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Auditable Safety Analysis

Engineering Test Reactor Facility

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ABSTRACT

Abstract

This document is prepared in a three-chapter seven-section format recently adopted by the contractor as noted in electronic correspondence.

SUMMARY

Since the inactivation of the Engineering Test Reactor (ETR), the facility has been categorized as a Category 3 nuclear facility. In the spring of 2001, DOE-ID approved[1] the facility re-classification as a low hazard radiological facility. This auditable safety analysis describes the ETR facility, the hazards, and the controls. Additionally, numerous facilities, which supported the operation of the reactor, were re-categorized as not requiring additional safety analysis [NRASA]. These NRASA facilities are not addressed in this document.

[1] R.M. Stallman, Department of Energy, Idaho Operation Office, Letter dated April 16, 2001, to Mr. David M. Lucoff, Director Reactor Programs, Bechtel BWXT Idaho, LLC, Subject, Approval of Facility Hazard Classifications for the Test Reactor Area Effluent Processing (EP) and the Engineering Test Reactor (ETR) Facilities – (TPO-TRA-01-001)

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1. FACILITY/ACTIVITY DESCRIPTION

1.1 Facility Description

1.1.1 Engineering Test Reactor (ETR) Facility Overview

The ETR was the most advanced nuclear fuels and materials test reactor in the United States when it began operating in 1957 as a 175-megawatt light-water cooled and moderated, beryllium-reflected reactor. One of its many missions was to characterize engineering features of a sodium cooled reactor. The most significant residual radioactive source term is the reactor vessel and its internal structural support and components. These are securely contained within the reactor vessel and adequately shielded for personnel protection. Other hazards reported previously[1] included materials such as volatile organic compounds, asbestos insulation, and small residual amounts of sodium and sodium-potassium (Na and NaK) in retired experimental coolant loops. These and other normal industrial hazards such as fire, electrical, flooding, freezing, pressurized systems, and residual chemicals in drained systems such as acid and caustic come under the jurisdiction of companywide management and are not addressed in this safety analysis.

In January 2000, the contractor completed a hazard categorization of the ETR facility.[2] This analysis evaluated the radiological and hazardous materials in the ETR. Based on the unmitigated release of the radiological and hazardous chemical inventories, ETR is classified as a low hazard radiological facility. The contractor submitted this classification for approval to DOE-ID. The classification approval by DOE-ID required the development of this auditable safety analysis (ASA).

This ASA addresses the following list of facilities and structures.

Table 1. Facilities and Structures.

TRA-642	ETR Reactor Building
TRA-643	ETR Compressor Building
TRA-644	ETR Heat Exchanger Building
TRA-704	Underground Exhaust Pipe,
TRA-705	ETR Primary Filter Pit
TRA-706	ETR Secondary Filter Pit
TRA-755	ETR Delay Tanks

EDF-TRA-1554[1] contains the hazards, mitigation, and classification of the ETR facility support buildings / structures. These support facilities have been designated as not requiring additional safety analysis [NRASA] and are not further described in this document.

The TRA site characteristics can be found in SAR-100, INEEL Standardized Safety Analysis Report (SAR) Chapters.

Figure 1-1 shows the location of these buildings and structures inside the Test Reactor Area site.

1.2 Facility Structure

1.2.1 ETR Facility Areas and Buildings

The ETR facility consists of a number of separate buildings and a large number of systems, mostly in the reactor building, that directly supported reactor operation and the experiment conditions before it rendered inactive in 1981. These buildings are shaded on the map shown in Figure 1-2.

The following section discusses buildings and their physical size and spatial arrangement. Radiological hazards, as well as building structure and housekeeping hazards, tend to relate in this form. However, a number of industrial safety hazards are system of function related and are more readily evaluated by that association rather than spatial location.

In the following subsections, descriptions of each building, area, active system(s), or function are provided. The emphasis is on floor plan layout or area layout, basic materials, and types of construction. General services such as lighting, heating, and water are included. Additional design detail can be found in support documents.[2,3]

1.2.1.1 ETR Reactor Building (TRA-642). The reactor building is 136 ft in the east-west direction and 112 ft in the north-south direction. It extends 58 ft above the grade and 38 ft below grade to the basement floor. The interior floor area is 46,000 sq. ft. The walls, floors, and columns below grade are of reinforced concrete construction. The walls above grade are insulated metal-sandwich panel siding with the interior surface sealed and taped to provide containment. The roof construction consists of steel decking with applied foam glass insulation and built-up roofing. The panel walls, roof, and crane structure are supported on a steel superstructure of columns and trusses. The steel columns rest on reinforced concrete columns which extend to bedrock from the first floor level.

1.2.1.1.1 Main Floor—The high bay area above the first floor has a clear height of 47 ft to the bottom of the roof truss structure. The first floor is at elevation 97 ft. Layout of this floor is shown in Figure 1-3. The first floor is designed for three intensities of loading. That part of the first floor between column centerlines E24 to E25 from the north truck door to and including the pipe tunnel, the eastward extension of the pipe tunnel, and remaining floor area north to the edge of the stairwell enclosure is rated at 1,000 pounds per square foot (psf). The central floor area near the reactor is limited to 750 psf. This area extends 22 ft south, 29 ft west, 27 ft north, and 27 ft 6 in. east of the reactor centerline (except where this area overlaps the 1,000 psf area described above). The balance of the first floor area is limited to 350 psf. The bounds of these floor areas are painted on the floor for quick reference. The first floor slabs are 10 in. thick except for the 1,000-psf area, which is 12 in. thick.

The centerline of the reactor is located approximately 61 ft west of the reactor building east wall and 47 ft south of the north wall. The working canal extends westward from the reactor structure, and the process water pipe tunnel extends eastward from the reactor structure under the first floor. The T-shaped canal consists of two sections. The working canal (stem of the T) is 37 ft long and 8 ft wide tapering to a 2 ft 8 in. width at the reactor. The storage canal is 60 ft long and 12 ft wide. Except for the well beneath the reactor discharge chute, the water depth was 20 ft with a 1-ft freeboard. Two removable bulkheads for the working canal permitted the various sections of the canal to be drained individually. The canal floor is rated at 200 psf live load plus the water load.

1.2.1.1.2 Console Floor—The console floor, Figure 1-4, at elevation of 74 ft, served the dual purpose of a shielding roof for the experimental cubicles at basement level and a working level for experimental consoles and equipment. The walls of the pipe tunnel, the biological shield, and the canal walls extending from the first floor to the console floor divide the console area into two halves connected only at the west end by a corridor 9 ft 6 in. wide. The entire console floor is rated at 350 psf. That part of the floor directly over the basement cubicle area is constructed of 3-ft-thick ordinary concrete; the balance of the floor is 1 ft thick. Electrical ducts are laid in 9-in.-thick nonload-bearing concrete fill over the floor proper.

A 30-ft by 80-ft concrete balcony, Figure 1-5, was added on the south side of the console area in order to obtain additional floor space for experimental instrumentation and control equipment. The balcony is served by two stairways to the console floor. The balcony is designed for a live load of 200 psf.

1.2.1.1.3 Basement—The basement floor, Figures 1-6 and 1-7, rests on a compact fill at reference elevation 58 ft. Design loading is 900 psf. Walls of the experiment loop cubicles are mostly of magnetite and barytes concrete block construction. The floors and ceiling are of high-density concrete. Doors to the individual cubicles also are shielded and either hinged or track mounted for opening. The alpha-numeric designation of the cubicles relates to the location of the loop in-pile tube in the reactor core.

On the north side aisleway, there are floor-level hatches covering pits. These pits house various liquid effluent tanks, some of which are radioactive.

A glove box sample station is located off the northside aisleway adjacent to the M-3 cubicle door. This glove box is used to sample liquid from the warm sump tank.

1.2.1.1.4 Subpile Room—The area directly under the reactor is the subpile room, Figure 1-8. It is separated from the basement area by a 4-ft-thick high-density concrete circular wall. This room is 20 ft in diameter. The floor elevation is 58 ft, the same as the basement floor. The walls of the subpile room act as shielding, and as a support for the reactor and biological shield. Access is by means of a shielding door opening to the basement on the east side. Thirty-eight holes through the wall provide for penetration of experiment piping, instrument leads, etc.

1.2.1.1.5 Control Rod Access Room—The control rod access room is located directly below the subpile room and has a floor elevation of 45 ft. This room is reached by a stairway extending westward from basement floor level. As the name implies, it housed and provided access to the control rod, regulating rod, and chamber drive mechanisms. Figure 1-8 shows the vertical relationship within the biological shielding below the reactor and subpile room. As the low point, any leakage in the reactor building drains to the control rod access room. A sump is provided along with pumping for transfer of the water to a disposal pond.

