U.S. Department of Energy
Hanford Field Office
P.O. Box 550
Richland, Washington 99352

October 24, 2024

24-ECD-0170

Addressees: See page 3

U.S. DEPARTMENT OF ENERGY, HANFORD FIELD OFFICE SUBMITS 400 AREA DIFFUSE AND FUGITIVE NOTICE OF CONSTRUCTION APPLICATION

The U.S. Department of Energy, Hanford Field Office (HFO), submits the attached Notice of Construction Application (NOCA) (Attachment 1), to revise emission unit (EU) 1128, 400 Area Diffuse and Fugitive, updating the potential-to-emit calculation to align with the maximally exposed individual (MEI) to total effective dose equivalent at the onsite Energy Northwest location. The process description was updated to remove the sodium processing and focus on surveillance and maintenance activities.

The April 9, 2024, Washington State Department of Health Inspection #5465, "Various 400 Area Emission Units," document requested to "Provide documentation to show the license abated emission limit of 5.70E-03 mrem/year to the MEI has not been exceeded." The near field monitor array data was used to determine the calculation. This calculation was found to be below the background values of the array and above license potential to emit (PTE) limit of 5.70E-03 mrem/year.

Environmental Calculation File ECF-HANFORD-23-0010, Revision 0, Radiological and Toxic Air Emissions for the Fast Flux Test Facility Complex, (found in the Administrative Record) was prepared to support the Comprehensive Environmental Response, Compensation, and Liability Act documents for the 400 Area, using a similar method to that used to develop the current EU 1128 NOCA. The updated unabated PTE calculation is 1.08E-01 mrem/year and is requested to be the new PTE limit.

The attached Notification of Off-Permit Change (Attachment 2) is being submitted to the Washington State Department of Ecology for its administration of the Hanford Air Operating Permit (AOP), as well as to the U.S. Environmental Protection Agency, Region 10, as part of the notification process for off permit changes outlined in the Hanford AOP.

If you have any questions, please contact me, or you may contact Corey A. Low, Acting Assistant Manager for Safety and Environment, at (509) 376-4820.

Sincerely,

Brian T. Vance

Digitally signed by Brian T. Vance
Date: 2024.10.24 12:50:03 -07'00'

Brian T. Vance
Manager

ECD:BRT

Attachments:
1. Radioactive Emission Notice of Construction Application for the 400 Area Diffuse and Fugitive
2. Notification of Off-Permit Change

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Attachment 1
24-ECD-0170

Radioactive Emission Notice of Construction Application
For The 400 Area Diffuse and Fugitive

(42 pages including cover sheet)

DOE/HFO-2024-35
Revision 0

Radioactive Emission Notice of Construction Application for the 400 Area Diffuse and Fugitive

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract 89303320DEM000030

CPCCo
Central Plateau Cleanup Company

P.O. Box 1464
Richland, Washington 99352

DOE/HFO-2024-35
Revision 0

Radioactive Emission Notice of Construction Application for the 400 Area Diffuse and Fugitive

M. P. Marrott
Central Plateau Cleanup Company LLC (CPCCo)

Date Published
October 2024

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract 89303320DEM000030

CPCCo
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APPROVED
By Janis Aardal at 6:21 am, Oct 11, 2024

Release Approval | Date

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Acronyms

ALARACT	as low as reasonably achievable control technology
BARCT	best available radionuclide control technology
CCP	core component pot
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CLS	closed loop system
DOE	U.S. Department of Energy
Ecology	Washington State Department of Ecology
EU	emission unit
EPA	U.S. Environmental Protection Agency
FFTF	Fast Flux Test Facility
FSF	Fuel Storage Facility
HEPA	high-efficiency particulate air
HTS	Heat Transport System
IDS	interim decay storage
IEM	Interim Examination and Maintenance
MASF	Maintenance and Storage Facility
MEI	maximum exposed individual
NFM	near-facility monitoring
NOC	Notice of Construction
NOCA	Notice of Construction Application
PTE	potential-to-emit
RCRA	*Resource Conservation and Recovery Act of 1976*
RCB	Reactor Containment Building
RSB	Reactor Service Building
S&M	surveillance and maintenance
SSF	Sodium Storage Facility
TACS	Test Assembly Conditions Station
TEDE	total effective dose equivalent
WDOH	Washington State Department of Health

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1 Notice of Construction History

In December 1994, a Notice of Construction Application (NOCA) for the Sodium Storage Facility (SSF) (DOE/RL-94-137, Rev. 0, *Radioactive Air Emissions Notice of Construction Sodium Storage Facility*) was provided to the Washington Department of Health (WDOH) and approved in the Notice of Construction (NOC) 398. Construction of the SSF was completed in October 1996 and Fast Flux Test Facility (FFTF) provided a NOCA to update the potential-to-emit (PTE) (DOE/RL-94-137, Rev. 1) calculation earlier that spring. A NOCA was requested to cover the sodium residual reaction/removal for deactivation work activities at FFTF (DOE/RL-2006-49, *Radioactive Air Emissions Notice of Construction for Sodium Residuals Reaction/Removal and Other Deactivation Work Activities at the Fast Flux Test Facility*) that was submitted in June 2006 and approved, creating NOC 646 and Emission Units (EUs) 385, 396, 397, 399, 1128, and 1176. The latest NOC (NOC 977, 400 Area Diffuse/Fugitive Emissions Associated with Operations, Deactivation, Surveillance, Maintenance, and Inactive Sites in the 400 Area) replaces NOC 833 and was approved in letter AIR 15-1107, "Re: Final Approval of Radioactive Air Emissions Licenses (RAELs) for the Maintenance and Storage Facility (MASF) and Fast Flux Test Facility (FFTF), to be Incorporated in the Next Revision of the Hanford Site RAEL (FF-01)."

In April 2024, the WDOH inspected the 400 Area Emission Units, including 400 Area Diffuse/Fugitive (EU 1128). The PTE of 5.70E-3 mrem/yr was found to be below the background measurements of the near-field monitoring (NFM) system. The measured value reported PTE to the offsite maximum exposed individual (MEI) in the most recent Hanford Site radionuclide air emissions report (DOE/RL-2024-08, *Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 2023*) and by using the calculation Method A described in DOE, 2020, *Subpart H—National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities*.

This NOCA addresses the surveillance and maintenance (S&M) of the 400 Area and FFTF. Additionally, this NOCA provides a bridge to future *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) planned decontamination and demolition work activities in the 400 Area.

2 Location

Regulatory Requirement: WAC 246-247-110, Appendix A(1) Name and address of the facility, and location (latitude and longitude) of the emission unit(s). [WAC 246-247-110 Appendix A(1)]

The 400 Area Diffuse and Fugitive area is associated with the FFTF test reactor. The FFTF location is as follows:

U.S. Department of Energy, Richland Operations Office
Hanford Site Richland, Washington 99352
46°43'55" North Latitude
119°35'99" West Longitude

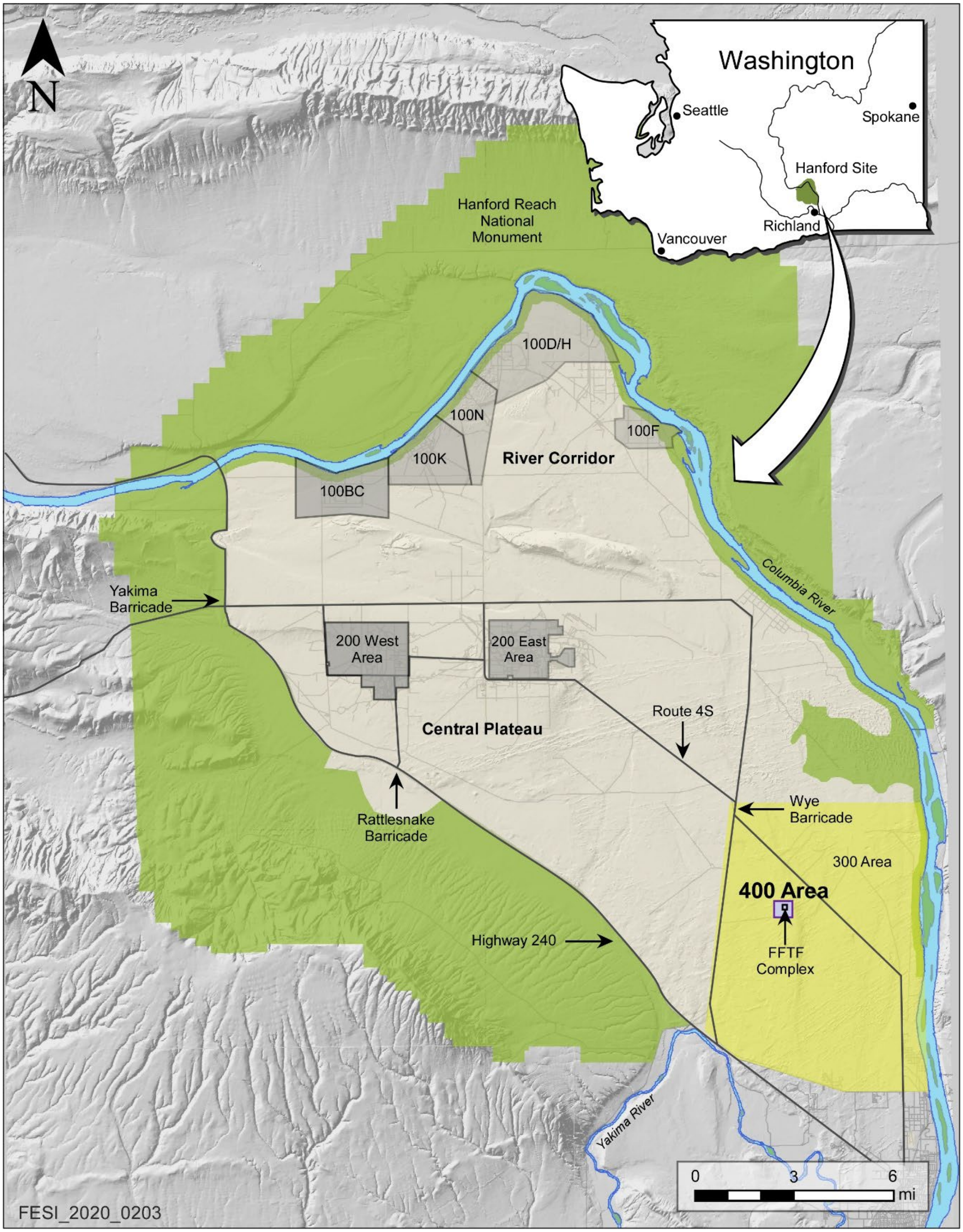

Figure 1. 400 Area and FFTF Complex

3 Responsible Manager

Regulatory Requirement: WAC 246-247-110, Appendix A(2) Name, title, address, and phone number of the responsible manager.

Brian T. Vance
U.S. Department of Energy, Hanford Field Office
P.O. Box 550
Richland, Washington 99352

4 Proposed Action

Regulatory Requirement: WAC 246-247-110, Appendix A(3) Identify the type of proposed action for which this application is submitted: Construction of new emission unit(s); Modification of existing emission unit(s); identify whether this is a significant modification; Modification of existing unit(s), unregistered. [WAC 246-247-110 Appendix A(3)]

The primary activities in the 400 Area are S&M support activities. Hazard abatement activities, excavations, roof repairs, and decontamination are expected to occur in the future to mitigate aging structures and prepare for demolition at the 400 Area. Sodium residuals have been removed from this NOC. Future sodium work will likely use different technologies, and a revision to this NOC will be provided in the future to address this scope.

Other related routine, continued deactivation activities that could occur as part of the proposed action are: sampling for worker protection and waste characterization; disposing of waste; remove/dispose of asbestos; remove/stabilize existing hazards in conjunction with systems and equipment deactivation associated with sodium residuals; remove/recycle/dispose excess deactivated equipment and components; nonradiological mockups and testing technologies supporting onsite deactivation and demolition projects; and remove depleted uranium and/or lead shielding.

5 State Environmental Policy Act

Regulatory Requirement: WAC 246-247-110, Appendix A(4) If this project is subject to the requirements of the State Environmental Policy Act (SEPA) contained in chapter 197-11 WAC, provide the name of the lead agency, lead agency contact person, and their phone number.

In accordance with the *National Environmental Policy Act of 1969*, the U.S. Department of Energy (DOE) published an Environmental Assessment and Finding of No Significant Impact for the shutdown and deactivation of FFTF in May 1995 (DOE/EA-0993, *Environmental Assessment Shutdown of the Fast Flux Test Facility Hanford Site, Richland, Washington*). The Environmental Assessment evaluated the environmental impacts of actions necessary to place FFTF in a radiologically and industrially safe shutdown condition.

6 Process Description

Regulatory Requirement: WAC 246-247-110, Appendix A(5) Describe the chemical and physical processes upstream of the emission unit(s).

6.1 403 Fuel Storage Facility

The 403 Fuel Storage Facility (FSF) was built in 1981. The structure is constructed of steel and sheet metal siding above grade and reinforced concrete below grade (Figure 2). The facility is approximately 34 m (112 ft) long, 27 m (90 ft) wide, 22 m (72 ft) tall, extending 12.2 m (40 ft) above grade and (9.7 m) 32 ft below grade (Figures 3 and 4). The 403 FSF is accessed via an equipment access door connected to the adjoining 4717 Reactor Service Building (RSB), an external rollup truck door, and two personnel access doors.

The 403 FSF was designed and used to store fuel for the first 5 years of FFTF operation. The FSF is equipped with an 18-ton bridge crane for moving large waste containers and equipment. The belowgrade is a cell that contains a carbon-steel storage vessel approximately 6.4 m (21 ft) in diameter and 7.3 m (24 ft) deep. The vessel was used to store up to 466 spent fuel assemblies and fuel pin containers in sodium.

The 403 FSF vessel and auxiliary systems have been drained, except for the cold trap, which contains 530 L (140 gal) of frozen sodium. At the ground level (167 m [550 ft] elevation), a dangerous waste management unit consists of two large metal boxes storing a total of 109 core component pots (CCPs) (Figure 3). Each CCP contains up to 14 L (3.7 gal) of radiologically contaminated frozen sodium. The permitted dangerous waste management unit is specified in WA7890008967, *Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste*. Closure of the 403 FSF will be performed in accordance with an approved closure plan. An argon gas system is in place at the 403 FSF to provide safety coverage.

