WCS Consolidated Interim Storage Facility System Safety Analysis Report

(Public Version)

Docket Number 72-1050

Revision 2

Table of Contents

Appendix A
NUHOMS®-MP187 Cask System

Appendix B
Standardized Advanced NUHOMS® System

Appendix C
Standardized NUHOMS®-61BT System

Appendix D
Standardized NUHOMS®-61BTH Type 1 System

Appendix E
NAC-MPC

Appendix F
NAC-UMS

Appendix G
NAC-MAGNASTOR

Appendix H
Canisterized GTCC Waste

CHAPTER 1
INTRODUCTION AND GENERAL DESCRIPTION OF INSTALLATION

Table of Contents

List of Tables

List of Figures

1. INTRODUCTION AND GENERAL DESCRIPTION OF INSTALLATION

This Safety Analysis Report (SAR) describes the design and forms the licensing basis for the 10 CFR 72 [1-1] facility license of the *Interim Storage Partners' (ISP's)* WCS Consolidated Interim Storage Facility (*WCS* CISF) to be located in Andrews County, Texas.

The quality assurance (QA) program applicable to this design satisfies the requirements of 10 CFR 72, Subpart G and is described in the Quality Assurance Program Description [1-2]. To facilitate U.S. Nuclear Regulatory Commission (NRC) review of this application, this SAR has been prepared in compliance with the information and methods defined in Revision 0 of NRC NUREG-1567 [1-3].

This SAR describes a facility designed to accept commercial spent nuclear fuel and Greater-than-Class C (GTCC) waste contained in dual-purpose (transportation/storage) cask and canister systems that have been approved by the NRC for spent nuclear fuel. The NUHOMS®-MP187 GTCC waste canister is currently included in a specific license for storage and is also certified by the NRC for transport under 10 CFR Part 71. The GTCC waste canisters for the NAC systems are certified by the NRC for transport under 10 CFR Part 71. The WCS CISF will ultimately accommodate 40,000 metric tons Uranium or Mixed-Oxide, or metric tons heavy metal (MTHM), and will have a service life of at least 40 years. This initial SAR, however, is for phase 1 of the project, which is to material defined in Conditions 8A and 8B of the license for storage in the same canisters and overpacks as those currently in use at several reactor sites in the United States.

This chapter provides a summary of the SAR. The following information is included: (1) a general description of the WCS CISF; (2) a general description of the systems and operations; (3) analysis of the WCS CISF operations; (4) identification of agents and contractors; and (5) material incorporated into this SAR by reference.

1.1 Introduction

Interim Storage Partners (ISP) is a joint venture (JV) between Waste Control Specialists LLC and Orano CIS LLC formed to design, license, construct, and operate the WCS CISF.

Waste Control Specialists currently operates two separate Low-Level Radioactive Waste (LLRW) disposal facilities at the Andrews County site, including the Texas Compact Disposal Facility. *Orano CIS, through its parent Orano USA, is a leading company in the safe management, dry storage and transportation of spent nuclear fuel with more than 30 years of experience in the United States.*

The need for an interim storage facility for spent nuclear fuel arises as a result of the ongoing decades long search for a disposal solution for the nation's spent nuclear fuel. In 2012, the presidential-appointed Blue Ribbon Commission on America's Nuclear Future issued a report recommending that at least one interim storage facility be sited in the U.S., while a permanent disposal site is being developed.

Consistent with the recommendation of the Blue Ribbon Commission on America's Nuclear Future, the WCS CISF will provide dry storage capacity for canisterized spent nuclear fuel and GTCC waste at the WCS *CISF* site in the same storage overpack designs as those currently licensed and used at the original storage sites. *ISP* is seeking a license to operate a CISF for spent fuel and GTCC waste storage for 40 years in accordance with 10 CFR Part 72.

Construction of the WCS CISF is planned to start in September *2021* and operation is planned to begin in *July 2023*.

The WCS CISF will be located within the owner-controlled area of the *existing Waste Control Specialists site,* which is operated by *Waste Control Specialists*. The site comprises approximately 14,000 acres in Andrews County, Texas. It is characterized by isolation from population centers, a sound foundation for structures, and favorable conditions of meteorology, seismology, and hydrology.

The proposed location of the CISF site within the *Waste Control Specialists* site is on the north west corner. Figure 1-1 shows the general location of the WCS CISF at the *Waste Control Specialists* site.

Spent nuclear fuel at the WCS CISF will be stored in cask systems that have been previously approved by the NRC. These cask systems include transportable canister-based storage systems. It is *ISP's* intent that all NRC approved dual-purpose (transportation/storage) or multi-purpose (transportation/storage/ disposal) cask systems be acceptable for use at the WCS CISF over time. For Phase I of the WCS CISF application, six (6) cask systems consisting of eleven (11) different canisters plus GTCC waste canisters stored in five (5) overpacks are proposed for storage at the WCS *CISF*. These cask systems are described in SARs that are docketed by the NRC. Appendix H of the SAR addresses canisterized GTCC waste. Table 1-1 provides a listing of the various cask systems proposed for storage at the WCS CISF.

The cask systems listed in Table 1-1 were originally approved for 20 years. An application for License Renewal for the cask systems associated with CoC 1004 for an additional 40 years is currently being reviewed by the NRC. Work is also currently underway to develop an application for License Renewal for SNM-2510 for timely submittal to the NRC. The remaining cask systems in the WCS CISF License Application have not yet reached 20 years of time in service and therefore work has not yet begun to develop the applications for License Renewal for these systems. As these systems approach 20 years of service time, their applications for License Renewal, including Aging Management Program (AMP) requirements, will be submitted to the NRC for review and approval. Any canisters stored at the WCS CISF will have been loaded under these previously approved NRC CoCs and licenses, and their "time in service" clock for triggering the implementation of required AMP activities will have begun at the time of loading for each individual canister. Therefore, the AMP activities for any of the canisters stored at the site will be established and approved well in advance of license renewal for the site-specific license for the WCS CISF. Similarly, AMP activities for the storage overpacks at the WCS CISF will be established by their respective CoCs and licenses, but their "time in service" clocks will begin at the time of their loading at the WCS CISF. As the aging management activities associated with the individual CoCs and licenses under which the systems were originally loaded have not been approved at this time, a condition imposed on this license [1-4] is to incorporate the required aging management activities into this license within 120 days of the effective date of the renewal authorization of a given authorized cask system's CoC or license, or within 120 days of the effective date of this license, whichever is later.

The canister-based cask systems require transfer of the canister from the transportation cask to the storage overpack. These transfers are performed in either the Cask Handling Building or the Storage Area, depending on the cask system design. All transfer and handling activities are accomplished in a dry mode using cask transfer equipment and WCS CISF structures, systems, and components (SSCs). The WCS CISF design, as presented in the SAR, does not employ a spent fuel pool or other bare fuel handling capability.

Chapter 3 identifies the important-to-safety (ITS) SSCs for the cask systems and the WCS CISF and those not-important-to-safety (NITS) SSCs that are necessary for the operation of the WCS CISF. Cask system SSCs are used to the maximum extent possible in the design of the WCS CISF and are described in the design and licensing basis documents associated with each cask system. The use of previously approved cask systems is an integral part of the WCS CISF design basis. The WCS CISF SSCs that are ITS include the Canister Transfer System in the Cask Handling Building and the storage pads for the vertical storage systems.

The physical, thermal, and radiological characteristics of the spent nuclear fuel (SNF) to be stored at the WCS CISF are defined in the respective cask system SARs.

1.2 General Description of Installation

The WCS CISF is designed as a stand-alone facility and consists of a storage area, and support facilities. The facility boundary is established at the outer limits by the Part 73 Owner Controlled Area (OCA). The Protected Area (PA) boundary is approximately 660 feet inside of the OCA boundary. The storage area is approximately 330 feet inside of the PA boundary. These areas are shown in Figure 1-2, "WCS CISF Site Boundary Layout."

Figure 1-3 is a blow-up view of the facility showing the storage area and the support facilities inside the Protected Area. Support facilities include the Cask Handling Building, the Security and Administration Building, Transport Haul Route, and Rail Access.

The SSCs that are important-to-safety are listed in Table 3-5. Table 3-5 also lists the SSCs that are classified as not important-to-safety. Because there is no waste generated during the storage phase, there are no gaseous, liquid, or solid radioactive waste treatment systems associated with the storage system. Likewise, heat removal is totally passive in the overpacks and no active cooling system is required. Therefore, there are no required Instrumentation and Control Systems for the WCS CISF.

1.2.1 Location and Site Characteristics

The WCS CISF is located approximately 32 miles west of the city of Andrews, Texas, and five miles east of the city of Eunice, New Mexico. The WCS CISF facility is located approximately one-half mile east of the Texas-New Mexico state boundary and one mile north of Texas Highway 176. *The Waste Control Specialists site* occupies parts of Section 16 and 17, Block A-29, Public School Land, Andrews County, Texas included in approximately 25 square miles of property (primarily in Texas with nominal acreage in New Mexico) *controlled* by *Waste Control Specialists* LLC in northwestern Andrews County, Texas. *Waste Control Specialists LLC will retain control of the Site, free and clear of any liens, claims or encumbrances, and will make available the portion of the Site to be used for the WCS CISF under a long-term lease.*

The WCS *CISF* is situated in an arid, isolated part of the state. Figure 1-4 shows the location of the facility with respect to known or easily identifiable landmarks. Figure 1-4, as supplemented by Figure 1-1, illustrates county boundaries, rail access, highways, and major roads.

The approximate coordinates of the site are 32° 27' 08" north latitude and 103° 03' 35" west longitude.

1.2.2 Principal Design Criteria

The WCS CISF principal design criteria are based on the site characteristics, the design criteria associated with the cask systems listed in Table 1-1 that have been previously approved by the NRC, and specific criteria required for the WCS CISF design.

The cask systems listed in Table 1-1 meet the WCS CISF design criteria. Table 1-2 provides a summary of the WCS CISF principal design criteria.

1.2.3 Facility Descriptions

The major facilities at the WCS CISF are the Cask Handling Building and the storage area. The Cask Handling Building is approximately 140 feet long by 130 feet wide by 70 feet high. The building is a two-bay steel structure designed to support two commercial overhead cranes used to move transportation casks from the rail car to the transport vehicle. One bay of the building will house the Canister Transfer System described in Section 1.3.1.2 and the other bay will be available for direct transfer of transportation casks from the rail car to the transport vehicle. A 2,400 square foot area of the building is set aside for cask storage. The building plan view is shown in Figure 1-7. Figure 1-8 is a section through the building showing the overhead crane location. Air monitors and dosimeters are located in the building for monitoring purposes. The building is not designed or intended to provide confinement or shielding for SNF or GTCC materials. The building is classified as ITS - Category C. The purpose of the Cask Handling Building is to receive and prepare for storage shipments of dual-purpose canister systems. It will also receive GTCC waste canisters for storage at the site. It is also designed to process canisters stored at the site for off-site shipment. The Cask Handling Building is designed to handle canisterized material and does not have the capability to handle bare fuel.