1.2.1.1.6 Access—Personnel ground-level access to the reactor building is possible directly on the west side, the truck entrance on the north side, and the low bay on the southeast corner. Other ground-level entrances are through the administration building on the north side, compressor building on the east side, and electrical building on the south side. Personnel access between the reactor main floor and the console floor is available by means of the north side, northeast and southeast stairwells; also access from the electrical building and the console floor is available by means of a stairwell in the electrical building. The passenger elevator in the northeast corner of the reactor building provides access down to the console and basement floors.

Equipment access between floors was by a 10-ft by 14-ft, 10-ton capacity freight elevator located near the north truck door in the northeast corner of the reactor building. This elevator is out of service. A hatchway on the reactor floor north of the reactor centerline is 8 by 10 ft through the console floor. The openings through the first floor are 1 ft larger each way to permit the console floor hatch covers to be removed through the first floor hatchways.

Various small access holes are provided both in the main and the console floor for experiment use. The access holes are covered with shielded plugs. There are three 1-ft diameter holes and two 19-in. square holes in the north side of the reactor building main floor; the same number and sizes of access holes are in the south side of the main floor. Two of the square holes are continued through the console floor, one on the north side and one on the south side.

1.2.1.2 ETR Compressor Building (TRA-643). All of the reactor support equipment has been removed from service including the compressor. A fire system rise room along the east wall remains active support the building dry pipe fire system. Radioactive material is stored in this building.

The compressor building (TRA-643), Figure 1-9, houses the equipment that was used to supply large quantities of heated, hydrocarbon-free compressed air to various experiments. In the building are the process control room (at the east end) that was used to control all plant services to the reactor and the sample laboratory (on the south side) that was used to conduct chemistry samples on the reactor primary and secondary coolant.

The compressor building is 125 ft in the east-west direction, 103 ft in the north-south direction, and is 30 ft high. At the south wall, the Primary Coolant System (PCS) pump pits of the heat exchanger building extend 10 ft above the floor and 21 ft from the wall. The area above the PCS pump pits is used for storage. The storage area contains primarily experiment spare parts, handling tools, and lifting fixtures.

The building walls above grade are 12-in. pumice block to a height of 8 ft with insulated metal panels above. The north wall contains 4-ft-high, manually operated, metal louvers for a 52-ft long section just above the pumice block, which have been covered with aluminum sheets from the outside; the east wall contains a chain-operated 9-ft by 12-ft rolling, steel, service door and a 32-in. personnel door. A 3-ft personnel door penetrates the east wall from the process control room. Access to the reactor building is through a 42-in. door near the center of the compressor building west wall. The building foundation is a spread-footing type supported by pipe piling. Building floors are concrete, with asphalt tile covering in the control room only. Much of the north flooring contains a grating-covered trench extending as far as 8 ft below the floor. The compressor building roof is steel deck on steel frame, vapor-sealed, with 2 in. of glass insulation. The roofing is built-up with a gravel top and is surrounded by a 1-ft parapet. The process control room walls are constructed of 4-in. pumice blocks with 3 in. of glass fiber insulation between. A balcony above the control room has an 11-in. concrete floor. The balcony contains motor control center MCC-3A and commercial powered centers MCC-3B and -3C. These three MCCs are de-energized and out of service. Electrical controllers are located on the north and east walls. The sample laboratory north wall is 8-in. concrete block with voids filled with concrete; and the south, east, and west walls are the concrete heat exchanger building walls. A 3-ft door and 6-ft by 4-ft safety glass window are in the north wall of the sample laboratory.

Along the south side of the main floor are five large access hatches made of high-density concrete, which provide access to the PCS pipe tunnel. On the east end of the main floor is an access hatch to the cold pit. This pit is located between the degassing pump pit and the process control room. Access hatches are also provided into the individual PCS pump pits from above. All hatches require use of the crane to open.

The main floor of the compressor building is served with 20 drains, which drain to a sump on the northwest side of the process control room. This pump pumps to the cold waste leaching pond. A warm drain is located in the pipe shaft in the west side of the building near the reactor building.

1.2.1.3 ETR Heat Exchanger Building (TRA-644). The heat exchanger building, Figure 1-10, is adjacent to and east of the reactor building and south of the compressor building. The heat exchanger building is access controlled. The building includes (a) a main room and lower level, (b) the pipe tunnel, (c) a demineralizer wing (valve room and tank room), (d) a degassing tank room, and (e) an exhaust fan and cubicle exhaust booster blower room. The secondary pipe pit is located on the south side of the building.

1.2.1.3.1 Main Room and Lower Level—The primary function of the heat exchanger building main room was to house the 12 primary coolant-to-secondary coolant heat exchangers and associated piping. The building is constructed of reinforced concrete; the west wall is 5 ft thick, the east wall 4 ft thick, and the north and south walls are 4 ft thick. The building dimensions are 66 ft 6 in. by 78 ft by 22 ft high above ground. The lower level on the north side extends down an additional 18 ft 9 in. below ground level. The roof is reinforced concrete 3 ft thick. The west wall rests on the east wall of the reactor building and connects on the north to the compressor building.

The heat exchanger building has one 3-ft by 7-ft metal door in a metal frame on the south wall; there are no other readily accessible openings. Four knockout wall sections are provided on the south wall for access to and removal of the heat exchanger banks. The removable knockout sections are constructed of high density shielding block. Two ladders lead from the main room down to the north lower level and one ladder on the south side leads down to the secondary pipe pit.

The building is ventilated by an exhaust fan installed on the building roof which discharges to the exhaust stack through the cubicle exhaust piping.

Permanent scaffolding is installed on the north end of each bank of heat exchangers. One set of movable scaffolding is installed at the south end; facilities have been installed at each bank of heat exchangers to move this scaffolding as necessary. Stored at the heat exchanger banks are five sets of three-level temporary scaffolding that were manufactured to allow access to the heat exchangers for maintenance.

There is a warm drain line running east-west in the building north lower level. The automatic heat exchanger vents and the primary piping drained to the warm drains. A second warm drain line runs east to west under the primary pump cubicles for draining the primary pumps.

1.2.1.3.2 Pipe Tunnel—The PCS pipe tunnel is located on the north side of the heat exchanger building below ground level and beneath the reactor building main floor. Its purpose was to contain the piping necessary to transport the reactor fission heat to the secondary coolant system. The tunnel floor elevation is 18 ft below ground level. The tunnel extends east from the reactor 70 ft with a width of 8 ft and height of 18 ft. It then extends eastward another 80 ft with a width of 22 ft, and then another 20 ft with a width of 41 ft. The south wall extends another 22 ft with a width of 12 ft. The pipe tunnel overhead is solid concrete varying approximately from 5 ft thick to 3 ft thick. The north and east walls are 1 ft thick and the south wall is 18 in. thick.

Access to the PCS pipe tunnel is from the heat exchanger room through a 3-ft by 7-ft door cut through the 18-in. concrete separating wall. Five concrete plugs (four are 5 ft by 7 ft, and one is 5 ft by 5 ft) penetrate the 5-ft concrete overhead above the supply header isolation valves and above the surge tank. A metal ladder is bolted by the "B" plug. The tunnel is ventilated by the heat exchanger exhaust blower withdraws through the heat exchanger building. Warm drains are in the tunnel in a line about 3 ft from the north tunnel wall at about 25-ft intervals. Warm drains are also located in the northeast, southeast, and southwest corners of the area below the pressurizing and emergency pump pits, and in the southwest corner of the area below the sample laboratory.

1.2.1.3.3 Demineralizer Wing—The demineralized wing of the heat exchanger building is divided into two rooms; the tank room contains four resin bed demineralized tanks, and the valve room contains the valves and piping associated with the PCS demineralizers. The resin beds have been removed and the tanks capped. The valve room also has one small capacity caustic addition pump.

The walls, ceiling, and floor of the wing are constructed of reinforced concrete. The valve room walls are 1 ft thick, and the tank room walls are 2 ft 6 in. thick. Outside dimensions of the wing are 45 ft by 13 ft by 17 ft high. The valve room measures 13 by 22 ft. The tank room is 13 by 21 ft with a 2-1/2 ft thick wall separating the two rooms.

Access to the demineralized tank room is through one 6-ft by 9-ft and one 3-ft by 3-ft hatch opening in the roof. There is one high-density shielding block knockout door on the east wall to facilitate removal of the demineralized tanks. Entrance to the valve room is through one 3-ft by 6-ft metal door in a metal frame on the west wall. A ladder on the west wall of the tank room allows access to the roof of the building.

Two floor warm drains are in the demineralized wing, one under the cation units and one under the anion units. The resin discharge header is installed on the tank room east wall.

