2. FACILITY DESCRIPTION

CONTENTS

2. FACILITY DESCRIPTION 2-1

2.1 Introduction 2-1

2.2 Requirements 2-1

2.3 Facility Overview 2-1

2.4 Facility Structure 2-3

2.4.1 Storage Vault 2-3
2.4.2 Cyclone Vault 2-8
2.4.3 Vault Cooling Air Blower and Instrument Building 2-8

2.5 Process Description 2-8

2.5.1 Storage Bins 2-9
2.5.2 Transport and Filling Systems 2-9
2.5.3 Bin Temperature Instrumentation 2-11
2.5.4 Bin Vent Off-Gas Filter System 2-11
2.5.5 Relief System 2-15
2.5.6 Vault Cooling Air System 2-15
2.5.7 Vault Sump Jet 2-15
2.5.8 Alumina Calcine Properties 2-15
2.5.9 Solids Cooling 2-16

2.6 Confinement Systems 2-16

2.6.1 Protection by Multiple Confinement Barriers and Systems 2-16
2.6.2 Bins 2-16
2.6.3 Vault 2-16

2.7 Safety Support Systems 2-17

2.7.1 Radiation Monitoring 2-17

2.8 Utility Distribution Systems 2-17

2.8.1 Electrical Power 2-17
2.8.2 Compressed Air, Water and Steam Supply 2-17

2.9 Auxiliary Systems and Support Facilities 2-17

2.10 References 2-18

FIGURES

2-1. Relative locations of the NWCF and CSSFs 2-2

2-2. First CSSF cross sectional view 2-4

2-3. First CSSF vault upper section 2-5

2-4. First CSSF lower section plan views 2-6

2-5. Plan view of the First CSSF bins with representative thermocouple locations shown 2-7

2-6. Structure of the First CSSF bins 2-10

2-7. First CSSF solids distribution system 2-12

2-8. First CSSF off-gas trap 2-14

2. FACILITY DESCRIPTION

2.1 Introduction

This chapter provides descriptions of the First CSSF and its operation. This chapter focuses on all major facility features and process equipment necessary to understand the hazard and accident analyses. Chapter 2 is used to support the safety analysis in Chapter 3.

2.2 Requirements

The following parts of the Code of Federal Regulations (CFR), DOE Orders, and requirements are applicable to this chapter in support of DOE Order 5480.23 requirements. These requirements are implemented by the INEEL contractor through various INEEL and INTEC procedural and operational controls, as indicated throughout this chapter.

1. 10 CFR 72[1]
2. 10 CFR 830.120[2]
3. 10 CFR 835[3]
4. DOE Order 5400.5[4]
5. DOE Order 414.1A[5]
6. DOE Order 420.1[6]
7. DOE-ID Architectural Engineering Standards
8. American National Standard Institute (ANSI) 14.5[7]
9. ANSI B31.3[8]
10. American Concrete Institute (ACI) 349[9]
11. American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code[10]
12. American Welding Society (AWS) D1.1, D1.2, and D1.4[11]

2.3 Facility Overview

The First CSSF is located within the INTEC boundaries, just south of the New Waste Calcining Facility (NWCF). A plot plan of the INTEC is shown in Figure 1-1. Figure 2-1 shows the approximate location of each of the INTEC CSSFs with respect to the NWCF.

The First CSSF is located in the immediate proximity of the Second and Third CSSFs. The earthen berms of these two facilities extend all the way to the smaller berm of the First CSSF.

