.
       b. Dewatering drain line exits the dewatering basin and connects to the overflow basin (where it exits the overflow basin to the storm sewer system).
    7. Hot Water Bypass (Vault E) measuring ~12 ft 2 inches x ~16 ft 8 inches x ~12 ft 6 inches.
       a. Contained a sump measuring ~18 inches in diameter x ~3 ft; drained to ground or back to basin.
    8. A-Loop Return and Bypass (Valve Vault B) measuring ~8 ft 8 inches x ~18 ft 2 inches x ~12 ft 8 inches.
       a. Contained a sump measuring ~12 inches x ~12 inches x ~6 inches; drained to ground or back to basin.
    9. A-Loop Return to Blending Tower measuring ~ 7 ft 6 inches x ~10 ft 3 inches x ~11 ft 6 inches.
       a. Located within footprint of main cooling tower; installed as part of blending towers in 1975/1976.
       b. Contained a sump measuring ~18 inches x ~18 inches x ~18 inches; drained to ground or back to basin.


Plant Water Station Vault (Make-up Weir Pit)


B-Loop Return to Blending Tower Vault


B-Loop Return Vault (Valve Vault A)


Make-up Water Venturi Vault (Valve Vault F)


Return Cross Over Vault


Flume/Sluice Gate/ Dewatering/Tower Vault


Hot Water Bypass Vault (Valve Vault E)


A-Loop Return and Bypass Vault (Valve Vault B)


A-Loop Return to Blending Tower Vault

C-631-2 Facility Photos: 6/2022

C-631-2 Cooling Tower - Operational History

- C-631-2 was originally built and operated as a cooling tower from its construction in 1951/1952.
  - Heated RCW from the C-331 process building, C-310, C-315, C-340, C-410, C-420, C-620, 12 condensers in the C-333 process building, C-531 switchyard (synchronous condensers), and C-532 Relay House was distributed through various sections of the cooling tower and released via evaporation; cooled RCW was then collected into the cooling tower basin where it then flowed by gravity via a flume into the wet well located underneath the C-631-1 pump house.
  - Tower was demolished down to the basin and rebuilt in the 1993-1994 timeframe.

C-631-2 Cooling Tower – South Side

- Brown rot fungi growth quickly became a problem for the cooling towers.
  - In 1958, a program was initiated to combat fungus deterioration.
  - Replaced infected wood with new pressure treated redwood.
    - Cooling tower structural members, fill, mist eliminators, outer wall, cell partitions, and deck were originally constructed of California redwood.
  - Treated remaining wood with fungicide solutions (most susceptible areas only).
  - All cell plenum chambers, tower deck, outer sidewalls, and tower tops were treated periodically with one of two types of fungicide solutions:
    - Sodium pentachlorophenate.
    - Double diffusion method – first spraying with a solution of zinc sulphate and arsenic acid followed by a second spraying with a solution of sodium bichromate.
  - Fungicide treatment was discontinued in 1987.

C-631-2 Cooling Tower – Interior View

C-631-2 Facility Photos: 6/2022

C-631-2 Cooling Tower - Operational History

- In 1972, the main cooling towers underwent restoration.
  - Restoration was limited; engineering drawings indicate that certain structural members were only removed if necessary. (Note: Mechanical repairs to motors, gear boxes, etc., also occurred over the years of operation.)
- Between 1975 – 1977 firewater/sprinkler systems were upgraded.
- In 1978, new wind baffling was installed.
- In 1979, a cooling tower drift study was conducted to determine the impact of chromium dispersion from the cooling towers.
  - Vegetation survey provided evidence of long-term transport and disposition of chromium to terrestrial ecosystem components.
    - Decrease in concentration with distance; most disposition is confined to DOE property.
  - Chromium deposited by drift to soils or lost to soils from vegetation does not accumulate significantly beyond 200 meters from the towers.
    - Soil chromium is the less soluble and less biologically active oxidation state (Cr+3).
- In 1981, RCW sprinkler alarms were installed.

C-631-2 Sprinkler System - External View

C-631-2 Sprinkler System - Internal View

C-631-2 Facility Photos: 6/2022

C-631-2 Cooling Tower - Operational History

- In 1993-1994, the main cooling tower was replaced down to the basin.
  - The overall footprint of the cooling tower was adjusted and the height and length of the new cooling tower was reduced.
    - Height reduced from approximately 40 ft to approximately 32 ft.
    - Length reduced from approximately 240 ft to approximately 180 ft.
      - Modified from 8 to 6 pairs of back-to-back cooling tower cells; total of 12 rather than 16 cooling tower cells.
      - Modified from 8 risers to 6 risers.
  - Downsized because the cooling tower load designed for in the 1950s was not required for C-331 and the new tower design was more efficient.

- USEC leased the facility in the early 1990s and continued to use C-631-2 as a cooling tower until enrichment operations ceased at C-331.

- In 2013, C-631-2 was shutdown, along with its associated pump house and blending towers. [Note: One pump in C-631-1 continued to serve as ancillary support to C-620 and the HPFWS until 2021].
  - Sodium hypochlorite (bleach) was added to maintain the integrity of the water in the basin while providing service to C-620 and the HPFWS.
  - In order to maintain the required HPFWS water volume, sanitary water, was added to C-611-R (red/white checked HPFWS tower) and the basin.
  - Any overflow from C-611-R was returned back into the basin; any overflow of the basin was discharged through Outfall 008.
  - This cycle of sanitary overflow decreased the amount of phosphate remaining in the basin after enrichment shutdown (several cycles); achieving a phosphate value of <1 ppm.

Historical photo of main cooling tower replacement project
(Photo of C-631 Main Cooling Tower)

C-631-2 Cooling Tower – East Side
(Area Where Cells Formerly Existed)

C-631-2 Facility Photo: 6/2022

C-631-2 Cooling Tower - Operational History

- C-631-2 transitioned from USEC to DOE in 2014.
- In January 2021, the RCW from the basin was no longer required to support C-620.
- In November 2021, conversion to a "dry-hybrid" fire system was completed, the HPFWS pumps were removed from service, and the RCW water remaining in the basin was no longer required to support the HPFWS, including C-611-R.
  - The basin and influent flume have not been drained and remain full of water; draining has not occurred in order to prevent hydrostatic pressure changes that could cause collapse or floating of the subsurface structure.
  - Calcium hypochlorite tablets are added once a month to keep the water from becoming septic.

C-631-2 RCW Return Line

C-631-2 Plant Water Station

C-631-2 Cooling Tower Basin East Pad with Withdrawl Connections for Firefighting

C-631-2 Cooling Tower Basin Interior View

C-631-2 Facility Photos: 6/2022

C-631-2 Cooling Tower - Current Status

- Walkdown inspection conducted in June 2022 and employee interviews confirmed no unusual conditions.
  - Both ACM (e.g., transite siding) and lead-based paints are known to be present.
  - Basin located beneath the cooling tower contains five pressure release valves and two drop down areas that connect to an influent flume (basin remains full of water).
  - Houses an influent flume that remains full of water and exits at the bottom of the basin of the cooling tower.
    - Chlorine, sulfuric acid, and corrosion inhibitors (including chromate) were routinely fed into the RCW system via the C-631-1 wet well and would be present in the basin.
  - Nine vaults located within the footprint of the cooling tower; some contain sump pumps.
  - Two external concrete buildings; house the fire sprinkler system.
  - Not used for radiological storage; no radiological postings are present.
  - No GSA or SAA.
  - Historical use of sodium pentachlorophenate; zinc sulphate; arsenic acid; and sodium bichromate for fungicide treatment of wood.
  - Historical chromated water leaks have occurred and were immediately addressed.
  - No known chemical spills except for chromated water leaks.

C-631-2 - Examples of RCW Return Line

C-631-2 - North Basin and Lateral Flush Lines

C-631-2 – Electrical Conduits

C-631-2 - V-Notch Weir

C-631-2 - Surrounding Area Vaults and East Basin Pad

C-631-2 Facility Photos: 6/2022

C-631-2 Cooling Tower - Environmental Impacts

- No information to indicate a release or threatened release of a hazardous substance that would require a CERCLA evaluation for a potential response action for demolition of the aboveground structure to protect future public health or welfare or the environment.
  - C-631-2 has exclusively operated as the main cooling tower; cooling heated RCW from the C-331 process building, C-310, C-315, C-340, C-410, C-420, C-620, 12 condensers in the C-333 process building, C-531 switchyard (synchronous condensers), and C-532 Relay House from its construction in 1951/1952 to 2013.
  - Building materials used for construction could contain lead-based paints and ACM (e.g., corrugated transite siding).
    - Because the cooling tower was completely rebuilt (wood removed down to basin) in the 1989/1990 timeframe, chemicals used for fungicide treatment prior to 1987 are no longer a concern for the existing wood.
    - In 1992/1993, the RCW system was converted from a chromate system to a phosphate system.
  - Building debris generated from demolition of the aboveground structures can be properly managed using standard demolition and waste management practices.

- Process knowledge and employee interviews indicate that the historical construction and system processes at C-631-2 involved equipment and chemicals that could have the potential to pose a release threat to the basin and associated vaults and underlying soils (including the surrounding area associated with the basin/vaults). (See slide 6 for SWMU 86 details.)
  - Chromated water releases and airborne dispersion of chromium have occurred; making the underlying soils and surrounding area suspect for potential chromium contamination.
  - Five pressure release valves are located along the bottom of the basin floor.
  - Basin (currently full of water) is connected to the C-631-1 pump house via an influent flume (currently full of water).
    - Chlorine, sulfuric acid, and corrosion inhibitors (including chromate) were routinely fed into the RCW system via the C-631-1 wet well and would be present in the basin (Note: Soda ash was occasionally used on a non-routine basis for pH correction).
  - Nine vaults located within the footprint of the cooling tower; some of which contain sump pumps that drained or potentially drained to the surrounding soils.

C-631-2 Cooling Tower - Conclusion and Recommendations

- Walkdown inspection of the facility, 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 structure.
  - Deactivation will include removal of any accessible loose items being stored and certain equipment (e.g., risers, fans, fan motors, and shrouds, etc.) (to the extent practicable) prior to demolition.
  - Any floor drains (along with the vaults, sumps, weir, influent flume, and supply/return lines) will be delineated, documented, and isolated prior to demolition.
  - An evaluation will be made to determine if any measures may be appropriate to stabilize and/or isolate the basin (or portions thereof) from the main floor of the cooling tower prior to demolition. [Note: Measures other than mechanical isolation (one example of a measure other than mechanical isolation would be the addition of flowable fill) will require additional consultation with EPA and Kentucky.]
  - Water from the basin and influent flume will be evaluated for removal and proper disposal as part of deactivation and/or predemolition activities. (Note: Because the basin and influent flume are part of the underlying slab and soils that constitutes the SWMU, a SWMU notification, along with a SAR revision, will be performed documenting removal and disposal of the water associated with deactivation and/or predemolition activities.)

- Pending completion of deactivation and availability of funding, proceeding with demolition and disposal of the C-631-2 facility (aboveground structure) outside of the FFA/CERCLA process, contingent upon the fact that no additional changes have occurred that would affect the CERCLA determination of the facility prior to demolition, is recommended.

- All applicable laws, regulations, and DOE procedures/protocols will be followed to ensure the demolition and disposal of the aboveground structure occurs in a safe, compliant manner, including conducting any additional radiological characterization through confirmation radiological surveys (as necessary) to support demolition and waste disposition.

C-631-2 Cooling Tower - Conclusion and Recommendations

- Based on the construction and historical use at C-631-2, demolition and disposal of the aboveground structure for C-631-2 is recommended to be conducted outside of the FFA/CERCLA process.

- As part of the demolition of the aboveground structure, the appropriate BMPs will be evaluated and implemented (as needed) to prevent/minimize the pooling and/or migration of storm water that may come into contact with any contamination that may exist on the pad/subsurface structure(s). For example, the following BMPs will be implemented as necessary:
  - Radiological surveying will occur following demolition.
  - Decontamination and/or application of fixatives and/or barriers to contaminated surfaces above regulatory posting limits.
  - Isolation measures and other types of barriers to minimize and/or control runoff/pooling of contaminated storm water [e.g., seal inlets to drains/sumps/subsurface structure(s)].

- Removal of the C-631-2 facility from the Facility D&D OU will be documented in the appropriate annual SMP revision.

- Based on the construction and historical use at C-631-2, it is recommended that the underlying slab and soils (including surrounding soils within the C-631-2 footprint) undergo further CERCLA evaluation as part of Soils and Slabs OU as currently identified in Appendix 4 of the SMP.
  - The SAR for SWMU 86 will be updated to clarify that the C-631-2 underlying slab and soils (including surrounding soils within the C-631-2 footprint) constitutes the SWMU and will undergo a remedial field investigation as part of the Soils and Slabs OU.
  - Consideration will be given to coordinate the timing for issuance and finalization of a revised SAR for SWMU 86 that includes updated information on C-631-2 prior to removal of the aboveground structure.

C-631-3 Pump House (Firewater)

C-631-3 Pump House (Firewater)

C-631-3 Pump House (Firewater) - Construction History

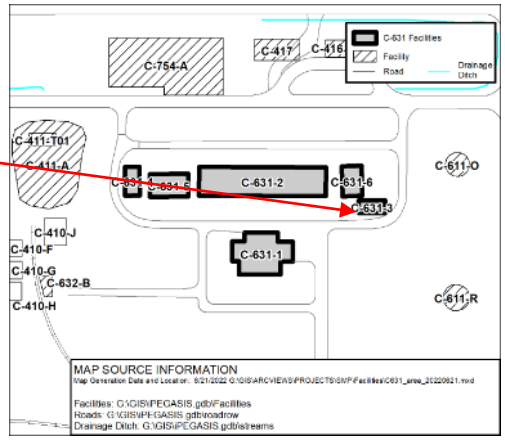
- C-631-3 Pump House (Firewater) facility is one of six facilities located in SWMU 86.

- The facility was constructed in 1958/1959.

- The facility is a single story, partially underground (~ 12 ft) concrete block structure with a roof extending approximately 3 ft abovegrade.
  - Two subgrade stairways, leading to pedestrian doorways on the east and south ends of the facility; one above grade stairway that provides access to the roof.
  - Roof contains a removal hatch; ventilation fans, diesel exhaust muffler, and manual valves.
  - Three underground suction lines enter the north side of the facility from the C-631 cooling tower basin; one underground suction line enters the west side from the "A" loop RCW return line.
  - 300 gal diesel fuel tank located exterior of the facility on the northeast corner.
  - Above ground pipe enters from the north side; serves as a pressure relief for Pump #4, discharging back to the C-631 basin.
  - Houses five pumps.
    - Four pumps are electrically driven (Pumps #1, #1A, #2, and #3).
    - One pump is diesel driven (Pump #4).

- The entire facility is approximately 1,196 ft^2 measuring ~23 ft x ~52 ft.
  - Floor drains and grating are present; drain into a single 3 ft x 3 ft x 3 ft sump that drains back into the C-631 basin.

C-631-3 Pump House



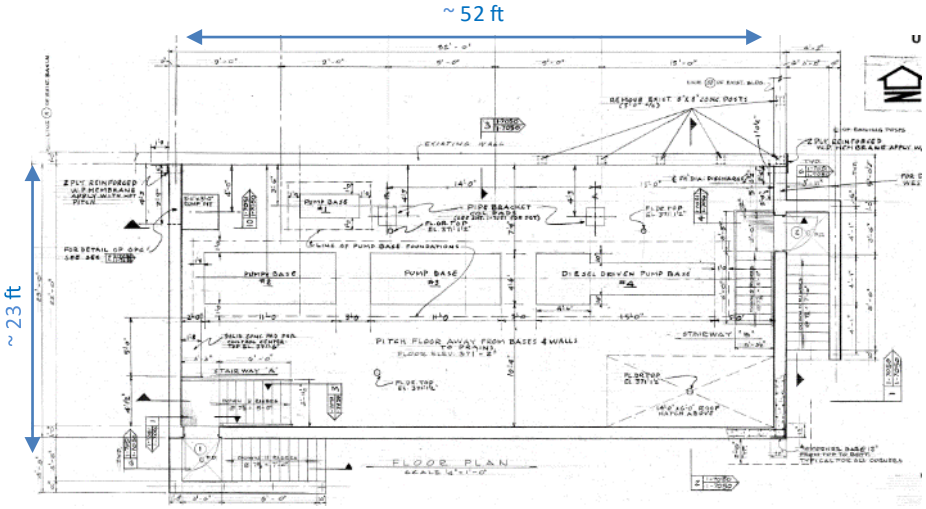
C-631-3 - Pump House (Firewater) South Side

C-631-3 Facility Photos: 6/2022

C-631-3 Pump House (Firewater) - Construction History

- The HPFWS supplies fire water to C-310; C-315; C-331, C-333, C-335, and C-337 Process Buildings; C-310-A; C-360; C-631-3, and the RCW blend pump houses. It also supplies the fire water spray systems in the RCW cooling towers.
  - Consists of a distribution piping network, a 300,000 gal elevated storage tank (C-611-R), a water supply reservoir (C-631-2 Cooling Tower Basin), and four water pumps housed in either C-631-1 or C-631-3.
  - Distribution piping network is a system consisting of underground mains and smaller lead-in pipes, and automatic wet pipe sprinkler systems that distribute high-pressure water to sprinkler heads.
  - Water can be supplied to the HPFWS from four pumps housed in either C-631-1 or C-631-3.

- C-631-3 was originally designed and built as a pump house in 1958/1959 to support the HPFWS.
  - Pump #1, also referred to as the "jockey" pump, and Pump #1A (backup jockey/booster pump) was designed to maintain the water level in the elevated 300,000-gal HPFWS tank (C-611-R); utilizing RCW water from the basin or "A" loop RCW return line.
  - Pumps #2, #3, and #4 were designed as fire pumps, connected to the HPFWS; utilizing RCW water from the basin.



Floor Plan View: Excerpt from Engineering DrawingC-631-3 1-7050_0001_0004_U-043220, dated 1958

C-631-3 - Pump House (Firewater) West Side

C-631-3 - Pump House (Firewater) East Entry Door

C-631-3 - Pump House (Firewater) Roof Top

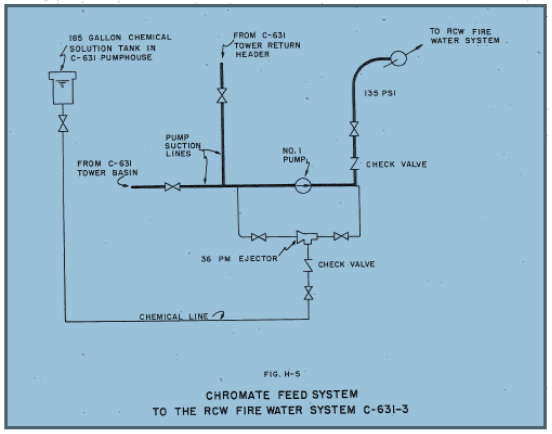
C-631-3 Facility Photos: 6/2022

C-631-3 Pump House (Firewater) - Operational History

- In 1961, high chromate treatment of the recirculation fire water system was implemented.
  - A 185-gal chemical chromate-soda ash solution tank located in C-631-1 fed over to the C-631-3 fire water pump house.
  - C-631-3 provided corrosion protection for the elevated water tower (C-611-R) and the HPFWS distribution system.
  - Treatment consisted of maintaining 800 – 1000 ppm chromate at a pH value between 6.5 – 7.5.

- In 1976, the water supply for Pump #1 (jockey pump) and Pump #1A (backup jockey/booster pump), which supplied the C-611-R elevated water tower, was converted from RCW to plant water.
  - Pumps #2, #3, and #4 continued to utilize RCW water from the C-631 basin.

- Shortly thereafter (late 1970s/early 1980s), the water supply for Pump #1 (jockey pump) and Pump #1A (backup jockey/booster pump), which supplied the C-611-R elevated water tower, was converted from plant water to sanitary water.
  - Pumps #2, #3, and #4 continued to utilize RCW water from the C-631 basin.



High Chromate Feed System Diagram Excerpt - Operations Division Training Manual – Utilities Operations, KYD-1482, July 1962

C-631-3 - Pump House (Firewater) Interior View Looking East

C-631-3 - Pump House (Firewater) Interior View – Pump #3 Suction

C-631-3 Facility Photos: 6/2022

C-631-3 Pump House (Firewater) - Operational History

- In 1986, a backup HPFWS was added and the fire pumps were reconfigured.
  - The pumps (Pumps #2, #3, and #4) and the pumps located in C-631-1 (Pump #5 and #6) were reconfigured to work together.
    - All five pumps (Pumps #2, #3, #4, #5, and #6) continued to utilized RCW water from the C-631 basin.
    - Pump #1 (jockey pump) and Pump #1A (backup jockey/booster pump) which supplied the C-611-R elevated water tower continued to operate utilizing sanitary water. (Note: If needed the jockey pump could also utilize RCW water from the basin.)
    - In approximately 1988, Pump #4 (diesel driven) was taken out of service with the new diesel driven pump (Pump #6) in C-631-1 continuing to operate.
- USEC leased the facility in the early 1990s and continued to use C-631-3 as a firewater pump house supporting the HPFWS.
- In 1995, new control instrumentation was installed.
- C-631-3 transitioned from USEC to DOE in 2014.
- In November 2021, conversion to a "dry-hybrid" fire system was completed and the HPFWS pumps (along with the C-611-R elevated water tower) were removed from service.

