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ASSESSMENT OF LARGE-SCALE ARTIFACTS

ASSOCIATED WITH

IDAHO NATIONAL LABORATORY'S NUCLEAR REACTOR TESTING HISTORIC CONTEXT

INL Cultural Resource Management Office

streamlined, research-based, project support.

May 23, 2016

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Assessment of Large-Scale Artifacts

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FOR:

Idaho State Archives
Idaho State Historical Museum

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ACRONYMS

A&M
Assembly and Maintenance

AEC
Atomic Energy Commission

ANESB
Army/Navy Explosives Safety Board

ANP
Aircraft Nuclear Propulsion

ARA
Army Reactor Area

CF(A)
Central Facilities (Area)

CRMO
Cultural Resource Management Office

CRMP
Cultural Resource Management Plan

DD&D
Deactivation, Decontamination, and Decommissioning

DEW
Defense Early Warning

DOD
Department of Defense

DOE(-HQ)
Department of Energy (Headquarters)

DOE-ID
Department of Energy Idaho Operations Office

EBR-I
Experimental Breeder Reactor Number One

ETR
Engineering Test Reactor

HABS
Historic American Building Survey

HAER
Historic American Engineering Record

HALS
Historic American Landscape Survey

HTRE
Heat Transfer Reactor Experiment

IET
Initial Engine Test

(I)CPP
(Idaho) Chemical Processing Plant

INL
Idaho National Laboratory

INTEC
Idaho Nuclear Technology and Engineering Center

LOFT
Loss of Fluid Test

MOA
Memorandum of Agreement

MTR
Materials Test Reactor

NaK
Sodium-Potassium

NHPA
National Historic Preservation Act

NOP
Naval Ordnance Plant

NPG
Naval Proving Ground

NRHP
National Register of Historic Places

NRTS
National Reactor Testing Station

PUREX
Plutonium and Uranium Extraction

RMF
Reactivity Measurement Facility

SHPO
State Historic Preservation Office

SL-1
Stationary Low-Power Reactor Number One

TAN
Test Area North

TRA
Test Reactor Area

WCF
Waste Calcining Facility

WRRTF
Water Reactor Research Test Facility

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Historic Context

In 1949, the federal government established the National Reactor Testing Station (NRTS), which would eventually become the Idaho National Laboratory (INL), an isolated location where prototype nuclear reactors could be designed, built, and tested. The Arco Naval Proving Ground (NPG), which had been the site for testing U.S. Navy Pacific Fleet guns serviced at the Pocatello Naval Ordnance Plant (NOP) and Army/Navy Explosives Safety Board (ANESB) munitions safety testing during World War II, was acquired by the Atomic Energy Commission (AEC). Excessed NPG buildings became the Central Facilities Area (CFA) and served as the centralized support services facility for the reactor testing operations, containing such jointly used services as a fire department, medical dispensary, cafeteria, crafts shops, and motor vehicle repair and maintenance facilities (INL Cultural Resource Managment Office 2016, 28; Williams 2015).

With the end of World War II, nuclear scientists in the United States turned their collective attention toward the application of nuclear energy to peacetime use. Very little was known or understood about how best to design reactors and reactor fuels for electrical power generation or propulsion. In addition, pipes, valves, fittings, and instruments that would keep coolant flowing and exchanging heat to maintain fuel at a safe and constant operating temperature were also yet to be designed. To facilitate these research needs a high flux reactor was designed that would test materials by exposing them to a high flow of neutrons and gamma radiation, while allowing scientists to study the effects of various temperature, pressure, and coolant conditions on different fuel assemblies. As well as providing research opportunity, the reactor would produce radioactive isotopes in sufficient quantity for medical treatment and experiments (INL Cultural Resource Managment Office 2016, 220).

In 1946, the Clinton Laboratory at Oak Ridge National Laboratory proposed that AEC build a test reactor and a companion chemical processing plant to recover uranium from the reactor's spent fuel. AEC agreed and assigned the Kellex Corporation to design it. Naturally, the scientists at Oak Ridge National Laboratory expected that this reactor would be built in Tennessee, but AEC decided in 1948 to centralize its reactor development program at Argonne National Laboratory near Chicago; Oak Ridge National Laboratory cooperated with a five-member steering committee whose task it was to manage the final design and construction of the Materials Test Reactor (MTR). In the end, Argonne did not house MTR either. AEC's Reactor Safeguards Committee decided that the proposed power level of 30 megawatts was too high to risk operating near the four million people living in the Chicago area. Argonne's director, Walter Zinn, also felt that the proposed chemical plant ought not to be near such dense population. MTR and the Idaho Chemical Processing Plant (ICPP, now INTEC) became two of the first four projects built at the newly established NRTS in Idaho (INL Cultural Resource Managment Office 2016, 221).

The Korean War began in June 1950 and AEC's peaceful intentions for MTR had to yield to the demands of national defense. MTR had the capability to speed the development of plutonium-producing reactors for weapons and propulsion reactors for Navy submarines. During 1950, the study groups working at Argonne considered how MTR could be modified to produce plutonium should this be necessary. ICPP, originally intended to reprocess only MTR fuel, also was recruited for defense with design changes that enabled it to process U-235 fuel slugs used at Hanford's tritium production reactors, Naval reactor fuel, and later the fuel for the Air Force's turbojet experiments. At the end of 1950, after considering thirty-four candidates, AEC contracted with Phillips Petroleum to operate MTR, partly because it wanted physicist Richard L. Doan, director of research at Phillips Petroleum (and who had previously worked on the Manhattan Project) to be the manager. Doan brought with him forty-two other Phillips Petroleum specialists. The group spent several months at Oak Ridge National Laboratory training in nuclear physics, health and safety, and reactor operation and management (INL Cultural Resource Managment Office 2016, 223).

MTR went critical for the first time on March 31, 1952, with Fred McMillan, the reactor manager, at the controls. Operators carefully increased its power, making adjustments as needed, until it reached its full power operation of 30,000 kilowatts. On August 5, 1952, MTR opened for business as the first test reactor in the world designed to test components for future reactors. Shortly thereafter, MTR test loops were in full use, irradiating proposed fuels for the Navy's Nautilus and other reactor prototypes, for the proposed nuclear-powered bomber, and for reactors at AEC's Savannah River weapons plant. MTR site was expanded to include a Hot Cell Building (TRA-632) that went into operation in the summer of 1954. Here operators, shielded safely behind thick concrete walls and special viewing windows, could work with radioactive samples using remotely operated manipulators (INL Cultural Resource Managment Office 2016, 223-224).

AEC authorized a Reactivity Measurement Facility (RMF) in February 1954. This was a small (very low power) reactor located in the east end of MTR canal, where water was its moderator, reflector, and shield. It complemented MTR in that it had a high sensitivity to subtle changes in reactivity, unlike MTR. It was proposed that the small facility would function as a detector, whereas the large MTR functioned as a source of neutrons. The two functions could not be maximized in the same reactor. The RMF enabled studies of reactivity changes in hafnium, zirconium, and other fuel materials as a function of their total irradiation - without having to transport the experiment to some other more distant facility on the NRTS site. Demand for space in MTR grew to such an extent that merely expanding its adjunct facilities was not enough to satisfy it. By the end of 1954, the scientists were making preliminary calculations for a new, larger, more convenient, and higher power test reactor (INL Cultural Resource Managment Office 2016, 224).