As Low As Reasonably Achievable (ALARA) principles are incorporated, to the maximum extent practical, throughout the facility design to reduce radiation exposure to facility personnel. Cranes/lifting devices for transferring the NUHOMS® transportation/transfer casks from the transportation skid to the transfer trailer/skid are designed to minimize the need for facility personnel to be near the loaded cask. This equipment is NITS as the lift heights of the loaded casks are maintained below 80 inches at all times after removal of the impact limiters. The analysis of bounding drop scenarios shows that a NUHOMS® transportation/transfer cask will maintain structural integrity of the DSC confinement boundary and maintain basket geometry from an 80 inch (from the bottom of the cask to the "ground") drop. The ITS canister transfer system for the vertical transfer of canisters is remotely operated and the transfer equipment used to make the transfer to the storage overpacks is substantially identical to that used to transfer the canister into dry storage at the reactor facilities where the material was initially stored.

The storage area is a large area comprised of concrete storage pads and storage overpacks. The purpose of the storage area is to provide safe storage for the canisterized spent nuclear fuel in cask systems that were previously approved by the NRC. The pads and approach aprons are designed to meet the applicable requirements of these previously approved cask systems. The storage area will be constructed in phases, as necessary. Phase 1 is designed to accommodate approximately 5,000 MTHM of spent nuclear fuel and GTCC waste in approximately 470 storage overpacks. Figure 1-6 shows the Phase 1 storage area. The individual storage pads are constructed of reinforced concrete at approximately ground level. Horizontal storage module pads will have concrete approach aprons. Vertical storage module pads will be surrounded by gravel approach roads.

The Security and Administration Building is a commercially designed and fabricated steel building with a reinforced concrete floor and foundation. The building primarily functions as the location for the Central Alarm Station and for Health Physics spaces. Additionally, the building provides additional security and administration spaces and is the main personnel entrance and exit for the facility. Figure 1-9 shows the Security and Administration Building Layout.

The remainder of the WCS CISF facilities provide support functions such as fuel receipt, security, and fire protection. Table 1-3 provides a list of the WCS CISF facilities and their functions.

1.2.4 Materials To Be Stored

Only canisters that have been previously approved by the NRC to store and transport commercial light water (PWR and BWR) spent nuclear fuel and GTCC waste will be received at the WCS CISF. The controls for limiting the types and forms of spent nuclear fuel received at the WCS CISF include those placed on the cask systems by the NRC-issued site licenses or certificates of compliance for the included transportation and storage systems. The approved systems are listed in Section 2.1 of the Technical Specifications [1-4], which include an additional limitation on uncanned high burnup fuel. The type, form and sources authorized for storage include:

- Canisterized spent nuclear fuel elements from commercial nuclear utilities licensed pursuant to 10 CFR Part 50 and associated radioactive materials related to the receipt, transfer, and storage of that spent nuclear fuel.
- Uranium or Mixed-Oxide (MOX) in the form of intact spent fuel assemblies, damaged fuel assemblies, and fuel debris, as specified in Section 2.1 of the WCS CISF Technical Specifications [1-4].
- Canisterized GTCC waste that consists of only reactor related low-level radioactive waste generated as a result of plant operation and decommissioning where the radionuclide concentration limits of Class C waste in 10 CFR 61.55 are exceeded. This waste may include such components as incore components, core support structures, and small reactor related miscellaneous parts resulting from the reactor vessel internals segmentation/decommissioning processes.

- All waste stored within the various GTCC canisters will be in the physical form of activated metals that may have surface contamination. The GTCC canisters will not contain process wastes containing paper, plastics or ion exchange resins that could result in the generation of combustible gases or chemical or galvanic corrosion reactions with the canister.

Aging Management considerations for the canisters and storage overpacks are discussed in Section 11.5.

1.2.4.1 Use of NRC Approved Storage Cask Systems

For Phase 1 of the *ISP* application, canisterized spent nuclear fuel and GTCC waste are stored at the WCS *CISF* in six cask storage systems previously approved by the NRC. The six storage systems used at the WCS *CISF* during Phase 1 are:

1. NUHOMS MP187 Storage System as Configured for the WCS *CISF*

   NUHOMS MP187 Cask Storage System as configured for the WCS *CISF* is described in "Rancho Seco Independent Spent Fuel Storage Installation Safety Analysis Report" Revision 4, NRC Docket No. 72-11. This configuration includes the overpack and canisters included in NRC SNM License 2510, Amendment 4. Specifically, the NUHOMS MP187 Storage System will use the HSM (Model 80) overpack to house one of three types of approved spent fuel canisters, the FO-DSC, FC-DCS or FF-DSC. The contents of the NUHOMS MP187 Storage System during Phase 1 are those contents currently authorized in NRC SNM License 2510, Amendment 4.

2. Advanced Standardized NUHOMS Storage System as Configured for the WCS *CISF*

   Advanced Standardized NUHOMS Storage System as configured for the WCS *CISF* is described in "Updated Final Safety Analysis Report for the Standardized Advanced NUHOMS® Horizontal Modular Storage System for Irradiated Nuclear Fuel" *TN* Americas Document No. ANUH-01.0150, Revision 6, NRC Docket No. 72-1029. This configuration includes the overpack and canister included in NRC Certificate of Compliance 72-1029, Amendments 0, 1, and 3. Specifically, the Advanced Standardized NUHOMS® Storage System will use the AHSM overpack to house the NUHOMS® 24PT1 spent fuel canister. The contents of the Advanced Standardized NUHOMS® Storage System during Phase 1 are those contents currently authorized in NRC Certificate of Compliance 72-1029, Amendments 0, 1, and 3.

3. Standardized NUHOMS Storage System as Configured for the WCS *CISF*

   Standardized NUHOMS Storage System as configured for the WCS *CISF* is described in "Updated Final Safety Analysis Report for the Standardized NUHOMS Horizontal Modular Storage System for Irradiated Nuclear Fuel" *TN* Americas Document No. NUH-003, Revision 14, NRC Docket No. 72-1004. This configuration includes the overpack and canisters included in NRC Certificate of Compliance 72-1004, Amendments 3-13. Specifically, the Standardized NUHOMS Storage System will use the HSM Model 102 overpack to house either the NUHOMS 61BT or NUHOMS 61BTH Type 1 spent fuel canister. The contents of the Standardized NUHOMS Storage System during Phase 1 are those contents currently authorized in NRC Certificate of Compliance 72-1004, Amendments 3-13.

4. NAC-MPC Storage System as Configured for the WCS *CISF*

   NAC-MPC Storage System as configured for the WCS *CISF* is described in "NAC Multipurpose Cask Final Safety Analysis Report", Revision 10, NRC Docket No. 72-1025. This configuration includes the overpack and canisters included in NRC Certificate of Compliance 72-1025, Amendments 0-6. Specifically, the NAC-MPC Storage System will use the VCC overpack to house one of three approved spent fuel canisters, the Yankee Class, Connecticut Yankee or LACBWR. The contents of the NAC-MPC Storage System during Phase 1 are those contents currently authorized in NRC Certificate of Compliance 72-1025, Amendments 0-6.

5. NAC-UMS Storage System as Configured for the WCS *CISF*

   NAC-UMS Storage System as configured for the WCS *CISF* is described in "Final Safety Analysis Report for the UMS Universal Storage System", Revision 10, NRC Docket No. 72-1015. This configuration includes the overpack and canisters included in NRC Certificate of Compliance 72-1015, Amendments 0-5. Specifically, the NAC-UMS Storage System will use the VCC overpack to house NAC-UMS Class 1 through 5 canisters. The contents of the NAC-UMS Storage System during Phase 1 are those contents currently authorized in NRC Certificate of Compliance 72-1015, Amendments 0-5.

6. MAGNASTOR Storage System as Configured for the WCS *CISF*

   MAGNASTOR Storage System as configured for the WCS *CISF* is described in "MAGNASTOR Final Safety Analysis Report", Revision 7, NRC Docket No. 72-1031. This configuration includes the overpacks and canisters included in NRC Certificate of Compliance 72-1031, Amendments 0-3, Revision 1, and Amendments 4 and 5. The MAGNASTOR Storage System will use the CC1, CC2, CC3 or CC4 overpacks to house four approved types of canisters, the TSC1 through TCS4 canisters. The contents of the MAGNASTOR Storage System during Phase 1 are those contents currently authorized in NRC Certificate of Compliance 72-1031, Amendments 0-3, Revision 1, and Amendments 4 and 5.

Descriptions of the storage systems used at the WCS *CISF* are summarized in Table 1-1.

In addition Table 1-1 addresses the canisters for storing GTCC waste in the storage overpack designs described in Appendix H under *the* WCS's *CISF* license.

- The GTCC Canister to be stored in the NUHOMS MP187 Cask Storage System as configured for the WCS *CISF* is described in Appendix C of the "Rancho Seco Independent Spent Fuel Storage Installation Safety Analysis Report" Revision 4, NRC Docket No. 72-11. This configuration includes the overpack and canister included in NRC SNM License 2510, Amendment 4. Specifically, the NUHOMS MP187 Storage System will use the HSM (Model 80) overpack to house the GTCC waste canister. The contents of the NUHOMS MP187 Storage System during Phase 1 are those contents currently authorized in NRC SNM License 2510, Amendment 4 for the GTCC waste.
- The GTCC-Canister-CY and GTCC-Canister-YR to be stored in the NAC MPC Storage System as configured for the WCS *CISF* are described in Appendix H and "NAC-STC, NAC Storage Transport Cask Safety Analysis Report", Revision 17, USNRC Docket No. 71-9235. This configuration includes the overpack included in NRC Certificate of Compliance 72-1025, Amendments 0-6 and the GTCC-Canister-CY and GTCC-Canister-YR included in NRC Certificate of Compliance No. 9235. Specifically, the NAC-MPC Storage System will use the VCC overpack to house either the GTCC-Canister-CY or GTCC-Canister-YR. The contents of the GTCC-Canister-CY or GTCC-Canister-YR during Phase 1 are those contents currently authorized in NRC Certificate of Compliance No 9235.

- The GTCC-Canister-MY to be stored in the NAC UMS Storage System as configured for the WCS *CISF* is described in Appendix H and "Safety Analysis Report for the UMS® Universal Transport Cask", Revision 2, USNRC Docket No. 71-9270. This configuration includes the overpack included in NRC Certificate of Compliance 72-1015, Amendments 0-5 and the GTCC-Canister-MY included in NRC Certificate of Compliance No. 9270. Specifically, the NAC-UMS Storage System will use the VCC overpack to house the GTCC-Canister-MY. The contents of the GTCC-Canister-MY during Phase 1 are those contents currently authorized in NRC Certificate of Compliance No 9270.
- The GTCC-Canister-ZN to be stored in the MAGNASTOR Storage System as configured for the WCS *CISF* is described in Appendix H and "Safety Analysis Report for the MAGNATRAN Transport Cask", Revisions 12A, 14A and 15A, USNRC Docket No. 71-9356. This configuration includes the overpack included in NRC Certificate of Compliance 72-1031, Amendments 0-3, Revision 1, and Amendments 4 and 5 and the GTCC-Canister-ZN included in "Safety Analysis Report for the MAGNATRAN Transport Cask", Revisions 12A, 14A and 15A, USNRC Docket No. 71-9356. Specifically, the MAGNASTOR Storage System will use one of the CC1 through CC4 overpacks to house the GTCC-Canister-ZN. The contents of the GTCC-Canister-ZN during Phase 1 are those contents currently addressed in "Safety Analysis Report for the MAGNATRAN Transport Cask", Revisions 12A, 14A and 15A, USNRC Docket No. 71-9356.