Figure 2. 403 Fuel Storage Facility

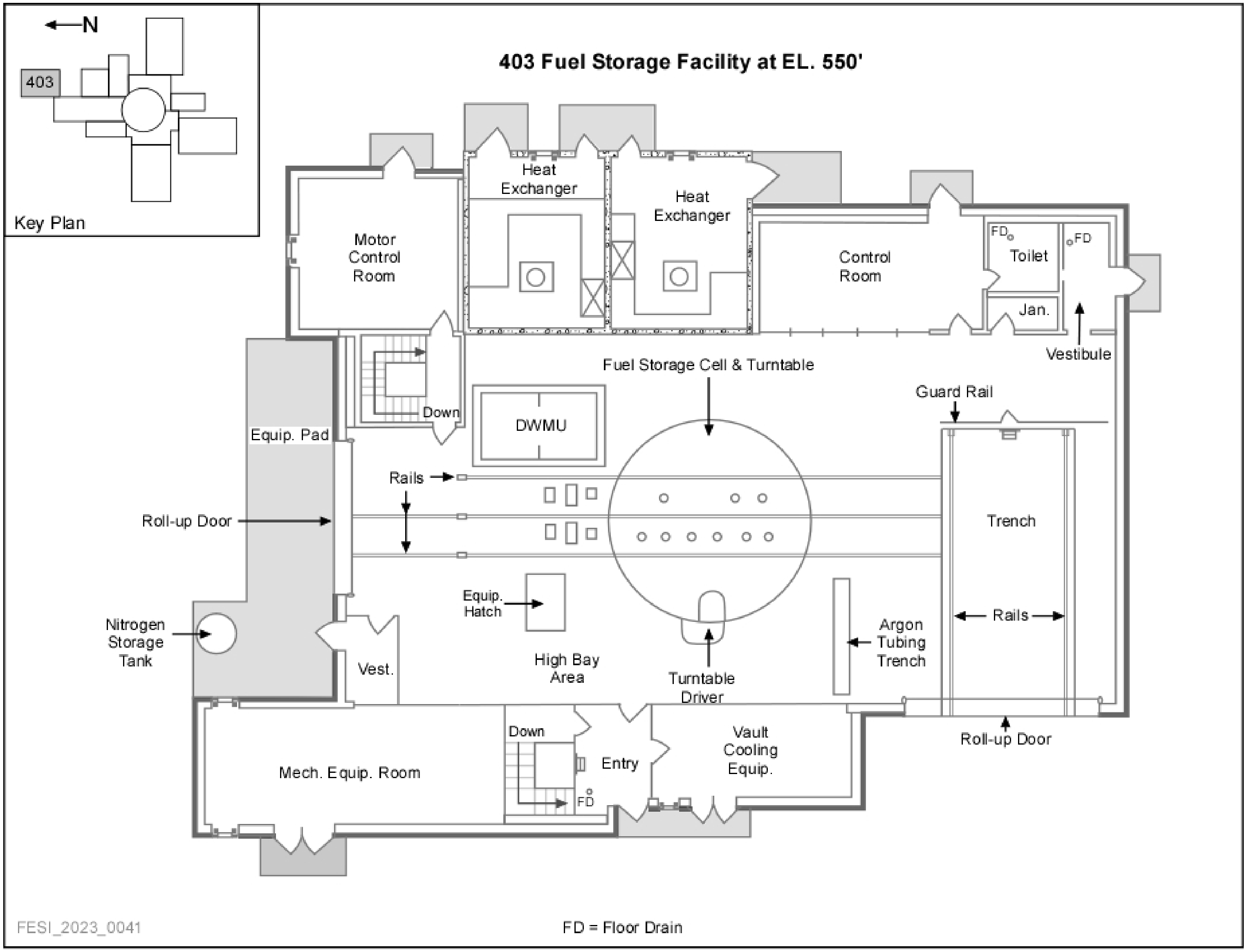

Figure 3. Plan View of 403 Fuel Storage Facility (550 ft Elevation)

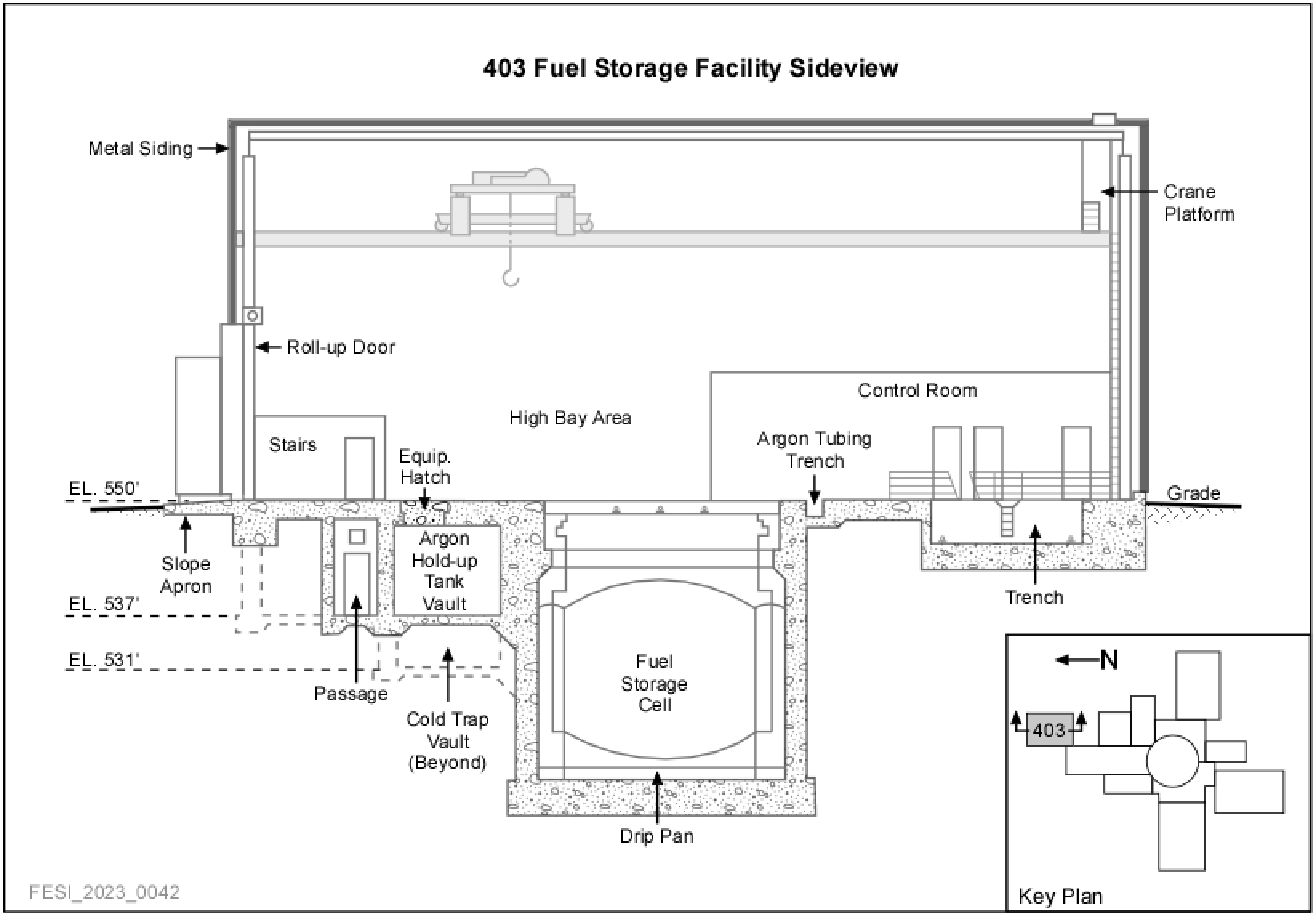

Figure 4. Sideview of 403 Fuel Storage Facility

6.2 405 Reactor Containment Building

The 405 Reactor Containment Building (RCB) (Figure 5) is a cylindrical, welded carbon-steel containment vessel approximately 57 m (186.7 ft) tall, extending 33 m (108.8 ft) above grade and 23.7 m (77.9) ft below grade (Figure 6). The 405 RCB is 41 m (135.0 ft) in diameter, the vertical walls are 3.5 cm (1-3/8 in.) thick, and the upper dome is 2.5 cm (1 in.) thick. The above grade area comprises an operating deck, mezzanine, and crane area (Figure 7). Located below grade are the following (Figure 8):

- Reactor cavity
- Interim Examination and Maintenance (IEM) cell
- Interim Decay Storage (IDS) vessel
- Test Assembly Conditions Station (TACS)
- Heat Transport System (HTS) cells
- Closed Loop System (CLS) cells

Sodium, piping, and miscellaneous components with residual sodium and radioactive contamination are spread throughout the 405 RCB. All are contained within cells and an inert argon gas blanket is maintained on these systems.

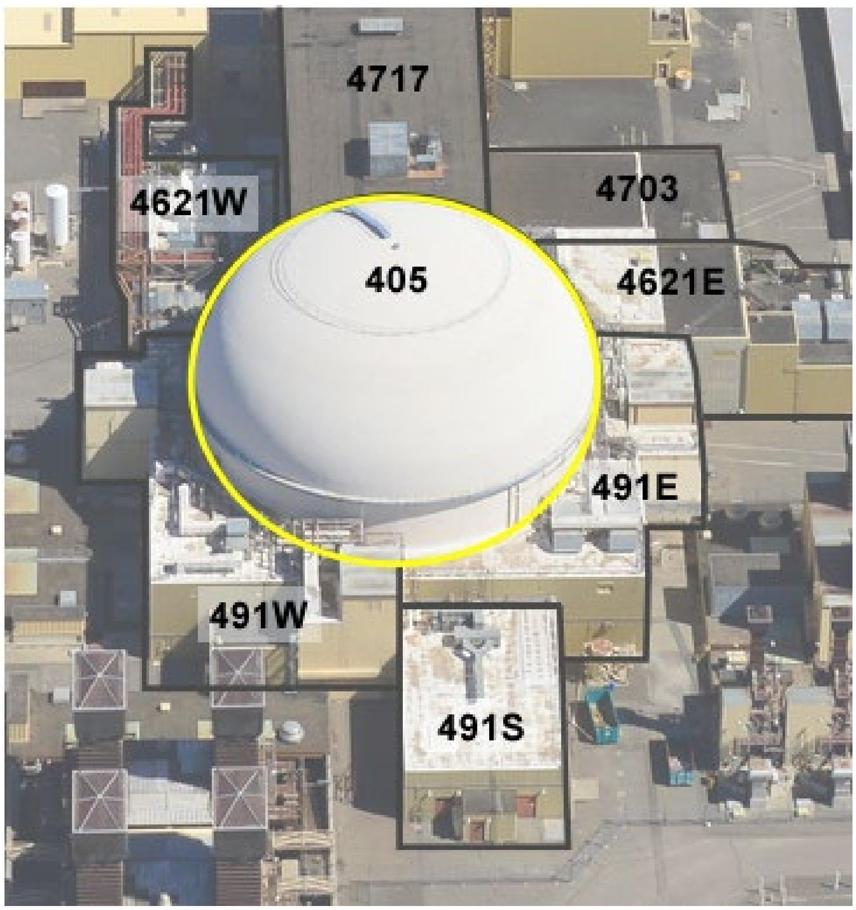

Figure 5. 405 Reactor Containment Building

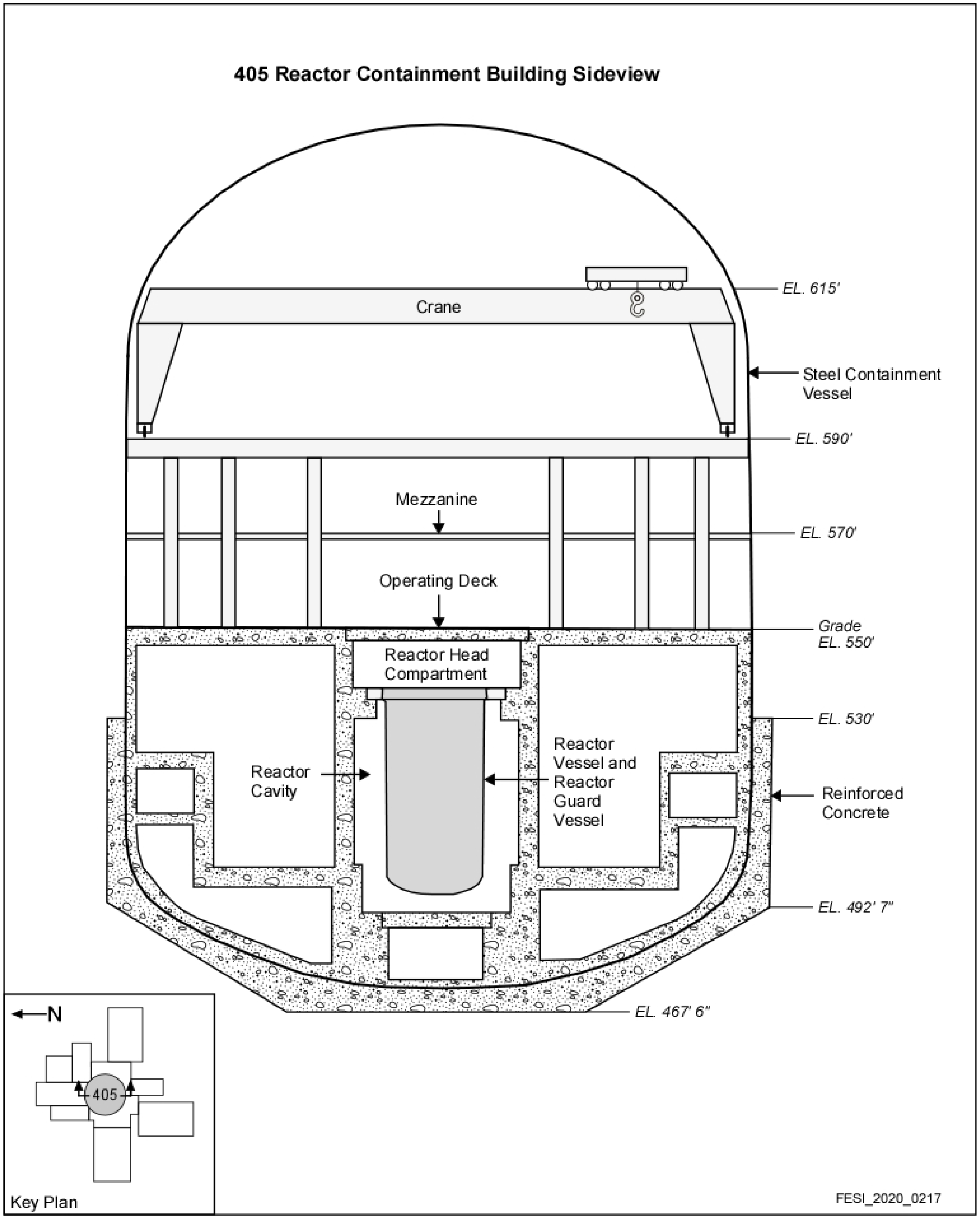

Figure 6. Side View of the 405 Reactor Containment Building

Figure 7. 405 Reactor Containment Building Interior Above Grade (1979)

6.2.1 405 Reactor Containment Building Above grade Areas

The 405 RCB has an operating floor at grade level (167 m [550 ft] elevation) (Figure 6). Two airlocks are located on the operating floor that provided equipment access to the 4717 RSB and personnel access to the 4621E Auxiliary Equipment Building. The Closed Loop Ex-Vessel Machine located on the operating floor was used to move fuel and test specimens into and out of the 405 RCB (Figure 7). The Bottom Loading Transfer Cask, located in the equipment airlock, moved fuel and test specimens to stations within the containment and moved irradiated core assemblies to the 403 FSF or Cask Loadout Station.