By 1955, although the Korean War had ended, the Cold War continued to escalate, generating more defense related demands on MTR. New operation centers were constructed at NRTS, including Test Area North (TAN), where General Electric's turbojet experiments for the U.S. Air Force were conducted and where the first Heat Transfer Reactor Experiment (HTRE) went critical on November 4, 1955 (INL Cultural Resource Managment Office 2016, 224-225). To accommodate a growing demand for gamma irradiation experiments by commercial interests, AEC's Idaho Operations Office designed a gamma irradiation facility (TRA-641) located outside of MTR security fence to facilitate experiments conducted by commercial scientists without security clearance to work at MTR. The Gamma Facility opened in 1955. The facility took advantage of MTR's spent fuel, a valuable research asset. After removal from MTR core, the spent fuel radiated gamma rays, a penetrating form of energy extremely active when first removed from the reactor, but which would gradually decay. Experiments were designed to subject nearly everything imaginable to gamma radiation - potatoes, meat, plastics, heat-sensitive pharmaceuticals, diamonds - anything for which there was a hope that irradiation would improve it, make it last longer, or increase its value. At any given time, the canal contained forty to fifty fuel elements. In September 1955, MTR reached a milestone when Phillips Petroleum increased the power level in the reactor to 40 megawatts. Higher levels permitted more rapid irradiation of materials and thus increased the speed at which an experiment could deliver results (INL Cultural Resource Managment Office 2016, 225). By the time MTR shut down for the last time in 1970, it had performed more than 15,000 different irradiation experiments, and its operators had disseminated the findings to an extensive community of nuclear scientists (INL Cultural Resource Managment Office 2016, 224).

Engineering Test Reactor (ETR)

By 1957, higher neutron fluxes than what MTR could provide were in demand throughout the United States. Higher fluxes meant that an experiment could be carried out in a shorter period. Lower fluxes, such as those provided in MTR low flux graphite zone, were no longer in demand except as a source of isotope production. In addition, test requirements were growing more sophisticated. Using MTR beam holes involved complicated and time-consuming handling problems. In addition, a uniform rate of flux was hard to supply in MTR. Many experiments needed more room in order to be in the proper test environment and not impact MTR operation. Phillips Petroleum designed the Engineering Test Reactor (ETR) to solve these problems. ETR provided large spaces in the highest flux zone in the core. Furthermore, the flux was uniform along the entire thirty-six-inch length of the fuel elements. After AEC approved the Phillips Petroleum conceptual design, it hired Kaiser Engineers to design and build ETR. Kaiser had General Electric design the reactor core and its controls. From design to completion, the project took two years. The reactor was a standard tank design except that its control rods were driven through the core from below the reactor, rather than from above. This left the area above the reactor available for experimentation (INL Cultural Resource Managment Office 2016, 226).

Phillips Petroleum situated the airtight ETR building about 420 feet south of MTR (center to center) so that it could share MTR auxiliary facilities while positioning its cooling towers to the east. Here it would be convenient to MTR operational centers (such as the Hot Cell, Hot Plug Storage, and Reactor Services Building) and yet be free of the facilities and services associated solely with MTR operations. Many of the shared facilities, such as water, electrical and steam distribution, fuel oil, sewer, standby power, waste disposal, were extended or enlarged. This arrangement still left space available for even further expansion of both MTR and ETR facilities. The single most critical design driver for the reactor building was the size of the reactor vessel, which was thirty-five feet long with a diameter ranging from eight to twelve feet, and the structural integrity to withstand 250 pounds of pressure per square inch along with temperatures of 200 degrees Fahrenheit (INL Cultural Resource Managment Office 2016, 226). ETR operated at 175 megawatts, generating considerably more heat than MTR. The primary coolant loop contained demineralized water. To keep it from boiling, it had to be kept pressurized. Pressure was maintained by pumping the water through the core and withdrawing it at an even rate equivalent to the desired pressure. A secondary loop discharged the heat to the atmosphere. Exhaust gases were filtered and vented to a new stack. Piping between the reactor building and the heat exchanger were shrouded with concrete shielding to contain radionuclides that accumulated in the coolant. Like MTR, ETR required a water-filled canal where spent fuel elements could cool down before transport elsewhere. Using remote manipulators, an operator could lift a fuel assembly part way up the side of the reactor tank, tilt it, and slide it through an opening and down a chute. The element flopped into the eighteen-foot deep canal, where technicians used grappling poles to guide the element to a resting place on a rack. Here, the fuel sat for several months to cool off, its radioactive constituents continuing to decay. With the help of a thirty-ton crane, it would be maneuvered into a special shielded transport cask, called a coffin, and shipped down the road to the Gamma Facility or the ICPP to recover the valuable U-235 remaining in the fuel element (INL Cultural Resource Managment Office 2016, 227).

ETR went critical for the first time at its full power level of 175 megawatts on April 19, 1957; its mission was to evaluate proposed reactor fuels, coolants, and moderators. It was designed especially to simulate environments like those expected in civilian nuclear power reactors. ETR had more test space, with nearly 20 percent of the head volume over the vessel filled with test voids available for experiments, and more flexibility than MTR. During its lifetime, ETR had less on-stream time than MTR because its experiments were more elaborate and required more time to plan, pre-test, and install. Demand for test space kept growing, calling for more than MTR and ETR could supply. Use of space was prioritized and allocated by the Washington Irradiation Board; military and AEC priorities came first (INL Cultural Resource Managment Office 2016, 227). If private test space were available elsewhere, the Board rejected commercial requests for irradiations in ETR. Nevertheless, ETR customers included research and educational institutions, and the civilian power industry (INL Cultural Resource Managment Office 2016, 228).

Stationary Low-Power Reactor Number One (SL-1)

The conventional method of supplying electricity to an isolated U.S. Army base or mobile field station was to transport a diesel generator to the site and operate a supply line to keep diesel fuel flowing from the nearest depot. Trucking or flying fuel to some bases, such as to Arctic locations where road access was impossible and flying was restricted, could be difficult, hazardous, and costly. The allure of atomic power to the Army was that a literal handful of nuclear fuel might replace the logistical headache of conventional fuel transport to remote locations. A nuclear power plant might be mobile, able to move with a field hospital or command center. Perhaps it could be portable, mounted on a barge and towable from one port to another as needed. Ideally, reactors could vary in capacity to serve a wide range of applications. They only needed to be small enough, lightweight enough, and cheap enough. The Army's nuclear power program aimed to meet these three challenges. The Army organized an Office of Research and Development in 1951 to begin a nuclear research program. Its chief, General K. D. Nichols, thought the Army's pursuit of small reactors might help to speed up the ultimate development of a commercial industry; he and others often used this argument as they sought support. The Army placed the Nuclear Development program under the supervision of the United States Army Corps of Engineers. Meeting initial resistance from AEC staff, which desired to retain the initiative in developing a commercial industry, the Army gradually acquired allies in Alvin Weinberg, director of Oak Ridge National Laboratory National Laboratory; Admiral Lewis Strauss, an AEC Commissioner after July 1953; and the Joint Chiefs of Staff, who declared an official military requirement for a nuclear power plant in December of 1953. AEC and the Army organized their first joint project, which AEC approved for funding in July 1954 (INL Cultural Resource Managment Office 2016, 237-238).