1.2.4.2 Pre-Shipment Review of Canisters

ISP will verify that every spent fuel canister received at *the* WCS *CISF* would comply with the terms, conditions of use, and technical specifications of one of the six storage systems listed in Section 2.1 of the Technical Specifications [1-4], when stored in the canister's approved overpack.

This verification will include a determination of the Certificate amendment under which the canister was loaded and an evaluation of any changes made to the canister under 10 CFR 72.48.

If it is determined, prior to acceptance, that a loaded canister does not comply, *ISP* would undertake further evaluation to determine if their site specific license should be amended, or if an evaluation done under 10 CFR 72.48 for the WCS *CISF* would support such a change without an amendment.

ISP will review 10 CFR 72.48 evaluations completed by other licensees or Certificate holders and determine if these evaluations can be clearly shown to be applicable to *WCS CISF*. *ISP* will prepare its own 72.48 evaluations in such instances.

ISP shall maintain procedures for and records of its reviews performed according to this section.

1.2.5 Waste Products Generated During Operations

As described in Chapter 6, there are minimal radioactive wastes generated at the WCS CISF. Gaseous and liquid wastes are not generated at the WCS CISF. Small volumes of solid radioactive waste may be produced from routine operations involving contamination surveys and decontamination activities involving incoming and outgoing transportation casks and equipment. Potential solid waste streams are collected and temporarily stored on site until authorization under *Waste Control Specialists* Low Level Radioactive Waste (LLRW) License RML R04100 allows for processing and disposal.

1.3 General Description of Systems and Operations

A general description of the WCS CISF systems and operations is provided in this section. The systems described relate to the receipt, handling, transfer, and storage of canisterized spent nuclear fuel and GTCC waste. In general, the same systems provide the corresponding function for canister retrieval and off site shipment operations.

1.3.1 WCS Consolidated Interim Storage Facility Systems

The major systems for the WCS CISF include the following: Cask Off-Loading and Loading System in the Cask Handling Building, Canister Transfer System (for vertical systems) and Transfer Cask or Storage Overpack Carrier System. These systems are used to transfer canisterized spent nuclear fuel and GTCC waste from transportation systems to storage overpacks and are used to retrieve canisters for off-site shipment.

1.3.1.1 Cask Off-Loading and Loading System

The purpose of the Cask Off-Loading and Loading System is to remove transportation casks from the cask railcars and to move transportation casks onto the railcars for shipment from the WCS CISF. Major components include two 130-ton capacity overhead bridge cranes and a Vertical Cask Transporter (VCT), which is also used to carry and position the loaded vertical concrete cask (VCC) to its storage pad position. The overhead bridge cranes and associated lifting fixtures are used to perform a horizontal transfer of the NUHOMS® transportation/transfer cask from the railcar (skid) onto the transfer skid for transfer operations. This transfer is performed without lifting the loaded NUHOMS® transportation/transfer cask above a height of 80” and these cranes are classified as NITS. The ITS VCT is used to upright transportation casks and place the casks under the Canister Transfer System for the vertical storage systems. The VCT is also used to collect the vertical transportation cask following loading with the Canister Transfer System and place/down end the transportation cask onto the railcar for offsite transport.

1.3.1.2 Canister Transfer System

For vertical systems, the ITS Canister Transfer System is used to transfer spent nuclear fuel and GTCC waste canisters from the uprighted transportation casks to vertical storage overpacks. Major components include a shielded transfer cask, mobile gantry crane and ancillary equipment used to move the canisters from the upright transportation cask to the vertical storage overpack. This system is not used with the NUHOMS® Systems.

1.3.1.3 Transfer Cask or Storage Overpack Carrier System

For NUHOMS® Systems the purpose of this equipment is to transfer the cask out to the Horizontal Storage Module (HSM) and transfer the canister into the HSM or retrieval of same. For vertical systems, the purpose of this equipment is to upright the transportation cask and place it under the Canister Transfer System and to transfer the storage overpack from the transfer station to the storage pad or to return the overpack to the transfer station when the canister is to be shipped off-site. Major components for the NUHOMS® System include the transfer trailer, skid, skid positioning system, HSM/cask restraint system, hydraulic ram and alignment equipment. The major component for the vertical system is a VCT to move the cask from the transfer station to the storage pad.

1.3.1.4 Waste Management Systems

The WCS CISF does not have any major radioactive waste management systems. The only radioactive wastes generated are the result of residual quantities of radioactive contamination on the transportation casks. Solid wastes generated during the decontamination process are disposed of at a licensed disposal facility.

1.3.1.5 Not Used

1.3.1.6 Storage Pad

For the NUHOMS® Systems the basemat and approach slabs are not relied upon to provide any safety function. There are no structural connections or other positive means to transfer shear between the modules and the foundation slab. The HSMs are not connected to the basemat. They resist horizontal forces by friction. Therefore, basemat and approach slabs are considered NITS and are designed, constructed, maintained, and tested as commercial-grade items.

The concrete storage pads loaded with NAC-MPC, NAC-UMS, and MAGNASTOR VCC systems meet the concrete storage pad properties presented in CoC No. 1025, Section B 3.4, CoC No. 1015, Section B 3.4, and CoC No. 1031, Sections 4.3.1 and 5.4, respectively. There are no structural connections or other positive means to transfer shear between the VCC systems and the slab. The VCC systems are not connected to the basemat, and resist horizontal forces by friction. The storage pads used for placement of NAC-MPC, NAC-UMS, and MAGNASTOR VCCs are classified as ITS, as identified in Chapter 3 and Chapter 7.

1.3.2 WCS Consolidated Interim Storage Facility Operations

Loaded transportation casks containing spent fuel or GTCC waste canisters are received via rail car. Security inspections and radiation surveys are performed in accordance with 10 CFR Part 71 and transportation cask CoC requirements.

The transportation casks are radiologically surveyed, impact limiters removed, their cavities are vented and tested, and they are decontaminated as necessary. Once receipt is completed under the provisions of 10 CFR Part 71, the cask is prepared to be removed from the railcar so that the canister can be transferred to the storage overpack. For NUHOMS® Systems, the cask is lifted horizontally from the transportation skid and placed on the transfer trailer where it is readied to be transferred to the storage pad and its designated HSM. The canister/cask is then transferred to the storage pad where the canister is inserted into its HSM. For vertical systems, the transportation cask is uprighted, placed in the transfer station, and made ready such that the canister can be retrieved with a shielded transfer cask and the canister transferred to the storage overpack. Once the canister is transferred to the storage overpack, the overpack is then moved using the VCT out to the storage pad and placed in its designated location for storage.

For canister retrieval operations, the operational sequences for placing the canister into storage are reversed.

1.4 Analysis of Operations

This section provides a summary of the analyses performed for normal operations, off-normal and accident conditions.

1.4.1 Normal Operations – Dose Assessment

ALARA practices and dose reduction techniques are incorporated into the design of the WCS CISF. The receipt and transfer operations incorporate the ALARA principles and operational experience gained from the operations of these NRC licensed cask systems. The calculated operational exposures are very conservative, as the assumed dose rates on and around the transport/transfer casks are assumed to be for design basis transportation sources and the assumed dose rates on and around the storage overpacks are based on design basis source terms in the existing storage FSARs. These storage source terms, in most cases, are much higher than what can be accommodated by the transportation cask and therefore significant decay is required prior to shipment to the WCS CISF.

The maximum calculated occupational exposure for normal transfer operations is 232 person-rem when the 5,000 MTHM and GTCC waste canisters are placed into storage. Chapter 9 and its associated appendices provide a detailed evaluation of occupational exposures.

1.4.2 Normal Operations – Establishment of the Controlled Area (Site) Boundary

An analysis was performed to identify the location of the controlled area boundary to ensure compliance with 10 CFR 72.104 (a) (dose rate ≤ 25 mrem/yr). As noted above, the dose rates assumed on the surface of the storage overpacks are based on the design basis source terms in the licensed storage systems at the reactor sites.

The annual expected yearly dose at the nearest site boundary for the fully loaded (5,000 MTHM plus GTCC waste canisters) WCS CISF is 4.29E-5 person-rem, including direct radiation (including skyshine) and contributions due to inhalation, submersion and ingestion from non-leak-tight containers. Chapters 9 and 11 and their associated appendices provide a detailed evaluation of site boundary exposures.

1.4.3 Accident Analysis

1.4.3.1 Safety Analysis Process

Chapter 12 and design specific appendices provide analysis for the off-normal and accident conditions for the approved storage systems. Chapter 12 defines the design basis events for each authorized cask system. The WCS CISF Technical Specifications [1-4] complete the design safety basis by defining the operational controls and limits placed on WCS CISF operations and lists the necessary administrative controls or programs established for the site. Chapter 14 provides the basis for the Technical Specifications.

1.4.3.2 Safety Analysis Methodology

The storage of spent nuclear fuel at the WCS CISF is based on the use of cask systems that have been previously approved by the NRC. The associated systems' storage FSARs and transportation SARs provide design basis information regarding radiological hazards for the individual systems to be used at the WCS CISF. The FSARs/SARs identify design basis events that are classified as either normal, off-normal or accidents for each approved system. Normal events include such operations as transportation package receipt, inspection, transfer of the canisters to the storage overpack and storage at the WCS CISF until ready to be transported off-site. Off-normal events are those events which are expected to occur with moderate frequency during transfer and storage operations. In general, the consequences of these events have no radiological safety implications and do not have a significant impact on ITS design functions. Accident conditions are those events that occur infrequently and could reasonably be expected to occur during the lifetime of the WCS CISF. These events include low probability design basis accidents which establish a conservative design basis for ITS SSCs. These events include natural phenomena such as earthquakes and tornados, and man-made events such as cask drop.

1.4.3.3 Results

For most of the accidents analyzed, there are no radiological consequences produced as a direct result of the event, and there are no impacts on ITS design functions. These negligible consequences are attributed primarily to the use of NRC approved storage systems and the implementation of operating controls and limits. However, recovery operations may involve some occupational exposure to personnel. The analyses results indicate that there are no credible accident scenarios for the WCS CISF which would result in a loss of confinement accident or a radiological release in excess of the radiological dose criterion of 10 CFR 72.106.

1.4.3.4 Technical Specifications

The WCS CISF Technical Specifications [1-4] define the operating controls and limits and the administrative controls. The Technical Specifications, including the relevant portions of the individual storage system Technical Specifications, provide defined operating limits and controls for each system for storage at the WCS CISF.