1.2.1.3.4 Degassing Tank Room—The degassing tank room was used to house the primary coolant system degassifier tank and its associated piping. The room is located on the northeast corner of the roof of the heat exchanger building. The outside dimensions of the room are 23 ft by 19 ft by 8 in. high. The walls are 1 ft 4 in. thick and constructed of high density shielding blocks. The roof and floor are high density concrete.

The room has one 3-ft by 6-ft 8-in. door on the north wall and two 3-ft by 3-ft shield plug hatches on the roof. There is one ladder access to the roof on the west side of the room.

One warm drain line from the degassing tank overflow and one floor drain run to the warm drains in the heat exchanger building lower level.

1.2.1.3.5 Heat Exchanger Building Fan and Cubicle Exhaust Booster Blower Room—This room is located on the southwest corner of the heat exchanger building roof. The function of this room was to house the heat exchanger building exhaust blower and the reactor building cubicle exhaust booster blower. Although power is available for these fans, they are out of service.

The external dimensions of the blower room are 23 ft by 21 ft and 13 ft high. The walls are constructed of pumice block and the roof is reinforced concrete. The room has one access double door entrance 5 ft wide by 7 ft high with metal encased metal doors.

1.2.1.4 ETR Filter Pit Building (TRA-755). The filter pit building is approximately 13 ft by 13 ft by 13 ft building constructed of pumice blocks. The building is located about 60-ft northeast of the compressor building and houses fans associated with experimenter's service exhaust. On the north side of the building the 20-in. line exits to the waste gas stack. Access to loop filters is on the northwest side of the building. Fan 755-7 and heaters 755-6 and 755-7 have power available but are out of service.

1.2.1.5 ETR Underground Exhaust Pits and Tunnels. Exhaust piping, Figure 1-11, is routed from the reactor building to the waste gas stack. This routing is provided in underground tunnels with pits having filters and delay tanks. This consists of the General Electric Experiment Loop (GEEL) pipe tunnel, hot filter pit, primary filter pipe tunnel, primary and secondary filter pits, and delay tank pit.

1.2.1.5.1 GEEL Pipe Tunnel—The original experiment exhaust system used the underground GEEL pipe tunnel and hot filter pit. The exhaust piping starts in the ETR basement and runs through a trench in the basement to a vertical shaft on the north side of the building near the truck door. The pipe tunnel runs north from the building for approximately 90 ft. It then runs east for about 155 ft to the hot filter pit. The tunnel, constructed of reinforced concrete, is approximately 8 ft high, 7 ft wide, and the top of the tunnel is about 9 ft below grade. The tunnel can be accessed through ventilation shaft hatches located just outside the building truck door or through the hot filter pit. The hatches require a crane to lift them for opening.

1.2.1.5.2 Hot Filter Pit—The hot filter pit houses three filters designated as the Loop 33, Loop 66, and Loop 99 hot filters. These filters are a canister charcoal-activated type contained in a lead and concrete shield. The pit is 30 ft long, 18 ft wide, and 17 ft deep. It can be entered through the three hatches or via a stairway, which starts on the north side of the filter pit building (TRA-755) and runs to the bottom of the pit.

1.2.1.5.3 Primary Filter Pipe Tunnel—The GEEL 99 modification consists of two filter pits, the primary and secondary filters, and two large delay tanks. The pipe trench for this pipe routing takes off from the GEEL tunnel just outside the reactor building and runs north, parallel to the GEEL tunnel, for about 32 ft to the primary filter pit. The trench then runs east for about 160 ft to the secondary pit and then continues east for another 65 ft to the delays tanks pit. All these pipe trenches are made of half-round corrugated plate. The trenches from the reactor building to the primary filter pit and from the primary filter pit to the secondary filter pit are approximately 5 ft wide at the bottom and 3 ft high at the center. The tops of these trenches are about 14 ft below grade. The trench between the secondary filter pit and the delay tank pit is slightly larger, 6 ft wide by 4 ft high. The top of this trench is about 16 ft below grade. None of these trenches are designed for personnel access.

1.2.1.5.4 Primary Filter Pit (TRA-704)—The primary filter pit houses two filters. It is 14 ft long, 10 ft wide, and about 17 ft deep. The pit can be entered through the hatches, which require a crane to lift them. There is a ladder, made of rungs embedded in concrete, on the west wall.

1.2.1.5.5 Secondary Filter Pit (TRA-705)—The secondary pit also houses two filters and is the same size as the primary pit. It is also connected to a small (7 ft long, 4 ft wide, and 4 ft high) pit to the north and a trap and sump pit to the south. The secondary pit can be accessed through the hatches, which require a crane to lift them. A ladder of metal rungs embedded in concrete is located on the east wall. It is also possible to enter the pit through the small pit to the north. Entry to the smaller pit is through a 30 in. diameter corrugated pipe about 18 ft long which is located to the north of the secondary pit.

1.2.1.5.6 Delay Tanks Pit (TRA-706)—There are two delay tanks located in this pit. Each tank is arranged in a housing of an approximate cylindrical cross-section. The major diameters of the housings are approximately 17 ft and 14 ft. The housings and concrete ends are about 70 ft long. The tops of the tanks are about 8 ft below grade. There are two ventilation ducts at the south end of the tank housings. Access is provided by two manholes, also located at the south end of the housings. There are no ladders inside the housings.

1.2.1.6 ETR Secondary Pipe Pit. The secondary pipe pit is an underground structure on the south side of the heat exchanger building. The function of secondary pipe pit was to house the Secondary Coolant System (SCS) heat exchanger isolation valves and the SCS drain sump and sump pump. The drain sump pump and motor are in the southeast corner of the pit floor. The sump extends about 7 ft below the floor level. The sump pump discharged to the cold well.

The walls, ceiling, and floor are constructed of 1-ft thick reinforced concrete. The dimensions are 15 ft by 78 ft by 14 ft high. The south wall of the heat exchanger building rests on the north wall of the secondary pipe pit.

Entrance to the pipe pit is gained through an opening in its north wall. A ladder down from the south heat exchanger building main floor leads to the opening. There are also three 3-ft by 4-ft hatch openings in the roof of the pipe pit with vertical ladders leading to the pit main floor. The pit was ventilated by the heat exchanger building exhaust fan through the opening in the north wall of the pipe pit.

1.2.1.7 ETR Storage Pit. The storage pit consists of two pits: hot pit (south) and cold pit (north). Earlier, these pits housed an experimental cooling loop for auxiliary cooling of water loop experiments. The cold pit (north) currently houses antiquated civil defense supplies.

The walls of the pit are 1-1/2-ft thick reinforced concrete. A 2-ft thick concrete wall separates the cold pit from the hot pit. Access hatches are in the roof of both pits. The cold pit, 28 ft by 15 ft, can be entered by a door on the west wall of the reactor building console floor.

A metal spiral stairway provides access down to the main floor of the pit. The floor drains to the door opening at the console floor. Lights are available in the pit.

The hot pit, 12 ft by 30 ft by 16 ft deep, may be entered only by removal of the hatches in the roof. A metal ladder in the southeast corner wall leads down to a metal grate at floor level. On the east side of the hot pit is a full length deep pit with a sump pit at the south end. The sump pit has two reach rod type drains.

1.2.2 Neighboring Facilities

The TRA is located in the southern portion of the INEEL west of the INTEC and north of the CFA. TRA is about 100 acres in size. TRA is approximately 10.6 km (6.6 mi) from the northwestern INEEL boundary and houses extensive facilities for studying effects of radiation on materials and fuels.

Table 2. Facilities near the ETR Facility.

Facility	Hazard Category
Advanced Test Reactor	Category 1
Nuclear Material Inspection Storage	Category 2
TRA Hot Cells	Category 3
MTR Canal and Plug Storage Holes #1 & #2	Category 2
TRA 635 Radiography Cave	Moderate Radiological

1.3 Activities

1.3.1.1 Description of Normal / Daily Activities

1.3.1.2 Operations. Operations within the facility are generally those required to ensure the integrity and safety of the structure and systems. These include routine "walk through" surveillance by employees monitoring conditions as listed in the ETR Surveillance and Maintenance Manual.[4]

1.3.1.3 Maintenance. As the facility is in a shutdown condition, minimal maintenance is necessary. The preventative maintenance activities as identified in the ETR Surveillance and Maintenance Manual. Corrective maintenance activities are identified by facility management and performed in accordance with contractor procedures.