A mezzanine located at the 174 m (570 ft) elevation of the 405 RCB provides a work area in addition to space for heating and ventilation equipment and control panels. An overhead polar gantry crane spans the RCB. The crane has a 200-ton capacity that provided access to all HTS and CLS cells through removable hatch plugs.

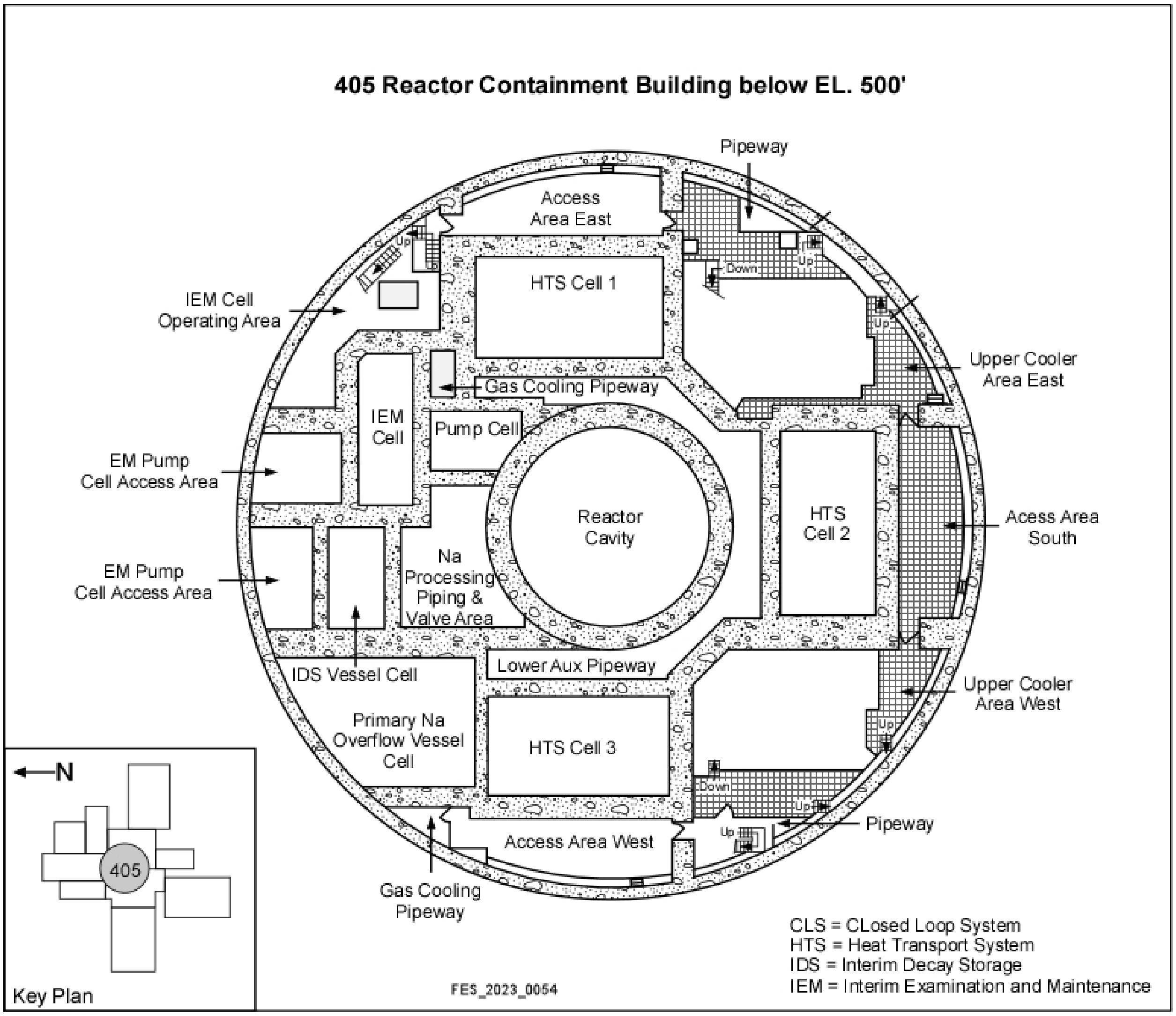

Figure 8. Plan View of 405 Reactor Containment Building (Below 500 ft Elevation)

6.2.2 405 Reactor Containment Building Belowgrade Areas

Located below grade, in the center of the reactor containment vessel, are the following major components:

- Reactor cavity that houses the reactor vessel, reactor guard vessel, reactor head, reactor core, above-core in-vessel components, and the ex-vessel neutron flux monitors and surveillance equipment. The reactor vessel is suspended from its upper section and nested in a bottom-mounted stainless-steel reactor guard vessel. The stainless-steel reactor vessel is approximately 13.1 m (43 ft) high with a 6.1 m (20 ft) inside diameter. Its wall thickness varies from 6.0 to 7.0 cm (2-3/8 to 2-3/4 in.). The reactor vessel was defueled and drained of sodium, although some residual sodium remains in the vessel. The reactor vessel is currently storing nonfuel components such as control rods and reflectors. The reactor head is the closure for the reactor vessel and is 7.6 m (25 ft) in diameter, approximately 56 cm (22 in.) thick, and weighs 214 tons. Equipment mounted on the head includes drive mechanisms for in-vessel components, seals, and shielding for openings providing access to the vessel interior, and coolant piping for independently cooled test loops.
- The IEM cell, located to the north and east of the reactor vessel, was used for handling, washing, and disassembling core components during the operation phase in addition to loading fuel and irradiated

steel into containers for shipment during deactivation. All IEM cell access ports were permanently sealed with cover plates during deactivation. The IEM cell remains closed at the bottom but has an air atmosphere and breathes through a filtered vent at the top. The lead glass windows remain as a boundary, but the oil has been drained such that they no longer provide good visibility of the cell's interior.

- The IDS Vessel, located north and west of the reactor vessel, was designed to contain up to 112 (3.6 m [12 ft] long) core components and 10 (12.2 m [40 ft] long) test assemblies in a sodium pool. The CCPs were primarily used to move and store the core components in liquid sodium. All core components and CCPs have been removed from the IDS Vessel and the vessel has been drained of sodium, although residual sodium remains. The primary and IDS cold traps, located in the northwest corner of the RCB, were intentionally left full of sodium and frozen.
- The TACS is located between the IEM cell and the reactor vessel. It was designed to store up to 27 (8.5 m [28 ft] or 12.2 m [40 ft] long) test assemblies. At present, it contains 23 nonfueled test assemblies, most of which are irradiated and/or contain sodium residues. The TACS are isolated and have no inert gas cover.
- The HTS, consisting of three circuits, removed heat generated by the reactor by pumping liquid sodium through the reactor vessel. Each circuit comprises a primary (radioactive) loop and a secondary (nonradioactive) loop. HTS cells are lined with steel to prevent sodium concrete reaction in case of leakage. Main HTS loop piping and components are located to the east, south, and west of the reactor. Secondary HTS loops are in the dump heat exchanger (DHX) structures: 408A, 408B, and 408C (Section 6.3).
- The CLS provided independently cooled irradiation testing systems. Space was provided for up to four loops, but only two were initially installed. Each loop consists of a closed loop in-reactor assembly that contains the irradiation test specimen, a primary cooling system, and a secondary cooling system. Each primary loop (within the 405 RCB) includes the closed loop in-reactor assembly, piping passing through and over the reactor head to the closed loop cell, two primary (electromagnetic) pumps, and an intermediate heat exchanger. Each secondary loop (409A and 409B Buildings) includes a secondary pump and a sodium-to-air forced draft heat exchanger. Both loops include tanks, piping, controls, and auxiliary equipment. The CLS was never used.

6.3 408A, 408B, and 408C Dump Heat Exchanger Structures

The 408A, 408B, and 408C DHX structures (Figure 9) were built in 1979. The DHXs are one-story steel structures with metal roofs and reinforced concrete basements. Each structure is situated in a large pit with a base elevation of 161 m (530 ft). The pits are approximately 52 m (170 ft) long and 35 m (115 ft) wide, and the heat exchangers rise approximately 9 m (30 ft) above ground level (Figures 10 and 11). Each DHX structure contains four 33-MW DHX modules, which are connected using structural steel framing (Figure 9). The 408A DHX is the only structure that is tornado-hardened, with 1.27 cm (0.5 in.) steel plate on a structural steel frame to provide protection for the DHX units below 177 m (580 ft) elevation.

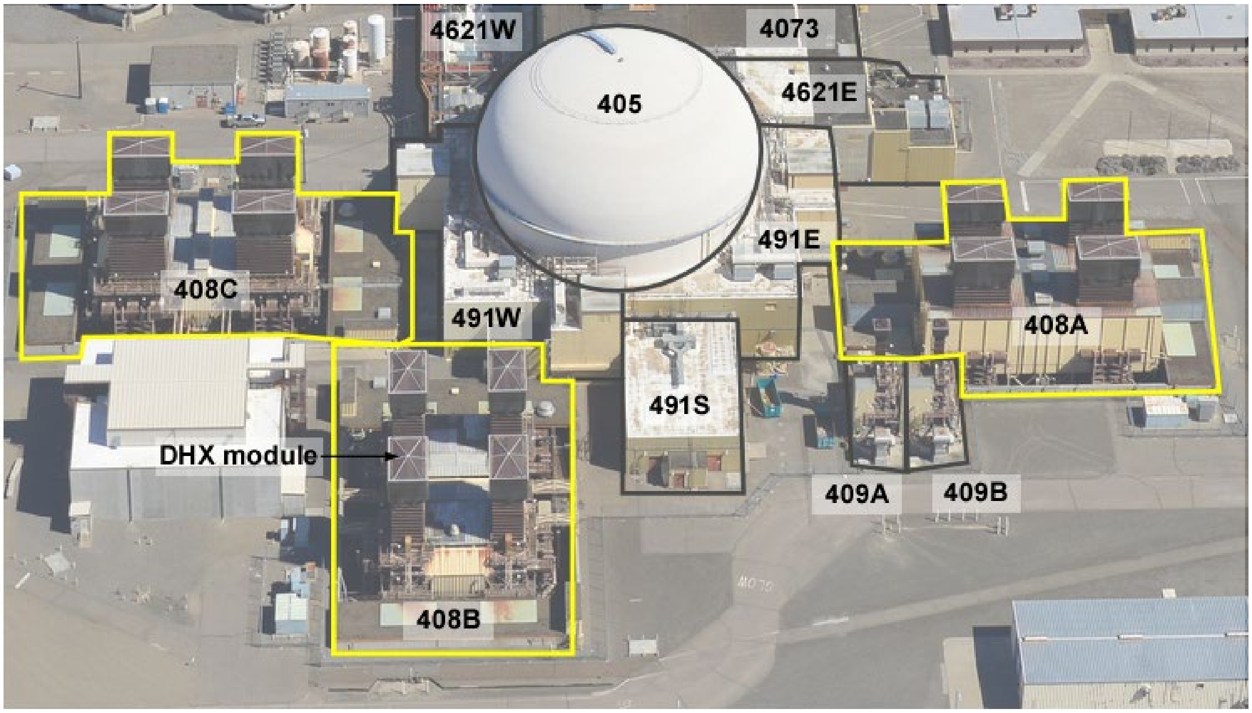

Figure 9. 408A, 408B, and 408C Dump Heat Exchanger Structures

The DHX modules are sodium-to-air exchangers that transferred heat from the secondary loop sodium to the ambient air. Each DHX module is equipped with a fan with variable inlet vanes, fan drive motor, fine and coarse control dampers, isolation gates, manual and automatic controls, tube bundle, oil-fired preheater, ducting, stack, and airflow turning vanes. The sodium piping to the modules is protected by a pipeway enclosure. Sodium catch pans extend to the adjacent HTS Service Buildings (491E, 491S, and 491W) and protect the concrete enclosure from sodium leaks. The pipeway enclosure in this area is also hardened with 1.27 cm (0.5 in.) steel plate. Various operational equipment remains, including the heat exchanger modules, fans, control equipment enclosures, motors, secondary sodium piping, and electrical equipment necessary for heat exchanger operation.

The 408A, 408B, and 408C DHX structures were deactivated and are in an S&M phase. An argon gas system is in place to provide safety coverage.