The Army's goal was to develop a family of three basic types of power plants. A stationary plant would be a permanent installation that could serve as a base in a remote area otherwise difficult to supply with fuel. It would not be designed for relocation elsewhere. A portable power plant would be preassembled for rapid erection in the field. A limited number of packages would make up the plant, each of which could fit in an air cargo transport or truck. The plant could be disassembled and then relocated to another site. A mobile power plant could move intact from one site to another without being broken down and reassembled at all. Further refining its goals, the Army selected operating ranges for its nuclear plants; a low-power reactor would produce in the range of 100 to 1,000 kilowatts; medium-power reactors would supply from 1,000 to 10,000 kilowatts, and high-power facilities could range between ten megawatts to about forty megawatts. The Army institutionalized these concepts in the names of its prototypes and experiments. Its first prototype, which went on line at Fort Belvoir, Virginia, thus carried the designation SM-1, a stationary medium-power reactor. Until it canceled its nuclear development program, the Army planned seventeen different projects. Of these, seven went into service, seven others were designed, and three were experiments built at NRTS (INL Cultural Resource Managment Office 2016, 238).

The Fort Belvoir reactor, within eighteen miles of The White House, was a pressurized water reactor. Although other reactor concepts promised to embody virtues of lightweight and simplicity so eagerly sought by the Army, pressurized water technology was the proven state of the art at the time. The Army dedicated the reactor in April 1957. However, reactors cooled with pressurized water had several disadvantages, however. The coolant circulated in a primary loop through the reactor and exchanged heat with water in a secondary loop. The secondary loop transferred heat to a boiler, which produced steam to run a turbine generator. The coolant piping, pumps, valves, controls, and instrumentation added considerable weight, bulk, and complexity to the overall design. The Army, therefore, set out to experiment with two alternatives. The first was a boiling water reactor. In this design, ordinary water boils as it passes through the hot reactor core. The steam generated there powers the turbine. The system eliminates the secondary loop and the heat exchanger equipment. The Army and AEC engaged Argonne

National Laboratory to design a stationary reactor in the low power range that might be suitable for a remote location. It had the Defense Early Warning (DEW) Line (later the Ballistic Missile Early Warning System) in mind, which consisted of dozens of radar stations ringing the Arctic Circle on guard for Soviet invasion. The Army wanted the plant small enough to haul on a thirty-ton trailer. The prototype was named Stationary Low-Power Reactor Number One (SL-1), constructed at the Army Reactor Area (ARA) at NRTS. (INL Cultural Resource Managment Office 2016, 239)

ARA would consist of three experiments, and would be situated a few miles west of Argonne West and five miles east of CFA. The ARA master pan encompassed a four-cluster complex, with the first cluster, ARA-I, acting as the administrative center that included a hot cell building, a shop and maintenance building, guardhouse, pump house, hydraulic test power facility, and water and electrical utilities. The three experiments were strung out along a connecting road and as close together as possible without compromising rules establishing minimum distances between reactors. The four-cluster string was perpendicular to the direction of the most prevalent winds. This way, the risk of accidental releases from one reactor blowing over the other centers was reduced as much as possible (INL Cultural Resource Managment Office 2016, 239-240).

SL-1, the first of the three experiments, was located at ARA-II. In August 1955, AEC chose Pioneer Services and Engineering Company of Chicago as the architect and engineer for SL-1. Bid requests began to go out in 1956, including one to build the circular steel tank that would house the reactor. Construction began in 1957 and was finished in July 1958. The SL-1 site included the cylindrical reactor building, a control room building with auxiliary equipment, and several small service buildings. The cylinder of the reactor building was constructed from quarter-inch thick steel plate and was an integral part of the experiment, set on dummy piles to simulate construction methods used at DEW Line radar stations located on permafrost. The reactor vessel, fuel storage well, and demineralizer for the water were in the lower part of the cylinder and shielded with gravel. Other equipment and shielding were in the upper two thirds of the building. The Army planned to use SL-1 for training, so its operating contractor, Combustion Engineering, employed a military crew. Several earth berms were constructed at strategic places at the site. In keeping with access control protocol at NRTS, a security fence and guard gate controlled entry to SL-1. The reactor went critical for the first time on August 11, 1958, and produced electricity two months later on October 24. It was the first power plant reactor to use aluminum-clad fuel elements, which heretofore had been used only in test reactors like MTR. It used a new alloy that overcame the low melting point of aluminum. After SL-1, aluminum alloys became an industry standard (INL Cultural Resource Managment Office 2016, 239-240).

On January 3, 1961, SL-1 had been shut down for maintenance since December 23, 1960. Three military crewmembers on an evening shift were preparing the reactor for another run. A violent explosion occurred in the reactor vessel, killing all three men. This was the first, and is still the only, fatal accident in the history of American reactor operations. AEC immediately appointed an investigating committee to discover what had caused the accident. After interviewing hundreds of people, the committee never could say conclusively what had caused it. High levels of radioactivity in the building prohibited a detailed examination of its contents, although the technicians did manage to photograph parts of it remotely. It seemed plausible that one of the crew had moved a control rod farther out of the reactor than was specified in the maintenance procedures. In four milliseconds, the reactor went critical, heated rapidly, and caused water in the core to flash to steam. The column of steam slammed into the lid of the pressure vessel, causing the entire vessel to jump from its foundation, shearing all of its piping connections and blowing shield plugs and shielding material from the top of the vessel. The men died from the impacts of the explosion rather than from the effects of nuclear radiation (although radiation in the reactor building was at lethal levels after the accident). Most of the radiation released from the reactor vessel by the explosion remained inside the building. The investigating committee identified many problems with the management of SL-1 reactor. One of the worst, and possibly a contributing cause of the accident, was that the fuel elements had been allowed to deteriorate to such a degree that operation of the reactor was questionable. AEC hired General Electric to evaluate options for disposal of the reactor building. The reactor core, vessel, and fuel went to the TAN Hot Shop for analysis. The rest of the lower-level radioactive debris and contaminated soil was placed in a burial ground approximately 1,600 feet from its original location. Two pits and a trench were dug into bedrock to accept the waste. Backfill over the debris provided shielding and an exclusion fence surrounded the burial ground (INL Cultural Resource Managment Office 2016, 241-242).

AEC decided that the cost of continuing to fund tests of boiling water reactors like SL-1 would not produce worthwhile benefits. It phased out the program and shelved it for possible future use. Although the Army felt that the concept had progressed well, it also ceased funding. The accident may have aroused doubts in the minds of some about the Army's nuclear power plant program, but if so, the effects were not immediate. Editorials from nuclear industry publications articulated that although accidents should be considered inevitable, the industry should do everything it could to protect its outstanding safety record to date. AEC soon prohibited reactors that were controllable with only one control rod. The accident aroused protests from the local Oil, Chemical, and Atomic Workers International Union, which urged Congress to enact legislation to improve safety of nuclear workers. The Union also protested the lack of an isolation ward at NRTS dispensary, lack of shielded lead caskets for burials, and lack of instruments available to read radiation levels higher than 500 roentgens. NRTS managers agreed that it was ill equipped to deal with high-radiation casualties, but also felt that their pre-planned emergency procedures had been carried out appropriately during SL-1 accident. Perhaps the long-term impact of SL-1 accident is best measured by the frequency with which it was mentioned by anti-nuclear writers in the 1970s and 1980s. Books appeared containing lists of nuclear accidents, near-accidents, and mishaps, described in language aimed to outrage or frighten the reader. Sometimes the accounts of SL-1 accident were quite inaccurate, but they worked to alarm the public (INL Cultural Resource Managment Office 2016, 242-243).