C-631-3 – No. 4 HPFWS Pump and Diesel Motor

C-631-3 – No. 4 HPFWS Pump Diesel Engine

C-631-3 – No. 2 HPFWS Pump and Motor

C-631-3 – No. 3 HPFWS Pump and Motor

C-631-3 – No. 1 Jockey Pump and Motor

C-631-3 – No. 1 Jockey Pump and Motor

C-631-3 – Motor Control Cabinet

C-631-3 Facility Photos: 6/2022

C-631-3 Pump House (Firewater) - Current Status

- Walkdown inspection conducted in June 2022 and employee interviews confirmed no unusual conditions.
  - Houses five HPFWS pumps.
  - Both ACM and lead-based paints are known to be present.
  - Floor drains, grating, and a single sump are present.
    - Floor drains and grating drain into the sump; sump drains back into the C-631-2 cooling tower basin.
  - 300-gal diesel fuel tank located within a diked area; drained, air-gapped, and marked "permanently closed".
  - Two diesel air tanks; empty.
  - Not used for radiological storage; no radiological postings are present.
  - No GSA or SAA.
  - Minor oil staining around several of the HPFWS pumps.
  - Visible signs of historical water leaks.
  - Contains some loose equipment.
  - No known chemical spills.

    Note: Corrosion inhibitors (including chromate) were routinely fed into the RCW system and would have been present when water leaks occurred.

C-631-3 - Floor Drains

C-631-3 - Sump

C-631-3 – Diesel Fuel Tank

C-631-3 – Diesel Air Tanks

C-631-3 - Oil Staining

C-631-3 - Water Staining

C-631-3 – South Door and Electrical Panel

C-631-3 – Loose Equipment

C-631-3 Facility Photos: 6/2022

C-631-3 Pump House (Firewater) – Environmental Impacts

- No information to indicate a release or threatened release of a hazardous substance that would require a CERCLA evaluation for a potential response action for demolition of the structure (aboveground and subgrade) to protect future public health or welfare or the environment.

- C-631-3 has exclusively operated as a pump house that supported the HPFWS to C-310; C-315; C-331, C-333, C-335, and C-337 Process Buildings; C-310-A; C-360; C-631-3, the RCW blend pump houses: and the water spray systems in the RCW cooling towers from its construction in 1958/1959 to 2021.
  - Building materials used for construction could contain lead-based paints and ACM.
  - Building debris generated from demolition of the structure (aboveground and subgrade) can be properly managed using standard demolition and waste management practices.

- Process knowledge and employee interviews indicate that the historical construction and system processes at C-631-3 involved equipment and chemicals that could have the potential to pose a release threat to the concrete pad and underlying soils. (See slide 6 for SWMU 86 details.)
  - C-631-3 is located within the footprint of the C-631 Cooling Tower.
  - C-631-3 was connected to part of the RCW system which contained chromated water.
  - Floor drains and grating are located along the slab of the facility that drain into a single sump that drains back into the C-631-2 main cooling tower basin.
  - High chromate treatment (800 – 1000 ppm chromate) of the recirculation fire water system occurred within C-631-3.

C-631-3 Pump House (Firewater) - Conclusion and Recommendations

- Walkdown inspection of the facility, 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 structure (aboveground and subgrade).
  - Deactivation will include removal of any accessible loose items being stored and certain equipment (e.g., HPFWS pumps and motors, electrical control panels, etc.) (to the extent practicable) prior to demolition.
  - Any floor drains (along with the sump) will be delineated, documented, and isolated prior to demolition.
  - An evaluation will be made to determine if any measures may be appropriate to stabilize and/or isolate the subgrade structure (or portions thereof) prior to demolition. [Note: Measures other than mechanical isolation (one example of a measure other than mechanical isolation would be the addition of flowable fill) will require additional consultation with EPA and Kentucky.]

- Pending completion of deactivation and availability of funding, proceeding with demolition and disposal of the C-631-3 facility (aboveground and subgrade structure) outside of the FFA/CERCLA process, contingent upon the fact that no additional changes have occurred that would affect the CERCLA determination of the facility prior to demolition, is recommended.

- All applicable laws, regulations, and DOE procedures/protocols will be followed to ensure the demolition and disposal of the aboveground structure occurs in a safe, compliant manner, including conducting any additional radiological characterization through confirmation radiological surveys (as necessary) to support demolition and waste disposition.

C-631-3 Pump House (Firewater) - Conclusion and Recommendations

- Based on the construction and historical use at C-631-3, demolition and disposal of the structure (aboveground and subgrade) for C-631-3 is recommended to be conducted outside of the FFA/CERCLA process.

- As part of the demolition of the structure (aboveground and subgrade), the appropriate BMPs will be evaluated and implemented (as needed) to prevent/minimize the pooling and/or migration of storm water that may come into contact with any contamination that may exist on the pad/subsurface structure(s). For example, the following BMPs will be implemented as necessary:
  - Radiological surveying will occur following demolition.
  - Decontamination and/or application of fixatives and/or barriers to contaminated surfaces above regulatory posting limits.
  - Isolation measures and other types of barriers to minimize and/or control runoff/pooling of contaminated storm water [e.g., seal inlets to drains/sumps/subsurface structure(s)].

- Removal of the C-631-3 facility from the Facility D&D OU will be documented in the appropriate annual SMP revision.

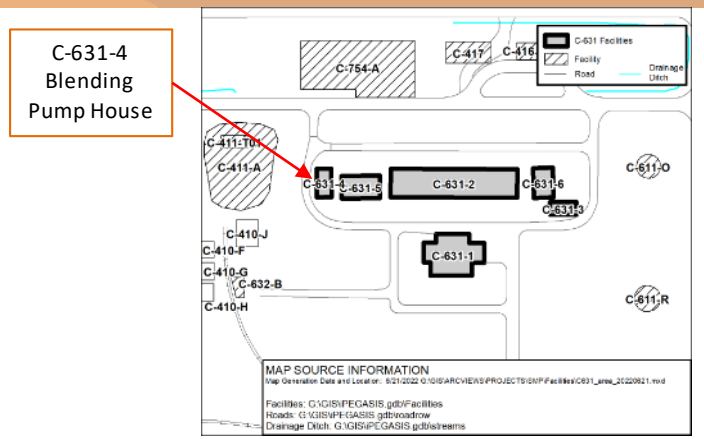
- Based on the construction and historical use at C-631-3, it is recommended that the underlying slab (e.g., floor of subgrade structure) and soils undergo further CERCLA evaluation as part of Soils and Slabs OU as currently identified in Appendix 4 of the SMP.
  - The SAR for SWMU 86 will be updated to clarify that the C-631-3 underlying slab (e.g., floor of subgrade structure) and soils constitutes the SWMU and will undergo a remedial field investigation as part of the Soils and Slabs OU.
  - Consideration will be given to coordinate the timing for issuance and finalization of a revised SAR for SWMU 86 that includes updated information on C-631-3 prior to removal of the structure.

C-631-4 Blending Pump House

C-631-4 Blending Pump House

C-631-4 Blending Pump House - Construction History

- C-631-4 Blending Pump House facility is one of six facilities located in SWMU 86.
- The facility was constructed in 1975/1976.
- The facility is a one-story steel framed building with a slanted shed roof and exterior corrugated panels on a poured concrete foundation that varies in thickness from ~6 inches to ~4 ft (reinforced under the pumps).
  - Garage-like structure with two pedestrian doorways located on the north and south side of the facility.
  - West side of the facility houses two manually operable louver panels and three high bay removable panels.
  - Houses three blending pumps.
  - Three large water pipes located on the east side of the facility are connected to the C-631-2 cooling tower basin.
- The entire facility is approximately 1,540 ft^2.
  - Measuring ~28 ft x ~55 ft.
    - Five 3-inch floor drains that drain back into the C-631-2 main cooling tower basin.



C-631-4 – Blending Pump House North Side

C-631-4 – Blending Pump House West Side

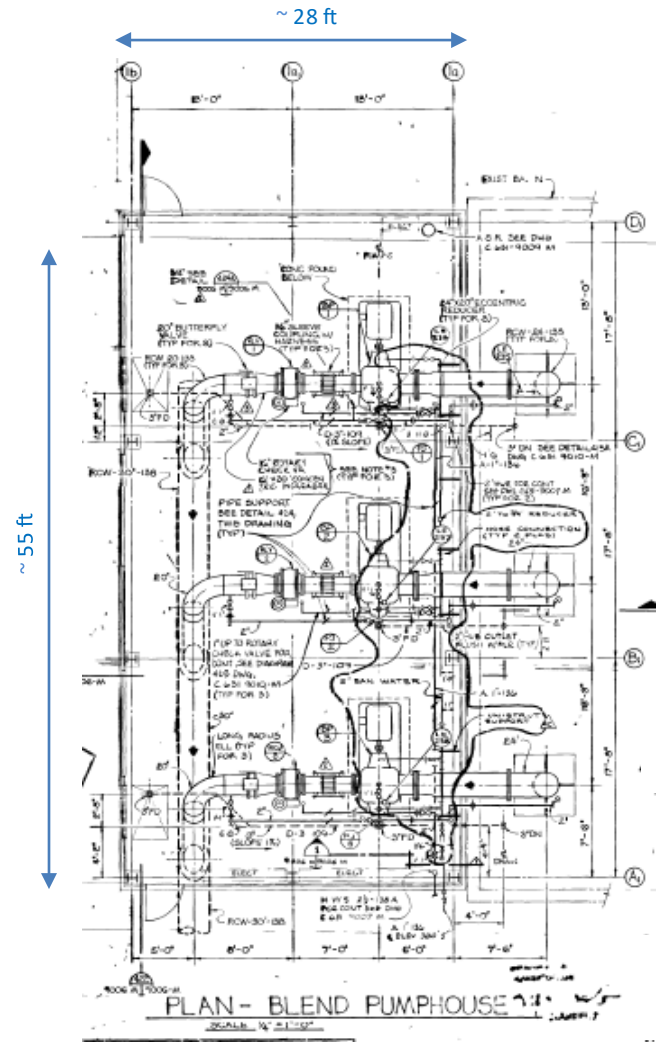
C-631-4 – Blending Pump House East Side

C-631-4 Facility Photos: 6/2022

C-631-4 Blending Pump House - Operational History

- Blending pump houses, along with the blending towers, were constructed as part of the 1970s Cascade Improvement Program and Cascade Uprating Program (CIP/CUP) in anticipation that the increase in enrichment capacity would result in an increase in process temperatures that would require additional cooling capability.
  - Blending pump houses were designed to decrease the temperature of RCW prior to entering into the main cooling tower. (Note: RCW temperatures in excess of 150°F could damage the cooling tower fill material.)
  - Cooled water from the cooling tower basin could be pumped (if needed) through the blending pump house where the cooled water could be "blended" with heated RCW in the return header before the water flowed over the cooling tower for further cooling.

- C-631-4 was originally designed and built as a blending pump house in 1975/1976; however, while brought on-line and tested to ensure proper operation, C-631-4 remained in standby and was never used.
  - The fill material temperature limits were never compromised.



Excerpt of Engineering Drawing from C-631-9006-M, Rev 4c; dated 1975

C-631-4 Blending Pump House - Operational History

- USEC leased the facility in the early 1990s and continued to maintain C-631-4 as a blending pump house until enrichment operations ceased at C-331.
  - C-631-4 was routinely inspected and serviced.
  - C-631-4 was retested (late 1980s/early 1990s) to ensure that the system was still in operational order.
- In 2013, C-631-4 was shutdown, along with its associated cooling towers (main cooling tower and blending towers).
- C-631-4 transitioned from USEC to DOE in 2014.
- C-631-4 is no longer operational.

C-631-4 - Skid Frame with Blend Motor and Pump

C-631-4 - Pump Discharge Lines

C-631-4 - Pump Suction Line Interior View

C-631-4 - Pump Suction Lines Exterior View

C-631-4 Facility Photos: 6/2022

C-631-4 Blending Pump House - Current Status

- Walkdown inspection conducted in June 2022 and employee interviews confirmed no unusual conditions.
  - Houses three blending pumps.
  - Both ACM (e.g., corrugated transite siding) and lead-based paints are known to be present.
  - Five 3-inch floor drains are present.
    - All drain back into the C-631-2 cooling tower basin.
  - Not used for radiological storage; no radiological postings are present.
  - No GSA or SAA.
  - Minor oil staining around the blending pumps.
  - Contains some loose equipment and empty storage cabinets.
  - No known chemical spills.

    Note: Corrosion inhibitors (including chromate) were routinely fed into the RCW system and would have been present if leaks occurred during startup testing and periodic retesting.

C-631-4 - Floor Drains

C-631-4 - Floor Drains

C-631-4 - Fire Sprinkler System

C-631-4 - Oil Staining

C-631-4 – Loose Equipment and Empty Storage Cabinets

C-631-4 – Ceiling Ventilation and Steam Heater

C-631-4 Facility Photos: 6/2022

C-631-4 Blending Pump House - Environmental Impacts

- No information to indicate a release or threatened release of a hazardous substance that would require a CERCLA evaluation for a potential response action for demolition of the aboveground structure to protect future public health or welfare or the environment.
  - C-631-4 was originally designed and built as a blending pump house in 1975/1976 and while brought on-line and tested to ensure proper operations; C-631-4 remained in standby and has never been used from its construction in 1975/1976 to 2013 and was placed into shutdown in 2013.
  - Building materials used for construction could contain lead-based paints and ACM (e.g., corrugated transite siding).
  - Building debris generated from demolition of the aboveground structures can be properly managed using standard demolition and waste management practices.

- Process knowledge and employee interviews indicate that outside of the testing of the operational status at C-631-4, the system remained in standby, was placed into shutdown in 2013, and there is no history or records of chemical spills that would pose an environmental release threat.
  - C-631-4 is located within the footprint of the C-631 Cooling Tower.
  - C-631-4 is connected to part of the RCW system which contained chromated water.
  - Five 3-inch floor drains are located along the slab of the facility that drain back into the C-631-2 main cooling tower basin.

C-631-4 Blending Pump House - Conclusion and Recommendations

- Walkdown inspection of the facility, 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 structure.
  - Deactivation will include removal of any accessible loose items being stored and certain equipment (e.g., blend pumps and motors, etc.) (to the extent practicable) prior to demolition.
  - Any floor drains (including the six identified floor drains) will be delineated, documented, and isolated prior to demolition.
- Pending completion of deactivation and availability of funding, proceeding with demolition and disposal of the C-631-4 facility (aboveground structure) outside of the FFA/CERCLA process, contingent upon the fact that no additional changes have occurred that would affect the CERCLA determination of the facility prior to demolition, is recommended.
- All applicable laws, regulations, and DOE procedures/protocols will be followed to ensure the demolition and disposal of the aboveground structure occurs in a safe, compliant manner, including conducting any additional radiological characterization through confirmation radiological surveys (as necessary) to support demolition and waste disposition.

C-631-4 Blending Pump House - Conclusion and Recommendations

- Based on the construction and historical use at C-631-4, demolition and disposal of the aboveground structure for C-631-4 is recommended to be conducted outside of the FFA/CERCLA process.

- As part of the demolition of the aboveground structure, the appropriate BMPs will be evaluated and implemented (as needed) to prevent/minimize the pooling and/or migration of storm water that may come into contact with any contamination that may exist on the pad/subsurface structure(s). For example, the following BMPs will be implemented as necessary:
  - Radiological surveying will occur following demolition.
  - Decontamination and/or application of fixatives and/or barriers to contaminated surfaces above regulatory posting limits.
  - Isolation measures and other types of barriers to minimize and/or control runoff/pooling of contaminated storm water [e.g., seal inlets to drains/sumps/subsurface structure(s)].

- Removal of the C-631-4 facility from the Facility D&D OU will be documented in the appropriate annual SMP revision.

- While there is no history or records of chemical spills that would pose an environmental release threat at C-631-4, based on its construction and association with the C-631 Cooling Tower footprint, it is recommended that the underlying slab and soils undergo further CERCLA evaluation as part of Soils and Slabs OU as currently identified in Appendix 4 of the SMP.
  - The SAR for SWMU 86 will be updated to clarify that the C-631-4 underlying slab and soils constitutes the SWMU and will undergo a remedial field investigation as part of the Soils and Slabs OU.
  - Consideration will be given to coordinate the timing for issuance and finalization of a revised SAR for SWMU 86 that includes updated information on C-631-4 prior to removal of the aboveground structure.

C-631-5 Blending Cooling Tower (West)

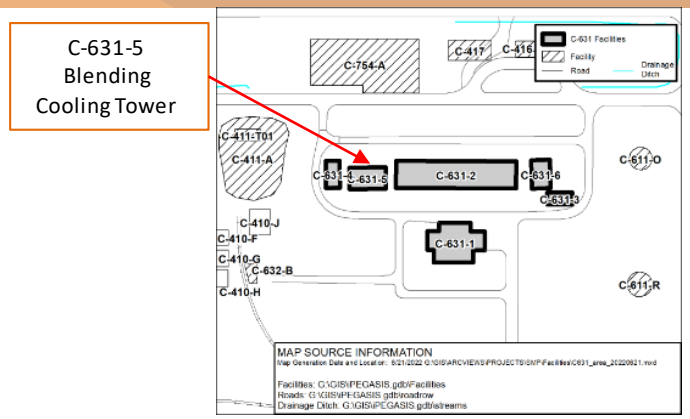
C-631-5 Blending Cooling Tower (West)

C-631-5 Blending Cooling Tower (West) - Construction History

- C-631-5 Blending Cooling Tower (West) facility is one of six facilities located in SWMU 86.

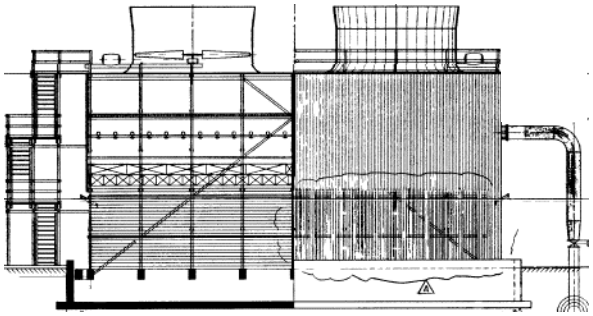
- The facility was constructed in 1975/1976.

- The facility is a wood frame structure (approximately 32 ft tall) resting on an 8-inch thick poured concrete slab; a deck roof with railing and fan shrouds; and exterior walls of corrugated panels.
  - Often referred to as one of the "CUP towers."
  - Supports two cooling tower cells.
    - Each cell has a fan and driving motor; total of 2 fans/driving motors.
    - Fans are enclosed by protective shrouds.
    - One riser serves each cooling tower cell; total of 2 risers.
    - The tower contains a water distribution system (including lateral flush lines), cold water fill (system of baffles), and mist eliminators.
    - Piping and sprinklers for fire protection throughout.
  - Cools RCW and returns it to the below grade collection basin.
    - Footprint of the basin is larger than the aboveground footprint of the cooling tower; extending approximately 349 ft east of C-631-5.
    - C-631-5 sits on top of a concrete slab with the basin running underneath the slab; as a result the basin is not open or visible.
    - Approximately 32 – 9-inch diameter holes are drilled into the slab allowing cooled RCW water to fall into the basin below.