The administrative controls presented in this SAR include the organization and management structure, response plans, procedures, programs, controls, record keeping requirements, review and audit procedures, and reporting necessary to assure that the operations involved in the storage of canisterized spent nuclear fuel and GTCC waste at the WCS CISF are performed in a safe manner.

1.4.4 Safety Management

The *ISP* management policy and highest priority is to ensure that all operations are conducted safely. Implementation of this policy is made through a consolidated safety management program. This program entails radiation protection, conduct of operations, and quality assurance.

1.4.4.1 Radiation Protection Program

The radiation protection program ensures that all operations are performed in a manner that ensures occupational exposures are maintained within prescribed regulatory limits and are ALARA. ALARA considerations have been integrated into the design of the WCS CISF and incorporated into all operating procedures.

1.4.4.2 Conduct of Operations Program

The conduct of operations program ensures that the WCS CISF is operated in a professional and safe manner. Highlights of this program include the following:

- The *ISP* organization provides clear lines of responsibilities and ensures independence of organizations. This ensures *ISP* has an effective organization with appropriate oversight.
- *ISP* performs an extensive test program, including an operational readiness review, prior to beginning normal operations. The test program ensures that the WCS *CISF* structures, systems, and components are operated in a dependable manner so as to perform their intended function.
- *ISP* maintains a systematic training program to ensure proficiency of all facility personnel.
- *ISP* maintains a formal procedure management program that ensures all ITS operations are performed using detailed written, approved, and controlled procedures.
- *ISP joint venture member Waste Control Specialists* has a detailed emergency preparedness program and conducts periodic drills and training. This ensures that *site* personnel are prepared to respond to emergencies as they arise.

1.4.4.3 Quality Assurance Program

Interim Storage Partners has adopted the TN Americas Quality Assurance Program for its use. The TN Americas Quality Assurance Program Description Manual (QAPDM) is docketed under 71-0250. The activities associated with the WCS CISF are governed by the applicable portions of the *TN Americas* QA program as described in *TN Americas LLC Quality Assurance Program Description Manual for 10 CFR Part 71, Subpart H and 10 CFR Part 72, Subpart G,* [1-2]. The QA program meet*s* the requirements of 10 CFR 72, Subpart G.

1.5 Identification of Agents and Contractors

ISP has overall responsibility for the engineering, design, licensing, and construction of the WCS CISF.

TN Americas and Waste Control Specialists are the contractor*s* for the design and operation of the WCS CISF. *TN Americas* is also the contractor for the design and fabrication of the HSMs, and associated auxiliary systems for the NUHOMS® systems. *TN Americas* is also the contractor for the NUHOMS® cask systems and is responsible for cask transportation licensing, fabrication, testing, and delineation of any cask specific requirements.

NAC International is the contractor for the design and fabrication of the NAC storage overpacks and ITS storage pads on which the NAC storage overpacks will be stored. NAC International is also the contractor for the NAC cask systems and is responsible for cask transportation licensing, fabrication, testing, and delineation of any cask specific requirements.

ISP will also use various contractors for site preparation and construction, as necessary.

1.6 Material Incorporated by Reference

This section provides a list of the safety analysis reports incorporated by reference as part of the SAR. The list of the SAR sections that reference one or more of the below documents is provided in Table 1-4.

1.6.1 NUHOMS® Systems

1.6.1.1 Transportation SARs

TN Americas, "NUHOMS®-MP197 Transport Packaging Safety Analysis Report," Revision 17, USNRC Docket Number 71-9302.

TN Americas, "Safety Analysis Report for the NUHOMS®-MP187 Multi-purpose Cask," Revision 17, USNRC Docket Number 71-9255.

1.6.1.2 Storage SARs

"Rancho Seco Independent Spent Fuel Storage Installation Safety Analysis Report," NRC Docket No. 72-11, Revision 4.

TN Americas, "Updated Final Safety Analysis Report for the Standardized NUHOMS® Horizontal Modular Storage System for Irradiated Nuclear Fuel," NRC Docket No. 72-1004, TN Americas Document No. NUH-003, Revision 14.

TN Americas, "Updated Final Safety Analysis Report for the Standardized Advanced NUHOMS® Horizontal Modular Storage System for Irradiated Nuclear Fuel," NRC Docket No. 72-1029, TN Americas Document No. ANUH-01.0150, Revision 6.

1.6.2 NAC International Systems

1.6.2.1 Transportation SARs

NAC International, "NAC-STC, NAC Storage Transport Cask Safety Analysis Report," Revision 17, USNRC Docket Number 71-9235.

NAC International, "Safety Analysis Report for the UMS® Universal Transport Cask," Revision 2, USNRC Docket Number 71-9270.

NAC International, "Safety Analysis Report for the MAGNATRAN Transport Cask," Revisions 12A, 14A, and 15A, USNRC Docket Number 71-9356.

1.6.2.2 Storage SARs

NAC International, "NAC Multipurpose Cask Final Safety Analysis Report," Revision 10, USNRC Docket Number 72-1025.

NAC International, "Final Safety Analysis Report for the UMS Universal Storage System," Revision 10, USNRC Docket Number 72-1015.

NAC International, “MAGNASTOR® Final Safety Analysis Report,” Revision 7, USNRC Docket Number 72-1031.

1.7 References

1-1 Title 10, Code of Federal Regulations, Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste."

1-2 *"TN Americas LLC Quality Assurance Program Description Manual for 10 CFR Part 71, Subpart H and 10 CFR Part 72, Subpart G," current revision.*

1-3 NUREG-1567, "Standard Review Plan for Spent Fuel Dry Storage Facilities," Revision 0, U.S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards, March 2000.

1-4 Proposed SNM-1050, WCS Consolidated Interim Storage Facility Technical Specifications, Amendment 0.

1-5 Reg Guide 1.76, "Design-Basis Tornado and Tornado Missiles For Nuclear Power Plants," Revision 1, March 2007.

1-6 NUREG-0800, Standard Review Plan, Section 3.3.1 "Wind Loading," 3.3.2 "Tornado Loads" and Section 3.5.1.4 "Missiles Generated by Tornado and Extreme Winds," Rev 3, March 2007.

1-7 NUREG-0800, Standard Review Plan, Section 3.5.1.4 "Missiles Generated by Natural Phenomena," Revision 2, July 1981.

1-8 WCS document "Environmental Report for the Consolidated Interim Storage Facility, Docket No. 72-1050," Revision 1.

1-9 Reg Guide 1.60. "Design Response Spectra for Seismic Design of Nuclear Power Plants," Revision 2, July 2014.

1-10 AECOM "Site Specific Seismic Hazzard Evaluation and Development of Seismic Design Ground Motions," Study Number WCS-12-05-100-001, Revision 0.

Table 1-1
Storage Systems at the WCS CISF

Cask System	NRC Docket No.	Canister	Overpack
NUHOMS® MP187 Cask System	71-9255 72-11 (SNM-2510)	FO-DSC	HSM (Model 80)
		FC-DSC	
		FF-DSC	
		GTCC Canister	
Advanced Standardized NUHOMS® System	71-9255 72-1029	NUHOMS® 24PT1	AHSM
Standardized NUHOMS® System	71-9302 72-1004	NUHOMS® 61BT	HSM Model 102
		NUHOMS® 61BTH Type 1	
NAC-MPC	71-9235 72-1025	Yankee Class	VCC
		Connecticut Yankee	
		LACBWR	
		GTCC-Canister-CY	
		GTCC-Canister-YR	
NAC-UMS	71-9270 72-1015	Classes 1 through 5	VCC
		GTCC-Canister-MY	
MAGNASTOR	71-9356 72-1031	TSC1 through TSC4	CC1 through CC4
		GTCC-Canister-ZN	

Table 1-2
Summary of WCS CISF Principal Design Criteria
(3 pages)

Design Parameter	Design Criteria	Condition	Applicable Codes, Standards and Basis
Type of fuel	Commercial, light water reactor spent fuel	Normal	N/A
Storage Systems	Transportable canisters and storage overpacks docketed by the NRC	Normal	See Table 1-1
Fuel Characteristics	Criteria as specified in previously approved CoCs and licenses for included systems	Normal	See Table 1-1
Tornado (Wind Load)	Max translational speed: 40 mph Max rotational speed: 160 mph Max tornado wind speed: 200 mph Radius of max rotational speed: 150 ft Tornado pressure drop: 0.9 psi Rate of pressure drop: 0.4 psi/sec	Accident	Reg Guide 1.76 [1-5] NUREG-800[1-6]
Tornado (Missile)	Automobile 4000 lb, 112 ft/s Schedule 40 Pipe 287 lb, 112 ft/s Solid Steel Sphere 0.147 lb, 23 ft/s	Accident	NUREG-800[1-7]
Floods	The WCS CISF is not in a floodplain and is above the Probable Maximum Flood elevation, and will remain dry in the event of a flood.	Accident	Section 2.4.2.2
Seismic (Ground Motion)	Site-specific ground-surface uniform hazard response spectra (UHRS) with 1E-4 annual frequency of exceedance (AFE) having peak ground acceleration (PGA) of 0.250 g horizontal and 0.175 g vertical. (Table 1-5 and Figure 1-5)	Accident	AECOM Study Number WCS-12-05-100-001[1-10]
Vent Blockage	For NUHOMS® Systems: Inlet and outlet vents blocked 40 hrs For MPC and UMS Systems: Inlet and outlet vents blocked 24 hrs For MAGNASTOR Systems: Inlet vents blocked 58 hrs	Accident	N/A
Fire/Explosion	For NUHOMS® Systems: Equivalent fire 300 gallons of diesel fuel For Vertical Systems: Equivalent fire 50 gallons of fuel	Accident	N/A

Table 1-2
Summary of WCS CISF Principal Design Criteria
(3 pages)

Design Parameter	Design Criteria	Condition	Applicable Codes, Standards and Basis
Cask Drop	For NUHOMS® Systems: Transfer Cask Horizontal side drop or slap down 80 inches VCCs for MPC Systems: Drop height 6 inches VCCs for UMS and MAGNASTOR Systems: Drop height 24 inches	Accident	N/A
Transfer Load	For NUHOMS® Systems only: Normal insertion load 60 kips Normal extraction load 60 kips	Normal	NA
Transfer Load	For NUHOMS® Systems only: Maximum insertion load 80 kips Maximum extraction load 80 kips	Off-Normal/ Accident	N/A
Ambient Temperatures (NUHOMS® Systems)	Normal temperature 44.1 – 81.5°F	Normal	Section 2.3.3.1
Off-Normal Temperature (NUHOMS® Systems)	Maximum temperature 113°F	Off-Normal	Section 2.3.3.1
Extreme Temperature (NUHOMS® Systems)	Maximum temperature 113°F	Accident	Section 2.3.3.1
Solar Load (Insolation)	Horizontal flat surface insolation 2949.4 BTU/day-ft^2 Curved surface solar insolation 1474.7 BTU/day-ft^2	Normal	10 CFR Part 71
Ambient Temperatures (NAC Systems)	Yearly Average Temperature 67.1°F	Normal	Section 2.3.3.1
Off-Normal Temperature (NAC Systems)	Minimum 3 Day Average temperature 27.9°F Maximum 3 Day Average temperature 89.4°F	Off-Normal	Section 2.3.3.1