Test Area North (TAN)

The idea for a nuclear-powered aircraft was envisioned before the end of World War II. Military advocates fought to have the idea given serious attention in the years after the war. The Aircraft Nuclear Propulsion (ANP) program at NRTS began in 1951 when the Department of Defense (DOD) decided that a nuclear-powered bomber was a military requirement. The concept for the weapon system was that a bomber would be able to remain aloft for at least five days, approach its target from any circuitous route, deliver the payload, evade enemy fire, and return home by any route desired. When AEC and the Air Force undertook the ANP program, they assigned General Electric the task of developing a direct cycle heat exchange system for a turbojet aircraft; the objective was to set up a turbojet engine, connect it to a reactor, and prove that the heat from the reactor could propel the engine. TAN was created as a new site on NRTS for General Electric, approximately twenty-seven miles from CFA. The Utah Construction Company broke ground for the first buildings at TAN in 1953. They were equipped and ready for serious experiments by Christmas of 1955 (INL Cultural Resource Managment Office 2016, 244).

One of the first large buildings completed was the Assembly and Maintenance (A&M) building (TAN-607), which would facilitate construction, assembly, repair, and modification of the experiment. A variety of fabrication shops and were contained within TAN-607, including: a metallurgical lab that contained X-ray machines for inspecting welds; a radioactive materials lab for examining spent fuel elements from the reactor and other radioactive samples; a Hot Shop, fifty-two feet wide by 160 feet long by sixty feet high, with six-foot-thick shielded windows and manipulators that allowed for the remote handling of industrial-scale work and radioactive substances; a chemical lab; and a photographic lab. Cold shops were equipped to repair jet engines, make and calibrate instrumentation, and assemble (prior to their initial test) the nuclear power plants that would be the subject of the experiments. A fifteen-foot-high earth embankment located atop a natural ridge formation separated TAN-607 from administrative and other non-research functions. Shielded roadways, tunnels, and a four-track railroad that would allow safe transport of people and heavy equipment from one area to another connected the ANP support facilities to each other. General Electric built a unique shielded locomotive with the driver's cab surrounded by lead and water for the safety of the operator and passengers while transporting radioactively hot items. The Initial Engine Test (IET) facilities were located north of TAN-607. When it was ready for testing, the reactor/engine assembly was moved to IET from the assembly area. Mounted on a dolly, the assembly could be moved in any weather, enclosed in a moveable all-aluminum building. Because of the weight of the reactor assembly, the railroad tracks consisted of four rails. Operators conducted the test from a shielded underground Control and Equipment Building (TAN-620). When an experiment concluded and the reactor shut down, the locomotive hauled the assembly back to TAN-607 for post-test examination and further study (INL Cultural Resource Managment Office 2016, 244-245).

General Electric built three major HTRE. On December 30, 1955, HTRE-1 demonstrated that a nuclear reactor could be the exclusive source of power for an aircraft engine. This was the first time that heat from a nuclear power reaction operated a J-47 turbojet engine. The reactor generated heat, the heat was compressed and forced through the nozzle of the turbojet. In an aircraft, the nozzle exhaust would provide thrust. Measurements and additional tests continued through January 1957. The reactor/engine plant accumulated a total of 150.8 hours of operation. In later experiments, engineers modified HTRE-1 so that they could test the impact of temperatures up to 2,800 degrees Fahrenheit for sustained periods of time (and at even higher temperatures for shorter periods) on various materials within and near the reactor. The first two experiments had been built without regard to the space or arrangement limitations that would be relevant in the body of an airplane. The third experiment, HTRE-3, was built with the components arranged as they would be in an aircraft. Full nuclear power was achieved in 1959 and for the first time, an experiment ran two engines at the same time on nuclear power. In the course of these experiments, ANP research advanced scientific understanding of ceramics, alloys, and other materials subject to high heat. As the experiments progressed, General Electric built additional facilities at TAN. The Flight Engine Test facility was to house an anticipated airframe with typical crew compartments and aircraft control systems. The major structure was a hangar building (TAN-629, completed in 1959) with a barrel-vaulted roof and open-span interior dimensions of 320 feet by 234 feet. Associated with TAN-629 was a shielded control building (TAN-630) and additional four-rail track leading into the hangar (INL Cultural Resource Managment Office 2016, 245).

Although General Electric demonstrated the principle of nuclear-powered flight, one of its major disappointments was to find that the reactor could not heat the engine air to the desired high temperatures, a requirement for fast bomber speeds. A nuclear airplane might be able to fly, but if it could not sprint at rapid speeds to evade the enemy or maneuver quickly, it could not serve as a military weapon. During the course of ANP experiments, DOD was simultaneously improving the technology of long-range guided missiles, another method of delivering a bomb to a far-away target. It proved to be more reliable and safer than a manned nuclear powered bomber. In 1961, President John F. Kennedy was looking for funds to enhance the military's conventional forces and build the country's supply of Minuteman rockets and Polaris-firing submarines. He canceled the ANP program, citing other military programs that would produce more tangible and immediate benefits. Following the cancellation of the program in 1961, the mission of TAN facilities changed considerably. Many ANP facilities were altered and reused, as other programs took up residence in TAN hot shops, laboratories, fabrication, and assembly shops, while other facilities remained vacant (INL Cultural Resource Managment Office 2016, 246-247).

The Loss of Fluid Test (LOFT) program was first conceptualized in 1962, shortly after the demise of ANP; TAN-650 underwent an extensive series of modifications before actual testing began at TAN in 1976. LOFT consisted of a series of simulated loss-of-coolant accidents. In 1978, the first nuclear tests began at the LOFT containment facility. The LOFT reactor was the only nuclear reactor in the world capable of repeatedly simulating loss-of-coolant incidents similar to those that might occur in commercial power reactors. In 1979, the LOFT scientists and reactor played a vital role in predicting activity within the Three Mile Island reactor core as scientists struggled to manage and control the Three Mile Island reactor core meltdown. Successful testing continued at LOFT until 1982, when an international consortium took over operations and continued testing until 1986, when the program officially ended. The

Water Reactor Research Test Facility (WRRTF), originally constructed to house reactor shielding tests associated with the ANP program, was reused during the LOFT program to conduct nonnuclear simulations of thermal-hydraulic features of commercial nuclear reactors (INL Cultural Resource Managment Office 2016, 30-31).

Chemical Processing Plant (CPP)

The same group of physicists and chemists who had designed MTR designed ICPP, which was one of the four original areas developed at NRTS. As a companion facility for MTR, it was equipped to receive MTR spent fuel elements and extract valuable U-235 from them. The spent fuel contained radioactive elements such as Strontium-90, Cesium-137, and other hazardous materials. Uranium was extracted from the fuel elements in a multi-step chemical treatment process known as a modified PUREX (Plutonium and Uranium Extraction, developed during the Manhattan Project) process. A solution of nitric acid dissolved the fuel to create a liquid that was run by steam-jet suction through three extraction cycles, in which chemical additives, catalysts, and mechanical actions produce a sequence of chemical reactions resulting in the separation of uranium from the other metals, acids, and fissionable products in the solution. The recovered U-235 product was then shipped to Oak Ridge National Laboratory in Tennessee, where it was further prepared for remanufacture into new fuel elements. Although its originators conceived it as an auxiliary to MTR, the mission of ICPP expanded to include processing of spent fuel from other sources. With the escalation of tensions between the United States and the Soviet Union, aggravated by the Korean War, AEC shifted the majority of its resources to developing atomic weapons. The plutonium-producing reactors at the Hanford Site in Washington sent some of their spent fuel to ICPP, where the first hot runs began processing on February 16, 1953(INL Cultural Resource Managment Office 2016, 257).