1.3.2 Description of Environmental/Compliance Activities

The Idaho Department of Environmental Quality (IDEQ) and the Department of Energy-Idaho Operations Office (DOE-ID) entered into a Voluntary Consent Order (VCO)[5] in June 2000 to correct potential Hazardous Waste Management Act (HWMA)/Resource Conservation and Recovery Act (RCRA) non-compliance. This consent order identified the Filling, Storage, and Remelt (FS&R) System at the Engineering Test Reactor as non-compliant. The FS&R system was removed in January, 2002.[6,7] The closure activities[8] associated with the FS&R were performed in accordance with contractor procedures.

Another non-compliant condition[9] is the unknown condition of various tanks in the facility. The corrective actions for these conditions will be developed based on the condition of the tank(s). The actions will be performed in accordance with contractor procedures.

As other environmental needs/activities are discovered, these activities, commensurate with the new hazard(s), will be performed in accordance with contractor procedures.

1.3.3 Description of D&D Plans

The Idaho National Engineering and Environmental Laboratory Excess Facility Action Plan[10] lists the current secretary office ownership of the individual facilities/structures as EM-60 with scheduled transfer dates to EM-40. The table below identifies the estimated decontamination and dismantlement cost.

Table 3. Estimated decontamination and dismantlement cost.

TRA-642	ETR Reactor Building	$9,258,000
TRA-643	ETR Compressor Building	$1,426,000
TRA-644	ETR Heat Exchanger Building	$1,289,000
TRA-704	Underground Exhaust Pipe,	$40,000
TRA-705	ETR Primary Filter Pit	$40,000
TRA-706	ETR Secondary Filter Pit	$37,000
TRA-755	ETR Delay Tanks	$181,000

1.4 References

1. Engineering Design File; TRA-1554; TRA Facility Hazard Categorization
http://zeus.inel.gov/docs/plsql/doc_3?f_doc=TRA-1554

2. Safety Analysis "Report for the Engineering Test Reactor in an Inactive Status.

3. Characterization of the Engineering Test Reactor Facility – September 1982, EGG-PR-5784.

4. ETR Maintenance and Surveillance Manual, OMM 6.1
http://zeus.inel.gov/docs/plsql/doc_3?f_doc=BPPPK+3-TRA+-+VOL+III

5. Letter from State of Idaho, Division of Environmental Quality, to Donald N. Rach, Environmental Technical Support Division, U.S. DOE, Idaho Operations Office, 850 Energy Dr., MS 1146, Idaho Falls, ID 83401-1562.

6. Engineering Change Form for the HWMA/RCRA Closure of the Filling, Storage, and Remelt Facility, ECF 6.9.1.4-4.

7. Engineering Change Form for the TRA-642 Filling, Storage, and Remelt Facility Stage III Closure, ECF 6.9.1.4-5.

8. INEEL, 2000, HWMA/RCRA Closure Plan for the Filling, Storage, and Remelt Facility in TRA-642, Idaho National Engineering and Environmental Laboratory, INEEL/EXT-200-00946.

9. Letter from State of Idaho, Division of Environmental Quality, to Donald N. Rach, Environmental Technical Support Division, U.S., DOE, Idaho Operations Office, 850 Energy Dr., MS 1146, Idaho Falls, ID 83401-1562.

   Appendix B: VCO Number: SITE-TANK-005

   Http://zeus.inel.gov/docs/plsql/doc_3?f_doc=BOOK+3-TRA+-+VOL+III

10. Idaho National Engineering and Environmental Laboratory Excess Facility Action Plan
http://mceris.inel.gov/plan/efap/EFAP_Home_Page.htm
http://mceris.inel.gov/plan/efap/EM40xfer.htm

TRA SITE PLOT PLAN

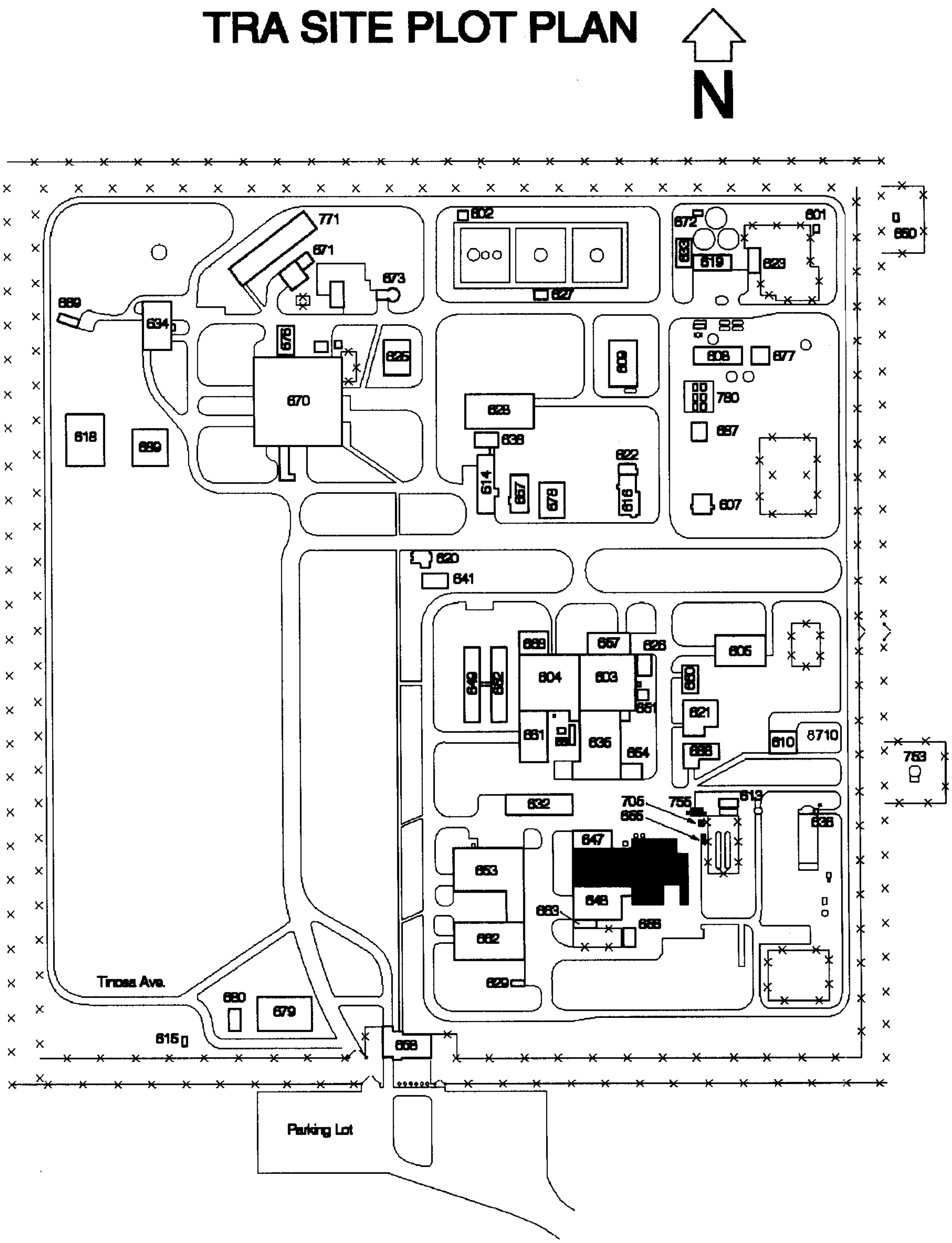

Figure 1-1. Test Reactor Area.

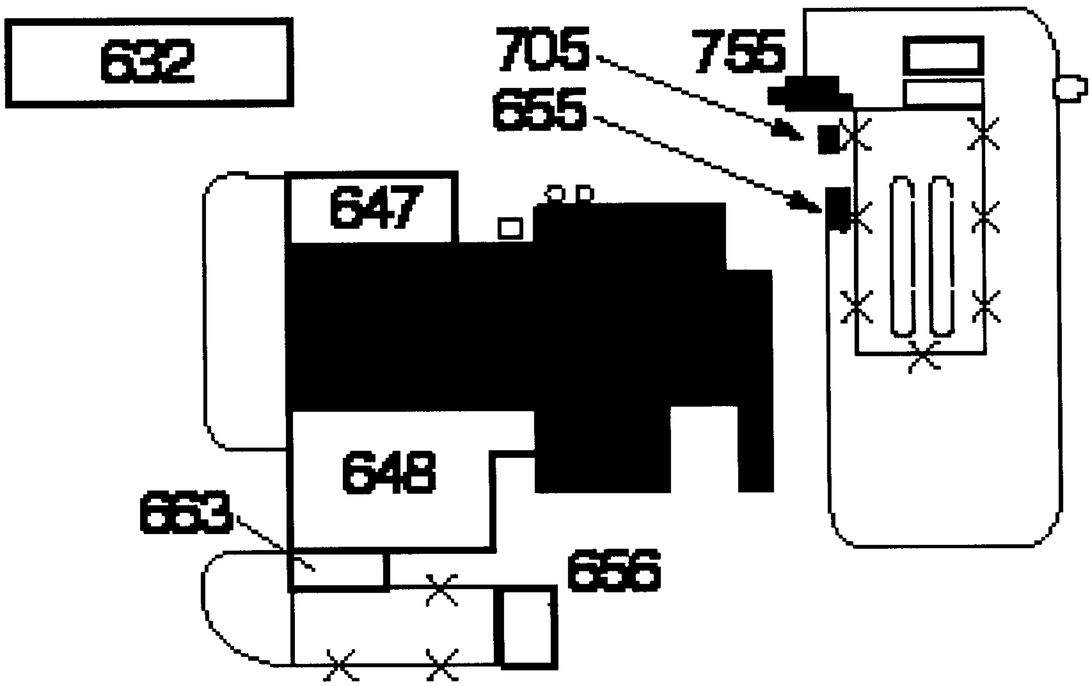

Figure 1-2. ETR Facility.