C-631-5
Blending Cooling
Tower – North Side

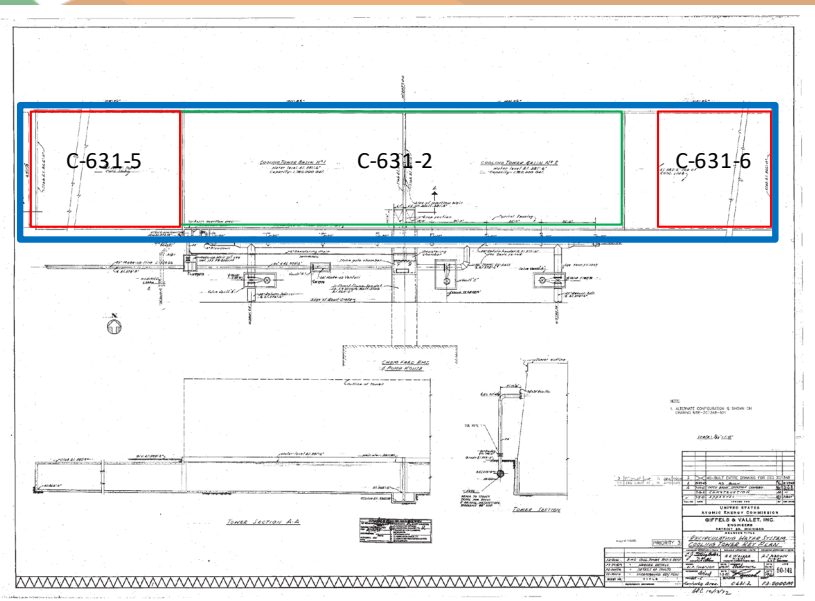
C-631-5 Facility Photo: 6/2022



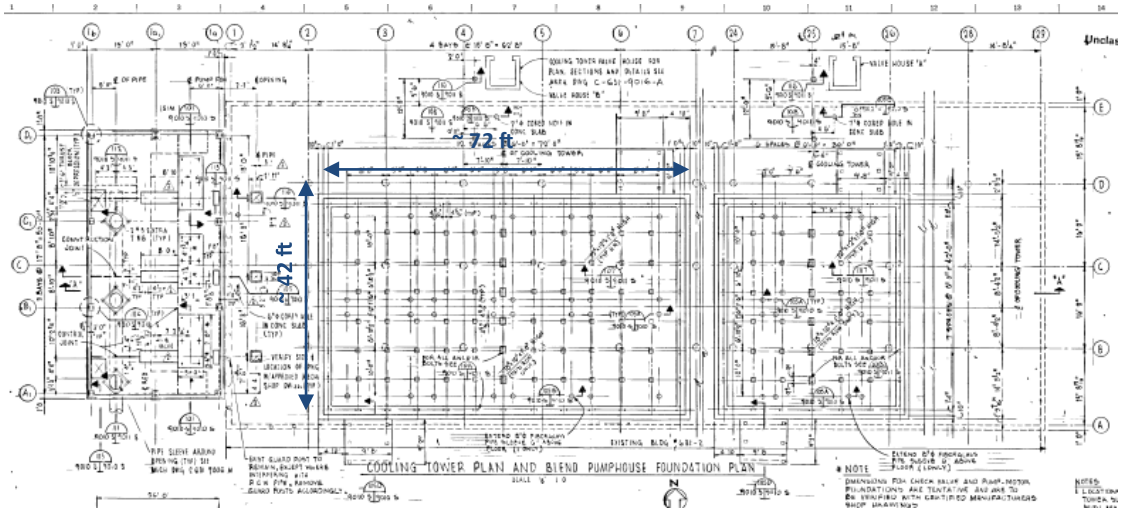
Internal Cooling Tower Components
Excerpt from Engineering Drawing HUC3403-001-01

C-631-5 Blending Cooling Tower (West) - Construction History

- C-631-5 Blending Cooling Tower (West) facility. (Continued)
  - South side infrastructure.
    - One exterior wood staircase; located on the south west end.
    - Two riser pipes; connect to the below grade piping system.
    - Electrical power supply to fans.
  - North side infrastructure.
    - One exterior wood staircase; located on the north east end.
    - One external concrete building; houses the fire sprinkler system.
  - Roof infrastructure.
    - Wood decking with railing that extends the circumference of the tower.
    - Support fans that are enclosed with protective shrouds.



Excerpt of Engineering Drawing of C-631-2 Layout; F3-2000M, dated 1951



Excerpt of Engineering Drawing of C-631 Blending Towers and Blending Tower Pump House Foundation Plan; C-631-9010-S, dated 1975

C-631-5 Blending Cooling Tower (West) - Construction History

- C-631-5 facility (aboveground structure) is approximately 3,024 ft^2; measuring ~ 42 ft x ~ 72 ft.
  - Collection basin measuring ~109 ft x ~65 ft x ~15 ft.
    - This basin is part of the larger basin footprint that runs underneath the majority of the C-631 Cooling Tower and has an overall measurement of ~458 ft x ~65 ft x ~15 ft. (Note: The portion of the basin under the C-631-2 main cooling tower contains the influent flume that connects the cooling tower basin to the C-631-1 pump house.)
  - One external concrete building measuring ~6 ft 8 inches x ~6 ft 8 inches x ~9 ft.
    - Houses the fire sprinkler system.
    - Located within footprint of the blending cooling tower.
  - B-Loop Return to blending tower vault measuring ~7 ft 6 inches x ~10 ft 6 inches x ~11 ft 6 inches.
    - While installed and associated with the C-631-5 blending tower, the vault is located within footprint of the C-631-2 main cooling tower.
    - Contained a sump measuring ~18 inches in diameter x ~18 inches deep; drained to ground or back to basin.

9-inch Diameter Holes to Basin (Allows cooled RCW water to fall into the basin below)

C-631-5 Top of Basin Slab

C-631-5 Fire Sprinkler System

B-Loop Return to C-631-5 Blending Tower

C-631-5 Facility Photos: 6/2022

C-631-5 Blending Cooling Tower (West) - Operational History

- Blending cooling towers, along with blending pump houses, were constructed as part of the 1970s CIP/CUP in anticipation that the increase in enrichment capacity would result in an increase in process temperatures that would require additional cooling capacity.
  - Blending cooling towers were designed similar to the main cooling tower and provided additional cooling capacity.

- C-631-5 was originally built and operated as a blending cooling tower from its construction in 1975/1976 to 2013.
  - Often referred to as one of the "CUP cooling towers."
  - Heated RCW from the C-331 process building, C-310, C-315, C-340, C-410, C-420, C-620, 12 condensers in the C-333 process building, C-531 switchyard (synchronous condensers), and C-532 Relay House was distributed through various sections of the blending cooling tower and released via evaporation; cooled RCW was then collected into the cooling tower basin where it then flowed by gravity via a flume into the wet well located underneath the C-631-1 pump house.

C-631-5 Blending Cooling Tower – South Side

C-631-5 Blending Cooling Tower – North Side

C-631-5 Facility Photos: 6/2022

C-631-5 Blending Cooling Tower (West) - Operational History

- Brown rot fungi growth was a problem for the blending cooling towers even though they were constructed with treated redwood.
  - All cell plenum chambers, tower deck, outer sidewalls, and tower tops were treated periodically with one of two types of fungicide solutions:
    - Sodium pentachlorophenate.
    - Double diffusion method – first spraying with a solution of zinc sulphate and arsenic acid followed by a second spraying with a solution of sodium bichromate.
  - Fungicide treatment was discontinued in 1987.

- In 1979, a cooling tower drift study was conducted to determine the impact of chromium disposition from the cooling towers.
  - Vegetation survey provided evidence of long-term transport and disposition of chromium to terrestrial ecosystem components.
    - Decrease in concentration with distance; most disposition is confined to DOE property.
  - Chromium deposited by drift to soils or lost to soils from vegetation does not accumulate significantly beyond 200 meters from the towers
    - Soil chromium is the less soluble and less biologically active oxidation state (Cr+3).

C-631-5 North Side – Looking West

C-631-5 South Side – Riser No. 11

C-631-5 Facility Photos: 6/2022

C-631-5 Blending Cooling Tower (West) - Operational History

- In 1981, RCW sprinkler alarms were installed.
- USEC leased the facility in the early 1990s and continued to use C-631-5 as a blending cooling tower until enrichment operations ceased at C-331.
- From 2008-2010 the CUP cooling towers underwent refurbishment.
  - Refurbishment included the replacement of selected structure and decking materials. (Note: Mechanical repairs to motors, gear boxes, etc., also occurred over the years of operation.)
- In 2013, C-631-5 was shutdown, along with its associated pump house. [Note: One pump in C-631-1 continued to serve as ancillary support to C-620 and the HPFWS until 2021].
  - The basin and influent flume have not been drained and remain full of water; draining has not occurred in order to prevent hydrostatic pressure changes that could cause collapse or floating of the subsurface structure.
- C-631-5 transitioned from USEC to DOE in 2014.

C-631-5 North Stairs

C-631-5 – West Side

C-631-5 – South Side and No. 10 and No. 11 Risers

C-631-5 Facility Photos: 6/2022

C-631-5 Blending Cooling Tower (West) - Current Status

- Walkdown inspection conducted in June 2022 and employee interviews confirmed no unusual conditions.
  - Both ACM (e.g., transite siding) and lead-based paints are known to be present.
  - Historical use of sodium pentachlorophenate; zinc sulphate; arsenic acid; and sodium bichromate for fungicide treatment of wood.
  - One external concrete building; houses the fire sprinkler system.
  - Not used for radiological storage; no radiological postings present.
  - No GSA or SAA.
  - Basin located beneath the C-631-5 blending cooling tower is associated with the main basin (basin remains full of water).
    - Contains five pressure release valves and two drop down areas that connect to an influent flume.
    - Houses an influent flume that exits at the bottom of the basin of the cooling tower (influent flume remains full of water).
    - Chlorine, sulfuric acid, and corrosion inhibitors (including chromate) were routinely fed into the RCW system via the C-631-1 wet well and would be present in the basin.
    - Historical chromated water leaks have occurred.
  - No known chemical spills except for those associated with the basin (e.g., chromated water leaks).
  - Vault associated with C-631-5 (B-Loop Return) is located within the footprint of the main cooling tower.

C-631-5 – Structural Frame

C-631-5 Electric Supply to Fans

C-631-5 Sprinkler

C-631-5 Basin Top – Looking East

C-631-5 Facility Photos: 6/2022

C-631-5 Blending Cooling Tower (West) - Environmental Impacts

- No information to indicate a release or threatened release of a hazardous substance that would require a CERCLA evaluation for a potential response action for demolition of the aboveground structure to protect future public health or welfare or the environment.
  - C-631-5 was exclusively operated as a blending cooling tower; cooling heated RCW from the C-331 process building, C-310, C-315, C-340, C-410, C-420, C-620, 12 condensers in the C-333 process building, C-531 switchyard (synchronous condensers), and C-532 Relay House from its construction in 1975/1976 to 2013.
  - Building materials used for construction could contain lead-based paints and ACM (e.g., corrugated transite siding).
    - Because the C-631-5 blending cooling tower was not completely refurbished; chemicals used for fungicide treatment in 1987 may still be of concern.
    - In 1992/1993, the RCW system was converted from a chromate system to a phosphate system.
  - Building debris generated from demolition of the aboveground structures can be properly managed using standard demolition and waste management practices.

- Process knowledge and employee interviews indicate that the historical construction and system processes at C-631-5 involved equipment and chemicals that could have the potential to pose a release threat to the basin and underlying soils (including the surrounding area associated with the basin/vaults). (See slide 6 for SWMU 86 details.)
  - Chromated water releases and airborne dispersion of chromium have occurred; making the underlying soils and surrounding area suspect for potential chromium contamination.
  - Five pressure release valves are located along the bottom of the basin floor.
  - Basin (currently full of water) is connected to the C-631-1 pump house via an influent flume (currently full of water).
    - Chlorine, sulfuric acid, and corrosion inhibitors (including chromate) were routinely fed into the RCW system via the C-631-1 wet well and would be present in the basin.
  - One of the nine vaults located within the footprint of the main cooling tower is associated with C-631-5; this vault contains a sump that drained or potentially drained to the surrounding soils.

C-631-5 Blending Cooling Tower (West) - Conclusion and Recommendations

- Walkdown inspection of the facility, 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 structure.
  - Deactivation will include removal of any accessible loose items being stored and certain equipment (e.g., risers, fans, fan motors, and shrouds, etc.) (to the extent practicable) prior to demolition.
  - Any floor drains will be delineated, documented, and isolated prior to demolition.
  - An evaluation will be made to determine if any measures may be appropriate to stabilize and/or isolate the basin (or portions thereof) from the main floor of the cooling tower prior to demolition. [Note: Measures other than mechanical isolation (one example of a measure other than mechanical isolation would be the addition of flowable fill) will require additional consultation with EPA and Kentucky.]
  - Water from the basin and influent flume will be evaluated for removal and proper disposal as part of deactivation and/or predemolition activities. (Note: Because the basin and influent flume are part of the underlying slab and soils that constitutes the SWMU, a SWMU notification, along with a SAR revision, will be performed documenting removal and disposal of the water associated with deactivation and/or predemolition activities.)

- Pending completion of deactivation and availability of funding, proceeding with demolition and disposal of the C-631-5 facility (aboveground structure) outside of the FFA/CERCLA process, contingent upon the fact that no additional changes have occurred that would affect the CERCLA determination of the facility prior to demolition, is recommended.

- All applicable laws, regulations, and DOE procedures/protocols will be followed to ensure the demolition and disposal of the aboveground structure occurs in a safe, compliant manner, including conducting any additional radiological characterization through confirmation radiological surveys (as necessary) to support demolition and waste disposition.

C-631-5 Blending Cooling Tower (West) - Conclusion and Recommendations

- Based on the construction and historical use at C-631-5, demolition and disposal of the aboveground structure for C-631-5 is recommended to be conducted outside of the FFA/CERCLA process.

- As part of the demolition of the aboveground structure, the appropriate BMPs will be evaluated and implemented (as needed) to prevent/minimize the pooling and/or migration of storm water that may come into contact with any contamination that may exist on the pad/subsurface structure(s). For example, the following BMPs will be implemented as necessary:
  - Radiological surveying will occur following demolition.
  - Decontamination and/or application of fixatives and/or barriers to contaminated surfaces above regulatory posting limits.
  - Isolation measures and other types of barriers to minimize and/or control runoff/pooling of contaminated storm water [e.g., seal inlets to drains/sumps/subsurface structure(s)].

- Removal of the C-631-5 facility from the Facility D&D OU will be documented in the appropriate annual SMP revision.

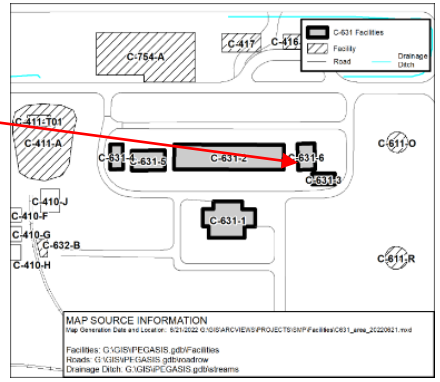
- Based on the construction and historical use at C-631-5, it is recommended that the underlying slab and soils (including surrounding soils within the C-631-5 footprint) undergo further CERCLA evaluation as part of Soils and Slabs OU as currently identified in Appendix 4 of the SMP.
  - The SAR for SWMU 86 will be updated to clarify that the C-631-5 underlying slab and soils (including surrounding soils within the C-631-5 footprint) constitutes the SWMU will undergo a remedial field investigation as part of the Soils and Slabs OU.
  - Consideration will be given to coordinate the timing for issuance and finalization of a revised SAR for SWMU 86 that includes updated information on C-631-5 prior to removal of the aboveground structure.

C-631-6 Blending Cooling Tower (East)

C-631-6 Blending Cooling Tower (East)

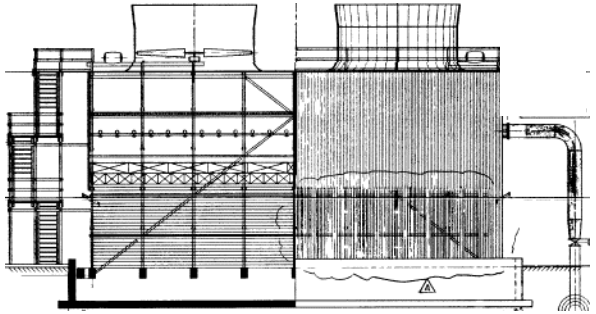
C-631-6 Blending Cooling Tower (East) - Construction History

- C-631-6 Blending Cooling Tower (East) facility is one of six facilities located in SWMU 86.
- The facility was constructed in 1975/1976.
- The facility is a wood frame structure (approximately 32 ft tall) resting on a 8-inch thick poured concrete slab; a deck roof with railing and fan shrouds; and exterior walls of corrugated panels.
  - Often referred to as one of the "CUP towers."
  - Supports one cooling tower cell.
    - The cell has one fan and one driving motor.
    - Fan is enclosed by a protective shroud.
    - One riser serves the cooling tower cell.
    - The tower contains a water distribution system (including lateral flush lines), cold water fill (system of baffles), and mist eliminators.
    - Piping and sprinklers for fire protection throughout.
  - Cools RCW and returns it to the below grade collection basin.
    - Footprint of the basin is larger than the aboveground footprint of the blending cooling tower; extending approximately 349 ft west of C-631-6.
    - C-631-6 sits on top of a concrete slab with the basin running underneath the slab; as a result the basin is not open or visible.
    - Approximately 18 – 9-inch diameter holes are drilled into the slab allowing cooled RCW water to fall into the basin below.



C-631-6
Blending Cooling
Tower – North Side

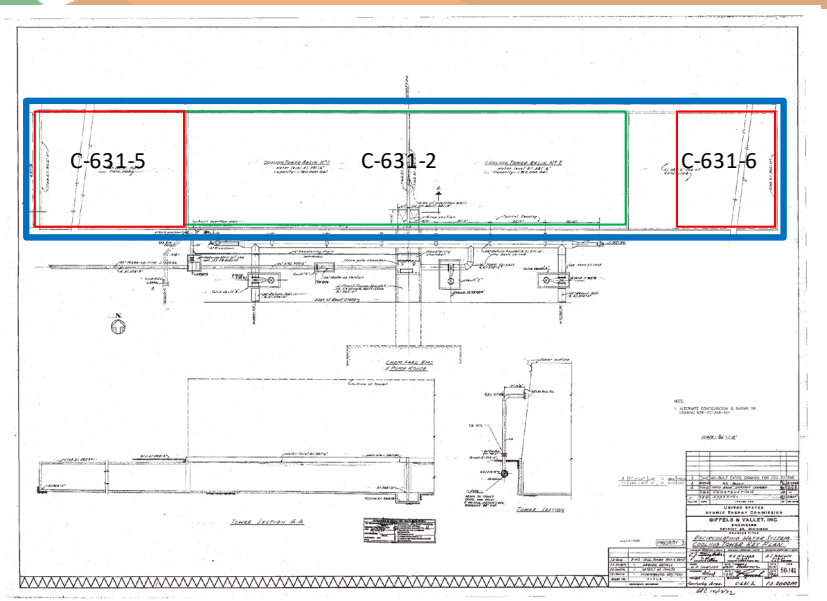
C-631-6 Facility Photos: 6/2022



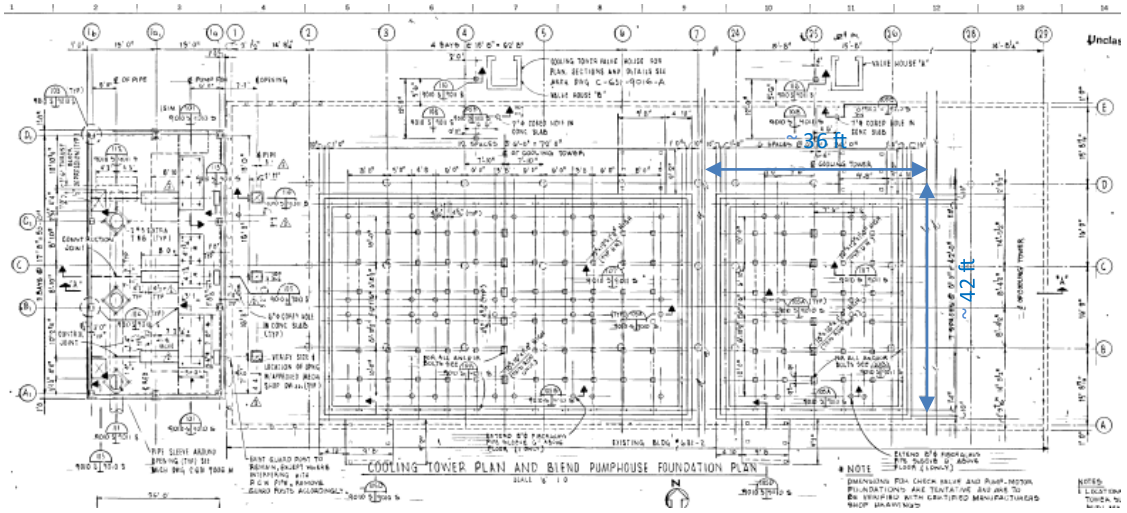
Internal Cooling Tower Components
Excerpt from Engineering Drawing
HUC3403-001-01

C-631-6 Blending Cooling Tower (East) - Construction History

- The facility is a wood frame structure… (Continued)
  - South side infrastructure.
    - One exterior wood staircase; located on the south west end.
    - One riser pipe; connects to the below grade piping system.
    - Electrical power supply to fan.
  - West side infrastructure.
    - One exterior wood staircase; located on the north east end.
    - One external concrete building; houses the fire sprinkler system.
  - Roof infrastructure.
    - Wood decking with railing that extends the circumference of the tower.
    - Support fan that is enclosed with a protective shroud.