Through the deliberate efforts of Congress and AEC, the supply of spent fuel was destined to grow in relation to the rate of reactor development. Congress passed the Atomic Energy Act of 1954, and AEC and Congress's Joint Committee on Atomic Energy did what they could to nurture a commercial atomic power industry. The U.S. Navy launched the USS Nautilus submarine in the 1950s and then built a large fleet of ships propelled by nuclear reactors. Research programs at NRTS tested the safety limits of reactor fuels and core constructions. General Electric and Westinghouse scaled up the demonstration and began to sell reactors to electric utility companies. A commercial industry began to grow. Clearly, this success meant that spent fuel would need reprocessing. With every processing run at the ICPP Process Building (CPP-601), a stream of high-level waste inevitably flowed into the stainless-steel tanks at the ICPP tank farm. After the first one was filled, another was made ready, and then another. By 1960, thirteen tanks populated the ICPP tank farm. Nine 300,000-gallon vessels held aluminum-type wastes; the other four each held 30,000 gallons of zirconium and stainless steel. Awash in a million gallons of liquid were only ten gallons of radioactive material. Scientists knew that metal tanks could not serve as a long-term method for storing the waste. They regarded the life of a stainless-steel tank to be no longer than fifty years because the acids from within or moisture from without would eventually corrode the metal.

The hazard they wished to avoid was to have the radioactive liquid leak into surrounding soils and ground water. Far more than fifty years were required to sequester the waste; several centuries would have to elapse before the process of radioactive decay could reduce the hazard potential significantly.to alleviate this potential for contamination, chemists in AEC's national laboratories launched investigations into interim and ultimate disposal of these wastes. One of the concepts for dealing with the growing volume of liquid waste was to transform it somehow into a dry solid, eliminating the water. This meant designing a process that would concentrate radioactive substances into a dry form, leaving the water clean enough to discharge into the environment. This could be an interim step in storing the waste. The volume could be reduced and the hazard of corrosion and leakage minimized. It was also conceivable that the solid form might be rendered even more inert or stable through future processes (INL Cultural Resource Managment Office 2016, 259-260).

Scientists proposed several ideas for transforming liquid into an inert solid-carrier waste. A 1954 study from Brookhaven National Laboratory suggested that radioactive ions could be made to adsorb and fix upon montmorillonite clay. Other studies proposed fixation in ceramic glazes or gelling liquids above the sludge that form in the tanks. Various techniques for solidifying the waste included pot calcining, radiant heat-spray, and rotary-ball kilns. Some proposed to incorporate the wastes into low melting salts and store the material in underground salt caverns equipped to remove heat. Another optimistic hope was that some breakthrough chemical means of decontaminating the radioactive constituents might be found. At Oak Ridge National Laboratory, workers were investigating the possibility of mixing waste with shale, limestone and soda ash and allowing decay heat to fix the material in a ceramic mass. The first liquid-to-solid procedure that AEC decided to fund for actual demonstration, however, was the fluidized-bed calcination process built at the ICPP. The development program began in 1955. Originally conceived by scientists at Argonne National Laboratory in Chicago, the method was first tested using small-scale models, and then built by Phillips Petroleum at the ICPP. The process not only solidified the waste, but the solid was granular, free flowing, and easily handled by pneumatic transport techniques. Phillips Petroleum engineers proposed early conceptual designs for the process in 1956 (INL Cultural Resource Managment Office 2016, 260-261).

Congress appropriated funds in 1957 for the early phases of the ICPP Waste Calcining Facility (WCF, designated CPP-633) design. AEC awarded a contract to Fluor Corporation to be architect/engineer for the project. Fluor commenced construction in 1958 and completed the facility in 1961. CPP-633 was placed southeast of the ICPP stack, where room still further east was available for the special tanks that would store the calcine. CPP-633 handled the entire process, receiving its fluid feed from underground piping extended from the main process building. The dry calcine, called alumina, exited CPP-633 propelled by pneumatic pressure to storage facilities called bin sets about a hundred feet east of the building. Each bin set contained from three to seven vertically positioned stainless-steel tanks. Partially above grade level, they were shielded by an earthen berm. On top of each bin set was an instrument shack and other devices designed to monitor the accumulation of waste heat and detect leaks or other problems. It was not known just what products in the solid might prove to have future value, so the storage containers were designed that the calcine could be retrieved for future use if needed. Once construction of CPP-633 was completed, Phillips Petroleum took control of the building and began two years of cold trouble-shooting operations using simulated waste. Hot operations began with the first run on December 23, 1963 (INL Cultural Resource Managment Office 2016, 261).

The concept of fluidized bed technology was not new. It had been applied in the petroleum, iron and steel, and limestone industries. As applied to liquid radioactive wastes at CPP-633, it involved placing a bed of sand-like granular material at the bottom of a cylindrical calciner vessel. The granular material would then be heated to temperatures of 752 degrees Fahrenheit or more by a heat exchanger placed directly in the bed. A flow of hot air was introduced into the bed through fourteen holes at the bottom of the vessel and evenly distributed to the grains, placing the grains in motion, or fluidizing them. Liquid waste would be fed as a fine mist into the vessel by pneumatic atomizing spray nozzles. In the hot environment, the water vaporized and the solids adhered to the small starter grains tumbling around in the fluidized bed. As the process continued, the solids knocked against each other, causing particles to flake off and form the starter grains for the continuously sprayed liquid feed. One issue with the calciner was that the fluidized bed was heated by means of a circulating loop of liquid sodium-potassium (NaK) alloy. Unplanned plant shutdowns frequently occurred because of leaks in the NaK piping. In 1970, the NaK system was replaced by a direct combustion system. Engineers refitted the calciner vessel so that kerosene and oxygen could be sprayed into it. Nitrates from the waste feed would ignite it, placing the heat in intimate contact with the moving particles in the bed. This method supplied steady temperatures of 752 degrees Fahrenheit. Overall, the new system was less hazardous because hydrocarbon fuel piping was more reliable than NaK piping (INL Cultural Resource Managment Office 2016, 261-262).

CPP-633 was the first plant in the world to demonstrate successfully a practical method of transforming liquid high-level radioactive waste into a solid form. The quest for a workable calcining process at INL began early. Once operating, it continued reliably, and operated regularly. The process reduced the volume of the waste by a ratio of up to 10:1. The solid form was easier and safer to transport. The stability of the solid form reduced the likelihood that storage tanks would corrode, causing accidental releases into the environment. The storage containers for solids have a design life of 500 years, whereas the tanks holding the waste in its liquid form had a design life of only fifty years. Calcining constituted a significant reason for optimism in the pursuit by scientists of a safe nuclear-fuel cycle. Further, the process proved adaptable to a variety of chemicals deriving from different types of reprocessed fuels. The success of CPP-633 lead to a highly significant reduction in risk in managing high-level liquid waste at INL; Although the costs of development and operation of the calcining process were high, calcining may prove to have been the lowest-cost long-term choice, avoiding the much higher cost of remediating serious leaks into the environment. (INL Cultural Resource Managment Office 2016, 264).