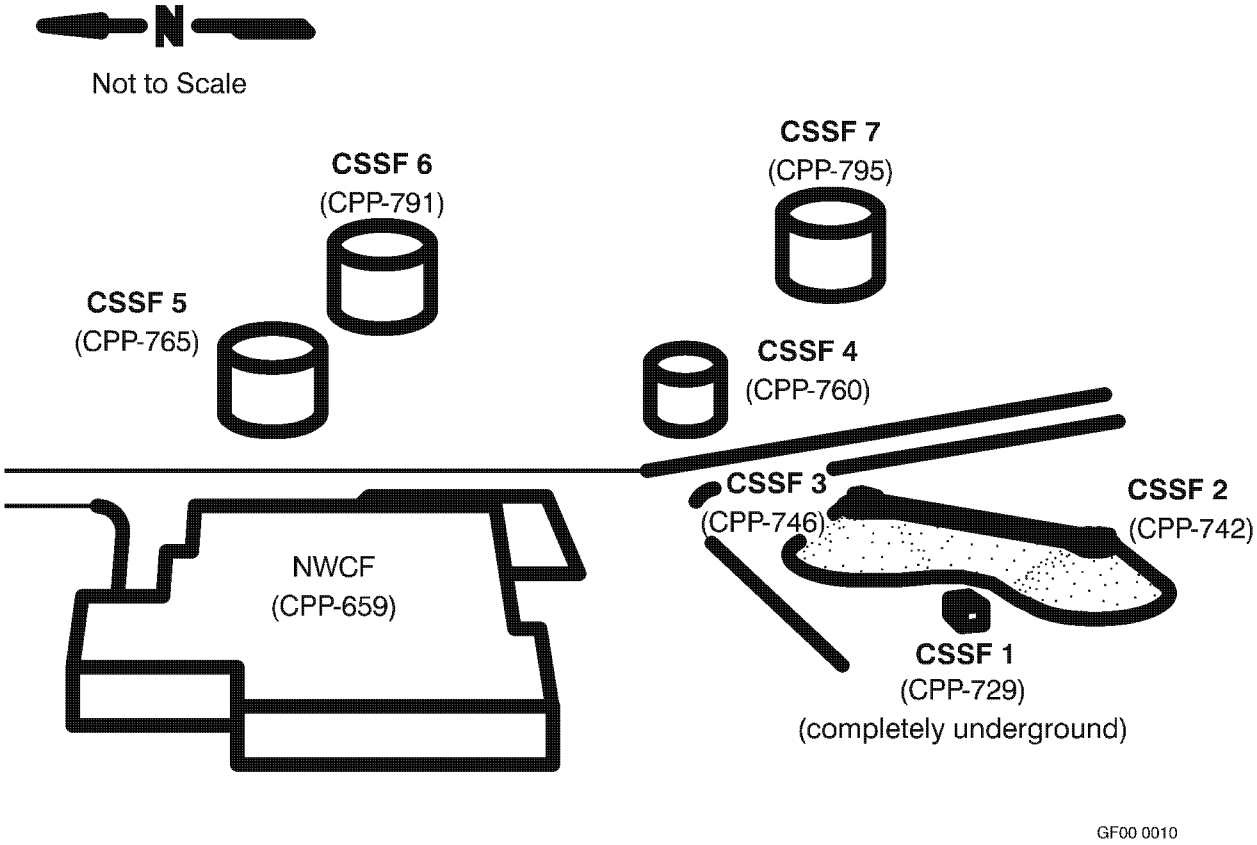

Figure 2-1. Relative locations of the NWCF and CSSFs.

The First CSSF is an interim storage facility for the resultant granular solids (calcine) produced in the Waste Calcining Facility (WCF). The WCF calcined the radioactive, aqueous waste generated from the past reprocessing of aluminum-type spent nuclear fuels at the INTEC. The First CSSF was built between 1959 and 1962 and was placed in service in 1963. Filling of the First CSSF bins was completed in 1964. Currently, the basic function of the First CSSF is the continued storage and confinement of the radioactive calcine. Future activities, including retrieval of the calcined solids, packaging of the calcine for transfer to a national repository, and facility decontamination and decomissioning (D&D) are not evaluated in this facility-specific safety analysis and will require additional analyses and safety document approvals.

The First CSSF houses a set of four stainless steel vertical storage bins contained within an underground reinforced concrete vault. Each bin consists of a central cylindrical section and two progressively larger concentric cylindrical sections. Annular air spaces are located between each section for cooling airflow and heat transfer purposes. The cyclone is located immediately above the bin storage vault in the cyclone vault and contains the balance-of-equipment, including the ventilation systems and filters. The vault cooling air blower and instrument building is located above the solids storage vault. In addition to the blowers, the building contains the instrumentation for the facility. See Figure 2-2 for a cross-sectional view of the First CSSF.

The bins contain approximately 220 m^3 (7800 ft^3) of calcined high-level waste produced by the WCF.[12,13] The transport air and return air lines from the WCF to the First CSSF are disconnected from the WCF and capped. Many of the First CSSF systems are no longer required for storage operations and are inactive.

2.4 Facility Structure

The First CSSF structure is comprised of the storage vault (CPP-729), the cyclone vault, the vault cooling air blower and instrument building (CPP-639), and the solids cooling air stack (CPP-732). The main structural features of the First CSSF are shown in Figures 2-2, 2-3, 2-4, and 2-5.

2.4.1 Storage Vault

The storage vault is located below the cyclone vault (see Figure 2-2). The storage vault is a reinforced concrete structure, which houses four calcine storage bins and a vault sump.