Table 1-2
Summary of WCS CISF Principal Design Criteria
(3 pages)

Design Parameter	Design Criteria	Condition	Applicable Codes, Standards and Basis
Extreme Temperature (NAC Systems)	Maximum Temperature 113°F Minimum Temperature -1°F	Accident	Section 2.3.3.1
Snow and Ice	Snow Load 10 psf	Normal	Section 2.3.2.4
Dead Weight	Per design basis for systems listed in Table 1-1	Normal	N/A
Internal and External Pressure Loads	Per design basis for systems listed in Table 1-1	Normal	N/A
Design Basis Thermal Loads	Per design basis for systems listed in Table 1-1	Normal	N/A
Operating Loads	Per design basis for systems listed in Table 1-1	Normal	N/A
Live Loads	Per design basis for systems listed in Table 1-1	Normal	N/A
Radiological Protection	Public wholebody ≤ 5 Rem Public deep dose plus individual organ or tissue ≤ 50 Rem Public shallow dose to skin or extremities ≤ 50 Rem Public lens of eye ≤ 15 Rem	Accident	10 CFR 72.106
Radiological Protection	Public wholebody ≤ 25 mrem/yr (1) Public thyroid ≤ 75 mrem/yr(1) Public critical organ ≤ 25 mrem/yr(1)	Normal	10 CFR 72.104
Confinement	Per design basis for systems listed in Table 1-1	N/A	N/A
Nuclear Criticality	Per design basis for systems listed in Table 1-1	N/A	N/A
Decommissioning	Minimize potential contamination	Normal	10 CFR 72.130
Materials Handling and Retrieval Capability	Cask/canister handling system prevent breach of confinement boundary under all conditions Storage system allows ready retrieval of canister for shipment off-site	Normal	10 CFR 72.122(1)
Cask Handling Building	Prevent building collapse in accordance with 2006 International Building Code	Accident	10 CFR 72.122(b)(2)(ii)

Note:

1. In accordance with 10 CFR 72.104 (a)(3) limits include any other radiation from uranium fuel cycle operations within the region.

Table 1-3
WCS CISF Facilities and Functions

Facility	Function
Cask Handling Building	Receive, inspect and prepare for storage, shipments of canisterized spent nuclear fuel and GTCC waste. Prepare canisterized spent nuclear fuel and GTCC waste stored at the site for off-site transport. Provide for transportation cask light maintenance.
Storage Area	Provide location for safe storage of canisterized spent nuclear fuel and GTCC waste.
Security and Administration Building	Provide main operation center and armory for site security and emergency equipment; control personnel, rail and vehicle access to the WCS CISF facilities; and provide administrative functions related to transport, communication and tracking center/facility, training and visitor center.
Receiving Area	Location to perform DOT/NRC required inspections of arriving railcars.

Table 1-4
Table of Topical Reports (SARs) Incorporated by Reference
(3 pages)

Chapter	Description	Applicable SARs (Docket Number)
01	INTRODUCTION AND GENERAL DESCRIPTION OF INSTALLATION	Section 1.6 (1.6 Material Incorporated by Reference)
A.3	Appendix A.3 - Design Criteria for NUHOMS® MP187 System	72-11 71-9255
B.3	Appendix B.3 - Design Criteria for Advanced Standardized NUHOMS® System	72-1029 72-11 71-9255
C.3	Appendix C.3 - Design Criteria for Standardized NUHOMS® System 61BT	72-1004 71-9302
D.3	Appendix D.3 - Design Criteria for Standardized NUHOMS® System 61BTH	72-1004 71-9302
E.3	Appendix E.3 - Design Criteria for NAC-MPC	72-1025
F.3	Appendix F.3 - Design Criteria for NAC-UMS	72-1015
G.3	Appendix G.3 - Design Criteria for NAC-MAGNASTOR	72-1031
A.4	Appendix A.4 - Operating Systems for NUHOMS® MP187 System	72-11
B.4	Appendix B.4 - Operating Systems for Advanced Standardized NUHOMS® System	72-1029
C.4	Appendix C.4 - Operating Systems for Standardized NUHOMS® System 61BT	72-1004
D.4	Appendix D.4 - Operating Systems for Standardized NUHOMS® System 61BTH	72-1004
E.4	Appendix E.4 - Operating Systems for NAC-MPC	72-1025
F.4	Appendix F.4 - Operating Systems for NAC-UMS	72-1015
G.4	Appendix G.4 - Operating Systems for NAC-MAGNASTOR	72-1031
A.7	Appendix A.7 - Structural Evaluation for NUHOMS® MP187 System	72-11 71-9255
B.7	Appendix B.7 - Structural Evaluation for Advanced Standardized NUHOMS® System	72-1029 72-11 71-9255
C.7	Appendix C.7 - Structural Evaluation for Standardized NUHOMS® System 61BT	72-1004 71-9302
D.7	Appendix D.7 - Structural Evaluation for Standardized NUHOMS® System 61BTH	72-1004 71-9302
E.7	Appendix E.7 - Structural Evaluation for NAC-MPC	72-1025

Table 1-4
Table of Topical Reports (SARs) Incorporated by Reference
(3 pages)

Chapter	Description	Applicable SARs (Docket Number)
F.7	Appendix F.7 - Structural Evaluation for NAC-UMS	72-1015
G.7	Appendix G.7 - Structural Evaluation for NAC-MAGNASTOR	72-1031
A.8	Appendix A.8 - Thermal Evaluation for NUHOMS® MP187 System	72-11 71-9255
B.8	Appendix B.8 - Thermal Evaluation for Advanced Standardized NUHOMS® System	72-1029 72-11 71-9255
C.8	Appendix C.8 - Thermal Evaluation for Standardized NUHOMS® System 61BT	72-1004 71-9302
D.8	Appendix D.8 - Thermal Evaluation for Standardized NUHOMS® System 61BTH	72-1004 71-9302
E.8	Appendix E.8 - Thermal Evaluation for NAC-MPC	72-1025
F.8	Appendix F.8 - Thermal Evaluation for NAC-UMS	72-1015
G.8	Appendix G.8 - Thermal Evaluation for NAC-MAGNASTOR	72-1031
A.9	Appendix A.9 - Radiation Protection for NUHOMS® MP187 System	72-11 71-9255
B.9	Appendix B.9 - Radiation Protection for Advanced Standardized NUHOMS® System	72-1029 71-9255
C.9	Appendix C.9 - Radiation Protection for Standardized NUHOMS® System 61BT	72-1004 71-9302
D.9	Appendix D.9 - Radiation Protection for Standardized NUHOMS® System 61BTH	72-1004 71-9302
E.9	Appendix E.9 - Radiation Protection for NAC-MPC	72-1025
F.9	Appendix F.9 - Radiation Protection for NAC-UMS	72-1015
G.9	Appendix G.9 - Radiation Protection for NAC-MAGNASTOR	72-1031
A.10	Appendix A.10 - Criticality Evaluation for NUHOMS® MP187 System	72-11
B.10	Appendix B.10 - Criticality Evaluation for Advanced Standardized NUHOMS® System	72-1029
C.10	Appendix C.10 - Criticality Evaluation for Standardized NUHOMS® System 61BT	72-1004
D.10	Appendix D.10 - Criticality Evaluation for Standardized NUHOMS® System 61BTH	72-1004
E.10	Appendix E.10 - Criticality Evaluation for NAC-MPC	72-1025

Table 1-4
Table of Topical Reports (SARs) Incorporated by Reference
(3 pages)

Chapter	Description	Applicable SARs (Docket Number)
F.10	Appendix F.10 - Criticality Evaluation for NAC-UMS	72-1015
G.10	Appendix G.10 - Criticality Evaluation for NAC-MAGNASTOR	72-1031
A.11	Appendix A.11 - Confinement Evaluation for NUHOMS® MP187 System	72-11
B.11	Appendix B.11 - Confinement Evaluation for Advanced Standardized NUHOMS® System	72-1029
C.11	Appendix C.11 - Confinement Evaluation for Standardized NUHOMS® System 61BT	72-1004
D.11	Appendix D.11 - Confinement Evaluation for Standardized NUHOMS® System 61BTH	72-1004
E.11	Appendix E.11 - Confinement Evaluation for NAC-MPC	72-1025
F.11	Appendix F.11 - Confinement Evaluation for NAC-UMS	72-1015
G.11	Appendix G.11 - Confinement Evaluation for NAC-MAGNASTOR	72-1031
A.12	Appendix A.12 - Accident Analyses for NUHOMS® MP187 System	72-11 71-9255
B.12	Appendix B.12 - Accident Analyses for Advanced Standardized NUHOMS® System	72-1029 72-11 71-9255
C.12	Appendix C.12 - Accident Analyses for Standardized NUHOMS® System 61BT	72-1004 71-9302
D.12	Appendix D.12 - Accident Analyses for Standardized NUHOMS® System 61BTH	72-1004 71-9302
E.12	Appendix E.12 - Accident Analyses for NAC-MPC	72-1025
F.12	Appendix F.12 - Accident Analyses for NAC-UMS	72-1015
G.12	Appendix G.12 - Accident Analyses for NAC-MAGNASTOR	72-1031

Table 1-5
Ground Surface DRS

Period (sec)	Horizontal (g)	Vertical (g)
0.01	0.250	0.175
0.03	0.347	0.287
0.04	0.406	0.377
0.05	0.473	0.471
0.08	0.586	0.539
0.10	0.610	0.466
0.15	0.504	0.310
0.20	0.399	0.216
0.25	0.314	0.157
0.30	0.262	0.126
0.40	0.198	0.094
0.50	0.154	0.076
0.60	0.124	0.063
0.75	0.096	0.051
1.00	0.067	0.038
1.50	0.039	0.024
2.00	0.025	0.016
3.00	0.014	0.0088
4.00	0.0094	0.0063
5.00	0.0068	0.0047
7.52	0.0029	0.0020
10.00	0.0016	0.0011