Artifacts

Formal recognition of the historic importance of INL programs and structures began in 1966 with the designation of Experimental Breeder Reactor-I (EBR-I) as a National Historic Landmark. However, it was not until the early 1990s that further consideration was given to post-1942 INL history and associated structures and artifacts. Increasing awareness of the historical importance of INL came about for a variety of reasons, primary among them were (INL Cultural Resource Managment Office 2016, 157):

1) an increased focus on, and commitment to, compliance with all environmental laws and regulations;

2) the end of the Cold War, as marked by the removal of the Berlin wall;

3) changing INL programs and missions that led to increased alterations and demolition of older INL structures;

4) the 50th anniversary of United States Department of Energy (DOE) national laboratories associated with the Manhattan Project;

5) and the 50th anniversary of INL in 1999.

As an active scientific and engineering laboratory with a historic mission of testing and development of nuclear power, INL presents unique challenges to historic preservation. These challenges include radiologically contaminated buildings and equipment, security restrictions, and the nearly constant modification, demolition, and replacement of structures and equipment to meet changing programmatic and mission needs. Because of these challenges, what began in 1966 as a building-by-building approach to historic preservation of the INL built environment has evolved into a more holistic management strategy and systematic procedures for identifying, evaluating, and protecting important properties within a historic contextual framework. The development of contexts, identification of historic themes, and inventories of historic INL architectural properties have been expanded following the strategies and procedures outlined within the INL Cultural Resource Management Plan (CRMP). Inventories are ongoing to catalog other important INL architectural properties that may or may not be eligible to the National Register of Historic Places (NRHP), such as nuclear-era artifacts and photographic and engineering collections. For INL management purposes, a historic architectural property is defined as any post-1942 man-made structure or object that is either on, or eligible for listing on, the NRHP (INL Cultural Resource Managment Office 2016, 157).

At INL, processes are in place to protect the integrity of historical properties from activities that could adversely affect a property's eligibility for listing on the National Register. Additionally, the historic property management approach includes property categories under which architectural properties might be considered eligible for listing on the National Register. The four architectural property categories are (INL Cultural Resource Managment Office 2016, 160):

1) **Signature Properties:** A term used by DOE-Headquarters (DOE-HQ), Signature Properties represent the most historically important properties across the complex and/or those properties that are viewed as having tourism potential. These properties are documented through Historic American Buildings Survey (HABS), Historic American Engineering Record (HAER), or Historic American Landscape Survey (HALS) reports regardless of their ultimate disposition.

2) **Category 1 Properties:** Key individual INL properties (generally reactor buildings) that, through periodic reviews, may be reclassified as Signature Properties.

3) **Category 2 Properties:** INL properties, which are contributing to the historic context and landscape, and that are directly, associated with Signature or Category 1 properties.

4) **Category 3 Properties:** INL properties, which are contributing to the historic context and landscape, but that are not directly associated with Signature or Category 1 properties.

When an effect on a historic architectural property will be adverse and avoidance or reuse is infeasible, mitigation to minimize the adverse effect is necessary. Based on the relative importance of the affected property, as defined by the property category, mitigation includes varying types of documentation and potentially other activities (INL Cultural Resource Managment Office 2016, 165). Table 1 (below) identifies Signature and Category 2 properties associated with INL's historic nuclear context for which avoidance was not possible, along with mitigation documentation. In addition to mitigation documentation, several large-scale artifacts associated with the Signature properties, along with a Category 2 object, listed in Table 1 were identified and removed to interim storage pending the establishment or identification of appropriate storage and interpretive space.

Table 1: Signature and Category 2 architectural properties and associated mitigation documentation.

DEMOLISHED BUILDINGS	NRHP ELIGIBILITY	PROPERTY TYPE (prior to demolition)	MITIGATION & ASSOCIATED DOCUMENTATION
ETR/TRA-642 (Engineering Test Reactor)	Eligible	Signature	HAER No. ID-33-G (INL/EXT-06-01185)
CF-603 (Dispensary) **SL-1 Examination Table**	Building - Not Eligible Table- Eligible	Building - N/A Table – Category 2	2000 MOA
TAN-607 (Hot Shop/A&M)	Eligible	Signature	HAER No. ID-33-E (INEEL/EXT-04-02536) 2005 MOA
TAN-630 (Control & Equipment)	Eligible	Signature	HAER No. ID-33-E (INEEL/EXT-04-02536) 2005 MOA
TAN-650/LOFT (Containment & Service)	Eligible	Signature	HAER No. ID-33-E (INEEL/EXT-04-02536) 2005 MOA
CPP-633 (Waste Calcining Facility)	Eligible	Signature	HAER No. ID-33-C (INEEL-97-01370)

Artifacts associated with INL's nuclear research history include buildings, features, and objects, many of which are part of the INL open-air museum. Teams comprised of cultural resource specialists and persons with specific knowledge of INL historic events conduct walkthroughs of buildings and facility areas to identify artifacts or items of historical significance for retention and/or collection. The United States Department of Energy Idaho Operations Office (DOE-ID) intends that the items be generally used in interpretive displays to educate the public about INL history and science. Displays may be comprised of both permanent INL exhibits and traveling displays to other interpretive centers and museums. Some artifacts are preserved in place due to their size and/or DOE-ID's desire to retain and interpret them in their original setting. A permanent curation facility for post-1942 INL artifacts has not been identified; however, DOE recognizes the need for such a facility, not only for INL artifacts, but also for those across the DOE complex (INL Cultural Resource Managment Office 2016, 162).

An October 2005 Memorandum of Agreement (MOA) between the DOE-ID and the Idaho State Historic Preservation Office (SHPO) established the INL Archives and Special Collections; the MOA was signed as part of the Section 106 of the National Historic Preservation Act (NHPA, Public Law 89-665: 16 U.S.C. 470 et seq.) consultation for demolition of TAN-607, TAN-630, TAN-650, and TRA-603, all of which were DOE Signature Properties eligible for listing on the NRHP, and all of which were significant cultural resources within the INL open-air museum. To mitigate for the demolition, the MOA stipulates:

> *"management of the overall identification, retention, long-term storage and retrieval, and public access to historic program and project collections to include documents, personal and official correspondence, photographs, drawings, tapes, and other information pertaining to the construction, adaptation and history of the buildings, structures, and sites at the INL Site, as well as the operational programs and projects housed in those facilities."*
>
> *(Department of Energy Idaho Operations Office and Idaho Sate Historic Preservation Office 2005)*.

Several large-scale artifacts associated with INL's nuclear reactor testing historic context were identified prior to the demolition of the buildings listed in Table 1 (above). Currently there is no appropriate storage facility available on the INL to accommodate large artifacts, which include a variety of irreplaceable items with significance to the history of the INL, and are presently stored in the Arco NPG concussion wall (CF-633) high bay addition. These artifacts are in danger of being lost if an appropriate repository is not identified prior to the full deactivation, decontamination, and decommissioning (DD&D) of the CF-633 high bay scheduled for FY-2017. On October 6, 2015, a field assessment of the large-scale artifacts in CF-633 was conducted; the items that were assessed are included in Table 2 (below).

Table 2: Large-scale artifacts currently housed in CF-633 High Bay.