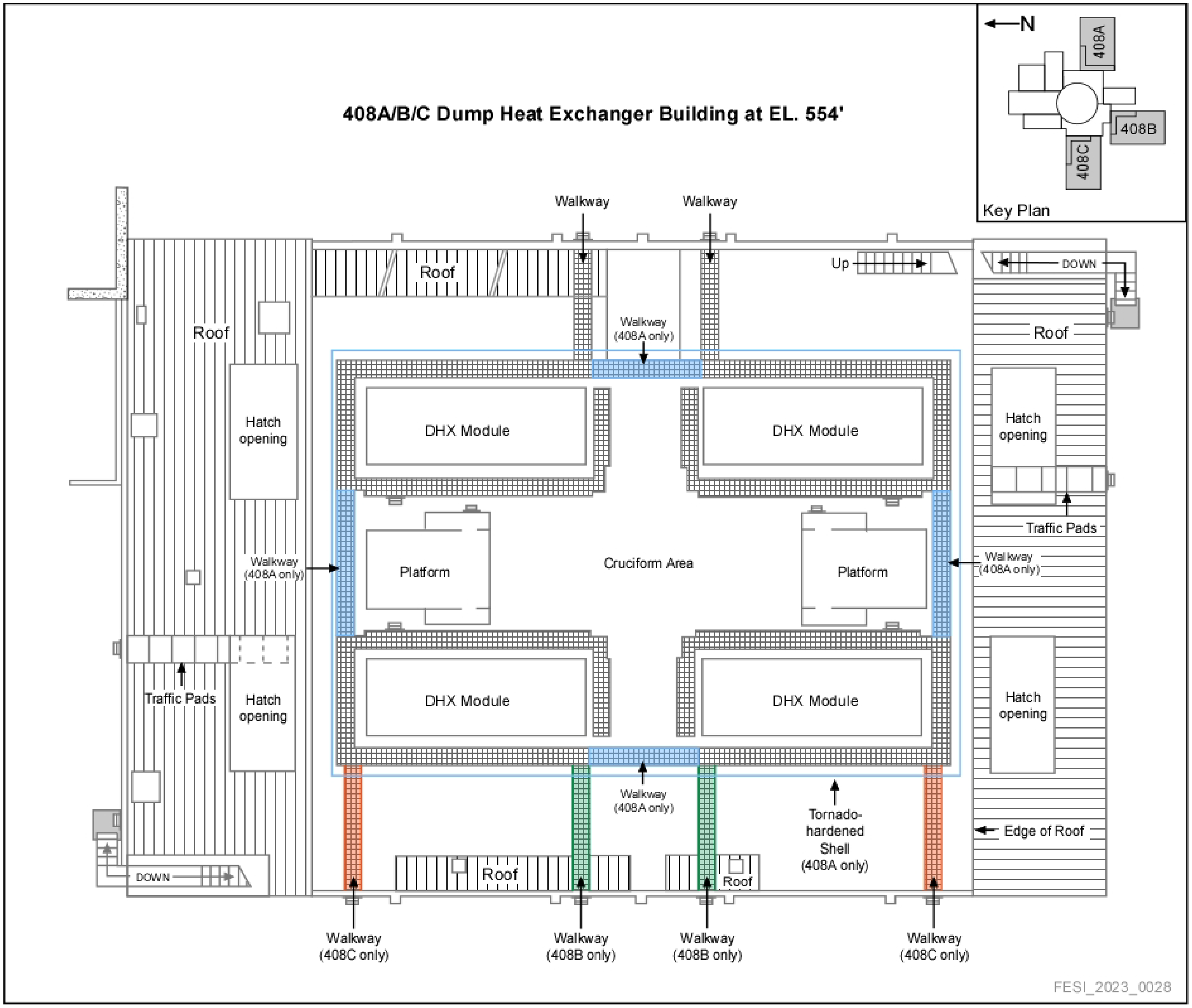

Figure 10. Plan View of 408A, 408B, and 408C Dump Heat Exchanger Structures (554 ft Elevation)

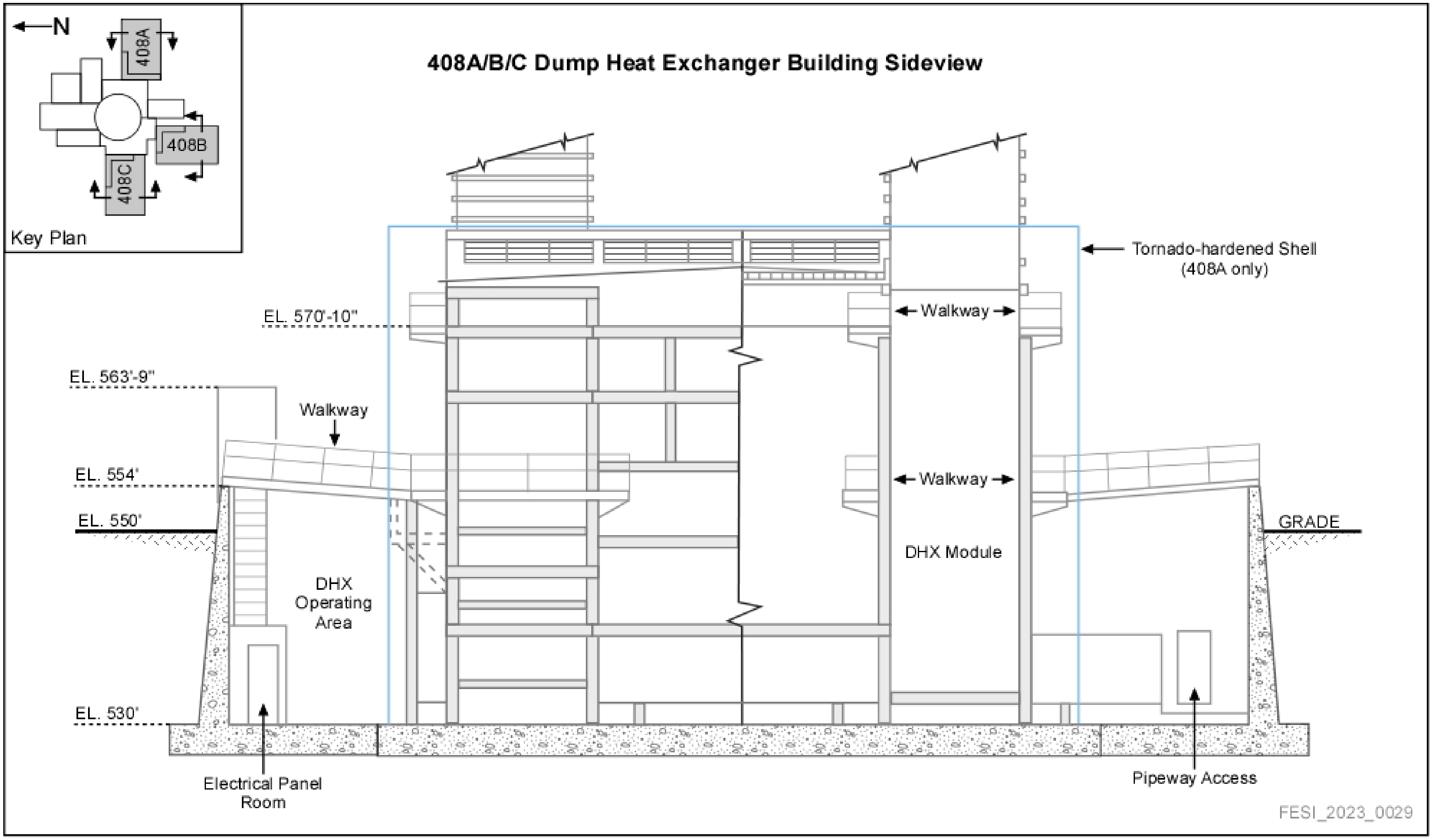

Figure 11. Side View of 408A, 408B, and 408C Dump Heat Exchanger Structures

6.4 491E, 491S, and 491W Heat Transport System Service Buildings

The 491E, 491S, and 491W HTS Service Buildings were built in 1973. The buildings are structurally connected to each other (Figure 12), with floors at the 161 m (530 ft) elevation (basement), 167 m (550 ft) elevation (ground level) and 174 m (570 ft) elevation (first floor). Figures 13 through 18 provide plan and side views of each building. Noncombustible construction materials were used consisting of steel framing, concrete floor and walls, and concrete block with metal siding. The 491S Building is approximately 13 m (43.5 ft) tall, extending 6 m (20 ft) above grade to 7.2 m (23.5 ft) below grade, and has a total area of 1,005 m^2 (10,823 ft^2). The 491E and 491W Buildings are 22 m (71 ft) tall, extending 13.4 m (44 ft) above grade to 8.2 m (27 ft) below grade. The 491W Building has a total area of 1,871 m^2 (20,140 ft^2), and the 491E Building has a total area of 1,862 m^2 (20,040 ft^2).

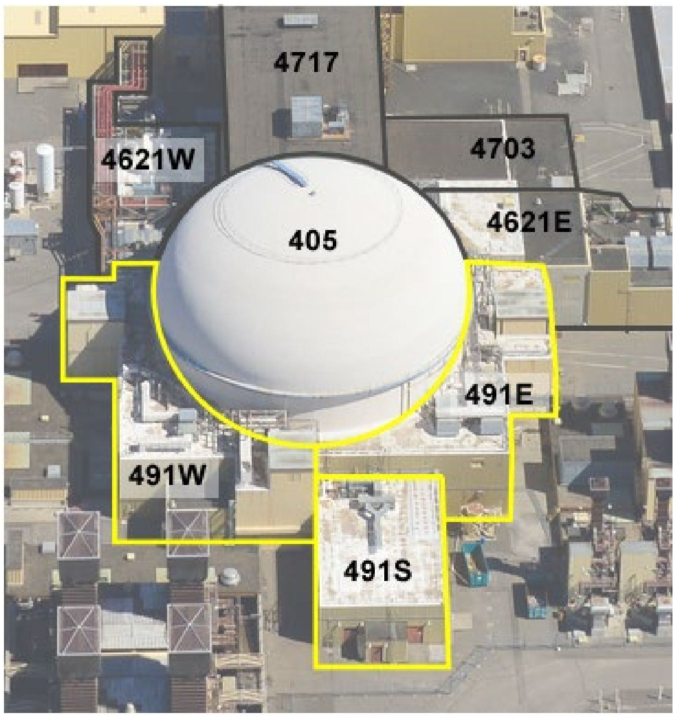

Figure 12. 491E, 491S, 491W Heat Transport System Service Buildings

Heat generated by the FFTF reactor was removed via the HTS by pumping liquid sodium through the reactor vessel. The HTS Buildings contain the secondary main HTS loop piping and components. The 491S Building contains cold trap cells, a gas cooler area, a sodium and argon sampling pipeway, and process monitoring equipment including gas chromatographs and fission gas monitors. The 491W Building contains two secondary sodium system pump enclosures, secondary sodium sampling enclosures, and other process-related equipment rooms. The sodium processing system drained into the T-44 vessel located in the 491W Building. The 491W Building also provides access to the 405 RCB through an emergency airlock. The 491E Building contains one secondary sodium pump enclosure and other similar equipment to the 491W Building.

The 491E, 491S, and 491W HTS Service Buildings were deactivated and are currently in an S&M phase. The remaining hazards consist of 113 L (30 gal) of residual sodium in the T-44 vessel located at the 491W Building and 227 L (60 gal) of frozen sodium in a cesium trap at the 491S Building. An argon gas system is in place to provide safety coverage.

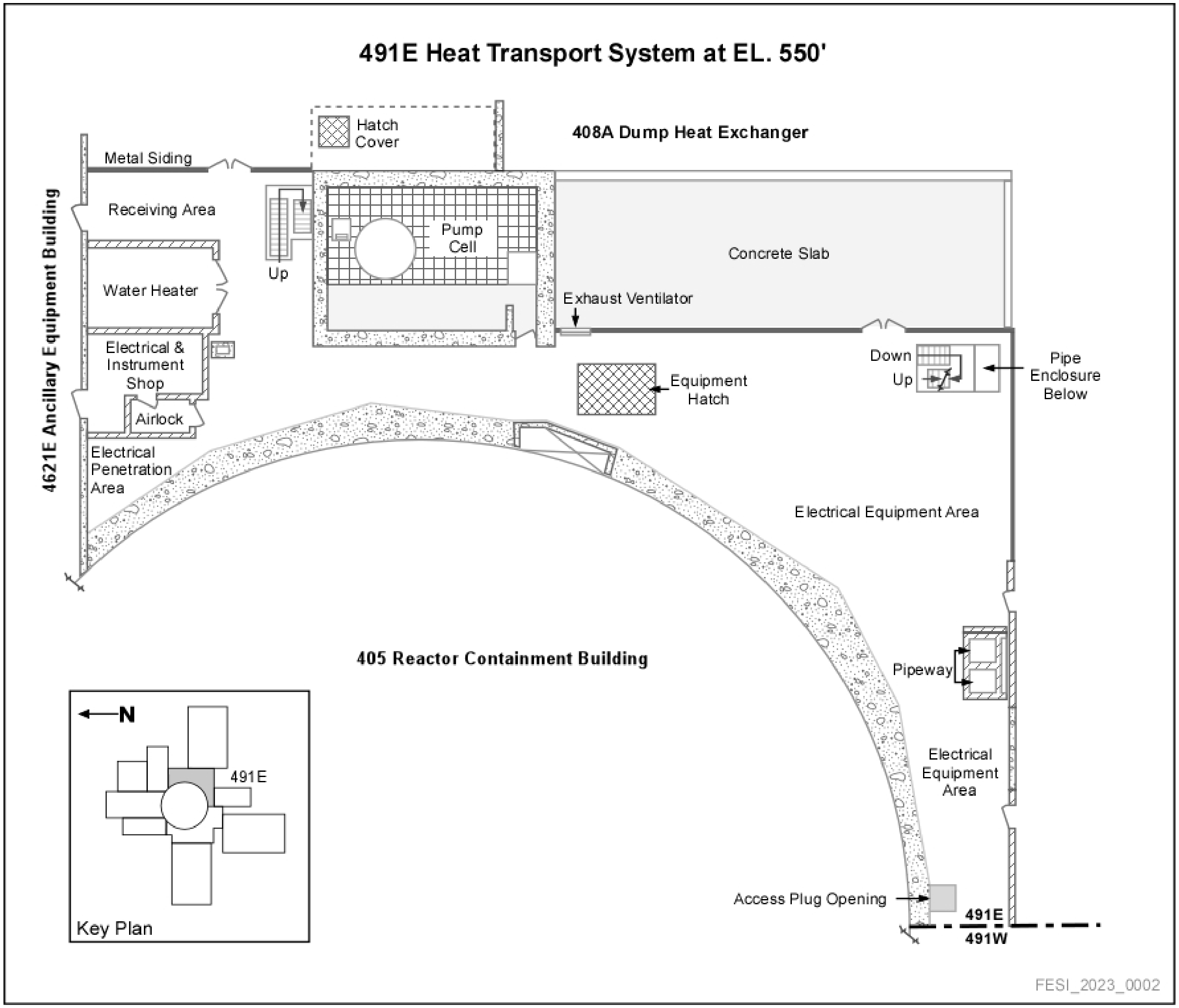

Figure 13. Plan View of 491E Heat Transport System Service Building (550 ft Elevation)