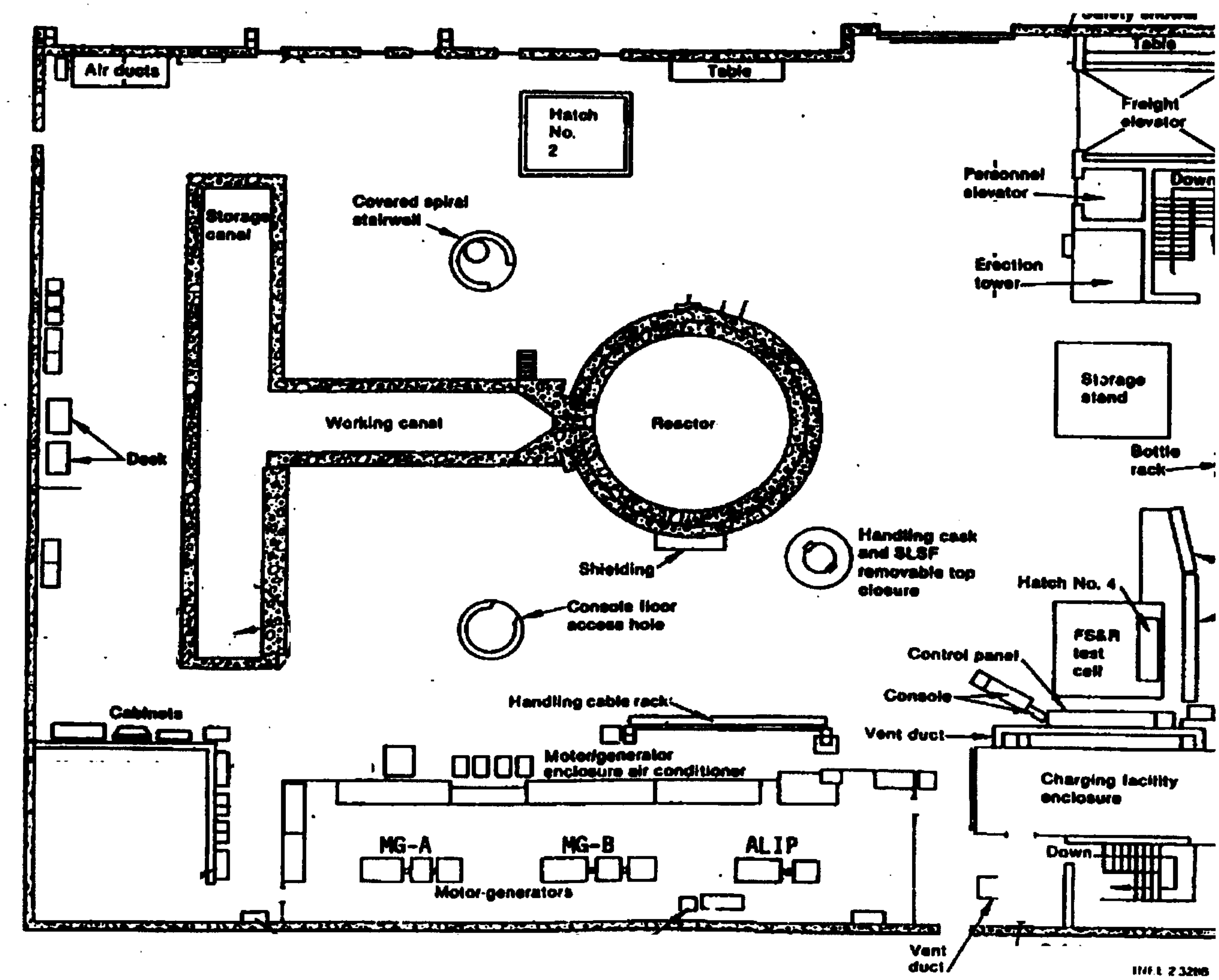

Figure 1-3. ETR Main Floor.

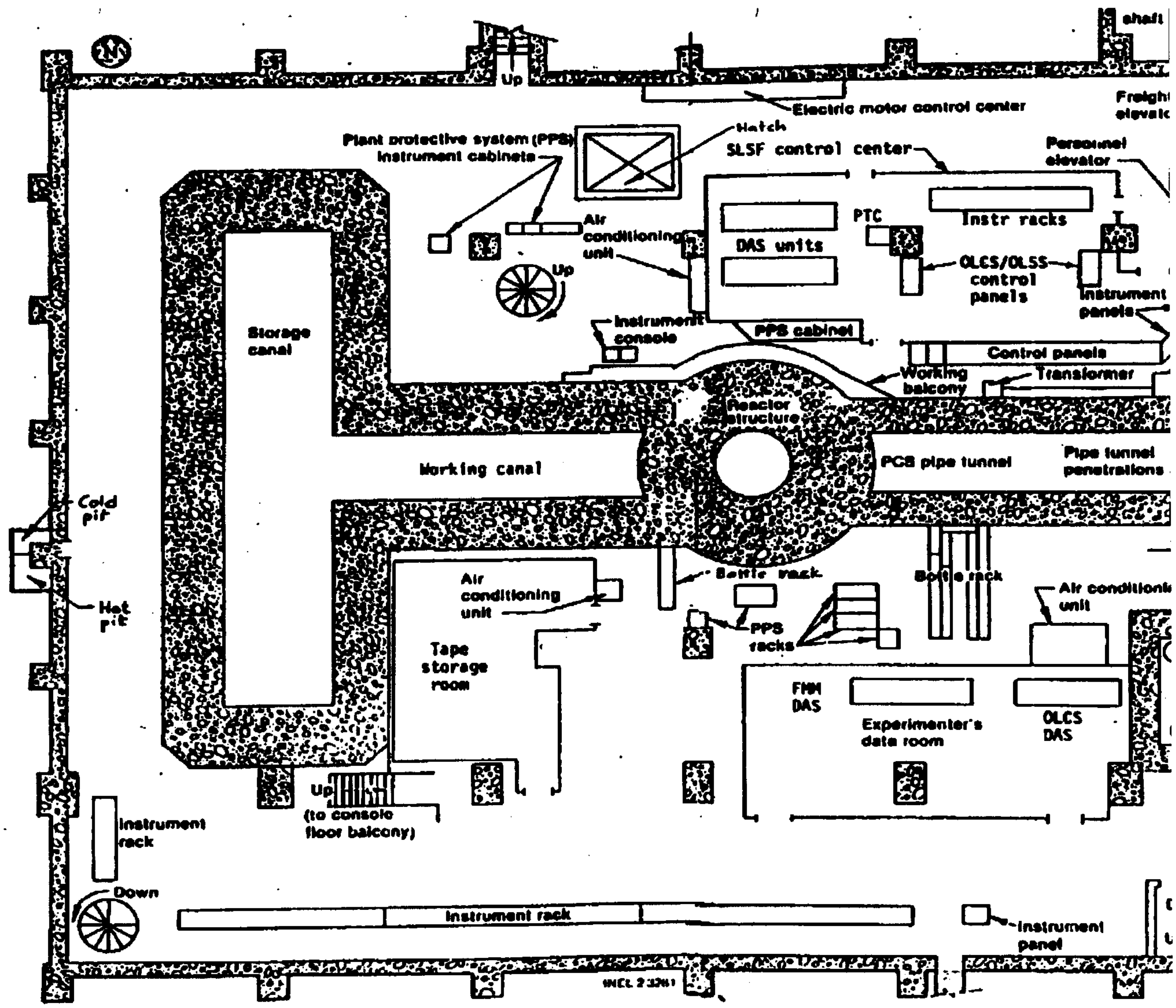

Figure 1-4. Console Floor.