Excerpt of Engineering Drawing of C-631-2 Layout; F3-2000M, dated 1951



Excerpt of Engineering Drawing of C-631 Blending Towers and Blending Tower Pump House Foundation Plan; C-631-9010-S, dated 1975

C-631-6 Blending Cooling Tower (East) - Construction History

- C-631-6 facility (aboveground structure) is approximately 1,512 ft^2; measuring ~42 ft x ~36 ft.
  - Collection basin measuring ~109 ft x ~65 ft x ~15 ft.
    - This basin is part of the larger basin footprint that runs underneath the majority of the C-631 Cooling Tower and has an overall measurement of ~458 ft x ~65 ft x ~15 ft. (Note: The portion of the basin under the C-631-2 main cooling tower contains the influent flume that connects the cooling tower basin to the C-631-1 pump house.)
  - One external concrete building measuring ~6 ft 8 inches x ~6 ft 8 inches x ~9 ft.
    - Houses the fire sprinkler system.
    - Located within footprint of the blending cooling tower.
  - A-Loop Return to blending tower vault measuring ~ 7 ft 6 inches x ~10 ft 3 inches x ~11 ft 6 inches.
    - While installed and associated with the C-631-6 blending tower, the vault is located within footprint of the C-631-2 main cooling tower.
    - Contained a sump measuring ~18 inches x ~18 inches x ~18 inches; drained to ground or back to basin.

C-631-6 - Top of Basin Slab

9-inch Diameter Holes to Basin (Allows cooled RCW water to fall into the basin below)

A-Loop Return Vault to C-631-6 Blending Tower

C-631-6 - Fire Sprinkler System

C-631-6 Facility Photos: 6/2022 and 8/2002

C-631-6 Blending Cooling Tower (East) - Operational History

- Blending cooling towers, along with blending pump houses, were constructed as part of the 1970s CIP/CUP in anticipation that the increase in enrichment capacity would result in an increase in process temperatures that would require additional cooling capability.
  - Blending cooling towers were designed similar to the main cooling tower and provided additional cooling capacity.

- C-631-6 was originally built and operated as a blending cooling tower from its construction in 1975/1976 to 2013.
  - Often referred to as one of the "CUP cooling towers."
  - Heated RCW from the C-331 process building, C-310, C-315, C-340, C-410, C-420, C-620, 12 condensers in the C-333 process building, C-531 switchyard (synchronous condensers), and C-532 Relay House was distributed through various sections of the blending cooling tower and released via evaporation; cooled RCW was then collected into the cooling tower basin where it then flowed by gravity via a flume into the wet well located underneath the C-631-1 pump house.

C-631-6 Blending Cooling Tower – North Side

C-631-6 Blending Cooling Tower - South Side

C-631-6 Facility Photos: 6/2022

C-631-6 Blending Cooling Tower (East) - Operational History

- Brown rot fungi growth was a problem for the blending cooling towers even though they were constructed with treated redwood.
  - All cell plenum chambers, tower deck, outer sidewalls, and tower tops were treated periodically with one of two types of fungicide solutions:
    - Sodium pentachlorophenate.
    - Double diffusion method – first spraying with a solution of zinc sulphate and arsenic acid followed by a second spraying with a solution of sodium bichromate.
  - Fungicide treatment was discontinued in 1987.

- In 1979, a cooling tower drift study was conducted to determine the impact of chromium dispersion from the cooling towers.
  - Vegetation survey provided evidence of long-term transport and disposition of chromium to terrestrial ecosystem components.
    - Decrease in concentration with distance; most disposition is confined to DOE property.
  - Chromium deposited by drift to soils or lost to soils from vegetation does not accumulate significantly beyond 200 meters from the towers
    - Soil chromium is the less soluble and less biologically active oxidation state (Cr+3).

C-631-6 – East Side

C-631-6 – West Side

C-631-6 Facility Photos: 6/2022

C-631-6 Blending Cooling Tower (East) - Operational History

- In 1981, RCW sprinkler alarms were installed.
- USEC leased the facility in the early 1990s and continued to use C-631-6 as a blending cooling tower until enrichment operations ceased at C-331.
- From 2008-2010 the CUP cooling towers underwent refurbishment.
  - Refurbishment included the replacement of selected structure and decking materials. (Note: Mechanical repairs to motors, gear boxes, etc., also occurred over the years of operation.)
- In 2013, C-631-6 was shutdown, along with its associated pump house. [Note: One pump in C-631-1 continued to serve as ancillary support to C-620 and the HPFWS until 2021].
  - The basin and influent flume have not been drained and remain full of water; draining has not occurred in order to prevent hydrostatic pressure changes that could cause collapse or floating of the subsurface structure.
- C-631-6 transitioned from USEC to DOE in 2014.

C-631-6 – South Side and No. 9 Riser

C-631-6 – East Side Looking Toward C-631-3

C-631-6 – North Stairway

C-631-6 Facility Photos: 6/2022

C-631-6 Blending Cooling Tower (East) - Current Status

- Walkdown inspection conducted in June 2022 and employee interviews confirmed no unusual conditions.
  - Both ACM (e.g., transite siding) and lead-based paints are known to be present.
  - Historical use of sodium pentachlorophenate; zinc sulphate; arsenic acid; and sodium bichromate for fungicide treatment of wood.
  - One external concrete building; houses the fire sprinkler system.
  - Not used for radiological storage; no radiological postings present.
  - No GSA or SAA.
  - Basin located beneath the C-631-6 blending cooling tower is associated with the main basin (basin remains full of water).
    - Contains five pressure release valves and two drop down areas that connect to an influent flume.
    - Houses an influent flume that exits at the bottom of the basin of the cooling tower (influent full remains full of water).
    - Chlorine, sulfuric acid, and corrosion inhibitors (including chromate) were routinely fed into the RCW system via the C-631-1 wet well and would be present in the basin.
    - Historical chromated water leaks have occurred.
  - No known chemical spills except for those associated with the basin (e.g., chromated water leaks).
  - Vault associated with C-631-6 (A-Loop Return) is located within the footprint of the main cooling tower.

C-631-6 – Structural Frame

C-631-6 – Sprinkler

C-631-6 – South Stairway and Electrical Supply to Fan

C-636-1 Facility Photos: 6/2022 and 8/2002

C-631-6 Blending Cooling Tower (East) - Environmental Impacts

- No information to indicate a release or threatened release of a hazardous substance that would require a CERCLA evaluation for a potential response action for demolition of the aboveground structure to protect future public health or welfare or the environment.
  - C-631-6 was exclusively operated as a blending cooling tower; cooling heated RCW from the C-331 process building, C-310, C-315, C-340, C-410, C-420, C-620, 12 condensers in the C-333 process building, C-531 switchyard (synchronous condensers), and C-532 Relay House from its construction in 1975/1976 to 2013.
  - Building materials used for construction could contain lead-based paints and ACM (e.g., corrugated transite siding).
    - Because the C-631-6 blending cooling tower was not completely refurbished; chemicals used for fungicide treatment through 1987 may be of concern.
    - In 1992/1993, the RCW system was converted from a chromate system to a phosphate system.
  - Building debris generated from demolition of the aboveground structures can be properly managed using standard demolition and waste management practices.

- Process knowledge and employee interviews indicate that the historical construction and system processes at C-631-6 involved equipment and chemicals that could have the potential to pose a release threat to the basin and underlying soils (including the surrounding area associated with the basin/vaults). (See slide 6 for SWMU 86 details.)
  - Chromated water releases and airborne dispersion of chromium have occurred; making the underlying soils and surrounding area suspect for potential chromium contamination.
  - Five pressure release valves are located along the bottom of the basin floor.
  - Basin (currently full of water) is connected to the C-631-1 pump house via an influent flume (currently full of water).
    - Chlorine, sulfuric acid, and corrosion inhibitors (including chromate) were routinely fed into the RCW system via the C-631-1 wet well and would be present in the basin.
  - One of the nine vaults located within the footprint of the main cooling tower is associated with C-631-6; this vault contains a sump that drained or potentially drained to the surrounding soils.

C-631-6 Blending Cooling Tower (East) - Conclusion and Recommendations

- Walkdown inspection of the facility, 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 structure.
  - Deactivation will include removal of any accessible loose items being stored and certain equipment (e.g., risers, fans, fan motors, and shrouds, etc.) (to the extent practicable) prior to demolition.
  - Any floor drains will be delineated, documented, and isolated prior to demolition.
  - An evaluation will be made to determine if any measures may be appropriate to stabilize and/or isolate the basin (or portions thereof) from the main floor of the cooling tower prior to demolition. [Note: Measures other than mechanical isolation (one example of a measure other than mechanical isolation would be the addition of flowable fill) will require additional consultation with EPA and Kentucky.]
  - Water from the basin and influent flume will be evaluated for removal and proper disposal as part of deactivation and/or predemolition activities. (Note: Because the basin and influent flume are part of the underlying slab and soils that constitutes the SWMU, a SWMU notification, along with a SAR revision, will be performed documenting removal and disposal of the water associated with deactivation and/or predemolition activities.)

- Pending completion of deactivation and availability of funding, proceeding with demolition and disposal of the C-631-6 facility (aboveground structure) outside of the FFA/CERCLA process, contingent upon the fact that no additional changes have occurred that would affect the CERCLA determination of the facility prior to demolition, is recommended.

- All applicable laws, regulations, and DOE procedures/protocols will be followed to ensure the demolition and disposal of the aboveground structure occurs in a safe, compliant manner, including conducting any additional radiological characterization through confirmation radiological surveys (as necessary) to support demolition and waste disposition.

C-631-6 Blending Cooling Tower (East) - Conclusion and Recommendations

- Based on the construction and historical use at C-631-6, demolition and disposal of the aboveground structure for C-631-6 is recommended to be conducted outside of the FFA/CERCLA process.

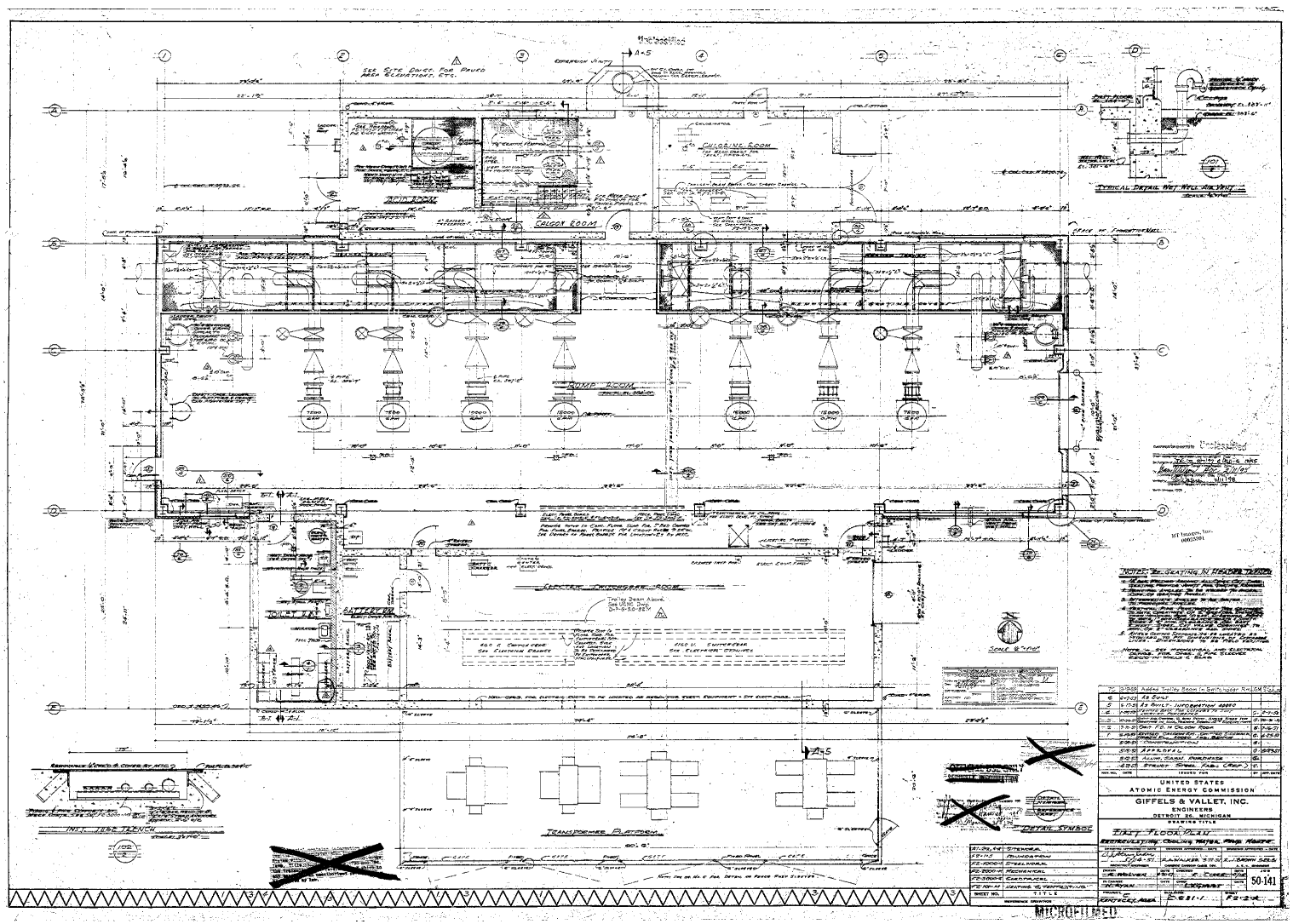
- As part of the demolition of the aboveground structure, the appropriate BMPs will be evaluated and implemented (as needed) to prevent/minimize the pooling and/or migration of storm water that may come into contact with any contamination that may exist on the pad/subsurface structure(s). For example, the following BMPs will be implemented as necessary:
  - Radiological surveying will occur following demolition.
  - Decontamination and/or application of fixatives and/or barriers to contaminated surfaces above regulatory posting limits.
  - Isolation measures and other types of barriers to minimize and/or control runoff/pooling of contaminated storm water [e.g., seal inlets to drains/sumps/subsurface structure(s)].

- Removal of the C-631-6 facility from the Facility D&D OU will be documented in the appropriate annual SMP revision.

- Based on the construction and historical use at C-631-6, it is recommended that the underlying slab and soils (including surrounding soils within the C-631-6 footprint) undergo further CERCLA evaluation as part of Soils and Slabs OU as currently identified in Appendix 4 of the SMP.
  - The SAR for SWMU 86 will be updated to clarify that the C-631-6 underlying slab and soils (including surrounding soils within the C-631-6 footprint) constitutes the SWMU and will undergo a remedial field investigation as part of the Soils and Slabs OU.
  - Consideration will be given to coordinate the timing for issuance and finalization of a revised SAR for SWMU 86 that includes updated information on C-631-6 prior to removal of the aboveground structure.