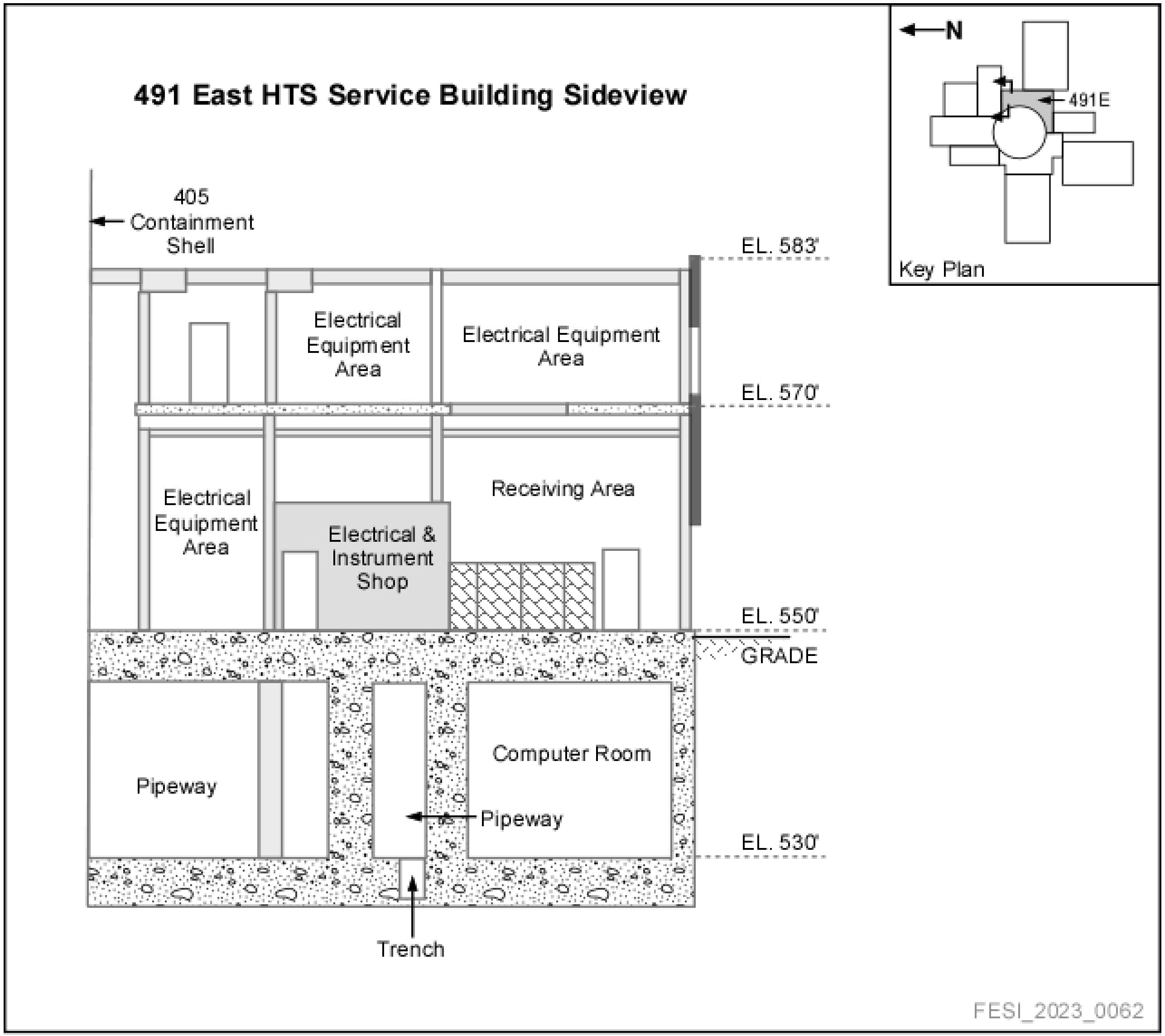

Figure 14. Side View of 491E Heat Transport System Service Building

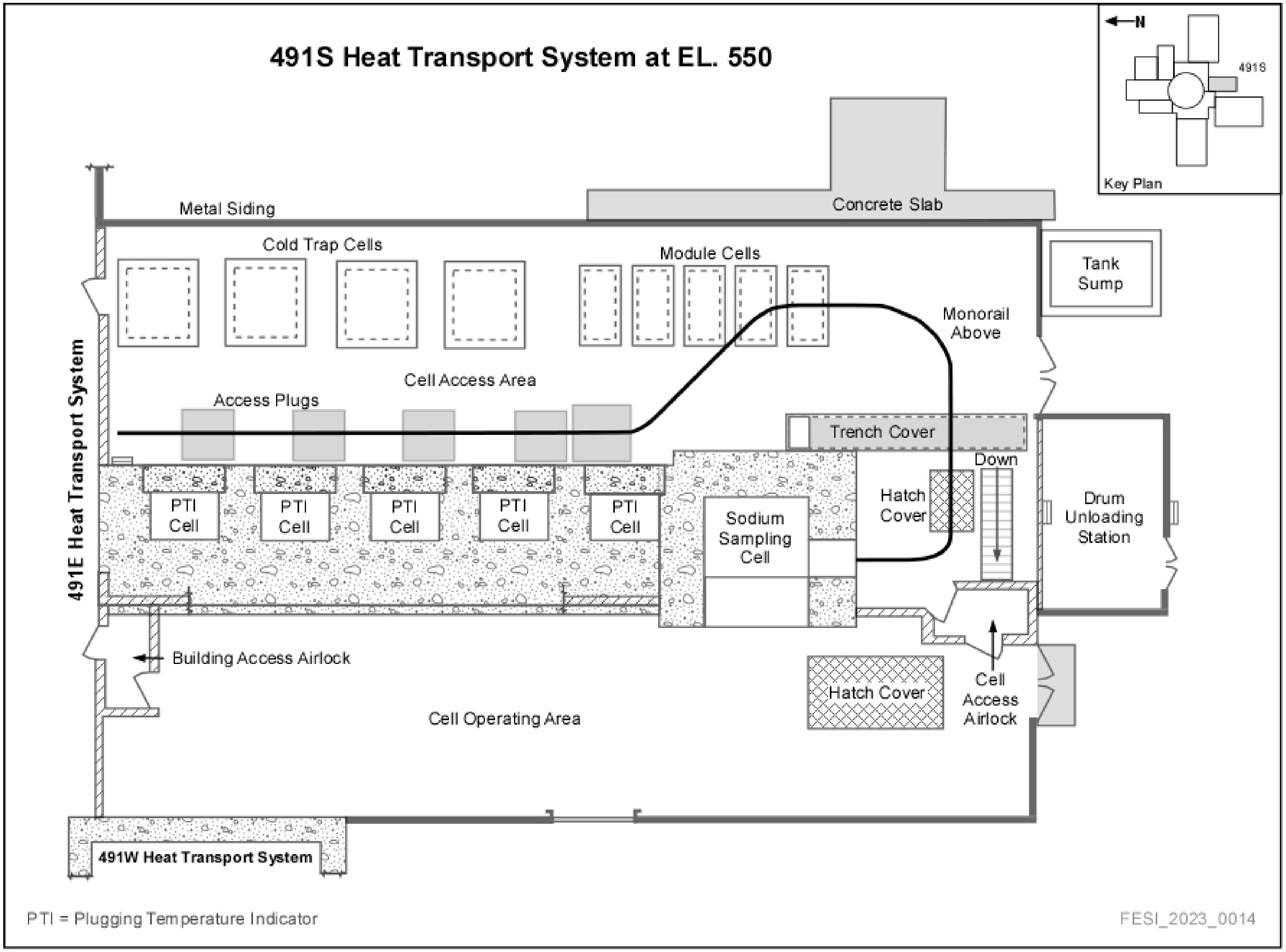

Figure 15. Plan View of 491S Heat Transport System Service Building (550 ft Elevation)

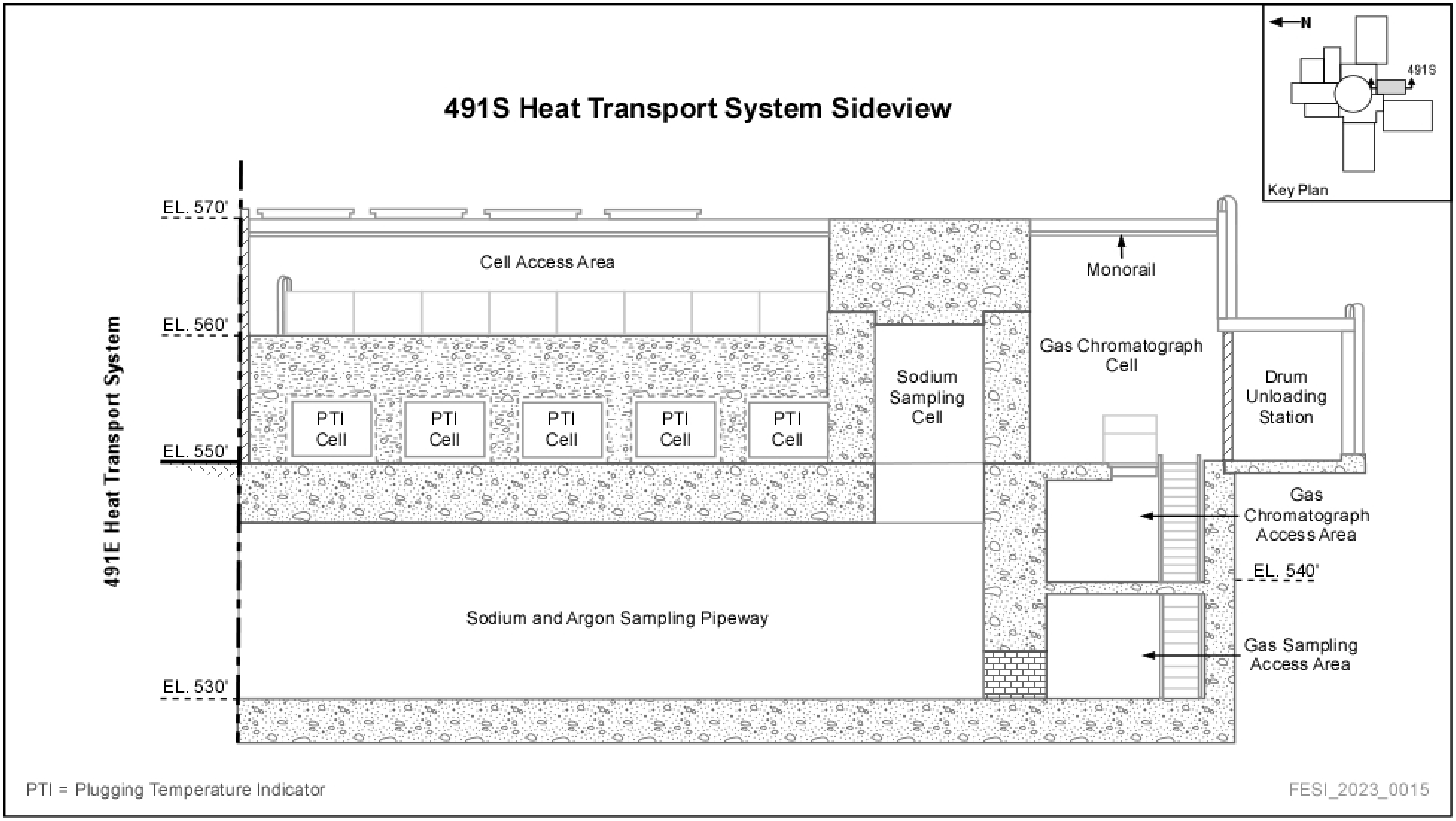

Figure 16. Side View of 491S Heat Transport System Service Building

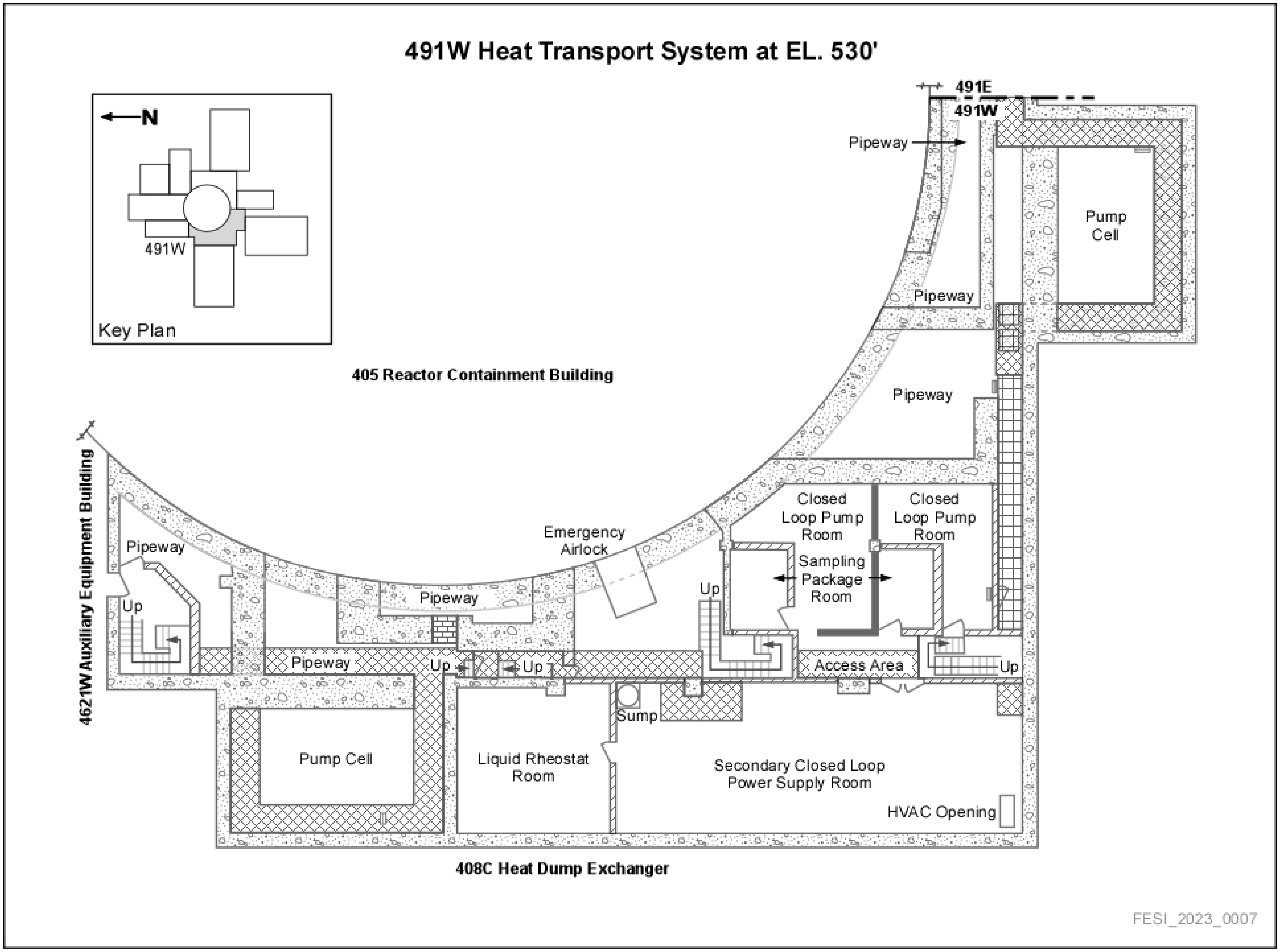

Figure 17. Plan View of 491W Heat Transport System Service Building (530 ft Elevation)