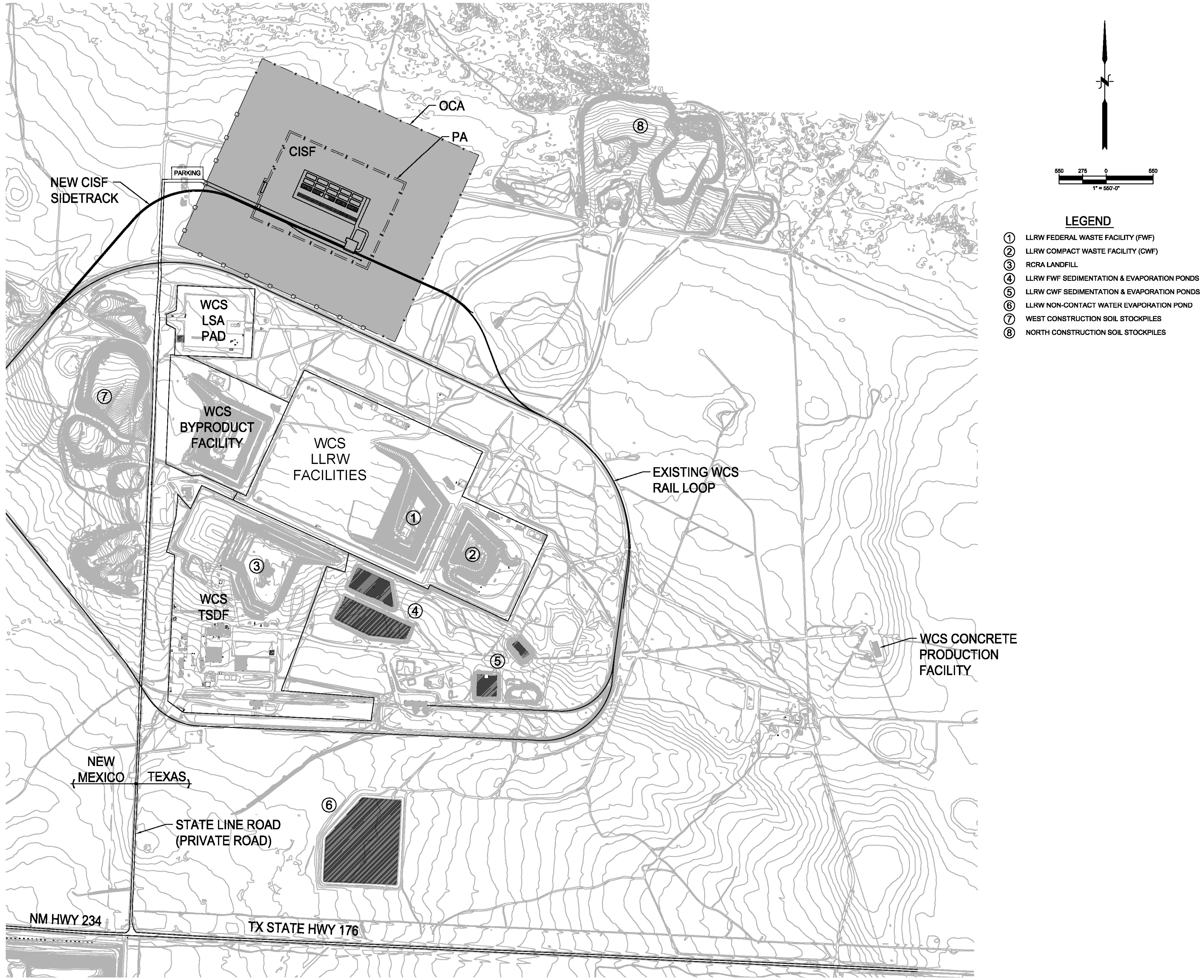

Figure 1-1
WCS CISF Location

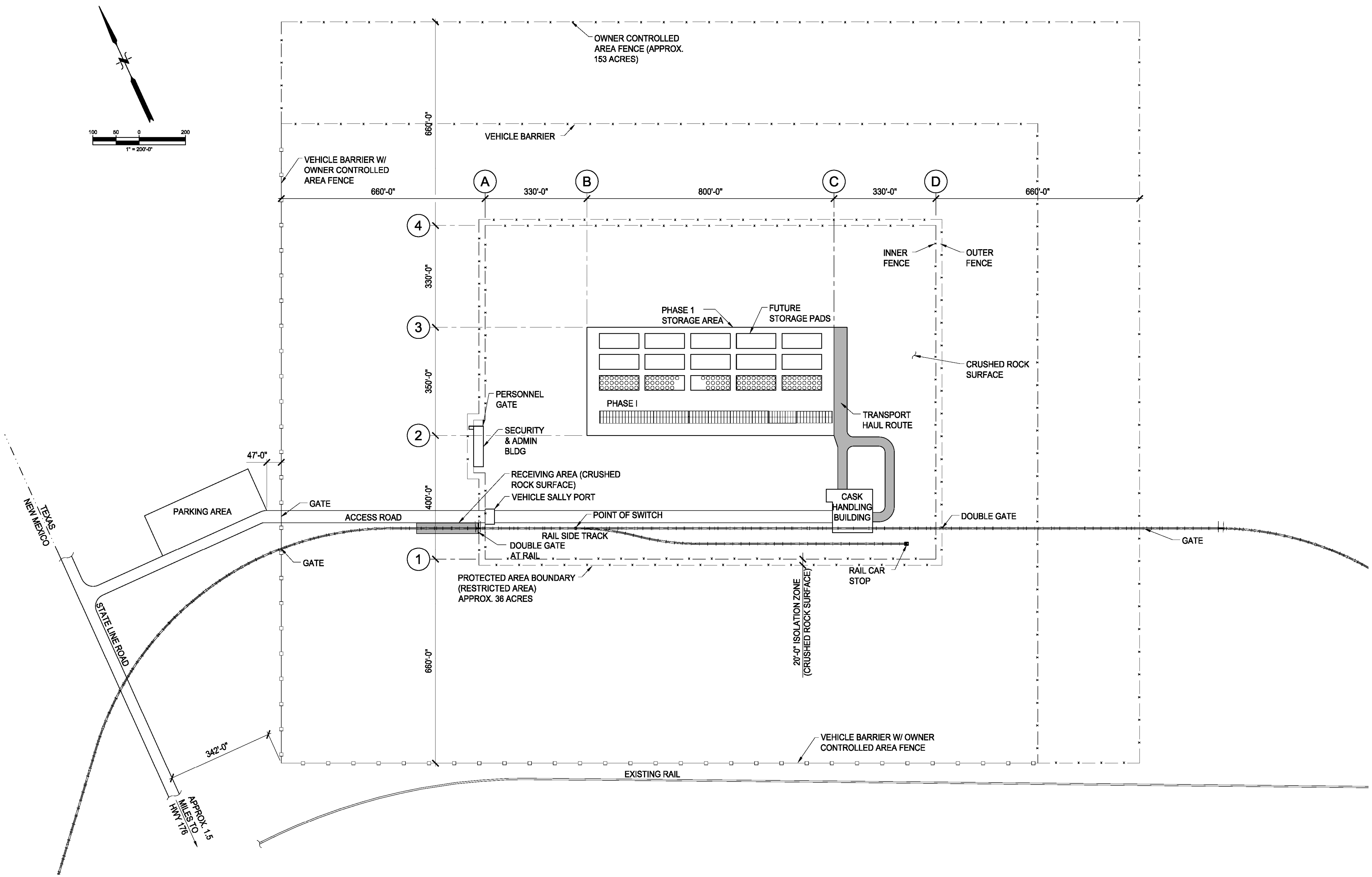

Figure 1-2
WCS CISF Site Boundary Layout

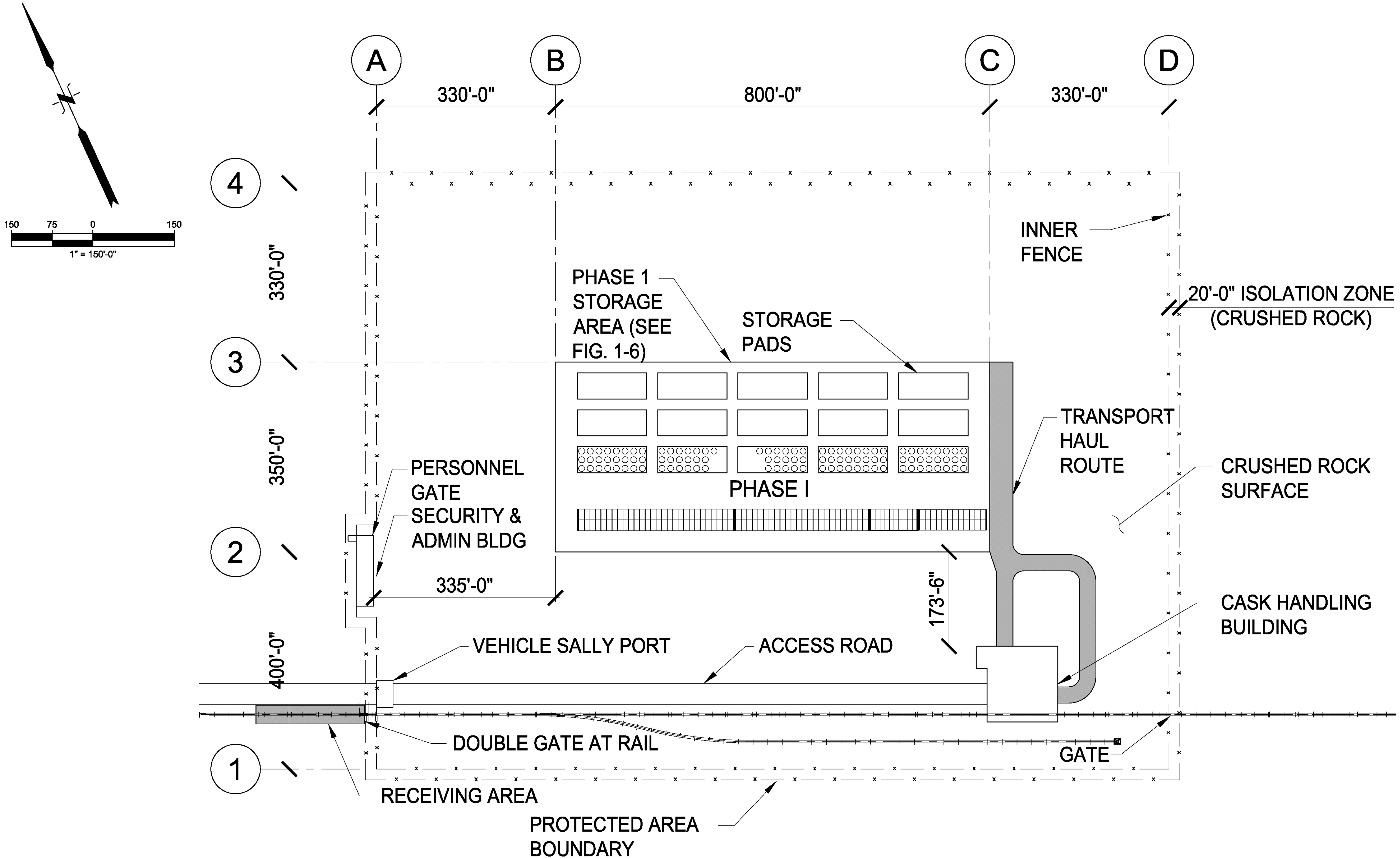

Figure 1-3