ASSOCIATED BUILDINGS	ARTIFACTS	MATERIALS	DIMENSIONS (approximate)	CONDITION
ETR/TRA-642 (Engineering Test Reactor)	Control panels and console	Metal, glass, paper	9 panels ranging in size from 2' x 4' x 8' to 4' x 4' x 8'	Fair/Good
ETR/TRA-642 (Engineering Test Reactor)	Reactor model	Metal, glass, acrylic	2' x 4' x 4'	Fair/Good
CF-603 (Dispensary)	SL-1 examination table portable shielding	Lead, glass, mineral oil	8 shields 6 at 1'6" x 3' x 3' 2 at 1'6" x 4' x 5'	Fair/Good
TAN-607 (Hot Shop/ A&M)	Hot shop model	Wood, metal, foam core, acrylic	3' x 5' x 1'	Fair
TAN-630 (Control & Equipment)	Alarm panel	Metal, glass, drafting velum	2' x 3'	Good
TAN-650/LOFT (Containment & Service)	Display panels	Foam core, paper	3' x 4'	Good
CPP-633 (Waste Calcining Facility)	Process display panels and model	Foam core, paper, acrylic	3' x 4'	Fair/Good

Details of individual artifacts are discussed below. CF-633 is in a decommissioned state and the building has no power or viable lighting; as such, photography of some of these items is very poor, while other items were not photographable at all.

ETR/TRA-642 Control Panels and Console

The nine control panels ETR range in size from 2' x 4' x 8' to 4' x 4' x 8'. Although interior components appear to have been removed, exterior components are still present (Figures 1 through 7). In addition to the panels, a portion of what appears to be the console desk is also stored in the CFA-633 high bay. ETR/TRA-642 was identified as a Signature property, eligible for listing on the NRHP, prior to demolition. The control panels and console were moved to CF-633 for interim storage in 1994, salvaged as partial mitigation for the DD&D of ETR, in addition to the completion of Historic American Engineering Record (HAER) documentation (INL Cultural Resource Managment Office, 2013, 2016, 364-366, 404; Stacy 2006; CRMO Project File HIST-94-004). The control panels and console came from TRA-642, which housed the reactor.

ETR/TRA-642 Reactor Model

The ETR model measures approximately 2' x 4' x 4' and appears to have had a working electrical component at one point (Figure 8 – lack of power in the CFA-633 High Bay did not allow for adequate lighting for photography). The model was moved to CF-633 for interim storage in 1994, salvaged as partial mitigation for the DD&D of ETR, in addition to the completion of Historic American Engineering Record (HAER) documentation (INL Cultural Resource Managment Office, 2016, 364-366, 404; Stacy 2006; CRMO Project File HIST-94-004). The model is an interpretation of the reactor process that was housed in TRA-642.

Figure 1: ETR control panels.

Figure 2: ETR control panel.

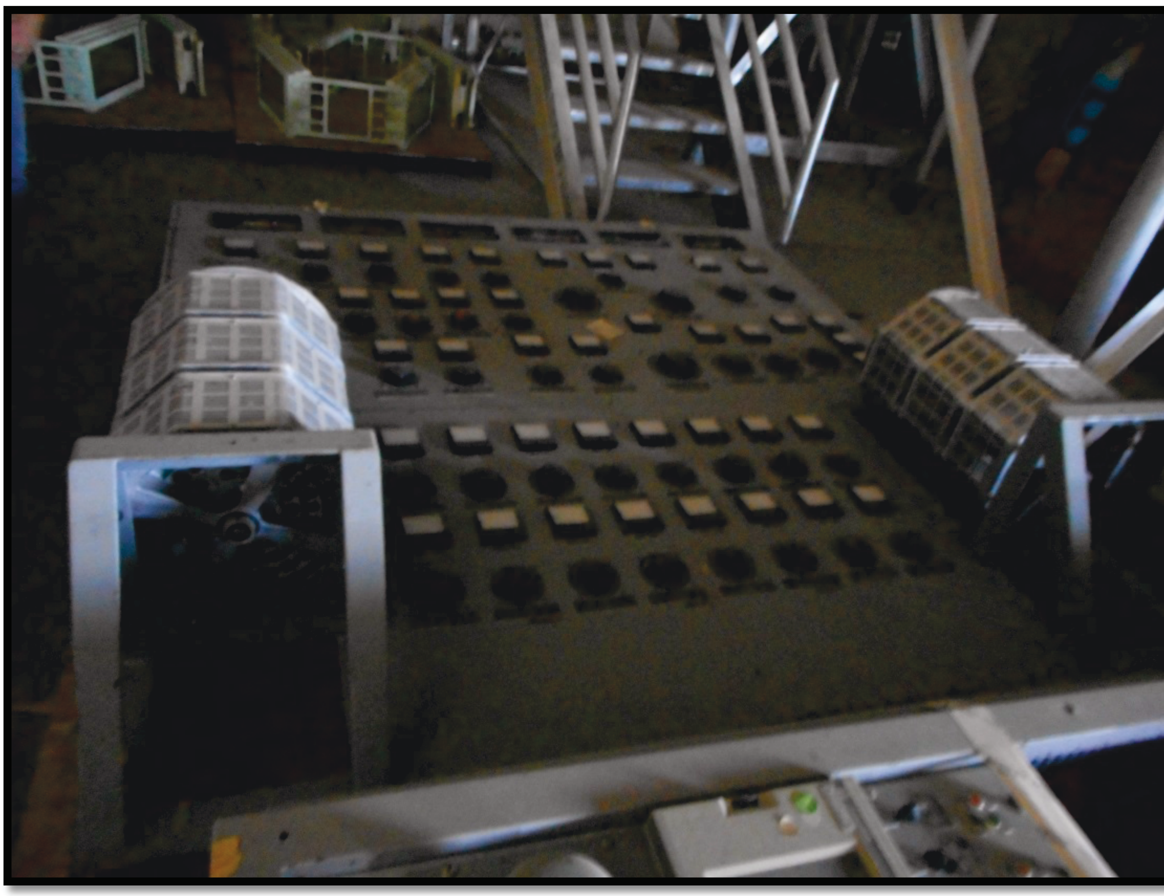

Figure 3: ETR control panel.

Figure 4: ETR control panels.

Figure 5: ETR control panels –calcining process display panels visible in background under window.

Figure 6: ETR control panels - calcining process display panels visible in right mid-ground.

Figure 7: ETR control panels.

Figure 8: ETR model (rear; poor photo quality due to insufficient lighting).

SL-1 Examination Table Portable Shielding

A shielded examination table was part of the facility constructed in CF-603 in response to SL-1 accident; the table shields are the only remaining elements of the facility which underwent DD&D in 2000 (INL Cultural Resource Managment Office, 2016, 409; CRMO Project File 00-004). While CF-603 was determined ineligible for listing on the NRHP, the objects within the examination facility were determined to be a Category 2 property, eligible for listing. A September 2000 Memorandum of Agreement between DOE-ID and the Idaho SHPO stipulates that the "table and associated shower equipment and signs shall be removed in a manner that allows for future display and interpretation and kept in covered and protective storage until an appropriate location can be identified for final disposition and public interpretation of the properties can be arranged" (INL Cultural Resource Managment Office, 2016, 409; CRMO Project File 00-004; Department of Energy Idaho Operations Office and Idaho State Historic Preservation Office, 2000).