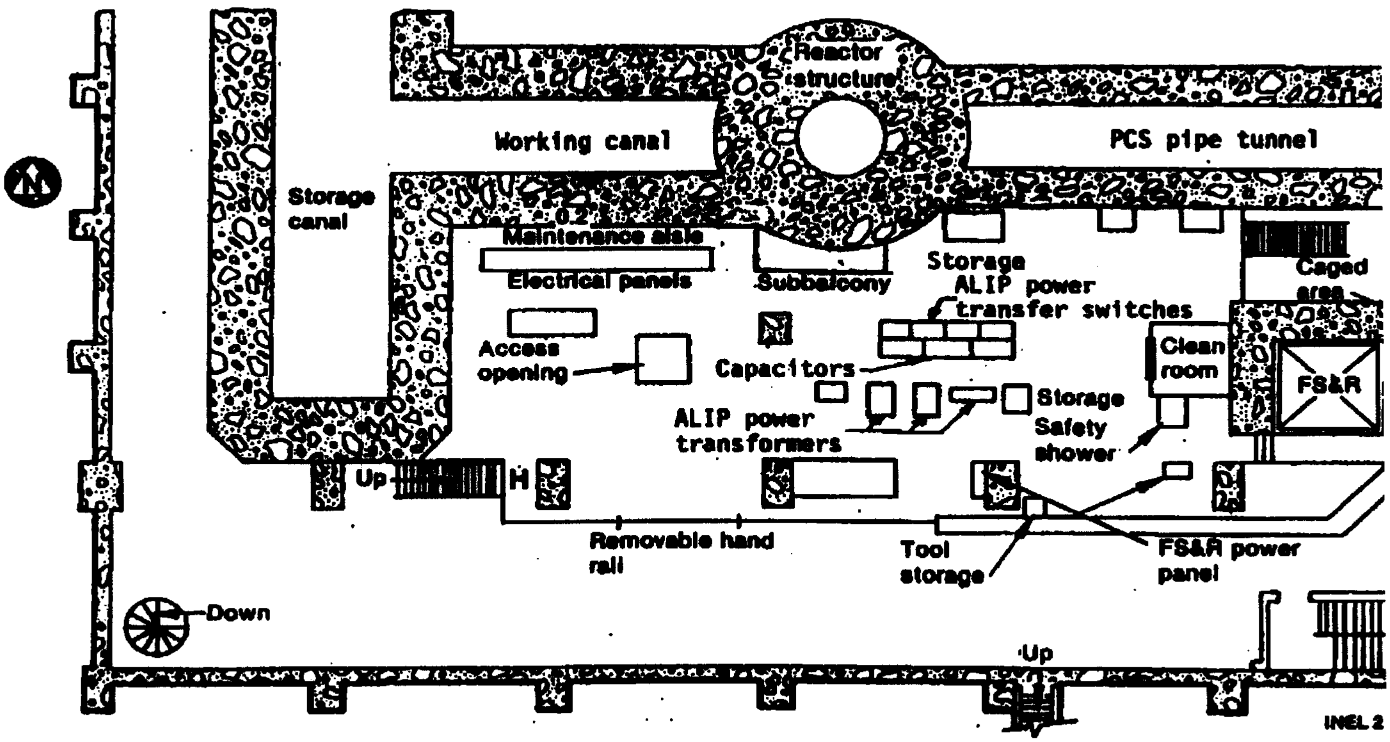

Figure 1-5. Console Floor Balcony.

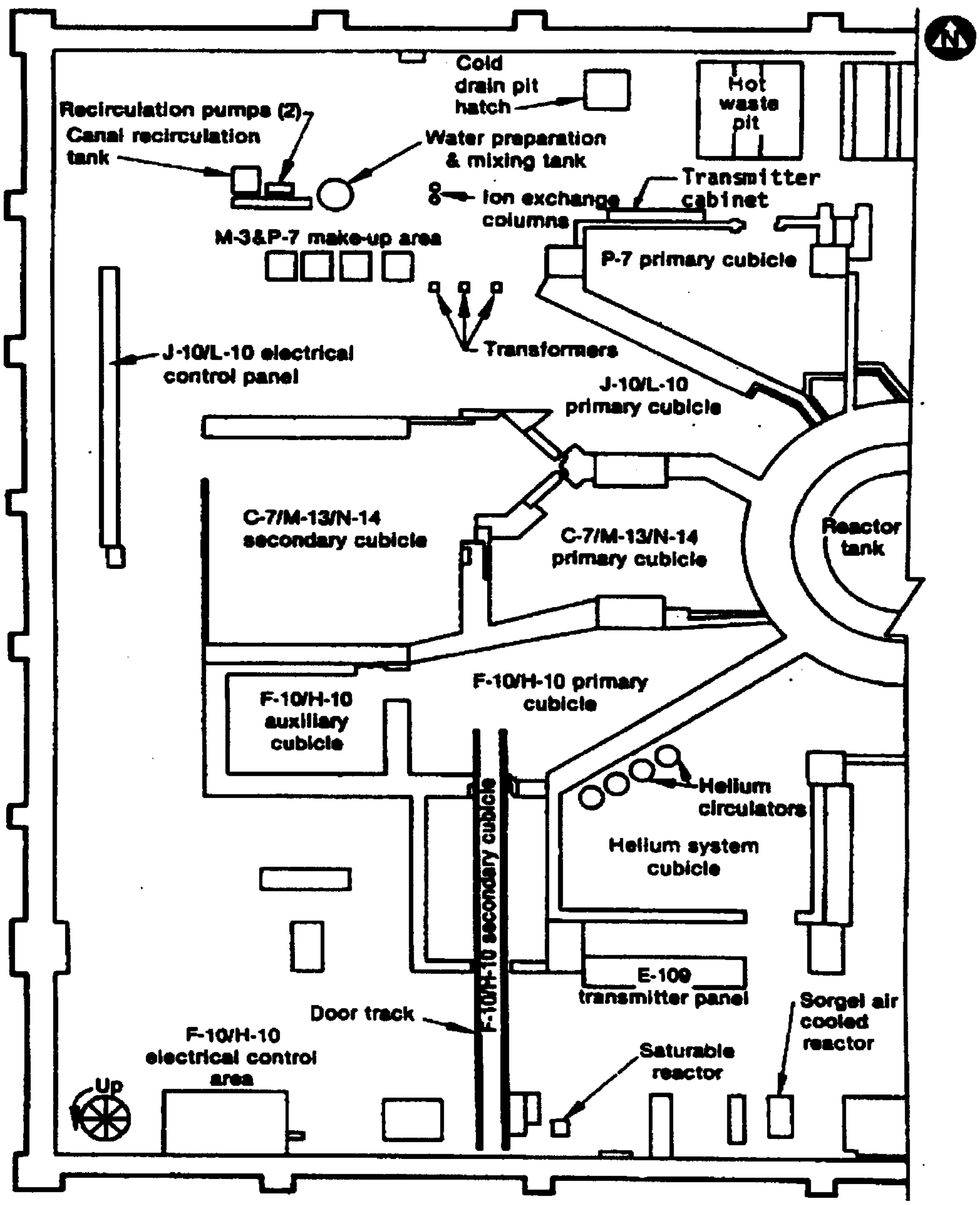

Figure 1-6. West Reactor Basement.