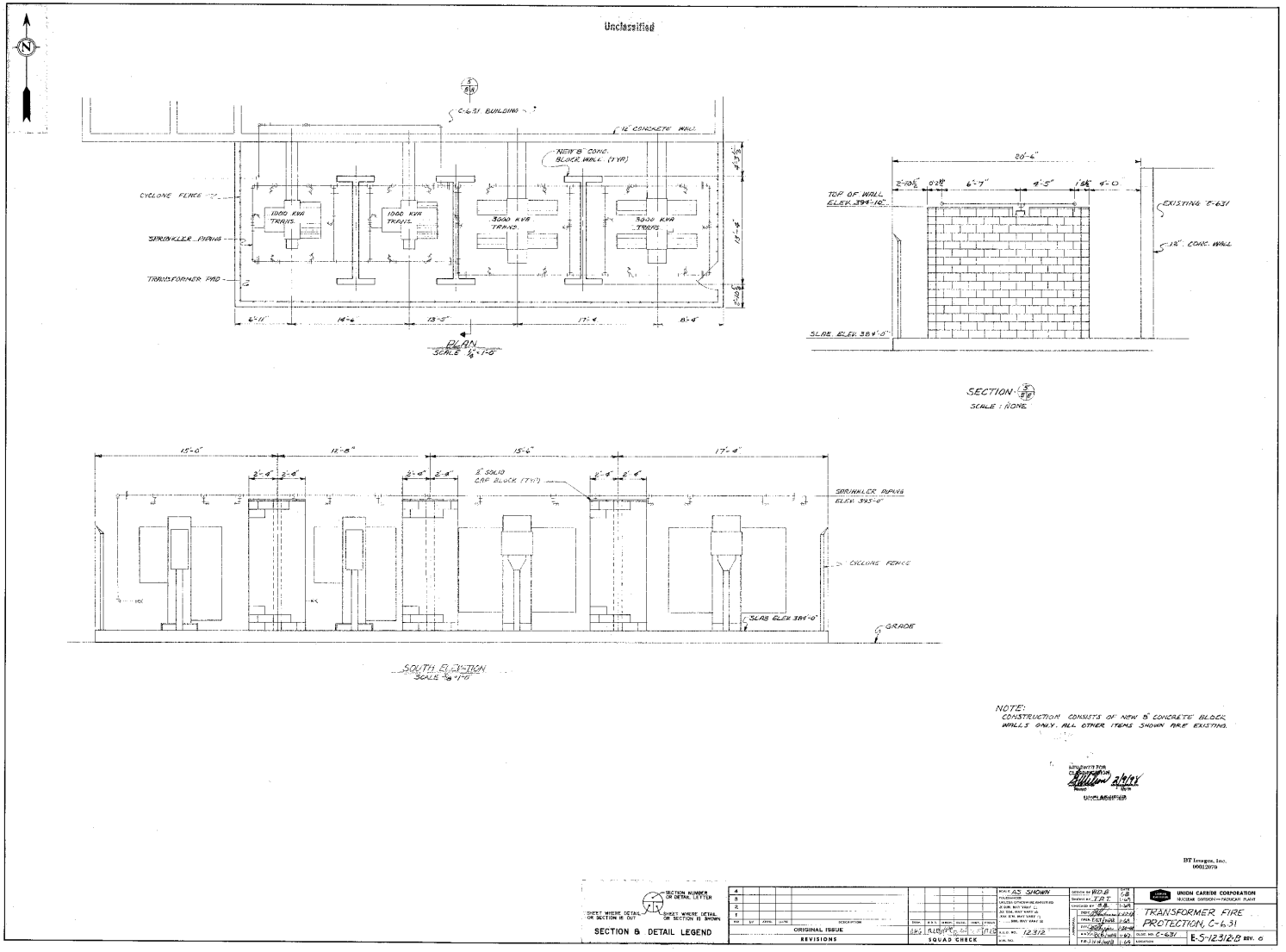
BACKUP INFORMATION

C-631-1 Engineering Drawings

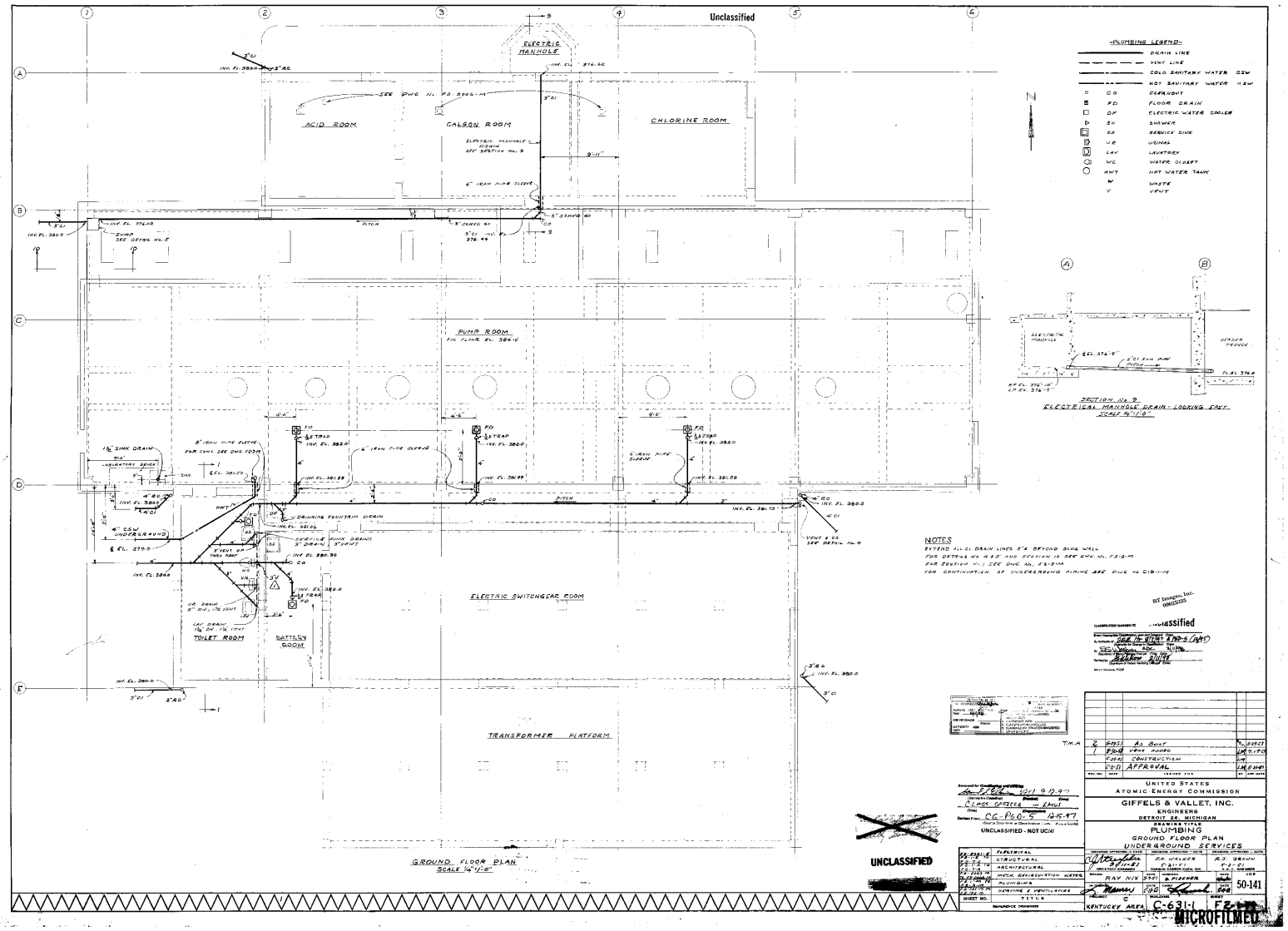


C-631-1; F2-2-A

C-631-1 Engineering Drawings

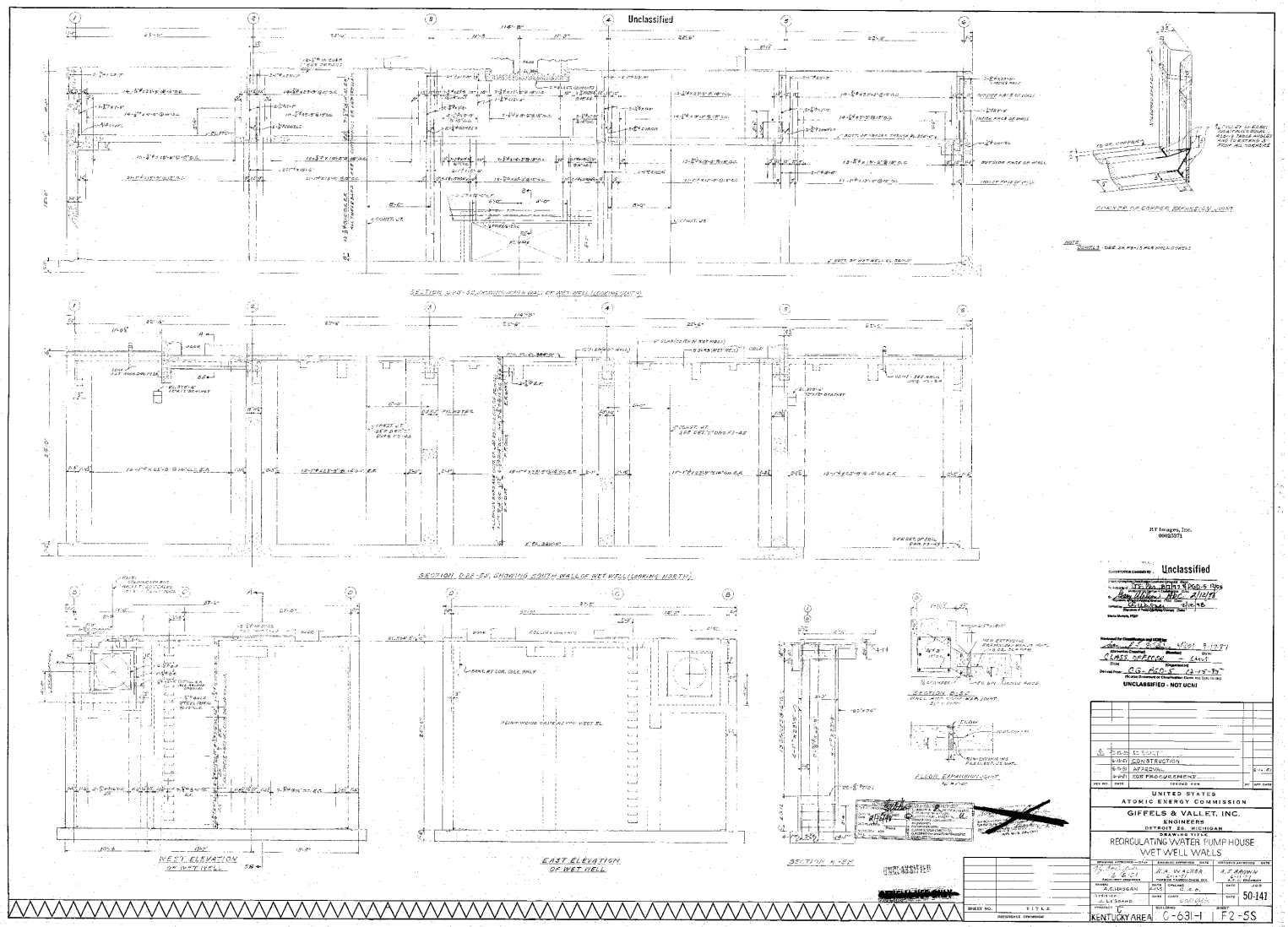


C-631-1 Engineering Drawings



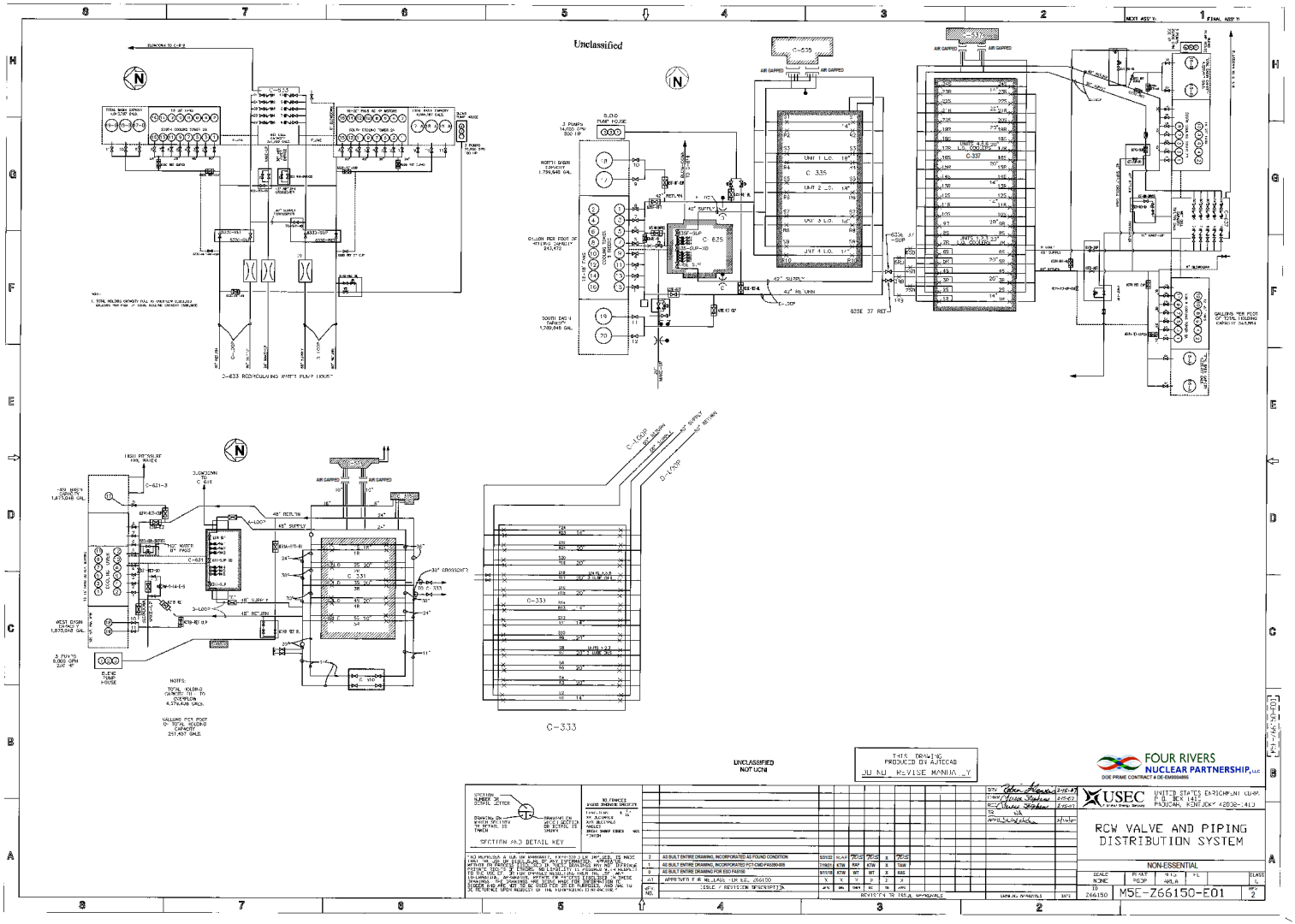
C-631-1, F2-1-M

C-631-1 Engineering Drawings



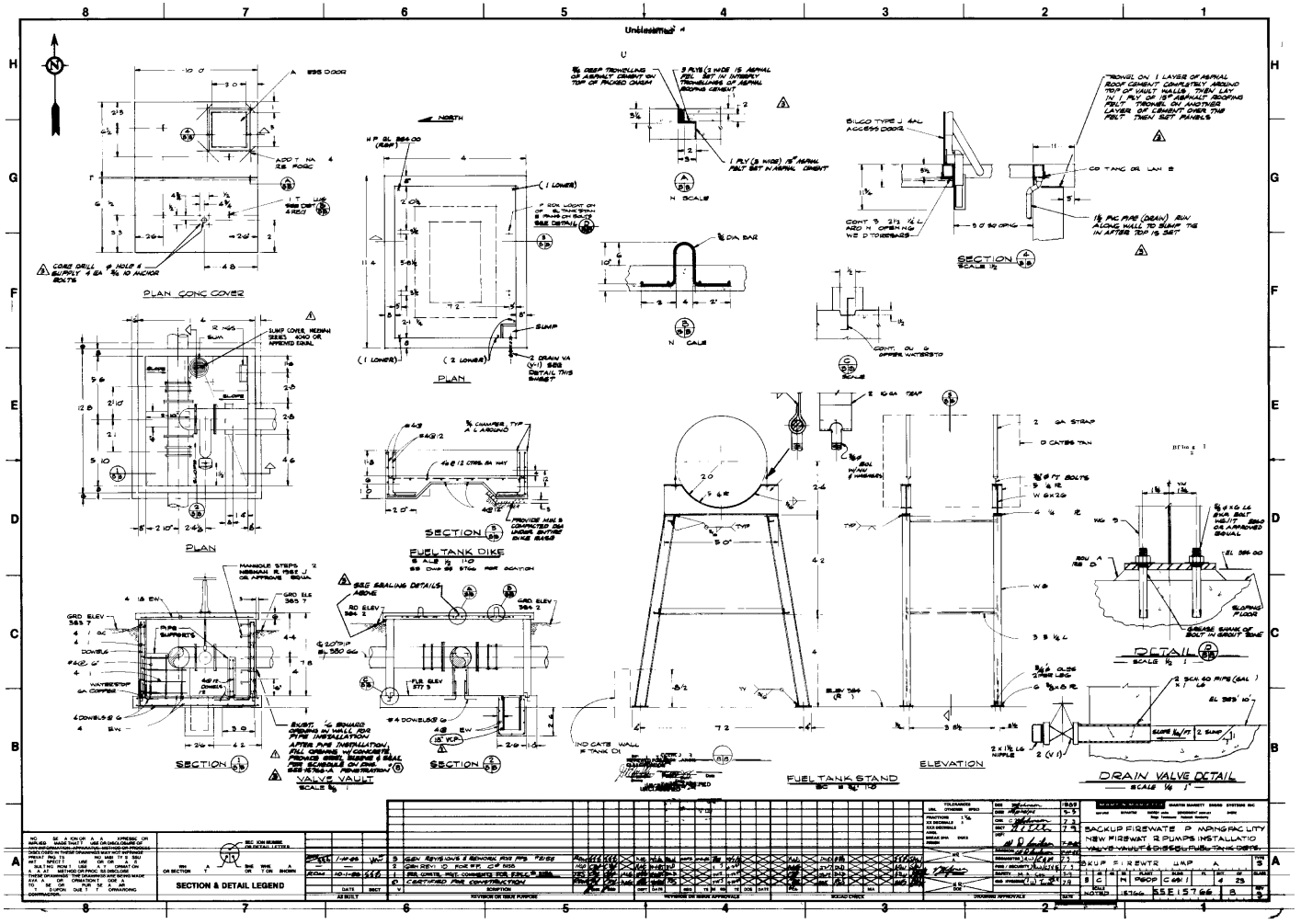
C-631-1; F2-5-S

C-631-1 Engineering Drawings



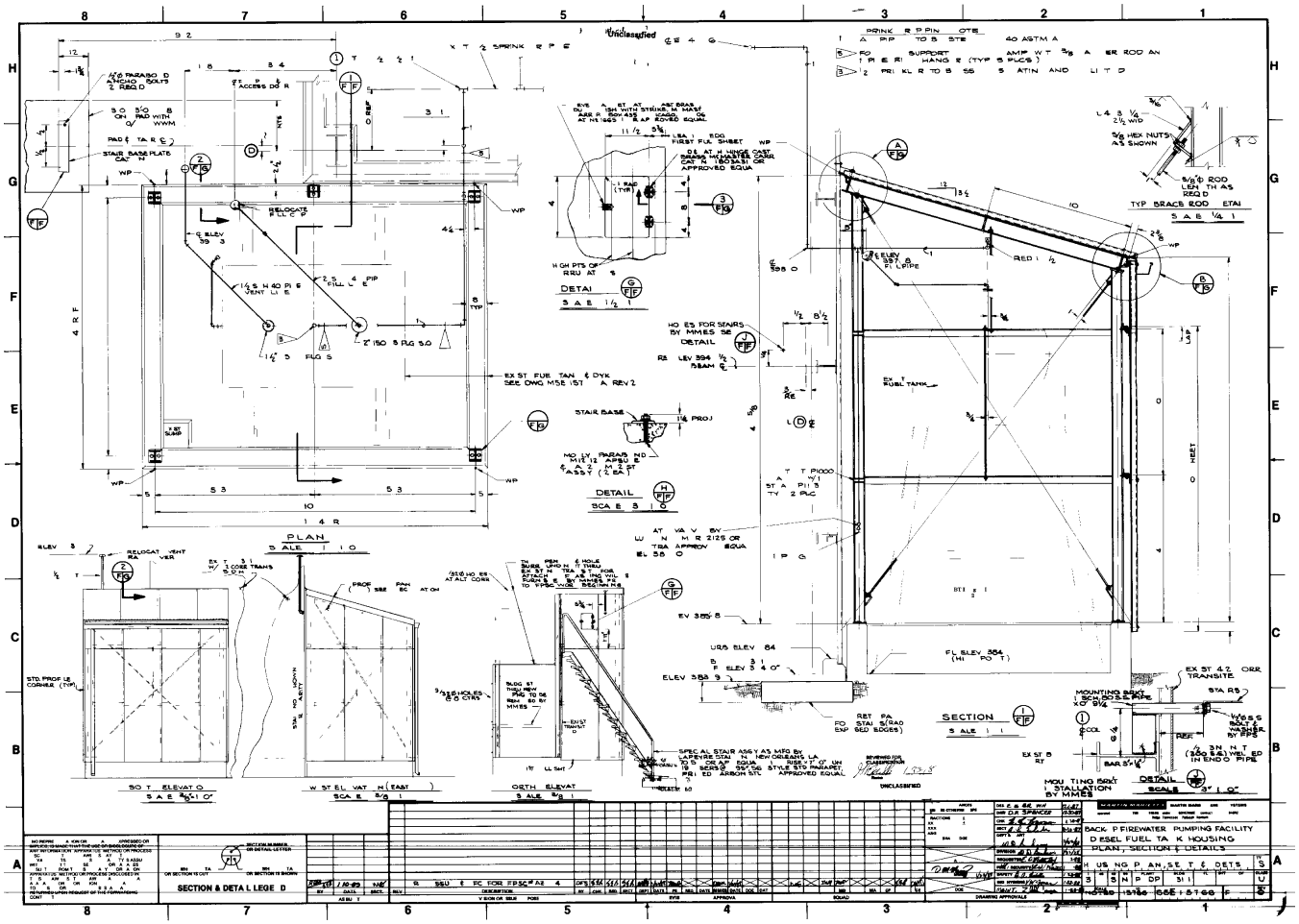
M5E-Z66150-E01, Rev 2

C-631-1 Engineering Drawings