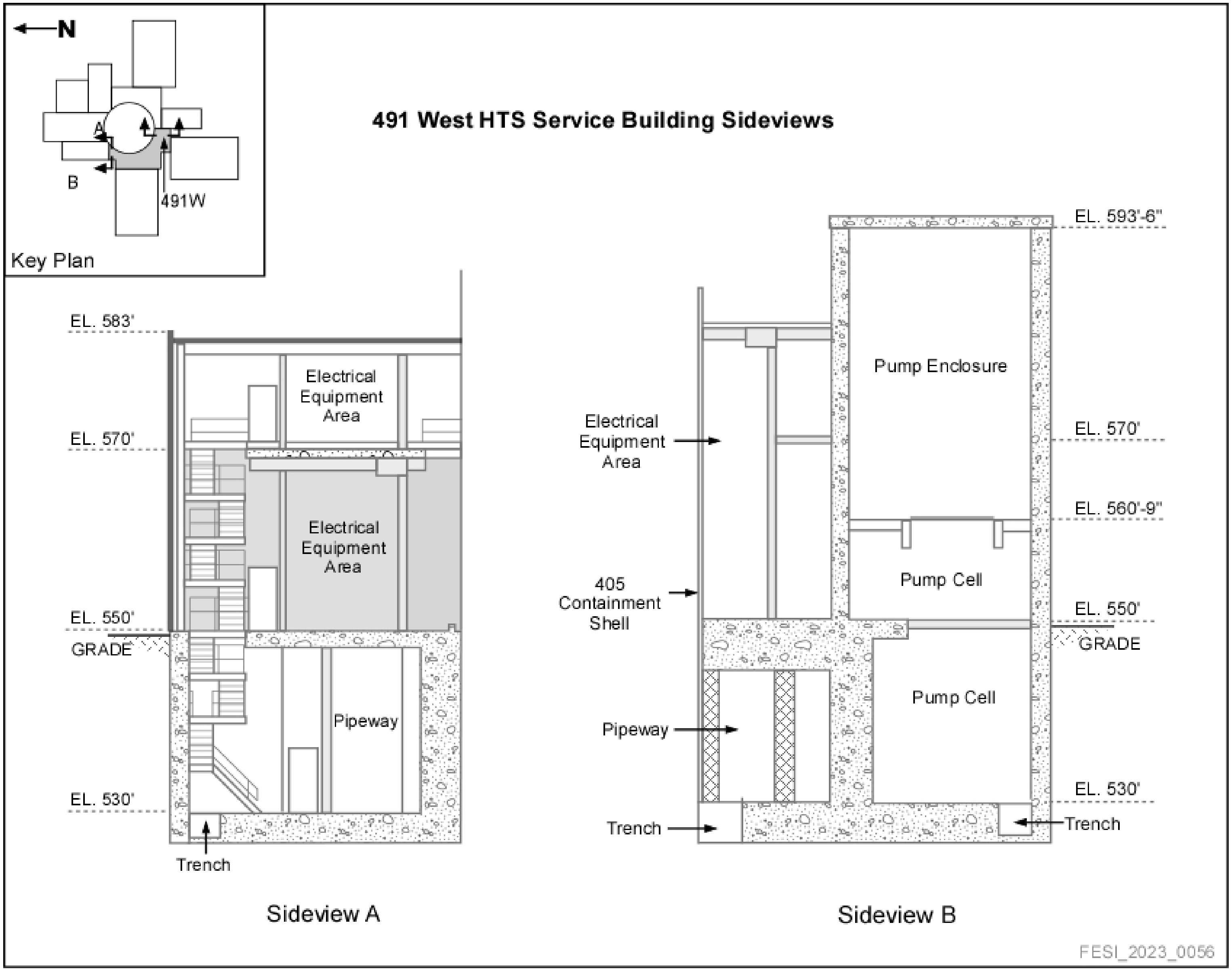

Figure 18. Side View of 491W Heat Transport System Service Building

6.5 4717 Reactor Services Building

Built in 1977, the 4717 RSB is a structure with one level of metal frame above grade and three levels of thick reinforced concrete below grade. The 4717 RSB is approximately 45.7 m (150 ft) long, 15.2 m (50 ft) wide, 36 m (118.4 ft) tall, extending 19.5 m (64 ft) above grade, and 16.6 m (54.4 ft) below grade (Figure 19).

The 4717 RSB was originally used for offsite cask loading and storage and processing of radioactive gases and waste. A large bay at ground level (167 m [550 ft] elevation) has a 100-ton bridge crane equipped with a 25-ton auxiliary hook, rail access, and rollup doors (Figures 20 and 21). The 4717 RSB houses an entry point into the 405 RCB through an airlock at ground level. The belowgrade levels (at the 161 m, 159 m, and 155 m [530 ft, 522.5 ft, and 508 ft] elevations, respectively) house support equipment such as chillers, compressors, and tanks. The 159 m (522.5 ft) and 155 m (508 ft) levels also contain systems that were used for reactor cover gas processing, sodium removal, and radioactive liquid waste collection and offloading.

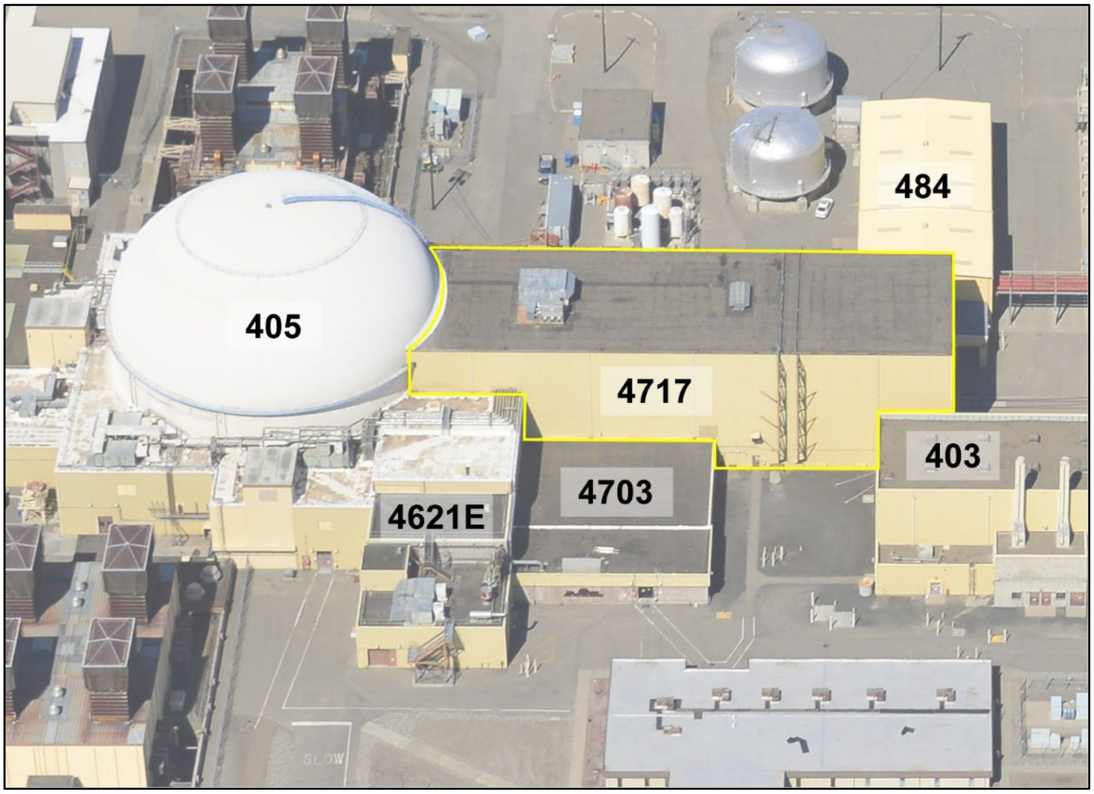

Figure 19. 4717 Reactor Service Building

The 4717 RSB was deactivated and is currently in an S&M phase. The remaining hazards include some contaminated fuel handling components, a small amount of internally contaminated piping formerly used for radioactive waste loadout, and a pipe containing residual sodium that was used for 403 FSF sodium offloading. The radiological contamination from the systems on the lower levels is primarily cesium.

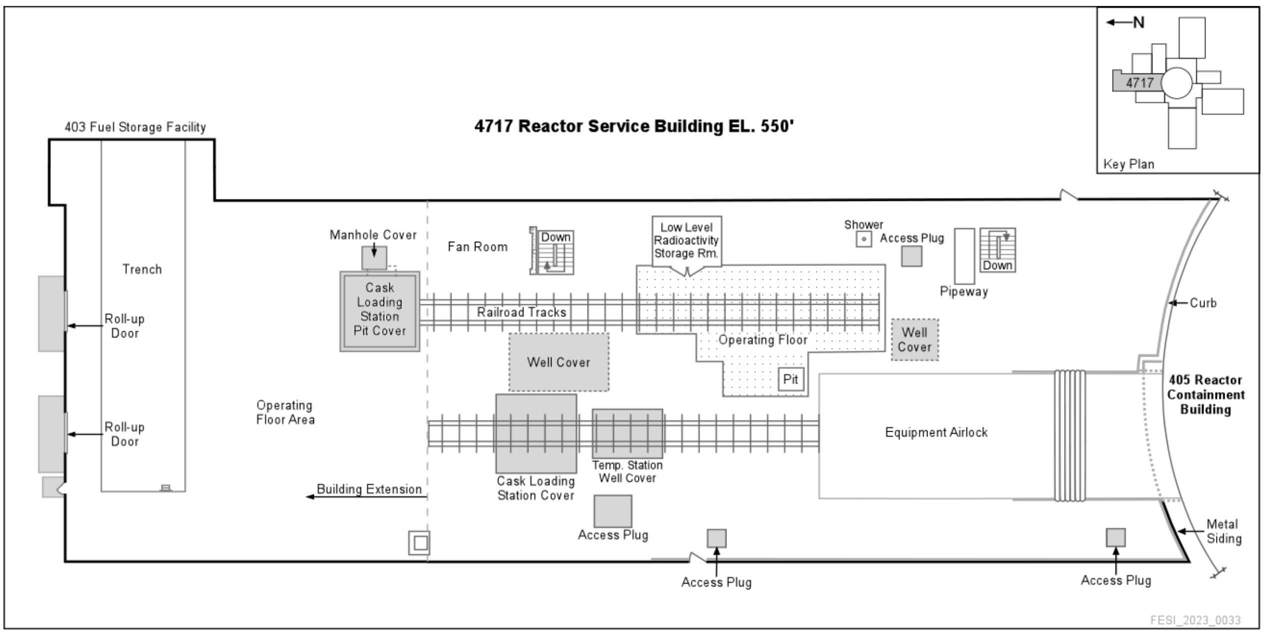

Figure 20. Plan View of 4717 Reactor Service Building (550 ft Elevation)

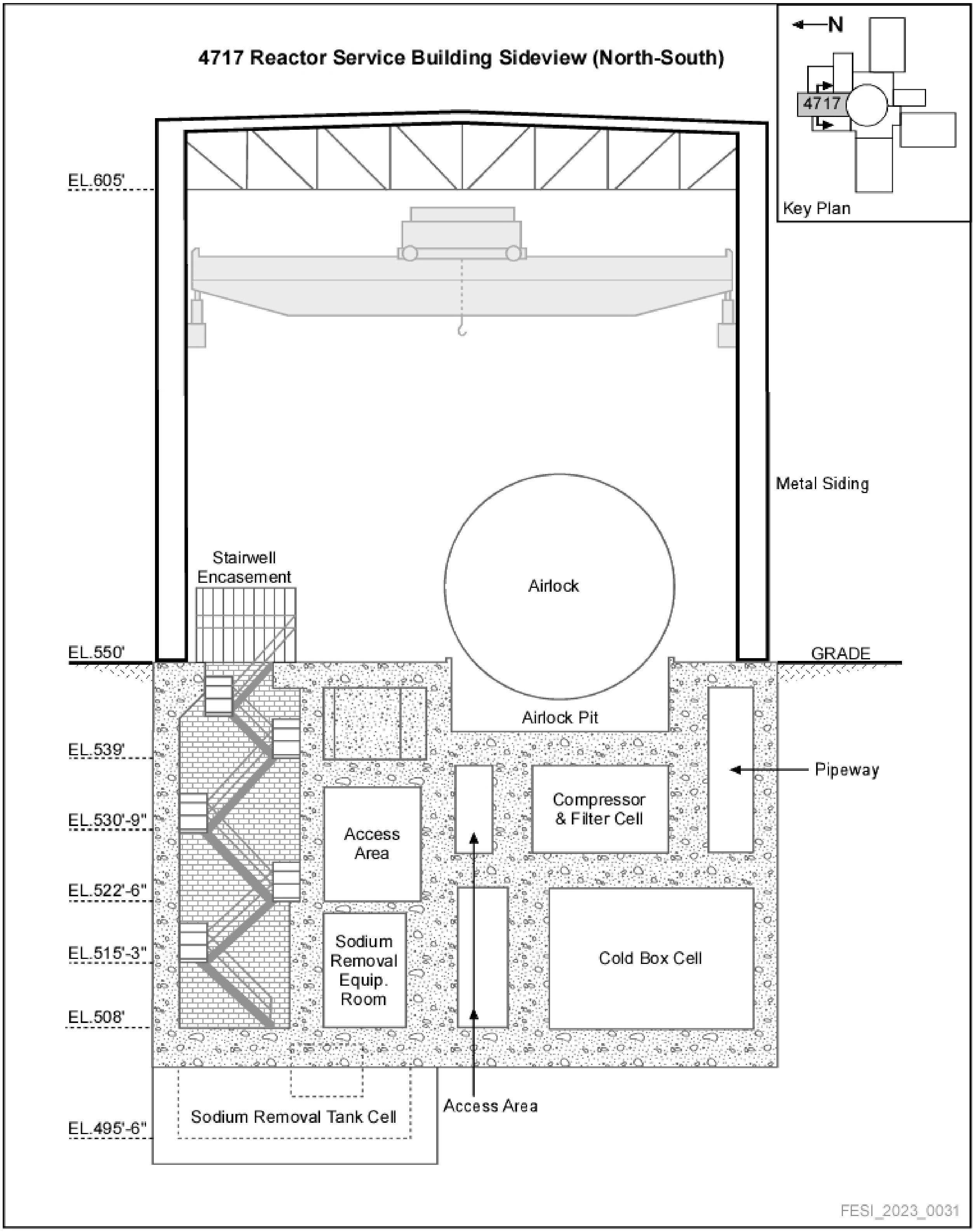

Figure 21. Side View of 4717 Reactor Service Building (North-South)