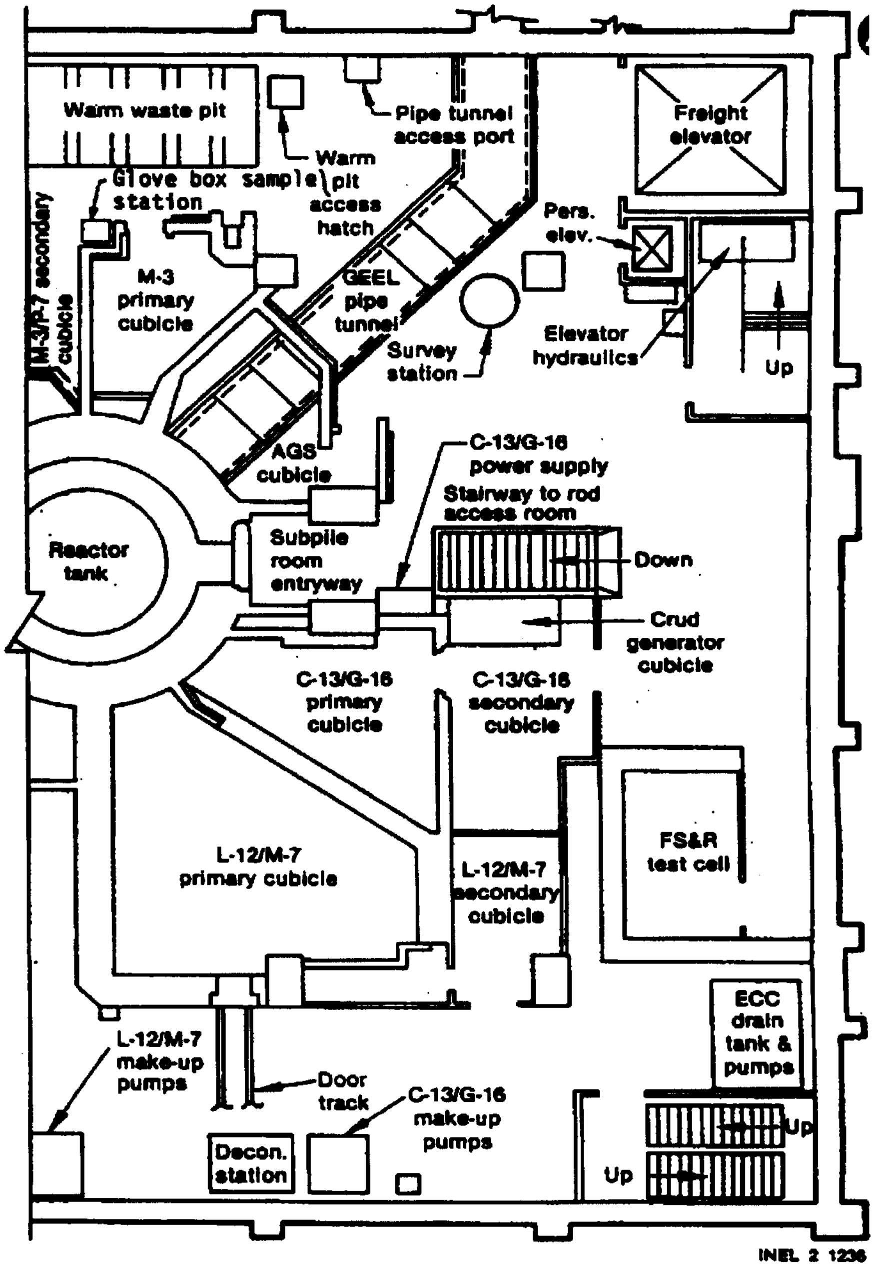

Figure 1-7. East Reactor Basement.

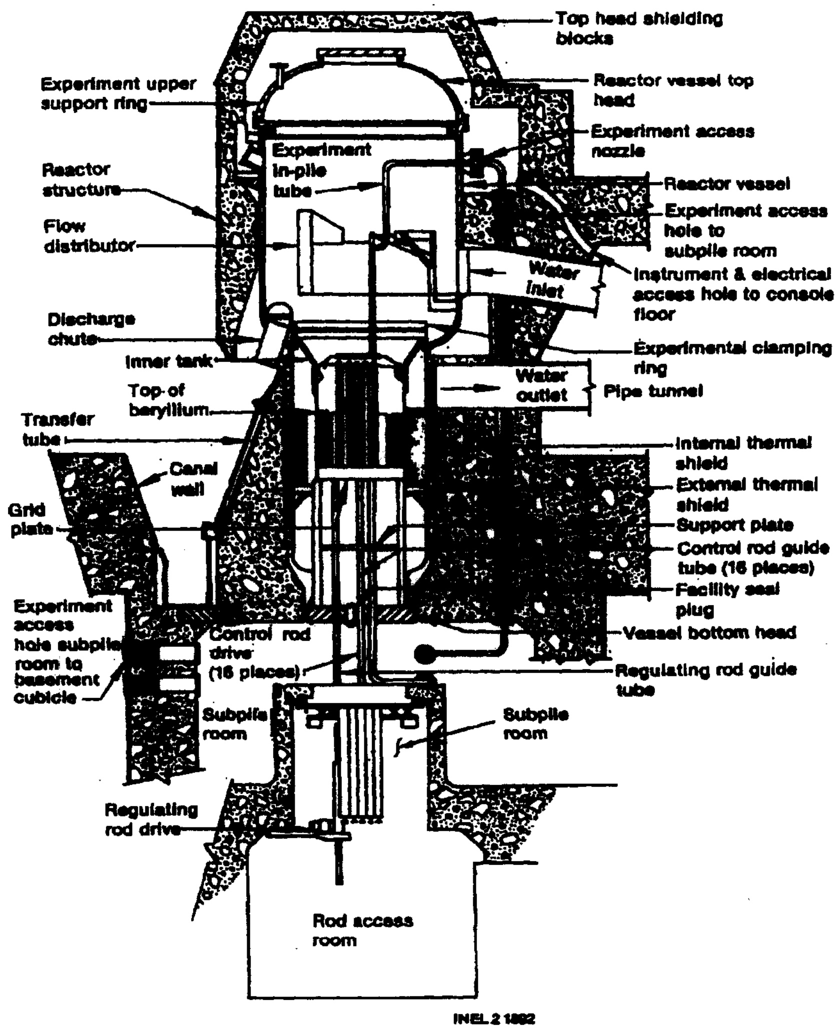

Figure 1-8. ETR Vertical Cross Section.

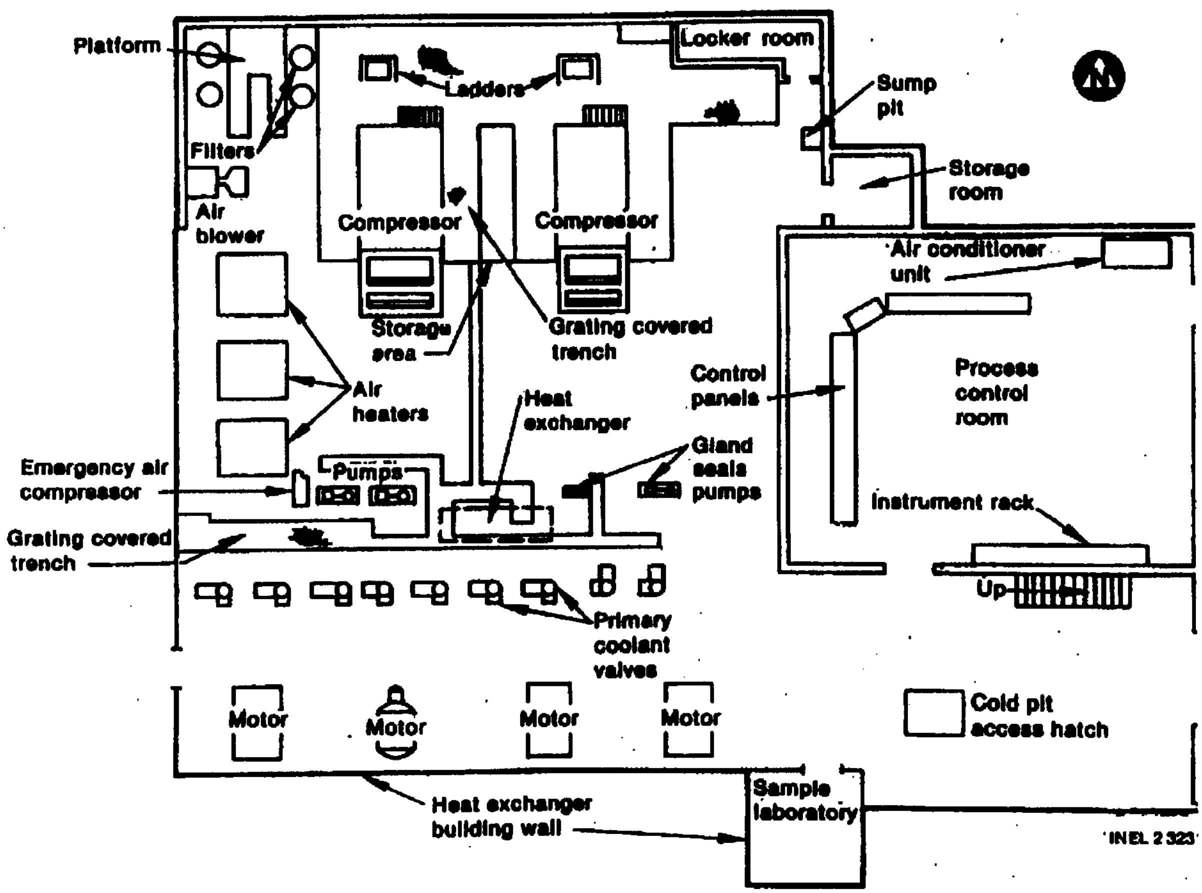

Figure 1-9. ETR Compressor Building (TRA-643A).