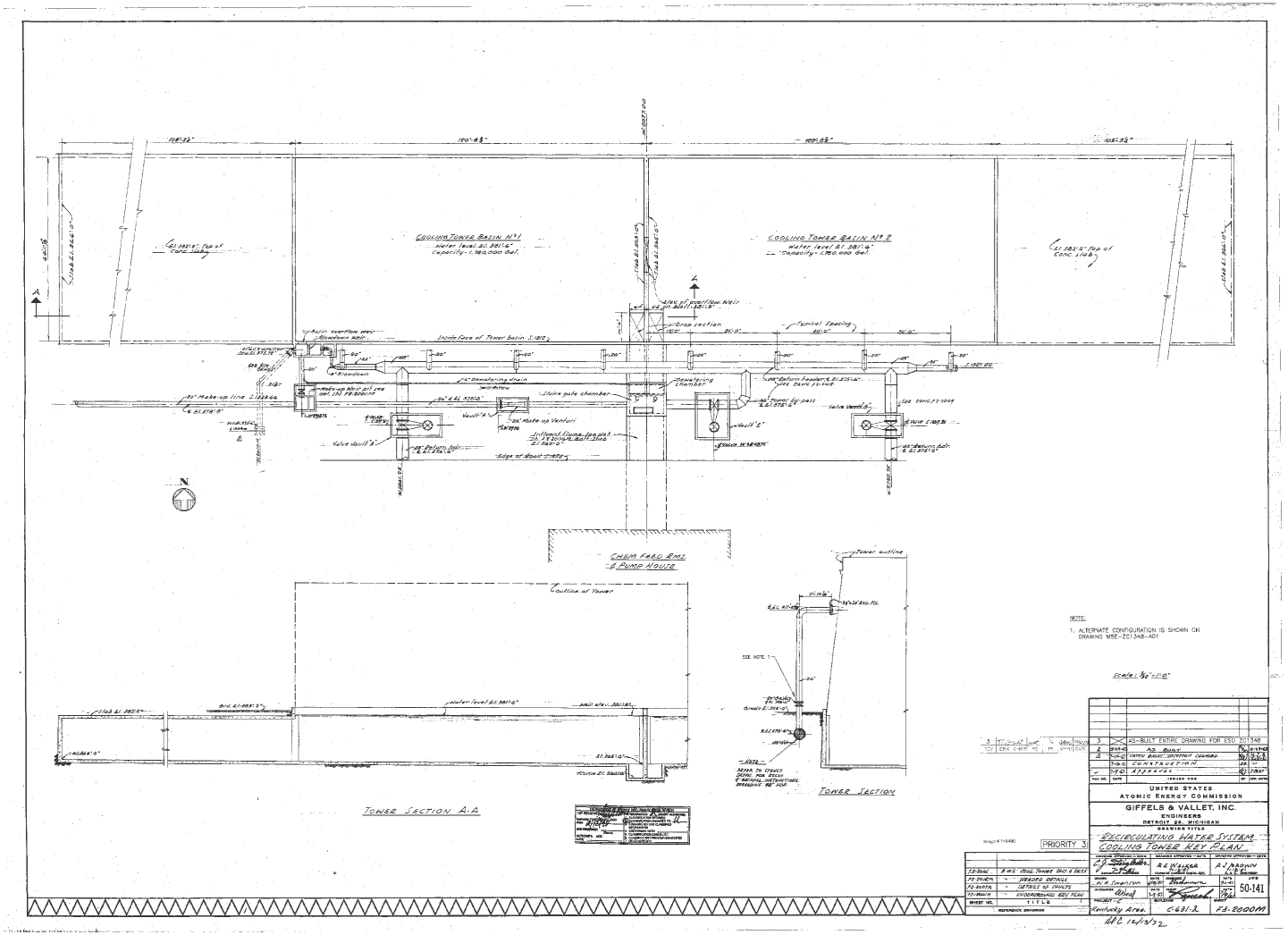


S5E 15766 B, Rev 3

C-631-1 Engineering Drawings

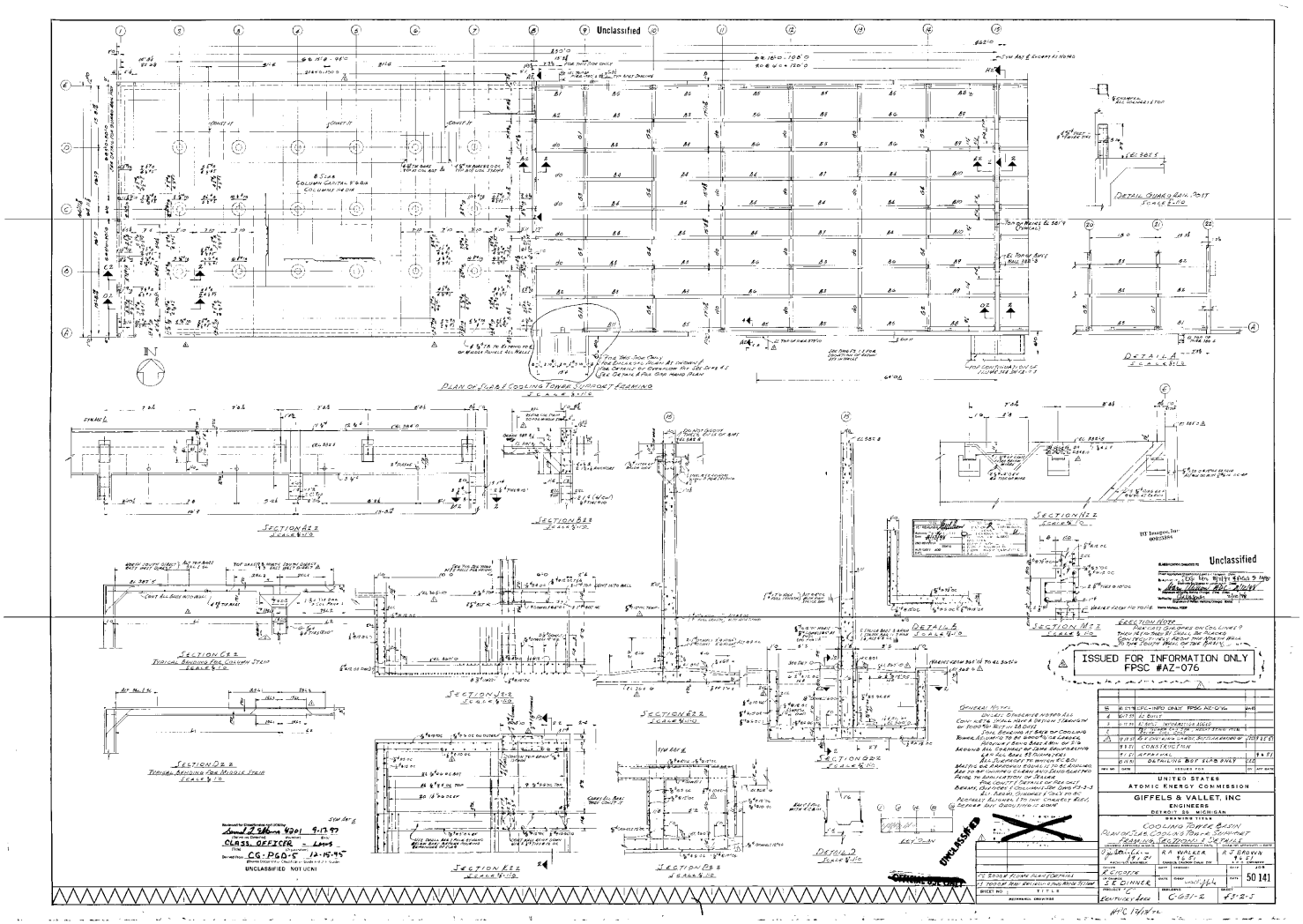


C-631-2 Engineering Drawings

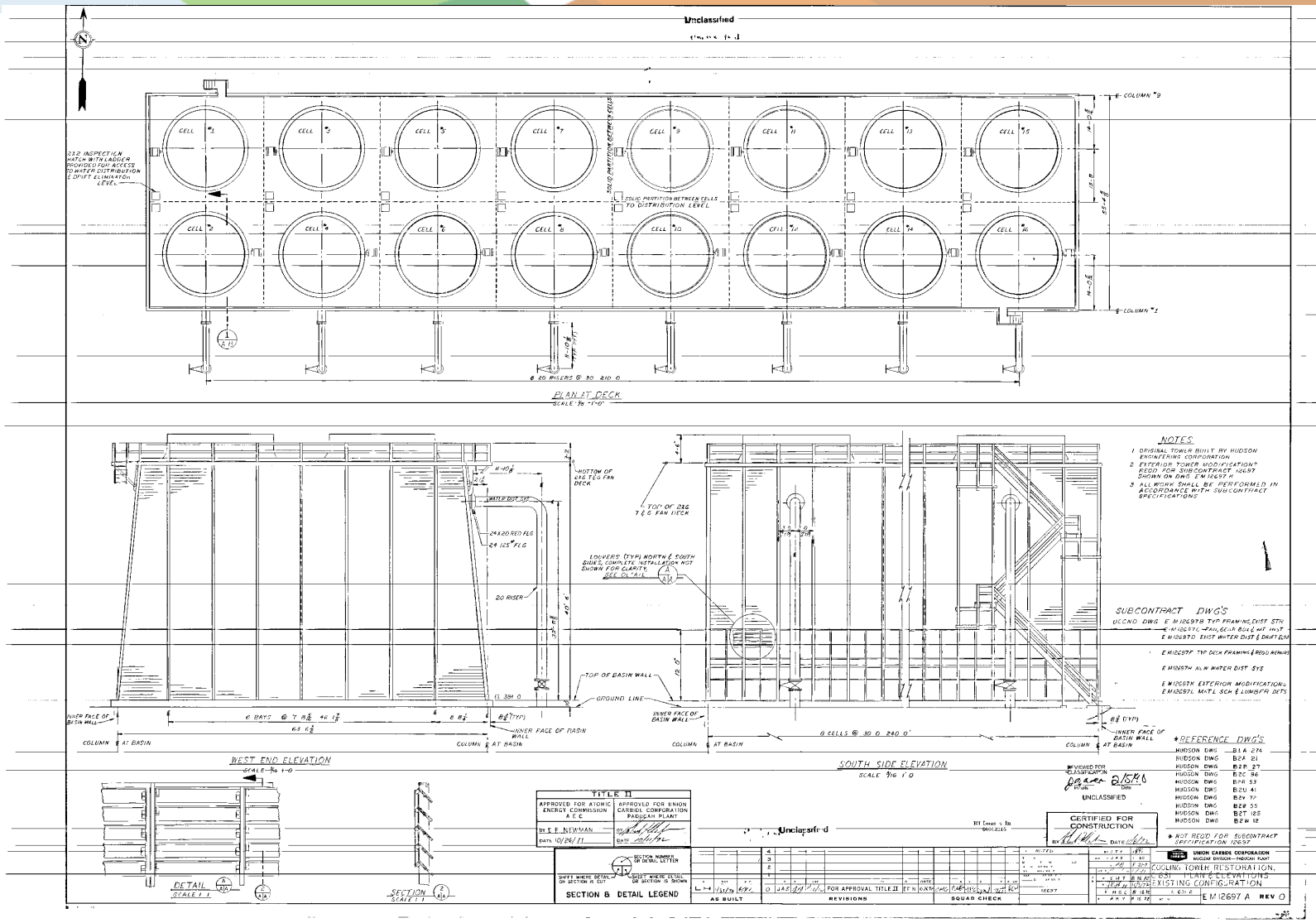


C-631-2; F3-2000-M

C-631-2 Engineering Drawings

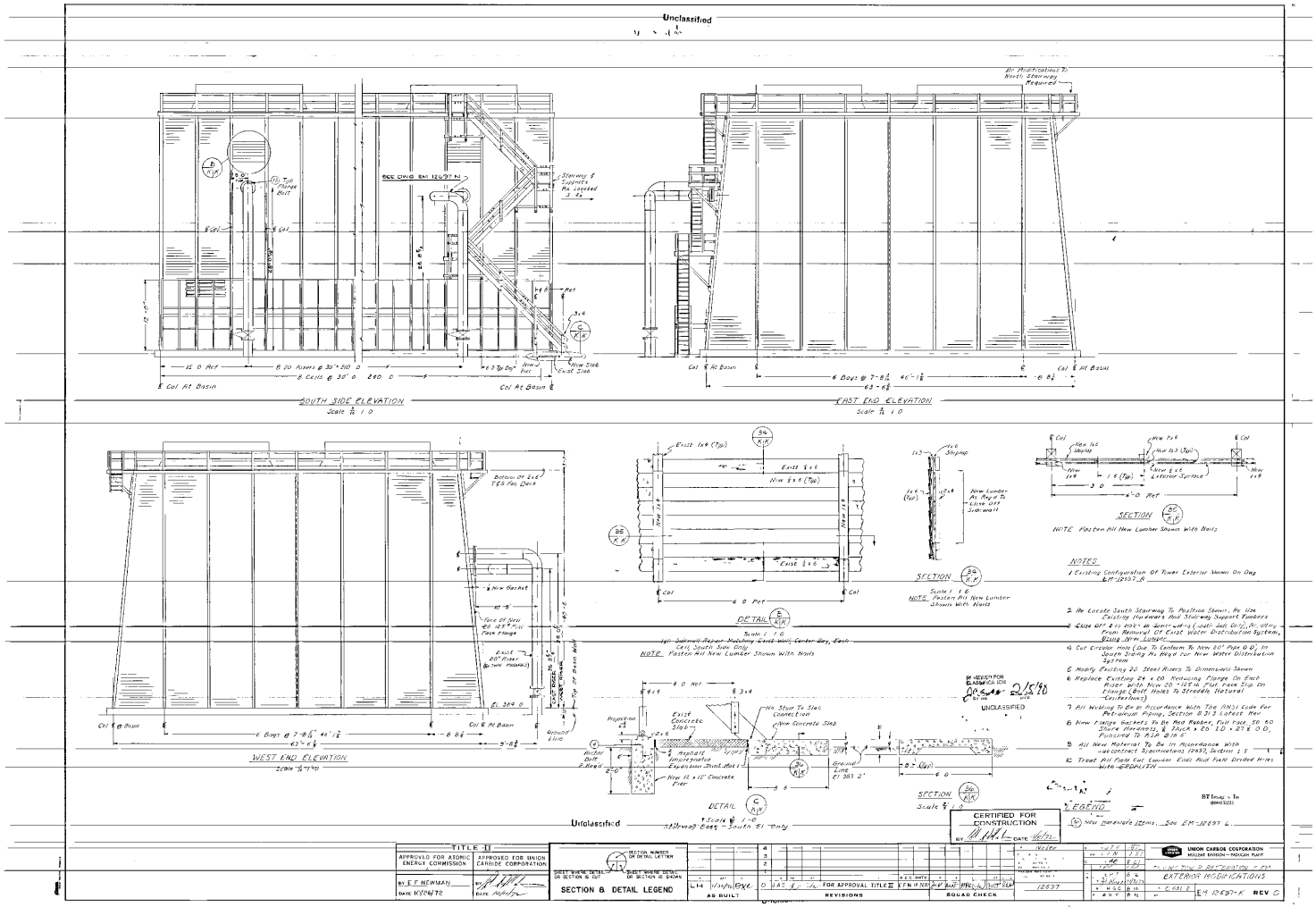


C-631-2 Engineering Drawings

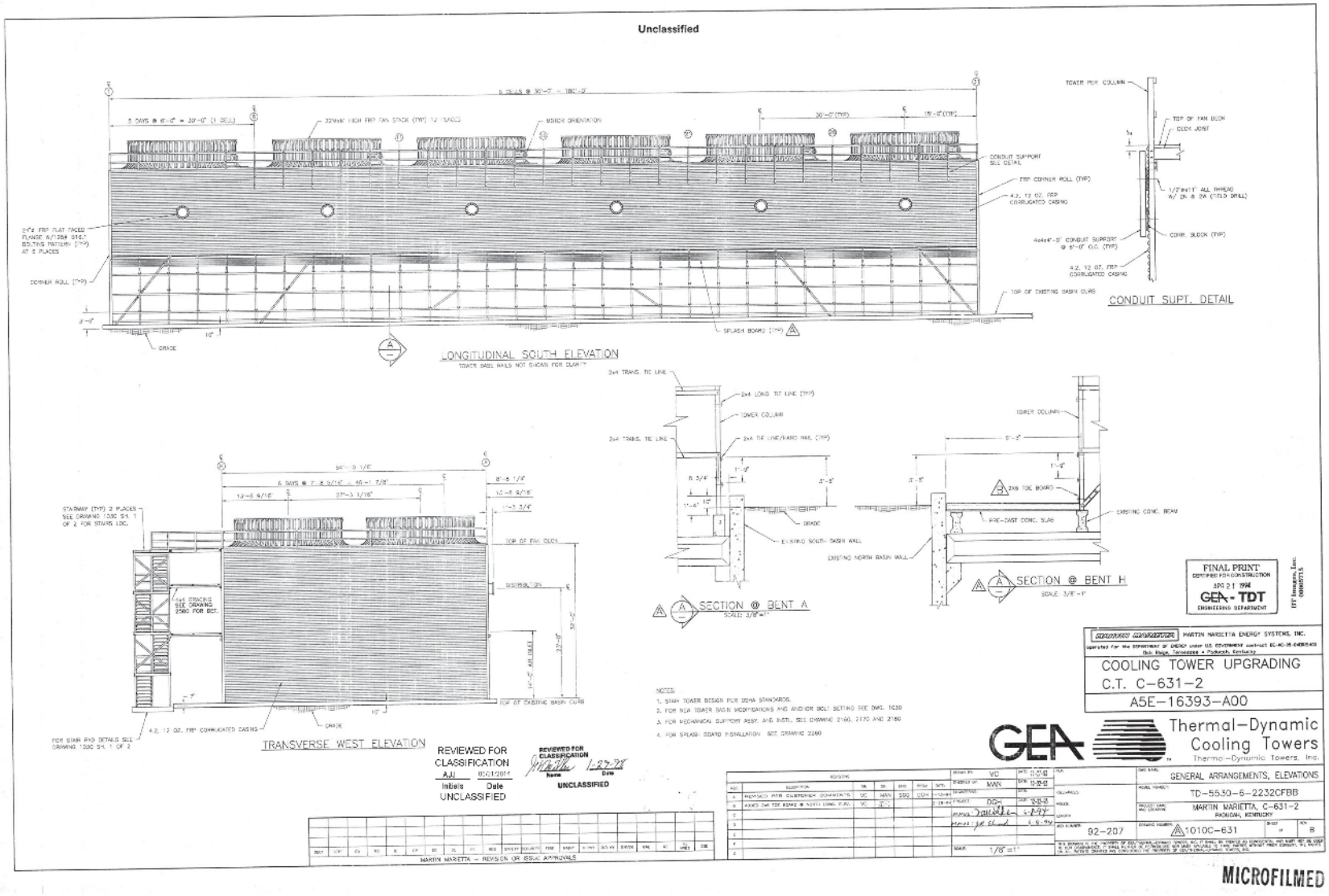


E-M-12697-A; Rev 0

C-631-2 Engineering Drawings

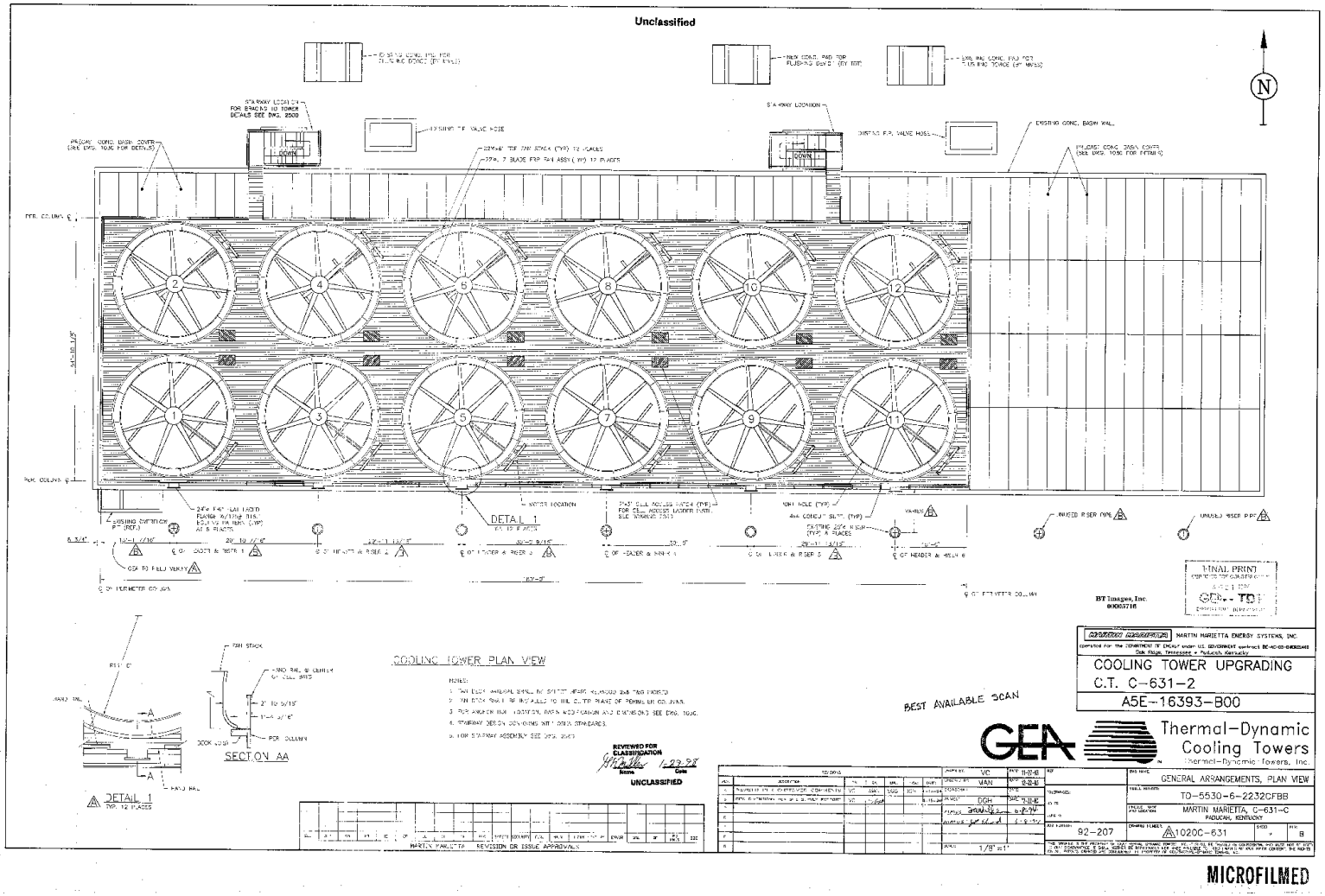


C-631-2 Engineering Drawings



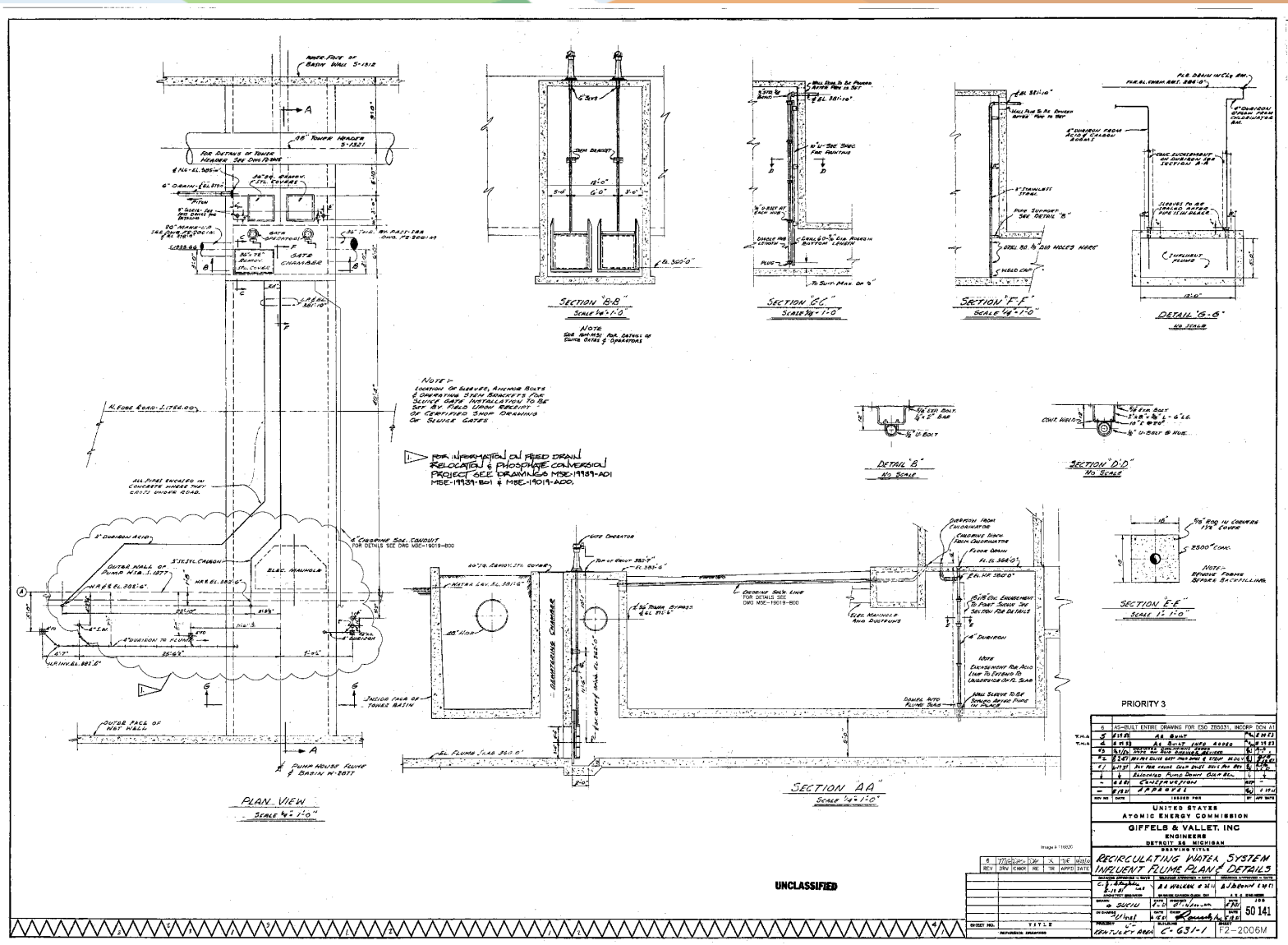
C-631-2; A5E-16393-A00(1010C)