Figure 22. 437 Maintenance and Storage Facility (MASF)

The Maintenance and Storage Facility (MASF) (437 Building) was constructed on site and has a concrete slab on grade with a metal braced frame with a combination of concrete and insulated sheet metal covered walls. The roof has a slightly pitched metal roof that has rigid insulated with a built-up covering. The facility is equipped with below grade areas that contains tanks, vessels and a service tunnel. The facility has electrical, water, sewer, telecommunications, and a fire protection sprinkler/alarm system service. The facility has chilled water and air handling system and numerous electric heaters. Facility access is provided by personnel doors on the north, south, and west sides with double doors on the south side. There are multiple roll up doors on the north and south sides of the facility. The facility interior consists of gypsum board walls with suspended tile ceiling with a mix of fluorescent lighting and LED lighting in the administration wing. The high bay has rigid insulation on the walls and ceilings. The facility floor are smooth concrete or linoleum tiles. The facility is also equipped with 60- and 200-ton overhead cranes.

The MASF ventilation system consists of one supply fan, one return fan, and two exhaust fans. The supply fan provides conditioned air to all areas of the facility. The return fan draws air from the offices and High and Low Bay areas, through a high-efficiency particulate air (HEPA) filter system, and then the air is either exhausted or directed to the supply fan. The two exhaust fans draw air from potentially contaminated areas, through HEPA filters, and then the air is exhausted from the facility.

7 Existing and Proposed Abatement Technology

Regulatory Requirement: WAC 246-247-110, Appendix A(6) Describe the existing and proposed (as applicable) abatement technology. Describe the basis for the use of the proposed system. Include expected efficiency of each control device, and the annual average volumetric flow rate(s) in meters^3 /second for the emission unit(s).

This is a diffuse and fugitive emission unit that uses no credited abatement technologies. HEPA filters may be used as a best management practice during deactivation and S&M activities (small/portable ventilation units, HEPA-filtered vacuums, etc.) but are not credited in calculating an abated total effective dose equivalent (TEDE) within this NOC application. When practicable, other emission units will be employed to mitigate potential radiological hazards (i.e., EU 1176, FFTF PTRAEU; EU 476, Hanford Sitewide Guzzler-001; or EU 455, Hanford Sitewide W-PORTEX-001 (HEPA Vacuums)).

The exhaust stack was modeled in ECF-HANFORD-23-0010, Rev. 0, *Radiological and Toxic Air Emissions for the Fast Flux Test Facility*, but did not include abatement. As shown in Appendix D of ECF-HANFORD-23-0010 Rev. 0, the stack exit velocity of 6.04 m/s was used in the CAP88 model.

8 Radionuclide Inventory

Regulatory Requirement: WAC 246-247-110, Appendix A(8) Identify each radionuclide that could contribute greater than ten percent of the potential-to-emit TEDE to the MEI, or greater than 0.1 mrem/yr potential-to-emit TEDE to the MEI.

The radiological inventories were obtained from Table 6 of ECF-HANFORD-23-0010, Rev. 0, and reflected in Table 1 of this NOC. The radiological inventories utilized conservative radionuclides for alpha emitters (assumed to be all plutonium-239) and for beta/gamma emitters (assumed to be all cesium-137). Barium-137m was included since it is a daughter product of cesium-137. Therefore, cesium-137, barium-137m, and plutonium-239 were the only radionuclides modeled in ECF-HANFORD-23-0010, Rev. 0. As mentioned, these are the most conservative radionuclides from a modeling perspective, but other radionuclides are known to be present.

From the evaluation of CAP88 modeling runs in ECF-HANFORD-23-0010 Rev. 0, cesium-137 and barium-137m would contribute greater than 10% of the TEDE.

The radionuclide inventory is considered conservative, given that ECF-HANFORD-23-0010, Rev. 0, is written for D4 activities associated with the FFTF facility complex and should more than address the work activities within this NOC.

9 Effluent Monitoring System

Regulatory Requirement: WAC 246-247-110, Appendix (9) Describe the effluent monitoring system for the proposed control system. Describe each piece of monitoring equipment and its monitoring capability, including detection limits, for each radionuclide that could contribute greater than ten percent of the potential-to-emit TEDE to the MEI, or greater than 0.1 mrem/yr potential-to-emit TEDE to the MEI, or greater than twenty-five percent of the TEDE to the MEI, after controls. Describe the method for monitoring or calculating those radionuclide emissions. Describe the method with detail sufficient to demonstrate compliance with the applicable requirements.

Near-facility ambient air monitoring stations will be used to augment workplace monitoring during deactivation and demolition activities. The Hanford Site protocol established for the NFM Program ambient air stations will be followed for station repairs, retirement, data collection, sampling frequencies, sample analysis, and data reporting (DOE/RL-91-50, *Hanford Site Environmental Monitoring Plan*).

These air monitors are used to measure emissions. Operation of these monitors will follow the protocol established for these programs. Data from these monitors will be included in annual reports prepared for the Hanford Site. Air samples are collected every 2 weeks and analyzed for total alpha and total beta. These samples are composited semiannually and analyzed for isotopic uranium, isotopic plutonium, americium-241, strontium-90, and gamma-emitting radionuclides (gamma energy analysis).

To verify continued low diffuse and fugitive emissions from the passive ventilation construction activity, the NFM network data from stations N589, N939, N911, N912, and N951 will be trended upon receipt of the analytical results for each bi-weekly sample period until the activity is completed.

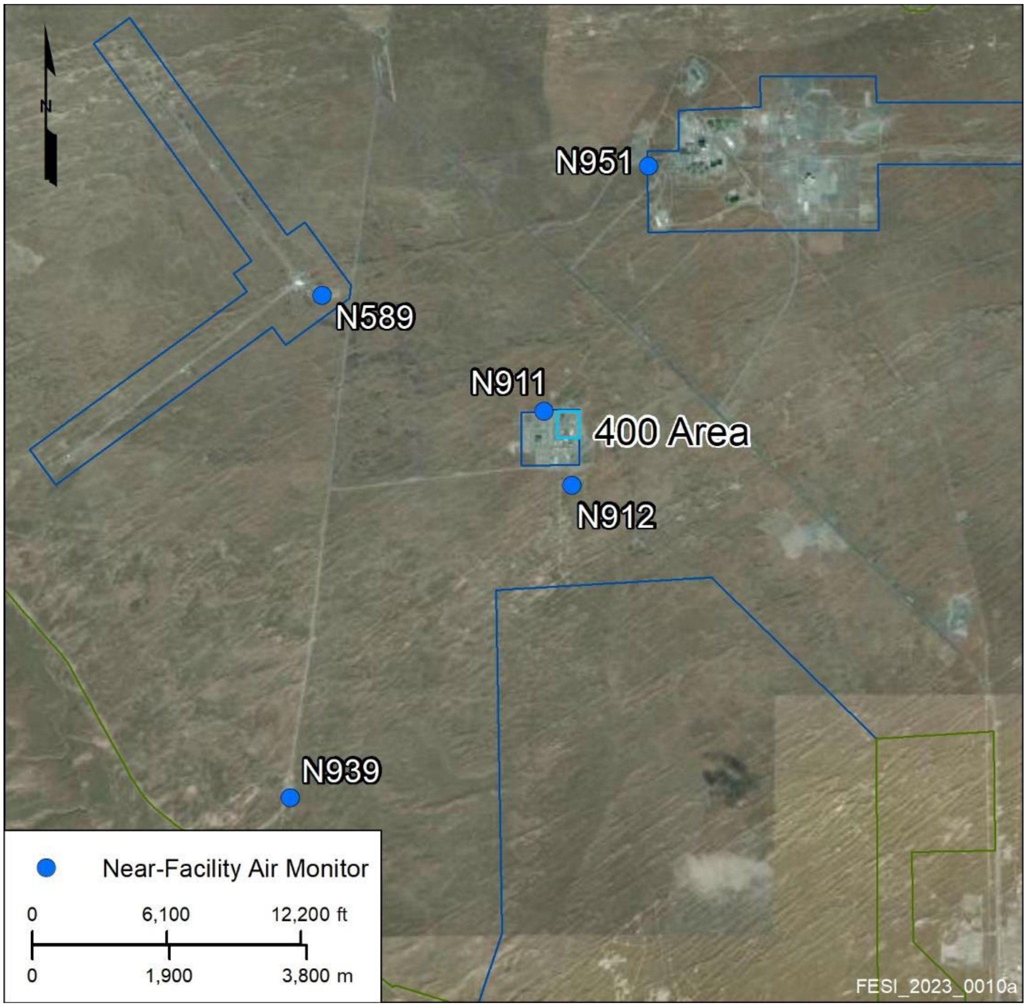

Figure 23. Near-Facility Air Monitoring Locations for the FFTF Complex Structures

10 Annual Possession Quantity

Regulatory Requirement: WAC 246-247-110, Appendix A(10) Indicate the annual possession quantity for each radionuclide.

The annual possession quantity was provided in Table 6 of ECF-HANFORD-23-0010, Rev. 0, and shown in Table 1 of this NOC.

11 Physical Form of Each Radionuclide

Regulatory Requirement: WAC 246-247-110, Appendix A(11) Indicate the physical form of each radionuclide in inventory: Solid, particulate solids, liquid, or gas.

The radionuclides in inventory are present primarily in the form of contamination on building/equipment surfaces and is considered a particulate solid (consistent with a release fraction of 1E-03) in accordance with WAC 246-247-030(21)(a).

12 Release Form of Each Radionuclide

Regulatory Requirement: WAC-246-247-110, Appendix A (12) Indicate the release form of each radionuclide in inventory: Particulate solids, vapor, or gas. Give the chemical form and ICRP 30 solubility class, if known.

The radionuclides in inventory are present primarily in the form of contamination on building/equipment surfaces and is considered a particulate solid (consistent with a release fraction of 1E-03) in accordance with WAC 246-247-030(21)(a).

13 Release Rates

Regulatory Requirement: WAC-246-247-110, Appendix A (13) Release rates. (a) New emission unit(s): Give predicted release rates without any emissions control equipment (the potential-to-emit) and with the proposed control equipment using the efficiencies described in subsection (6) of this section. (b) Modified emission unit(s): Give predicted release rates without any emissions control equipment (the potential-to-emit) and with the existing and proposed control equipment using the efficiencies described in subsection (6) of this section. Provide the latest year's emissions data or emissions estimates. In all cases, indicate whether the emission unit is operating in a batch or continuous mode.

The radionuclides of concern are particulate solids. Therefore, a release fraction of 1.0E-03 is used in accordance with WAC 246-247-030(21)(a), “Definitions, Abbreviations, and Acronyms,” Appendix D, “Methods for Estimating Radionuclide Emissions”; and in 40 CFR 61, “National Emission Standards for Hazardous Air Pollutants.” The PTE was provided in Table 6 of ECF-HANFORD-23-0010, Rev. 0, and shown in Table 1 of this NOC.

14 Location of Maximally Exposed Individual

Regulatory Requirement: WAC 246-247-110, Appendix A(14) Identify the MEI by distance and direction from the emission unit(s). The MEI is determined by considering distance, windrose data, presence of vegetable gardens, and meat or milk producing animals at unrestricted areas surrounding the emission unit.

The distances used in the CAP88-PC model runs are shown in Appendices D through K of ECF-HANFORD-23-0010, Rev. 0, for each of the building modeled. In accordance with WAC 246-247-030(15), the MEI is any member of the public (real or hypothetical) who abides or resides in an unrestricted area and may receive the highest TEDE from the emission unit(s) under remediation considering all exposure pathways by the radioactive emissions. For the purposes of this calculation, the MEI was assumed to be located at the Hanford Site boundary at a compass bearing from the source that yielded the highest dose from all air pathways as computed by the CAP88-PC program. The exception is where the Columbia River defines the eastern site boundary; hence, the east bank is considered the closest habitable location. Also, as requested by WDOH (AIR 00-1012, “New Maximally Exposed Individual Definition”), the Laser Interferometer Gravitational-Wave Observatory and Energy Northwest are considered onsite for the purpose of determining the location of the MEI. Distances to the site boundary were computed using the Hanford Geographic Information System. The southern boundary on the maps shown in Appendix C of ECF-HANFORD-23-0010, Rev. 0, reflects land that was transferred on September 30, 2015, from DOE to the Tri-City Development Council.

For all cases, the offsite MEI is located to the southeast at the Hanford Site boundary and the onsite MEI is located to the north-northeast at Energy Northwest. (Table 2).

15 Total Effective Dose Equivalent to the Maximally Exposed Individual

Regulatory Requirement: WAC 246-247-110, Appendix A(15) Calculate the TEDE to the MEI using an approved procedure (see WAC 246-247-085). For each radionuclide identified in subsection (8) of this section, determine the TEDE to the MEI for existing and proposed emission controls, and without any emission controls (the potential-to-emit) using the release rates from subsection (13) of this section. Provide all input data used in the calculations.