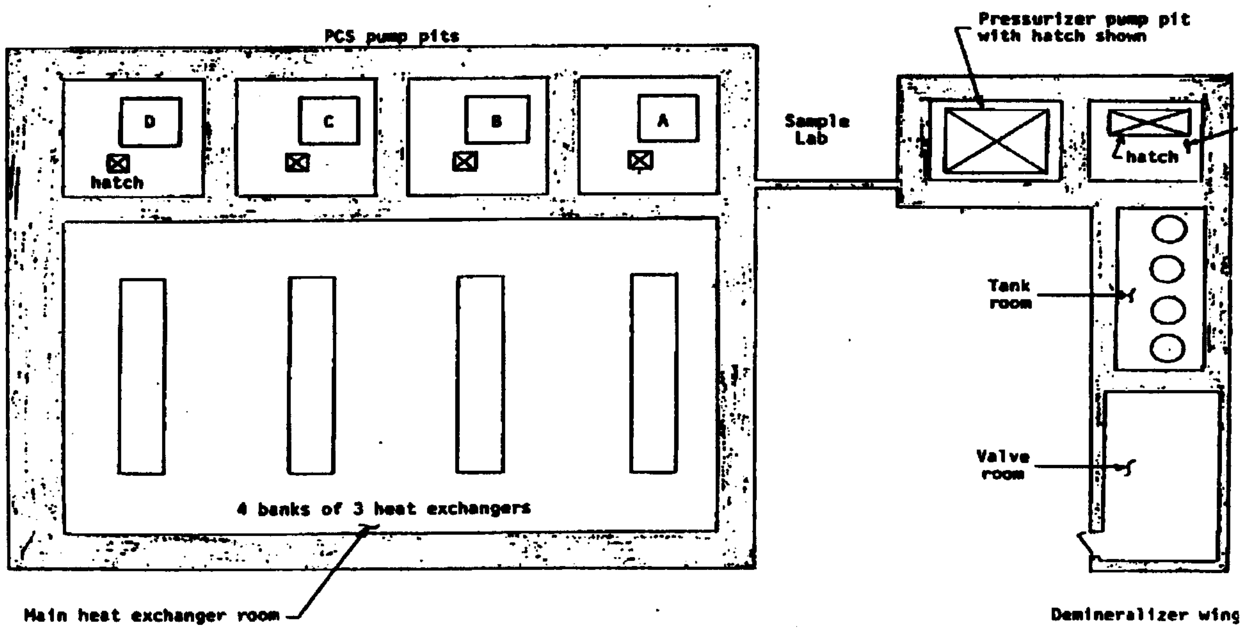

Figure 1-10. Heat Exchanger Building.

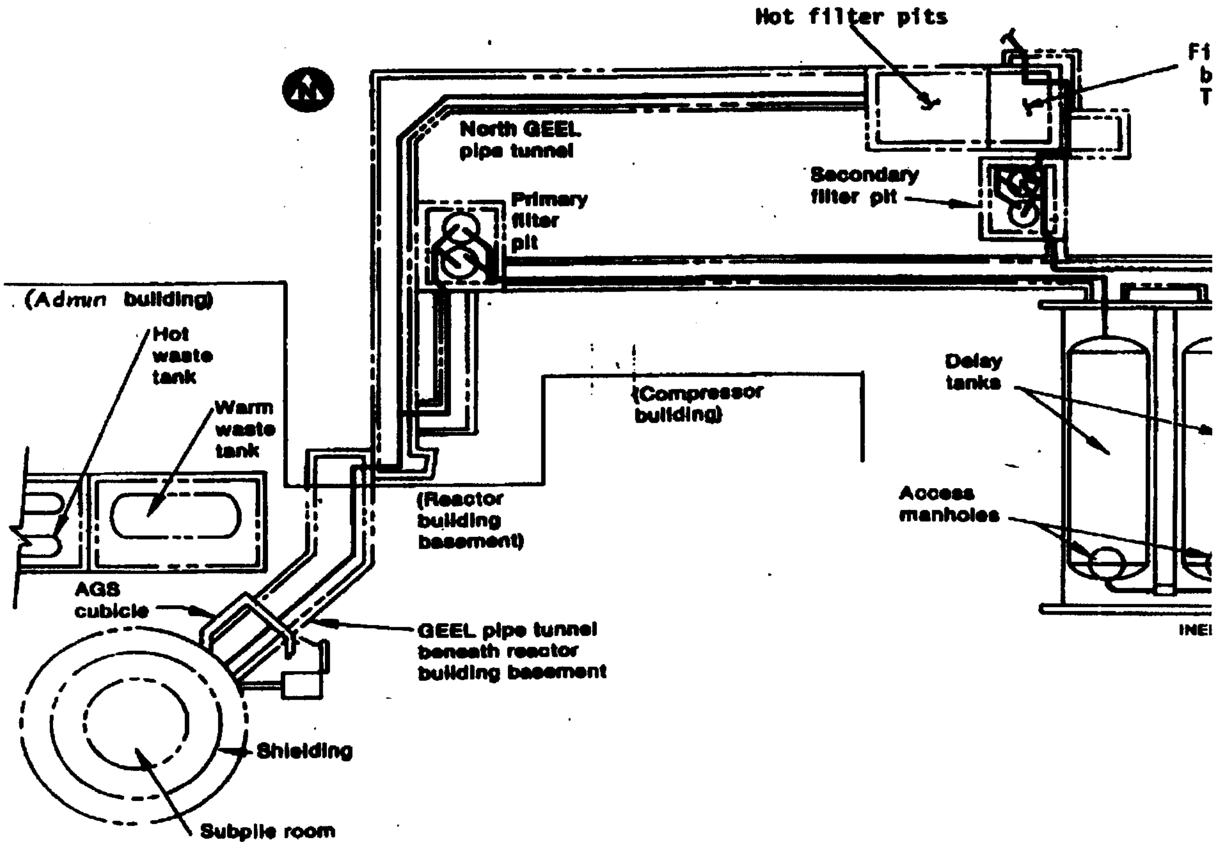

Figure 1-11. ETR Exhaust System.

2. HAZARD ANALYSIS

2.1 Methodology of Hazard Analysis

The radiological and hazardous material source terms were evaluated to determine the categorization of the ETR facility.[1] The evaluation of the facility hazards resulted in a categorization of "radiological facility" based on the criteria in DOE-STD-1027[2] and DOE-EM-STD-5502[3] and approved by DOE-ID.[4] Additionally, DOE-ID O 420.D specifies requirement for a hazard categorization process for all DOE-ID facilities and non-facility or activities. The ETR facility met the low-hazard criteria listed in the DOE-ID order. By definition, the unmitigated release of the radiological and hazardous chemical inventory in the ETR facility has been evaluated and determined the qualitative severity to be low. Minor onsite and negligible offsite impact on people or the environs. Therefore, a qualitative analysis is not required. Section 2.1.1 describes occupational and unique facility hazards.

2.1.1 Industrial/Occupational Hazards

After approval of the ETR facility hazard categorization and facility walk-through, the employee safety hazards, were determined to be industrial or occupational. Contractor institutionalized programs[2] mitigate these types of hazards. A fire hazard analysis[3] was completed in August 2000. The deficiencies were screened against unreviewed safety question[4] (USQ) criteria, and a determination was made that a USQ did not exist.

2.2 References

1. HAD-108; Engineering Test Reactor (ETR) Complex Combination Fire Hazard Analysis and Fire Safety Assessment Document [http://edms/docs/plsql/doc_3?f_doc=had-108]

2. Examples of institutionalized programs;
PRD-25; ACTIVITY LEVEL HAZARD IDENTIFICATION, ANALYSIS, AND CONTROL [http://edms/docs/plsql/doc_3?f_doc=prd-25]
STD-101; INTEGRATED WORK CONTROL PROCESS [http://edms/docs/plsql/doc_3?f_doc=std-101]

3. HAD-108; Engineering Test Reactor (ETR) Complex Combination Fire Hazard Analysis and Fire Safety Assessment Document [http://edms/docs/plsql/doc_3?f_doc=had-108]

4. SES-2000-331; ETR Complex Fire Hazard Analysis

3. HAZARD CONTROLS

3.1 Administrative Controls

In order to assure the hazards and mitigation continue to maintain the ETR facility in a safe condition, the below administrative controls are to be instituted.

3.1.1 Radiological Inventory

3.1.1.1 ETR Facility. In order to assure the hazards are mitigated to maintain the ETR facility in a safe condition, a method of controlling radiological inventory within the ETR facility must be employed to assure the hazard classification does not exceed that of radiological-low.

3.1.2 Hazards Identification

A method of controlling facility hazards must be employed to assure hazards remain within the low hazard classification.

3.1.3 Environmental Controls / Interim Status Actions

A method of complying with environmental/interim status and closure surveillance and or monitoring requirements must be developed and executed.