C-631-2 Engineering Drawings



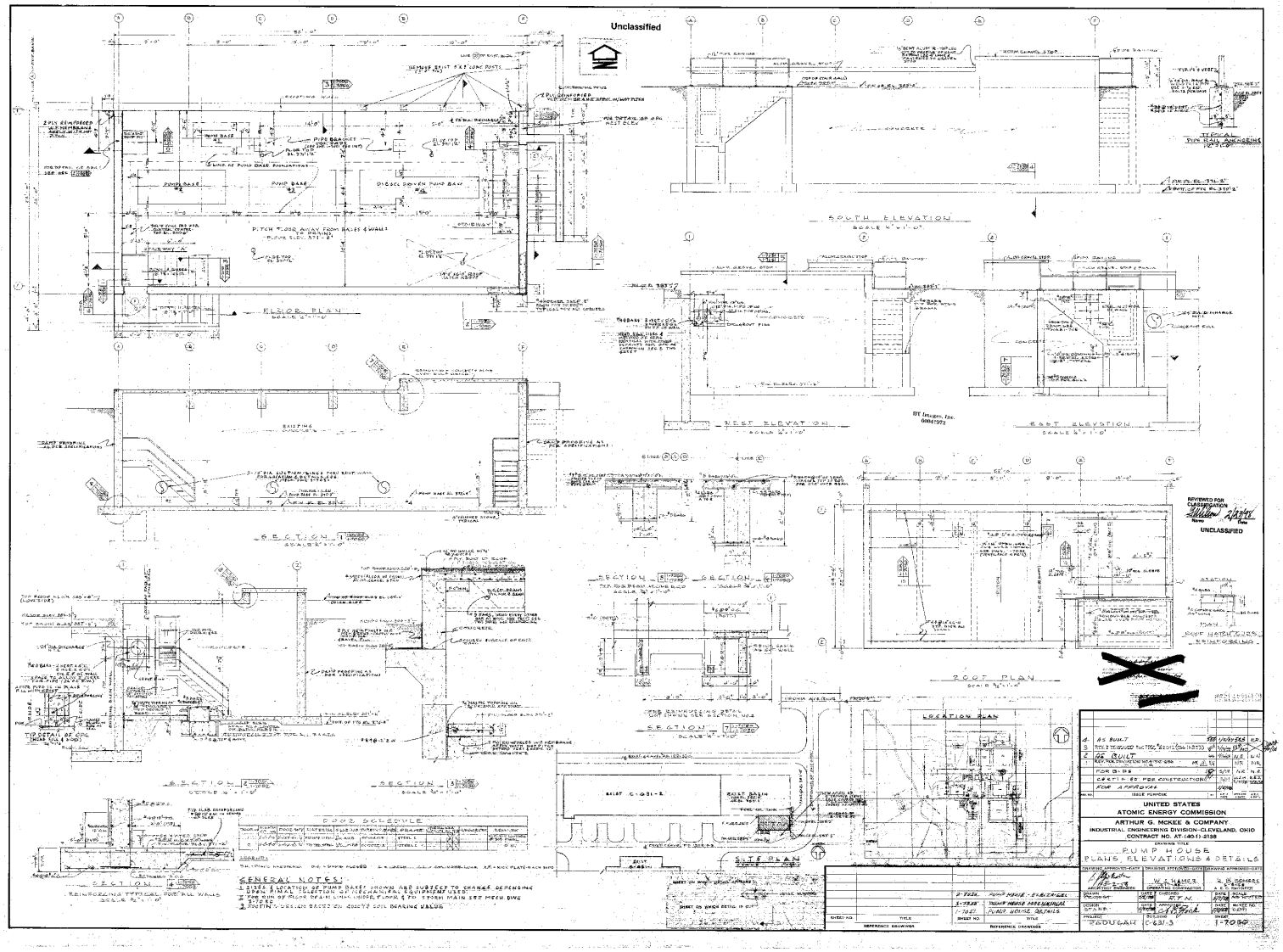
C-631-2; A5E-16393-B00(1020C)

C-631-2 Engineering Drawings



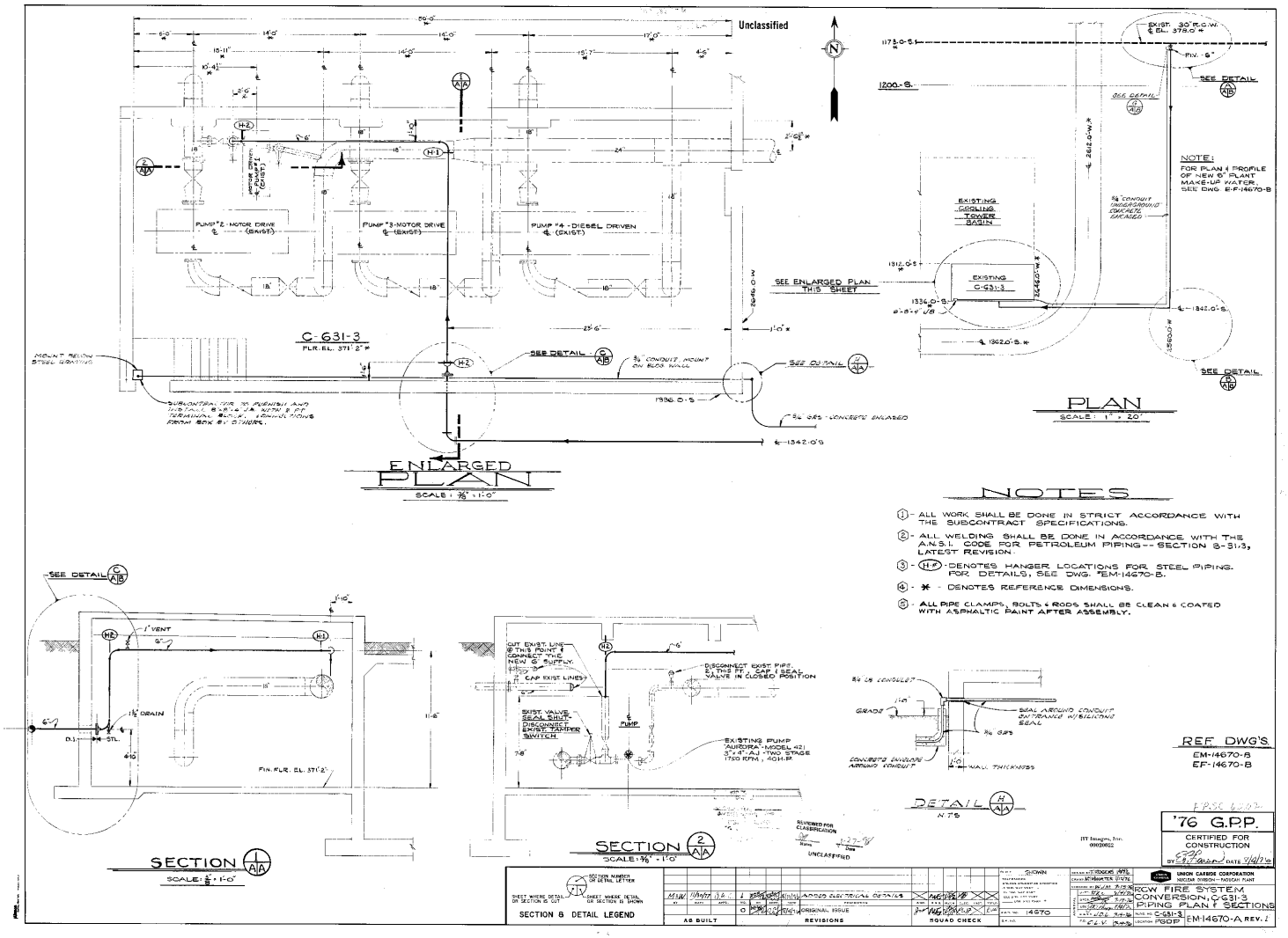
C-631-1; F2-2006M (Note: Used when discussing C-631-2)