WCS CISF Site Overview

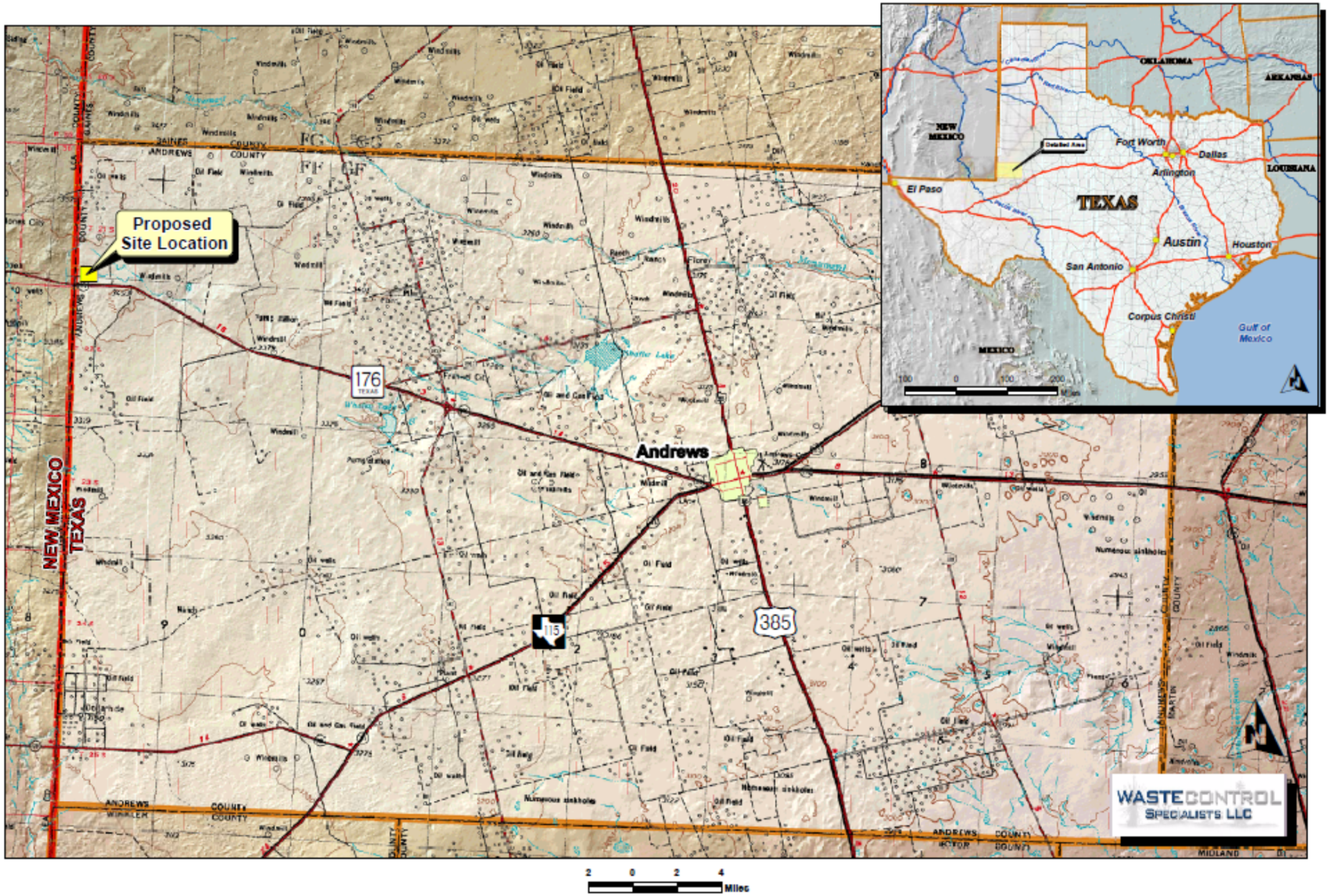

Figure 1-4
Site Location Map

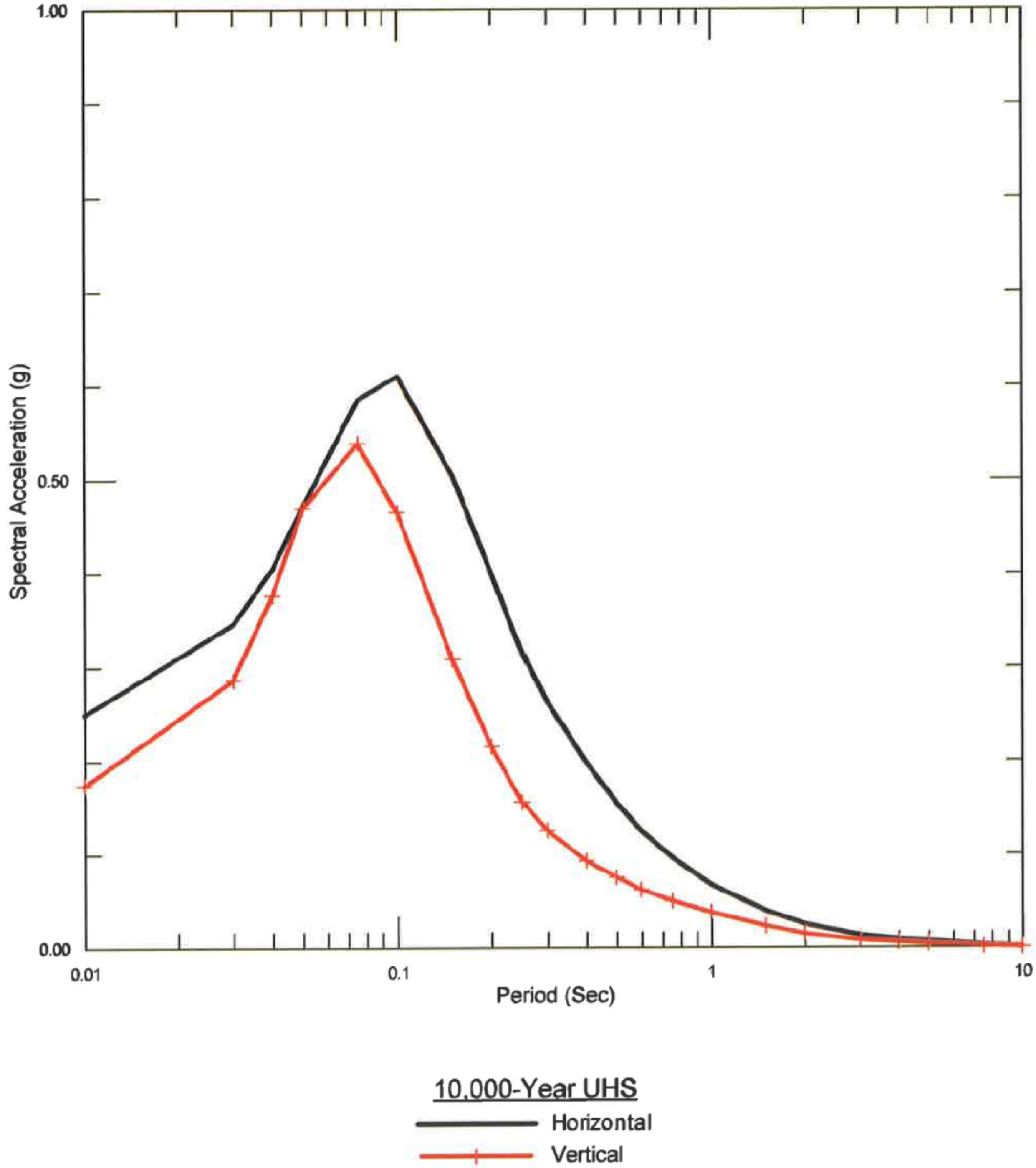

Figure 1-5
10,000-Year Return Period Response Spectra (5% Damped)