In 2006, the CF-603 the artifacts associated with the examination room were scheduled to be moved to interim storage in CF-633 (INL Cultural Resource Managment Office, 2016, 416; CRMO Project File 06-10). As the portale sheilding for the examination table are the only artifacts associated with the 2000 MOA mandates that were located in CF-633, it is assumed that the other associated artifacts could not be romoved or transported in tact or in potential display condition due to the specific construction of these items and that the portable sheilding were the only artifacts from CF-603 moved to interim storage in CF-633 in 2006, although no documentatnion has been identified to confirm this assumption. The shielding consists of heavy lead frames holding a number of glass panels layered with mineral oil, each measuring between 1'6" x 3' x 3' and 1'6' x 4' x 5'(Figures 9 through 11).

Figure 9: SL-1 examination table portable shielding.

Figure 10: SL-1 examination table portable shielding.

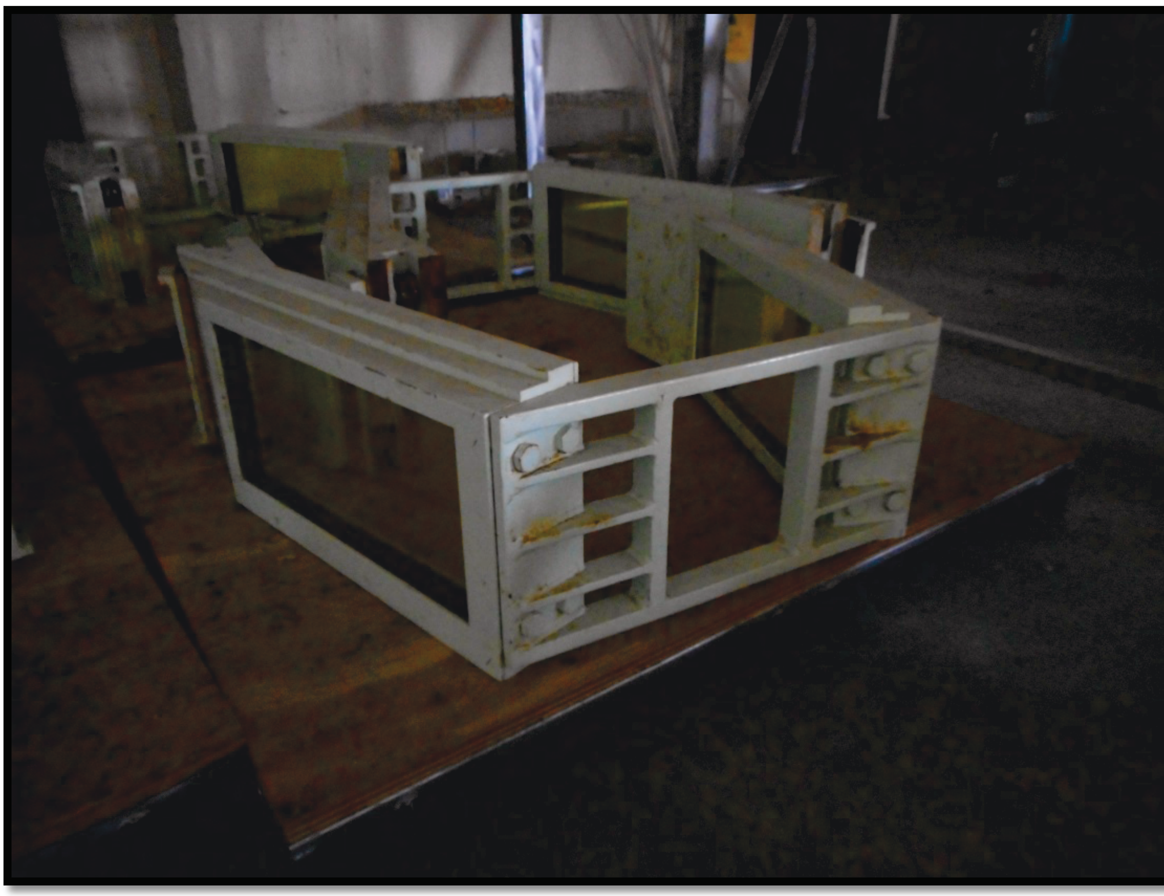

Figure 11: SL-1 examination table portable shielding.

TAN-607 Hot Shop Model

The TAN-607 Hot Shop model measures approximately 3’ x 5’ x 1’ (Figure 12). TAN-607 was identified as a Signature property, eligible for listing on the NRHP, prior to demolition. The model was moved to CF-633 for interim storage in 2006, salvaged as partial mitigation for the DD&D of Test Area North (TAN), in addition to the completion of Historic American Engineering Record (HAER) documentation (INL Cultural Resource Managment Office 2013, 2016, 359-363, 416 ;Stacy 2004; CRMO Project File 06-13).

TAN-630 Alarm Panel

The TAN-630 alarm panel measures approximately 2’ x 3’ and consists of an original schematic of the TAN facility fitted with pinpoint emergency alarm lights. TAN-630 was identified as a Signature property, eligible for listing on the NRHP, prior to demolition. The panel was moved to CF-633 for interim storage in 2006, salvaged as partial mitigation for the DD&D of Test Area North (TAN), in addition to the completion of Historic American Engineering Record (HAER) documentation (INL Cultural Resource Managment Office 2013, 2016, 359-363, 416 ;Stacy 2004; CRMO Project File 06-11).

TAN-650/LOFT Display Panels

The LOFT display panels consist of two interpretative panels that measure approximately 3’ x 4’. TAN-650/LOFT was identified as a Signature property, eligible for listing on the NRHP, prior to demolition. The display panels were moved to CF-633 for interim storage in 2006, salvaged as partial mitigation for the DD&D of Test Area North (TAN), in addition to the completion of Historic American Engineering Record (HAER) documentation (INL Cultural Resource Managment Office 2016, 359-363, 416 ;Stacy 2004; CRMO Project File 06-11).

Figure 12: TAN Hot Cell model (poor photo quality due to insufficient lighting).

CPP-633 Calcining Process Display Panels and Model

The CPP-633 Calcining Process display panels consist of a set of three interpretive panels that measure approximately 3' x 4'; the model is inset into one of the panels (Figures 8 and 9). CPP-633 was identified as a Signature property, eligible for listing on the NRHP, prior to demolition. The display panels and model were moved to CF-633 for interim storage in 1996, salvaged as partial mitigation for the DD&D of the CPP 633, in addition to the completion of Historic American Engineering Record (HAER) documentation (INL Cultural Resource Managment Office 2016, 224-225, 408; Stacy 1997; CRMO Project File HIST-96-022).

Recommendations

The artifacts stored in CF-633 are tangible elements of the historic research and developments in nuclear energy undertaken at INL over the past forty years and the last physical remnants of facilities that were inaccessible to the public when in operation; as such, these artifacts not only retain historic value, but interpretive value as well. As a federal facility, INL is obligated with implementing programmatic responsibilities regarding management of cultural resources. In addition, various MOAs between DOE-ID and the Idaho SHPO mandate the preservation of these artifacts.

Ideally, these large-scale artifacts would remain within the jurisdiction of INL and on site in a publicly accessible, environmentally controlled, facility, either in archival storage or on display within a museum setting with appropriate interpretation and security. If such a facility cannot be either located or constructed within INL before the scheduled DD&D of CF-633, scheduled for FY-2017, it is recommended that these artifacts be evaluated for release to an appropriate archival/museum facility, which has a mission and/or scope that encompasses either the history of Idaho or nuclear research and development, for preservation and interpretation.

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