C-631-3 Engineering Drawings



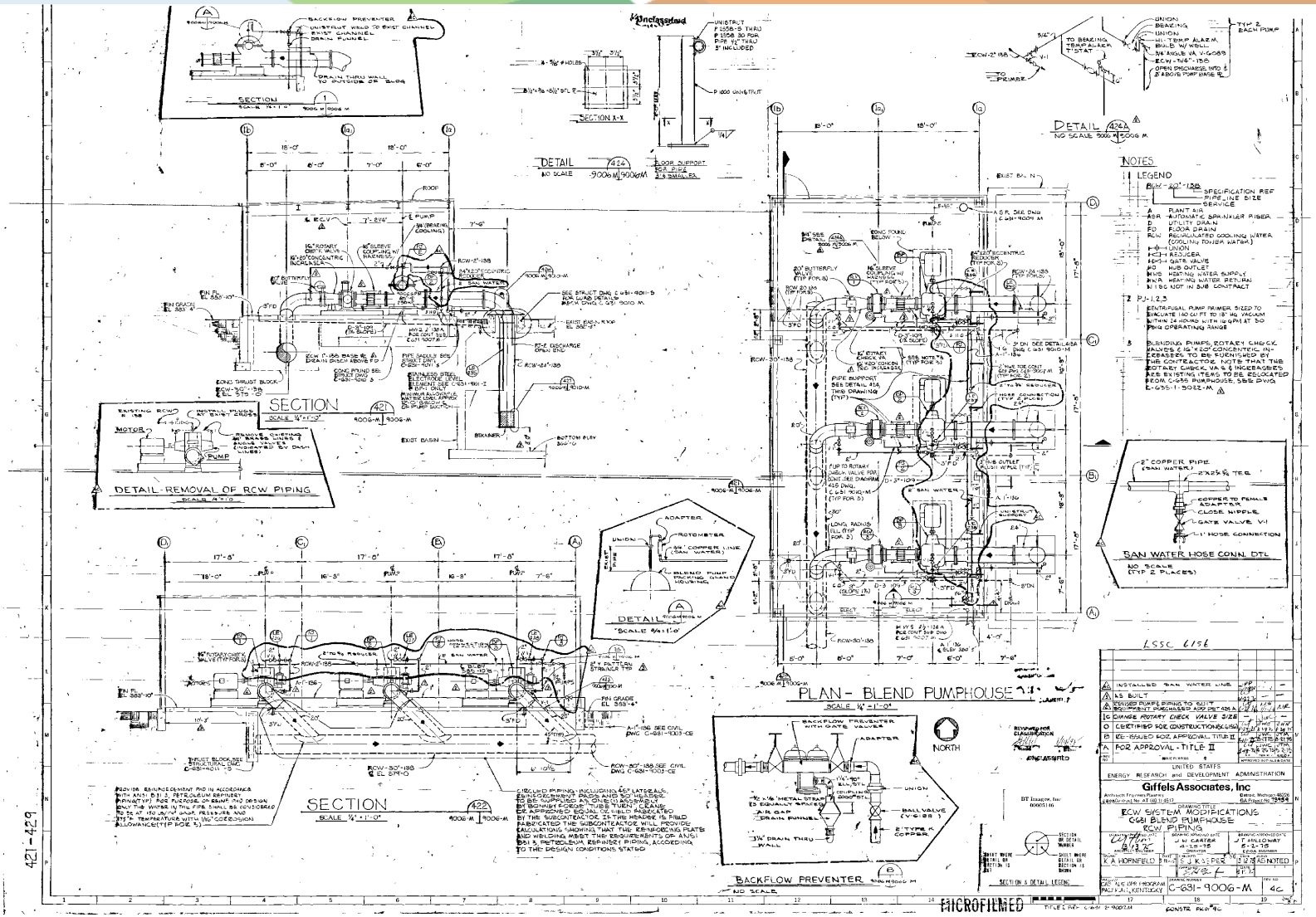
C-631-3 1-7050_0001_0004_U-043220

C-631-3 Engineering Drawings



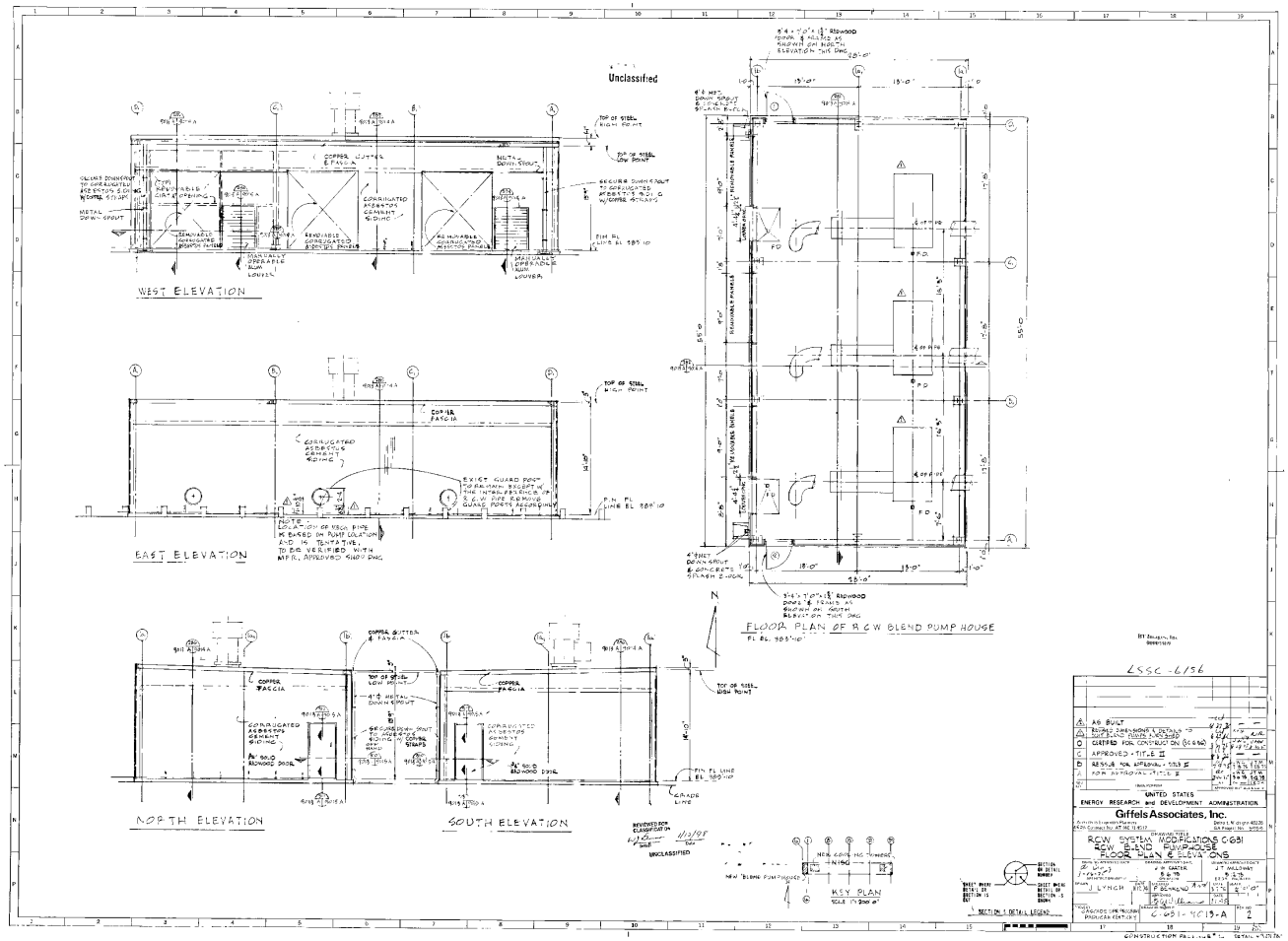
E-M-14670-A_0001_0001_U-020293

C-631-4 Engineering Drawings



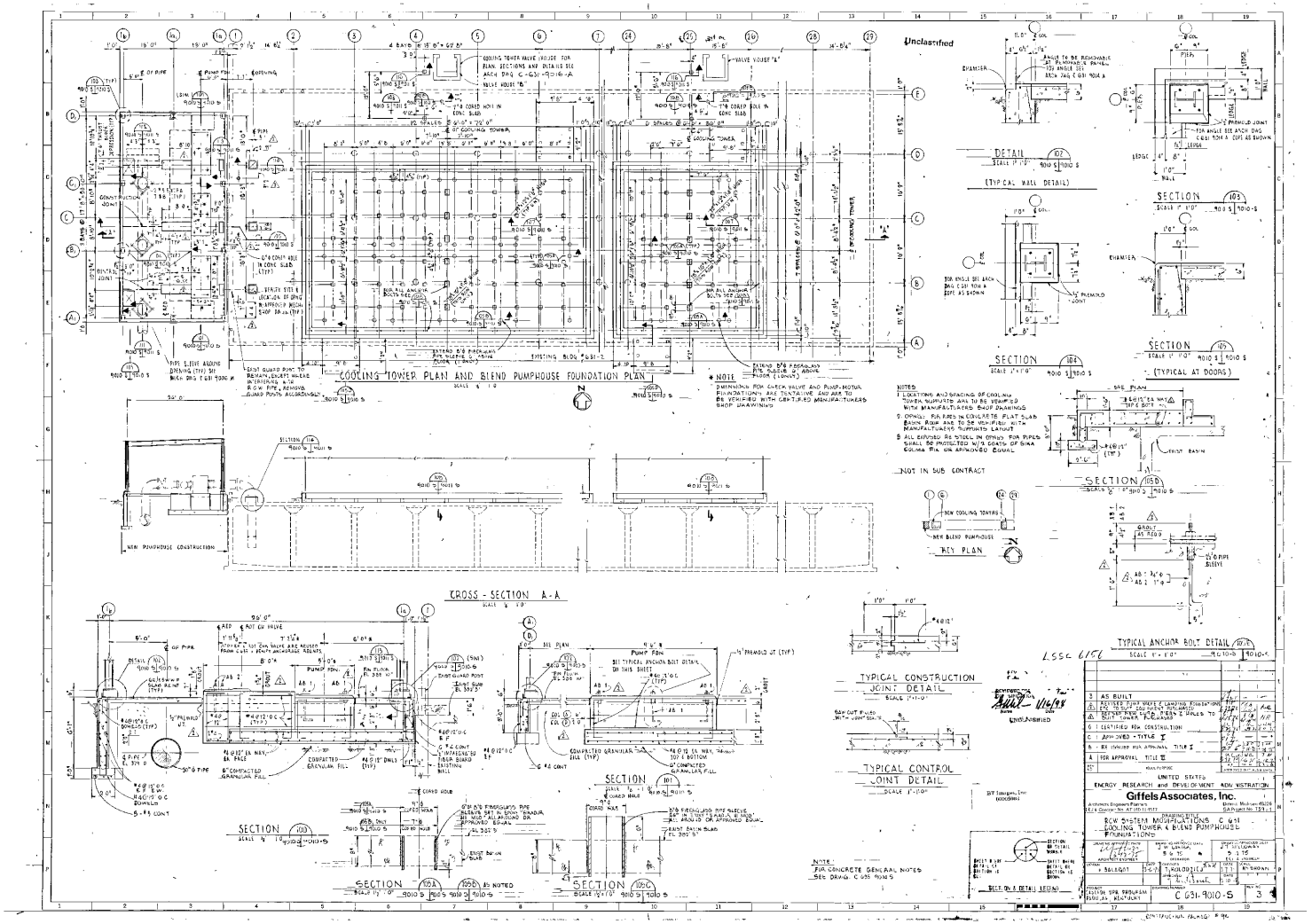
C-631-9006-M, Rev 4C

C-631-4 Engineering Drawings

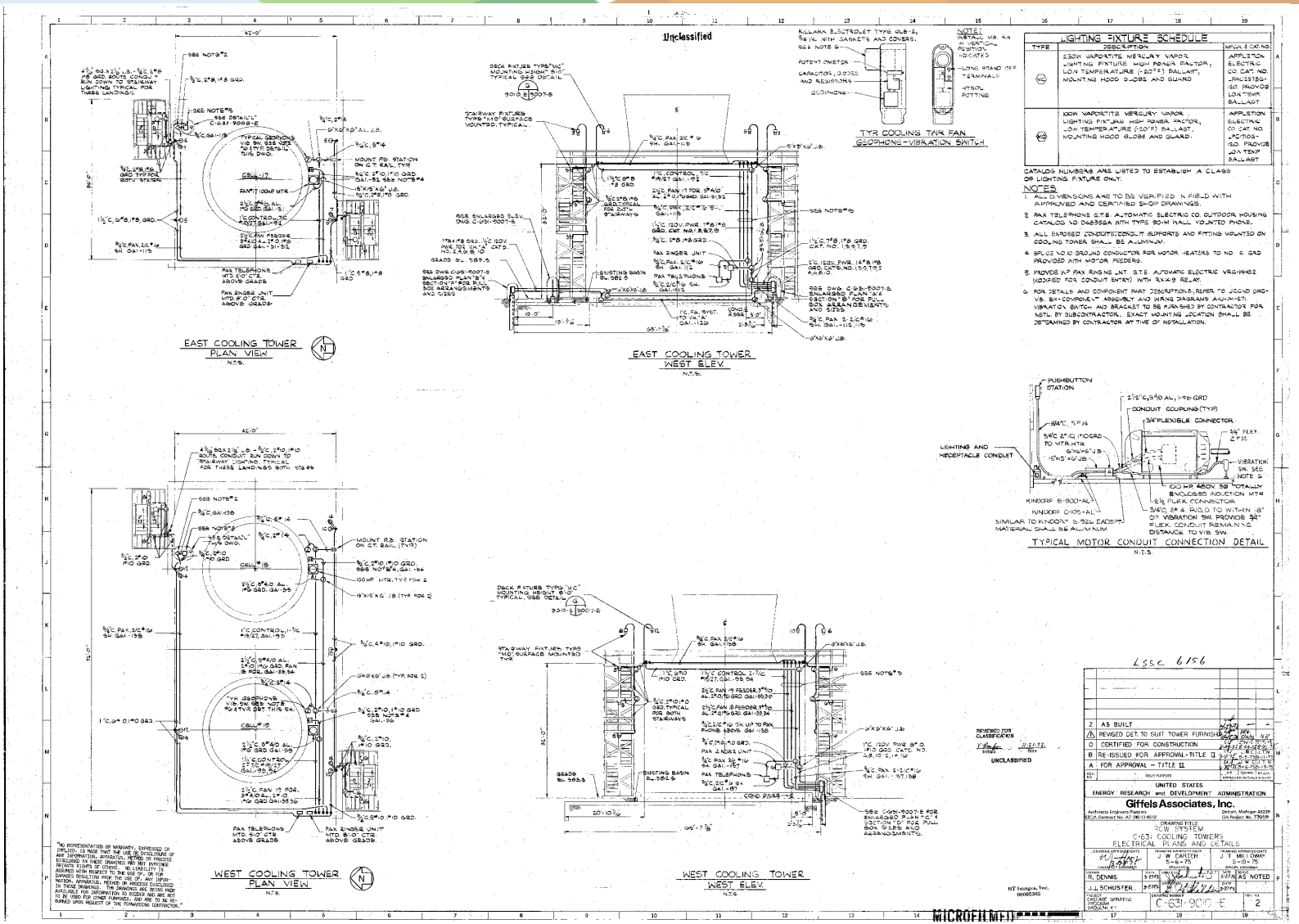


C-631-9013-A, Rev 2

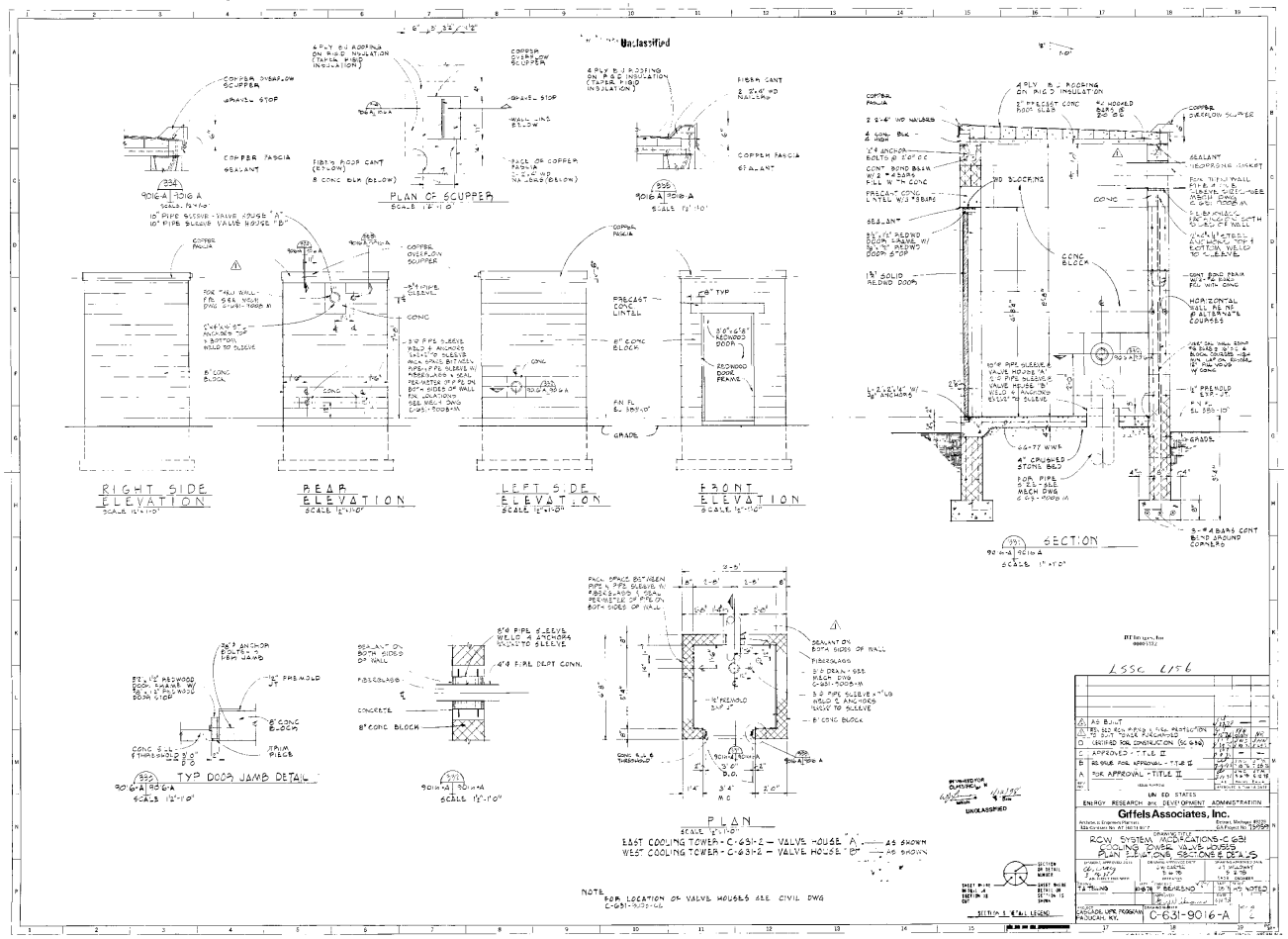
C-631-5 Engineering Drawings



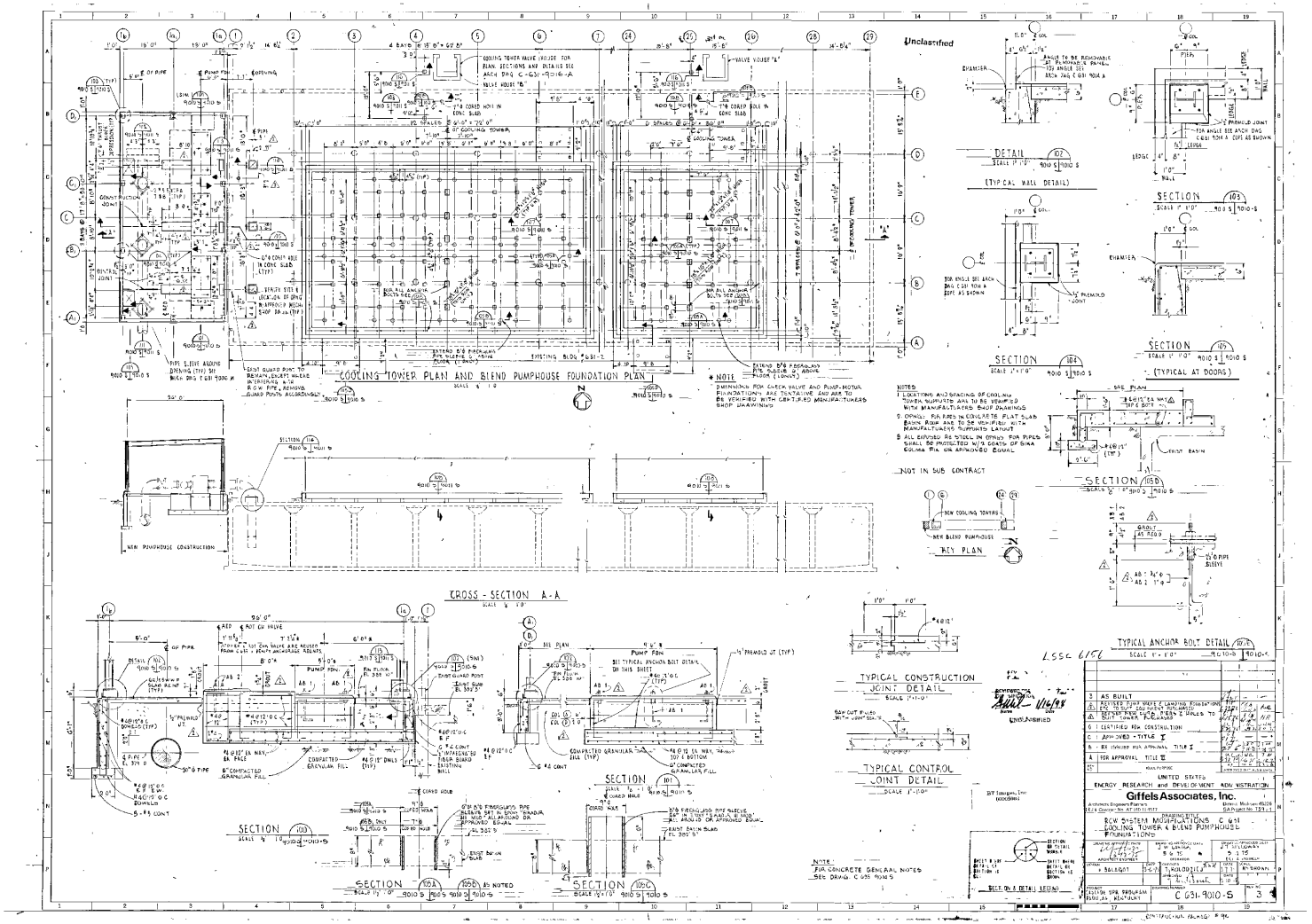
C-631-5 Engineering Drawings



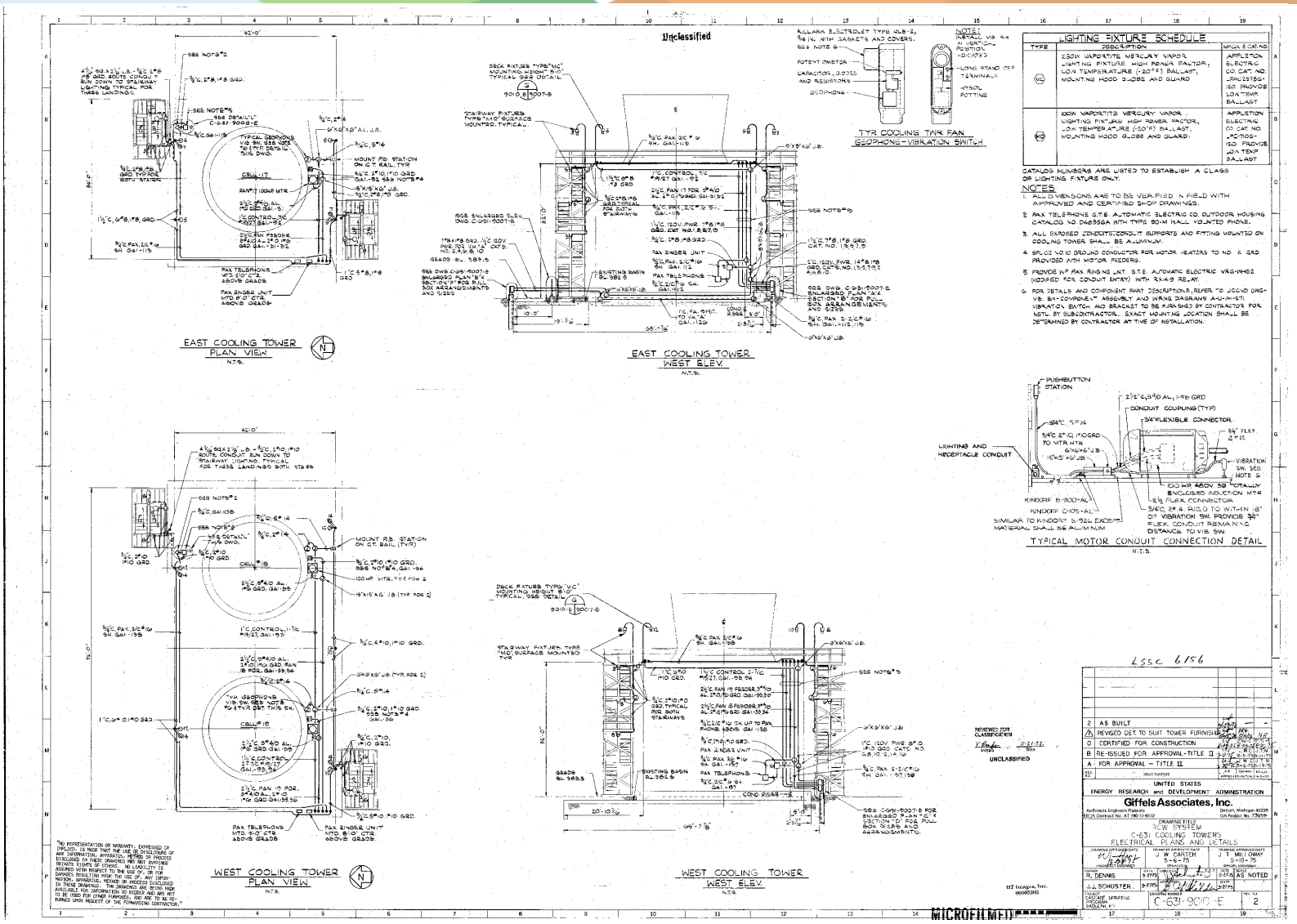
C-631-5 Engineering Drawings



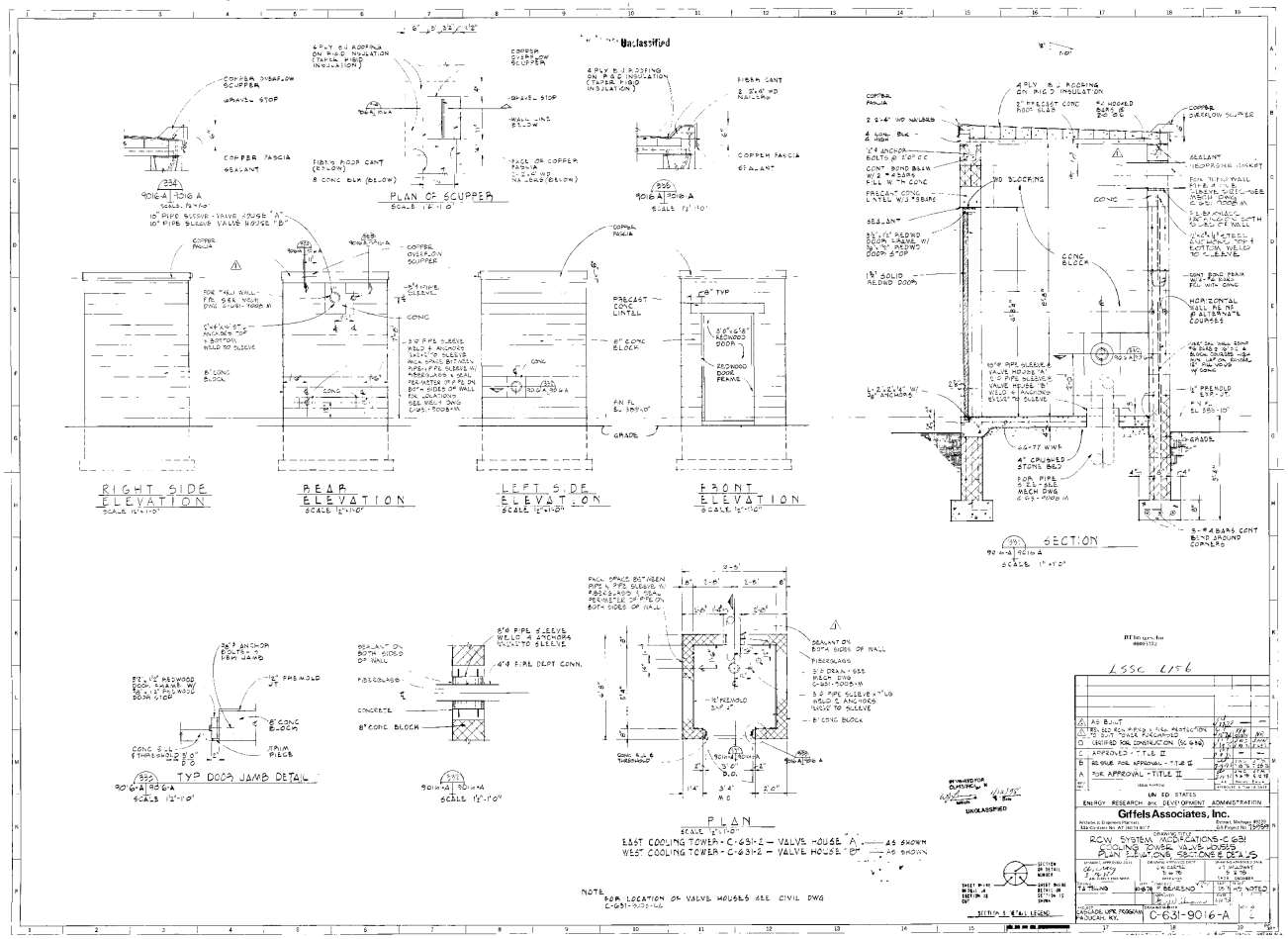
C-631-6 Engineering Drawings



C-631-6 Engineering Drawings



C-631-6 Engineering Drawings



C-631-9016-A, Rev 2

C-631 Pumphouse and Cooling Tower (SWMU 86) Sources

- Engineering Drawings:
  - Provided in presentation
- Databases:
  - USEC's BPS
  - Issues Management System
  - Regulatory Compliance Archive Spill Log (pre-2018)
  - PCB Database (1989 – 2021)
  - Active GSAs and SAAs Master List
  - Asbestos Walkdown (October 2020)
- Employee Interviews:
  - Utility Operations Subject Matter Expert (45 years plant expertise; operator/manager/supervisor)
  - Power Operations Subject Matter Expert (31 years plant expertise)
  - Compliance Subject Matter Expert (45 years plant expertise; trained on system)
  - Systems Engineer (Lead) Subject Matter Expert (34 years plant expertise)
  - Systems Engineer (Senior) Subject Matter Expert (32 years plant expertise)
  - Chemical Engineer Subject Matter Expert (31 years plant expertise)
- Documents:
  - Paducah Gaseous Diffusion Plant Sitewide Strategy Facility Background Information, FPDP-RPT-0021, May 2016
  - Report for Environmental Audit Supporting Transition of the Gaseous Diffusion Plants to the United States Enrichment Corporation, DOE/OR/1087&V5 (June 1993)

C-631 Pumphouse and Cooling Tower (SWMU 86) Sources

- Documents (Continued):
  - Paducah Asbestos Survey Executive Summary (Lee Wan Report), October 1990
  - Cultural Resource Management Plan for the Paducah Gaseous Diffusion Plant Paducah, Kentucky, BJC/PAD-691, May 2005
  - Fluor Federal Services, Inc., Paducah Deactivation Project Comprehensive Environmental Compliance Due Diligence Review, CP5-ES-0101, October 2014
  - Operations Division Training Manual – Utilities Operations, KYD-1482, July 1962
  - Evaluation of Corrosion Inhibitors for Open Recirculating Water Systems, KY-455, May 1964
  - Cooling Tower Drift Studies at the Paducah, Kentucky Gaseous Diffusion Plant, Conf-790109-1, January 1979
  - Paducah Gaseous Diffusion Plant Environmental Report for 1988, ES/ESH-8/V3, May 1989
  - 2018 Annual Hazardous Waste Report, Assessment Return, and Claim for Exclusion for the Paducah Gaseous Diffusion Plant, McCracken County, Kentucky, Permit Number KY8-890-008-982, Summary of Noncompliance, 2018
  - Fire Protection Facility Assessment for the C-631-1 Pump House and the C-631-3 Pump House (Fire Water) at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, C-631-1&3-FA/R0, dated August 2016