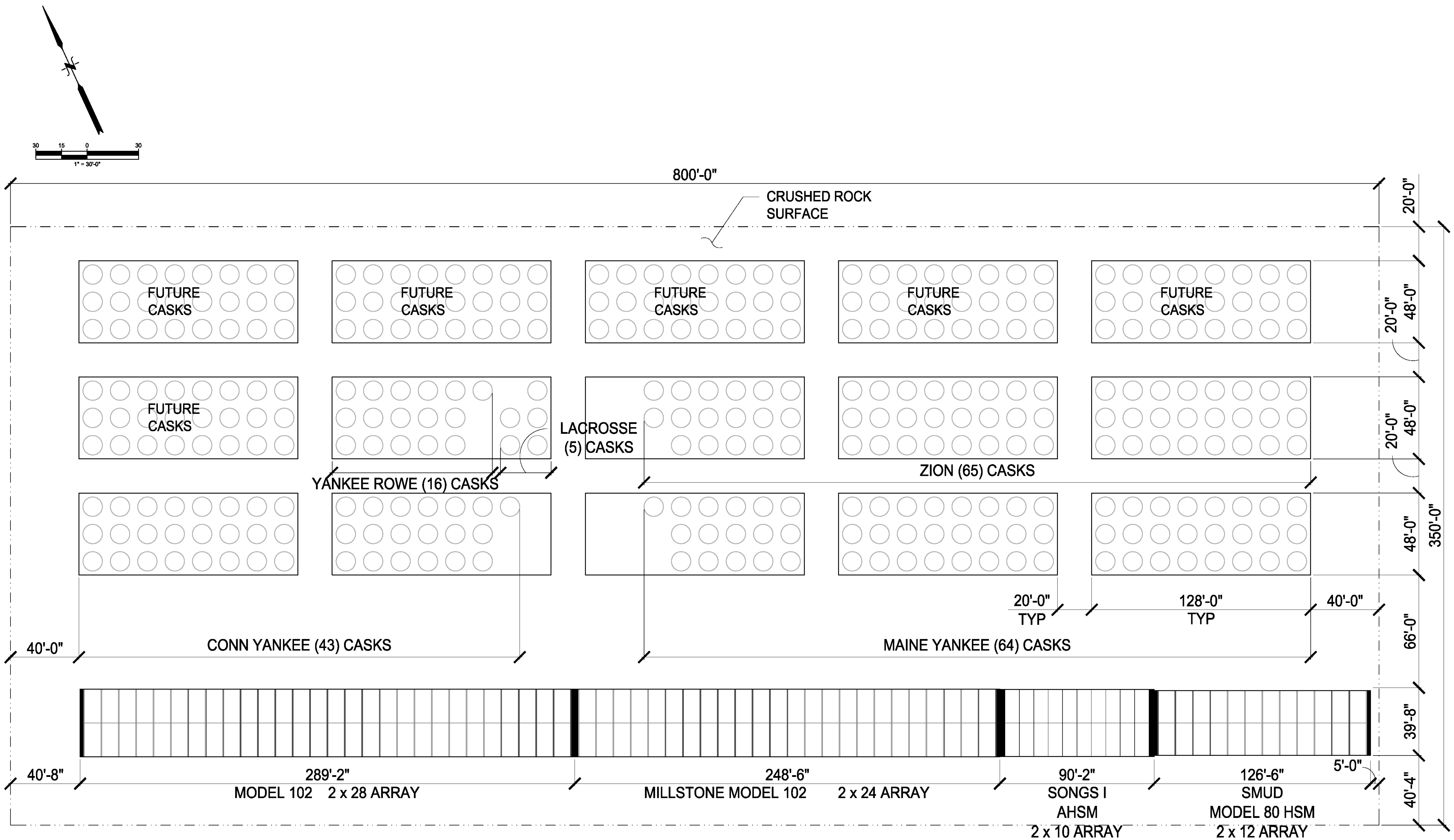

Figure 1-6
WCS CISF Storage Pad Layout

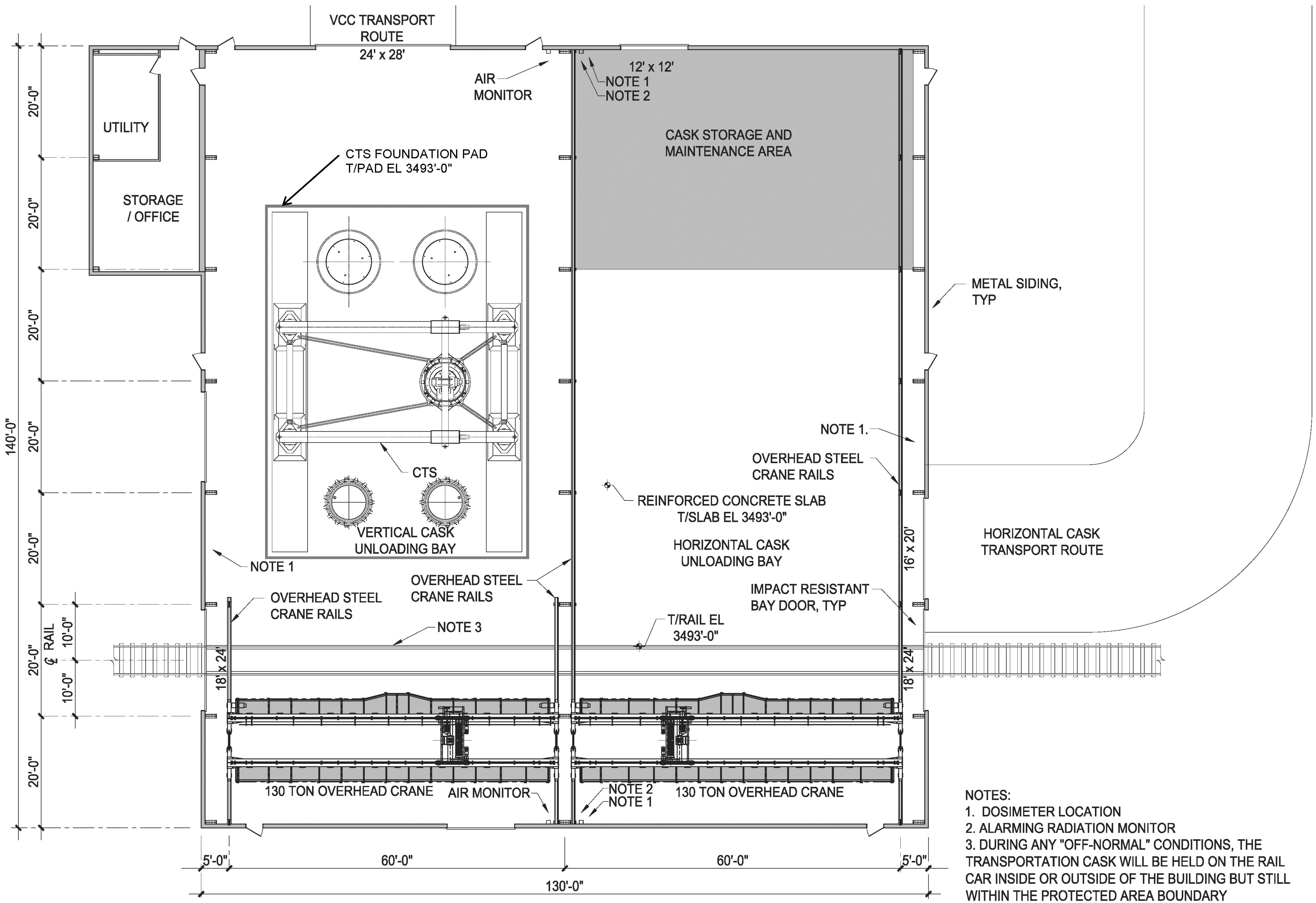

Figure 1-7
Cask Handling Building Plan

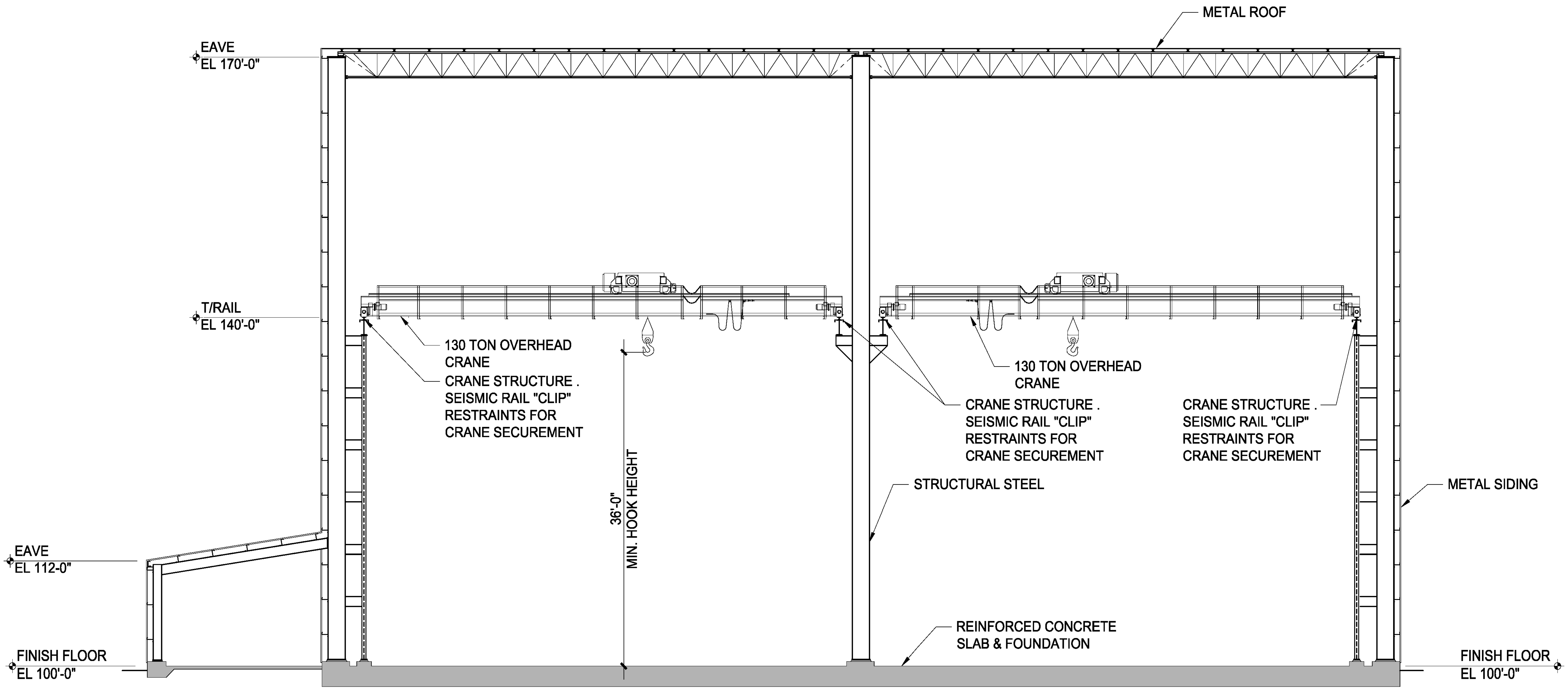

Figure 1-8
Cask Handling Building Section View

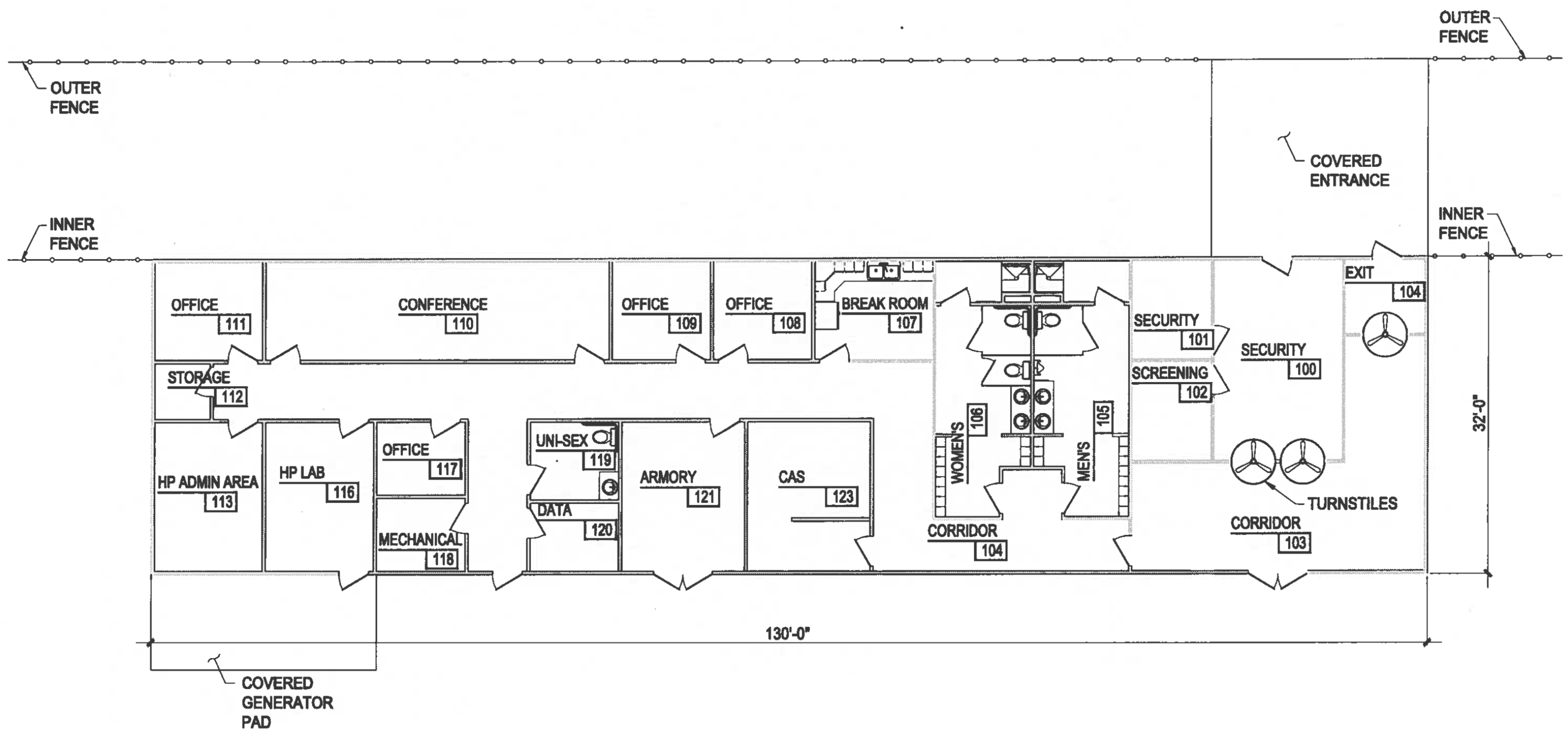

Figure 1-9
Security Administration Building Plan