CAP88-PC version 4.0.1.17 was used to calculate the dose to the MEI using the PTE values calculated in Section 3.4 of ECF-HANFORD-23-0010, Rev. 0, for each radionuclide as inputs into the CAP88-PC model run.

A Hanford Site-specific wind file for the 400 Area (a1940010.wnd) was used in the CAP88-PC model runs and is shown in Appendix B of ECF-HANFORD-23-0010, Rev. 0. The wind file is based on average data collected at Weather Station #9 in the 400 Area between 2010 and 2019 at the 10 m (32.8 ft) level. A wind rose for this weather station from 2010 to 2022 is also included in Appendix B of ECF-HANFORD-23-0010, Rev. 0.

Table 2 provides the TEDE to all of the FFTF buildings. As shown in Table 2, the sum for all offsite TEDEs was 4.33E-02 mrem/yr and the sum for all onsite TEDEs was 1.08E-01 mrem/yr. Given that the FFTF-CB-EX stack located within the 405 and 4717 Buildings is not abated, it was grouped with the remaining buildings that were modeled as diffuse/fugitive emission sources.

16 BARCT/ALARACT Assessment (or Cost Factors of Control Technology)

Regulatory Requirement: WAC 246-247-110, Appendix A(16) Provide cost factors for construction, operation, and maintenance of the proposed control technology components and system, if a BARCT or ALARACT demonstration is not submitted with the NOC.

Vacuum cleaners equipped with HEPA filters may be used to decontaminate personal protective equipment and asbestos removal tools, as well as for general radiological control. Glove bags or similar confinement methods may control the spread of contamination while removing asbestos. The HEPA-filtered exhausters may collapse these bags for disposal after use. Portable temporary radioactive air emission units equipped with HEPA filters may also be used to abate particulate emissions.

Any vacuum cleaners and portable exhausters used for demolition activities will be equipped with appropriately tested HEPA filters. Filters will be aerosol tested annually. Units will undergo additional aerosol testing in the event that the units are assumed to have been compromised (e.g., dropped or roughly handled).

The control technology for the existing emission unit is as low as reasonably achievable control technology (ALARACT), consisting of HEPA filtration. WAC 246-247-030(6) states that control technology that meets best available radionuclide control technology (BARCT) requirements also meets ALARACT requirements. Pursuant to WAC 246-247-110, Appendix A(16), cost factors for construction, operation, and maintenance of proposed technology requirements are not required (24590-WTP-RPT-ENV-15-004, *Best Available Radionuclide Control Technology Analysis Addendum for the WTP Effluent Management Facility*) and HEPA filters are generally considered BARCT for particulate emissions. The large majority of radionuclides present are in the form of particulate. This NOC proposes that HEPA filtration be accepted as BARCT/ALARACT. HEPA filters will be used as a best management practice but are not credited in calculating an abated TEDE within this NOC application.

No control technology is currently in place for the 400 Area Diffuse and Fugitive emission unit. The cost factors for construction, operation, and maintenance of any proposed technology requirements are not required, as the WDOH has provided guidance in a letter to DOE (AIR 92-107, "K Basin Surveillance Results").

17 Lifetime of the Facility Process

Regulatory Requirement: WAC 246-247-110, Appendix A(17) Provide an estimate of the lifetime for the facility process with the emission rates provided in this application.

The estimated emission rates provided in this application have been calculated through and beyond the conclusion of the 400 Area Stabilization and Maintenance activities outlined in the Action Memorandum (DOE/RL-2021-29, Rev. 0, *Action Memorandum for the Fast Flux Test Facility*, available in the Administrative Record).

This diffuse and fugitive emission source will continue through the deactivation and demolition of the FFTF complex and associated 400 Area structures. When the FFTF structures undergo D4 (addressed by the CERCLA removal action), an air monitoring plan will address radiological air emissions from those activities. The post-stabilization calculated unabated offsite and onsite TEDEs to the MEI in Table 2 are estimated to be 4.33E-02 mrem/yr and 1.08E-01mrem/yr, respectively. The abated offsite and onsite TEDE to the MEI is not calculated for a diffuse and fugitive emission unit.

18 Control Technology Standards

Regulatory Requirement: WAC 246-247-110, Appendix A(18) Indicate which of the following control technology standards have been considered and will be complied with in the design and operation of new or modified emission unit(s) described in this application.

HEPA filters will be used as a best management practice but are not credited in calculating an abated TEDE within this NOC application. Sitewide emission units will be employed for specific work scopes and the controls are outlined in those NOCs.

19 References

40 CFR 61, “National Emission Standards for Hazardous Air Pollutants,” *Code of Federal Regulations*. Available at: https://www.govinfo.gov/content/pkg/CFR-2010-title40-vol8/xml/CFR-2010-title40-vol8-part61.xml.

24590-WTP-RPT-ENV-15-004, *Best Available Radionuclide Control Technology Analysis Addendum for the WTP Effluent Management Facility* , River Protection Project, Waste Treatment Plant, Richland, Washington.

AIR 92-107, 1992, “K Basin Surveillance Results” (letter to J.D. Bauer, U.S. Department of Energy, Richland Field Office, from A.W. Conklin), Washington State Department of Health, Olympia, Washington, October 5.

AIR 00-1012, 2000, “New Maximally Exposed Individual Definition” (letter to S.H. Wisness, U.S. Department of Energy, Richland Operations Office, from A.W. Conklin), Washington State Department of Health, Olympia, Washington, October 18. Available at: https://pdw.hanford.gov/document/AR-03321.

AIR 15-1107, 2015, “Re: Final Approval of Radioactive Air Emissions Licenses (RAELs) for the Maintenance and Storage Facility (MASF) and Fast Flux Test Facility (FFTF), to be Incorporated in the Next Revision of the Hanford Site RAEL (FF-01)” (letter to S. Charboneau, U.S. Department of Energy, Richland Field Office, from J. Martell), Washington State Department of Health, Olympia, Washington, November 10.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601, et seq., Pub. L. 107-377, December 31, 2002. Available at: https://www.csu.edu/cerc/researchreports/documents/CERCLASummary1980.pdf.

DOE, 2020, *Subpart H—National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities*, Office of Environment, Health, Safety and Security and Office of Public Radiation Protection, U.S. Department of Energy, Washington, D.C. Available at: https://www.energy.gov/sites/default/files/2024-06/DOE-Info-Brief-on-NESHAPS-Jan-2020-508.pdf.

DOE/EA-0993, 1995, *Environmental Assessment Shutdown of the Fast Flux Test Facility Hanford Site, Richland, Washington* , U.S. Department of Energy, Washington, D.C. Available at: https://www.energy.gov/sites/prod/files/EA-0993-FEA-1995.pdf.

DOE/RL-91-50, 2013, *Hanford Site Environmental Monitoring Plan*, Rev. 6A, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: https://pdw.hanford.gov/document/1503160460.

DOE/RL-94-137, 1994, *Radioactive Air Emissions Notice of Construction Sodium Storage Facility*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: https://pdw.hanford.gov/document/E0040082.

DOE/RL-94-137, 2002, *Radioactive Air Emissions Notice of Construction Sodium Storage Facility*, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2006-49, 2006, *Radioactive Air Emissions Notice of Construction for Sodium Residuals Reaction/Removal and Other Deactivation Work Activities at the Fast Flux Test Facility*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: https://pdw.hanford.gov/document/DA03124994.

DOE/RL-2021-29, 2024, *Action Memorandum for the Fast Flux Test Facility*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: https://pdw.hanford.gov/document/AR-28918.

DOE/RL-2024-08, 2024, *Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 2023*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: https://pdw.hanford.gov/document/AR-30124.

ECF-HANFORD-23-0010, 2023, *Radiological and Toxic Air Emissions for the Fast Flux Test Facility*, Rev. 0, Central Plateau Cleanup Company, Richland, Washington. Available at: https://pdw.hanford.gov/document/AR-24960.

National Environmental Policy Act of 1969, 42 USC 4321, et seq. Available at: https://www.gpo.gov/fdsys/pkg/USCODE-2010-title42/pdf/USCODE-2010-title42-chap55-sec4321.pdf.

WA7890008967, *Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste*, Revision 8c, as amended, Washington State Department of Ecology, Richland, Washington. Available at: https://fortress.wa.gov/ecy/nwp/permitting/hdwp/rev/8c/index.html.

WAC 246-247, "Radiation Protection—Air Emissions," *Washington Administrative Code*, Olympia, Washington. Available at: https://apps.leg.wa.gov/WAC/default.aspx?cite=246-247.

Table 1. FFTF Building Inventory PTE Calculation Summary

Emission Type	Structure No.	A	B	C	D	E
		Isotope	Inventory (Ci)	APQ (Ci/yr)	Release Factor[a] (unitless)	Unabated PTE (Ci/yr)
		Input	Input	B / 1 yr[b]	Input	C x D
Point source	**405 and 4717 via FFTF-CB-EX Stack**	**Pu-239**	2.33E-03	2.33E-03	1.00E-03	2.33E-06
		Cs-137	2.71E+01	2.71E+01	1.00E-03	2.71E-02
		Ba-137m	2.57E+01	2.57E+01	1.00E-03	2.57E-02
Diffuse and fugitive	**403**	**Cs-137**	3.20E+00	3.20E+00	1.00E-03	3.20E-03
		Ba-137m	3.03E+00	3.03E+00	1.00E-03	3.03E-03
	408A, 408B, and 408C	**Pu-239**	1.17E-03	1.17E-03	1.00E-03	1.17E-06
		Cs-137	5.83E-02	5.83E-02	1.00E-03	5.83E-05
		Ba-137m	5.51E-02	5.51E-02	1.00E-03	5.51E-05
		H-3	1.67E-02	1.67E-02	1.00E+00	1.67E-02
	491E	**Pu-239**	1.57E-03	1.57E-03	1.00E-03	1.57E-06
		Cs-137	7.85E-02	7.85E-02	1.00E-03	7.85E-05
		Ba-137m	7.43E-02	7.43E-02	1.00E-03	7.43E-05
	491S	**Cs-137**	4.80E+01	4.80E+01	1.00E-03	4.80E-02
		Ba-137m	4.54E+01	4.54E+01	1.00E-03	4.54E-02
	491W	**Pu-239**	1.51E-03	1.51E-03	1.00E-03	1.51E-06
		Cs-137	7.57E-02	7.57E-02	1.00E-03	7.57E-05
		Ba-137m	7.16E-02	7.16E-02	1.00E-03	7.16E-05

Note: Calculations from Table 6 of ECF-HANFORD-23-0010, *Radiological and Toxic Air Emissions for the Fast Flux Test Facility*.

a. Duration identified as 1 year.

b. Release fraction, which is 1.0E-03 (for plutonium-239, cesium-137, and barium-137m).

APQ: annual possession quantity

PTE: potential-to-emit

Table 2. CAP88-PC Version 4.0 Calculation Summary for TEDE to the MEI[a]

Emission Type	Structure No.	Offsite MEI		Onsite MEI[a]	
		Unabated TEDE (mrem/yr)	MEI Location (m SE)	Unabated TEDE (mrem/yr)	MEI Location[b] (m NNE)
Point source	FFTF-CB-EX Stack (405 and 4717)	1.43E-02	6,072	3.27E-02	3,028
Diffuse and fugitive	403	1.81E-03	6,058	4.91E-03	2,964
	408A	4.17E-05	5,999	1.07E-04	3,057
	408B	4.04E-05	6,132	1.04E-04	3,123
	408C	3.98E-05	6,193	1.05E-04	3,088
	491E	5.50E-05	6,034	1.43E-04	3,051
	491S	2.70E-02	6,071	6.93E-02	3,087
	491W	5.21E-05	6,105	1.35E-04	3,080
	Subtotal	2.90E-02		7.48E-02	
Total		**4.33E-02**		**1.08E-01**	

Note: CAP88-PC, version 4.0, allows modeling on a personal computer and is a recent version of CAP-88, a regulatory compliance tool under 40 CFR 61, "National Emission Standards for Hazardous Air Pollutants."

a. TEDE to the onsite MEI is provided in accordance with the agreement reached between the U.S. Department of Energy, Richland Operations Office; the U.S. Environmental Protection Agency, and the Washington State Department of Health (AIR 00-1012, "New Maximally Exposed Individual Definition").

b. The onsite MEI is located at Energy Northwest for all cases.

MEI: maximally exposed individual

NNE: north-northeast

SE: southeast

TEDE: total effective dose equivalent

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Attachment 2
24-ECD-0170

Notification of Off-Permit
Change

(2 pages including cover sheet)

NOTIFICATION OF OFF-PERMIT CHANGE
Permit Number: 00-05-006, Renewal 3

This notification is provided to the Washington State Department of Ecology, Washington State Department of Health, and the U.S. Environmental Protection Agency as a notice of an off-permit change described as follows.

The following changes are allowed pursuant to WAC 173-401-724(1), WAC 173-401-724(2), and WAC 173-401-724(6): 1. Change is not specifically addressed or prohibited by the AOP terms and conditions; 2. Change does not weaken the enforceability of the existing AOP conditions; 3. Change is not a Title I modification or subject to the acid rain requirements under Title IV of the FCAA; 4. Change meets all applicable requirements and does not violate an existing permit term or condition; 5. Change has complied with applicable preconstruction review requirements established pursuant to RCW 70.94.152.

Description of the change:
This Notice of Construction Application is for the *400 Area Diffuse and Fugitive* emission unit (EU) 1128, to update the U. S. Department of Energy Air Operating Permit (AOP), Renewal 3, License Number RAEL FF-01, potential-to-emit (PTE) to 1.08E-01 mrem/year, using the environmental calculation file ECF-HANFORD-23-0010, Revision 0, *Radiological and Toxic Air Emissions for the Fast Flux Test Facility Complex.* The annual PTE calculation may be completed using the near field monitor array data, inventory tracking, and/or area surveys. (See Attachment 2) The process description has been updated to remove sodium processing and emphasize the ongoing surveillance and maintenance (S&M) activities. These S&M activities will include hazard analysis, abatement activities, excavations, roof repairs, and decontamination to mitigate aging structures and prepare for demolition at the 400 Area.
Date of change: (To be provided in the agency approval order.)
Describe the emissions resulting from the change:
None.
Describe the new applicable requirements that will apply as a result of the change: (To be provided in the agency approval order.)