The reinforced concrete lower level of the storage vault, is founded on bedrock approximately 16.6 m (54 ft 4 in.) beneath the ground surface. The main chamber of the vault has inside horizontal dimensions of 7.8 m (25 ft 6 in.) by 7.8 m (25 ft 6 in.) and a height of 12.6 m (41 ft 4 in.). The walls are 0.76 m (2 ft 6 in.) thick, the floor slab is 0.61 (2 ft) thick, and the ceiling (partition between upper and lower vault sections) is 0.53 m (1 ft 9 in.) thick. The top of the storage vault ceiling slab is approximately at ground level. Access to the storage vault is through the cyclone vault. This requires the removal of the two-part hatch cover to the cyclone vault. The two parts are a 15.2 cm (6 in.) thick, 694 kg (1530 lb) concrete upper hatch cover (UC-2) and a 38.1 cm (15 in.) thick, 1098 kg (2420 1b) lower concrete hatch (LC-2). Following access to the cyclone vault, a 53.3 cm (21 in.) thick, 567 kg (1250 lb) concrete hatch cover (C-3) located in the floor of the cyclone vault must be removed to gain access to the storage vault. Hatch cover C-3 is square and has a stepped design with a 7.6 cm (3 in.) lip and is located approximately 6.1 m (20 ft) above the storage bins.

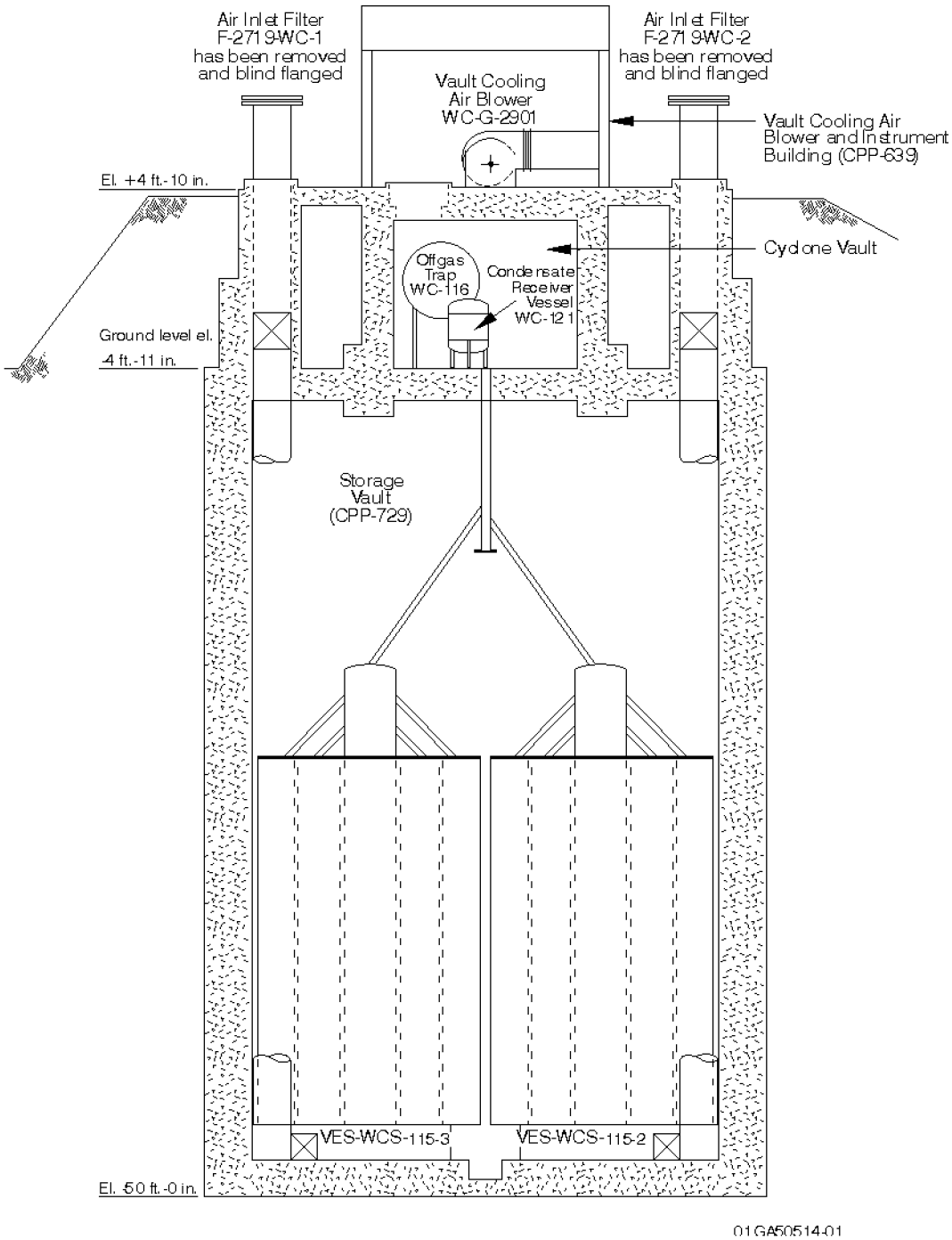

Figure 2-2. First CSSF cross sectional view.

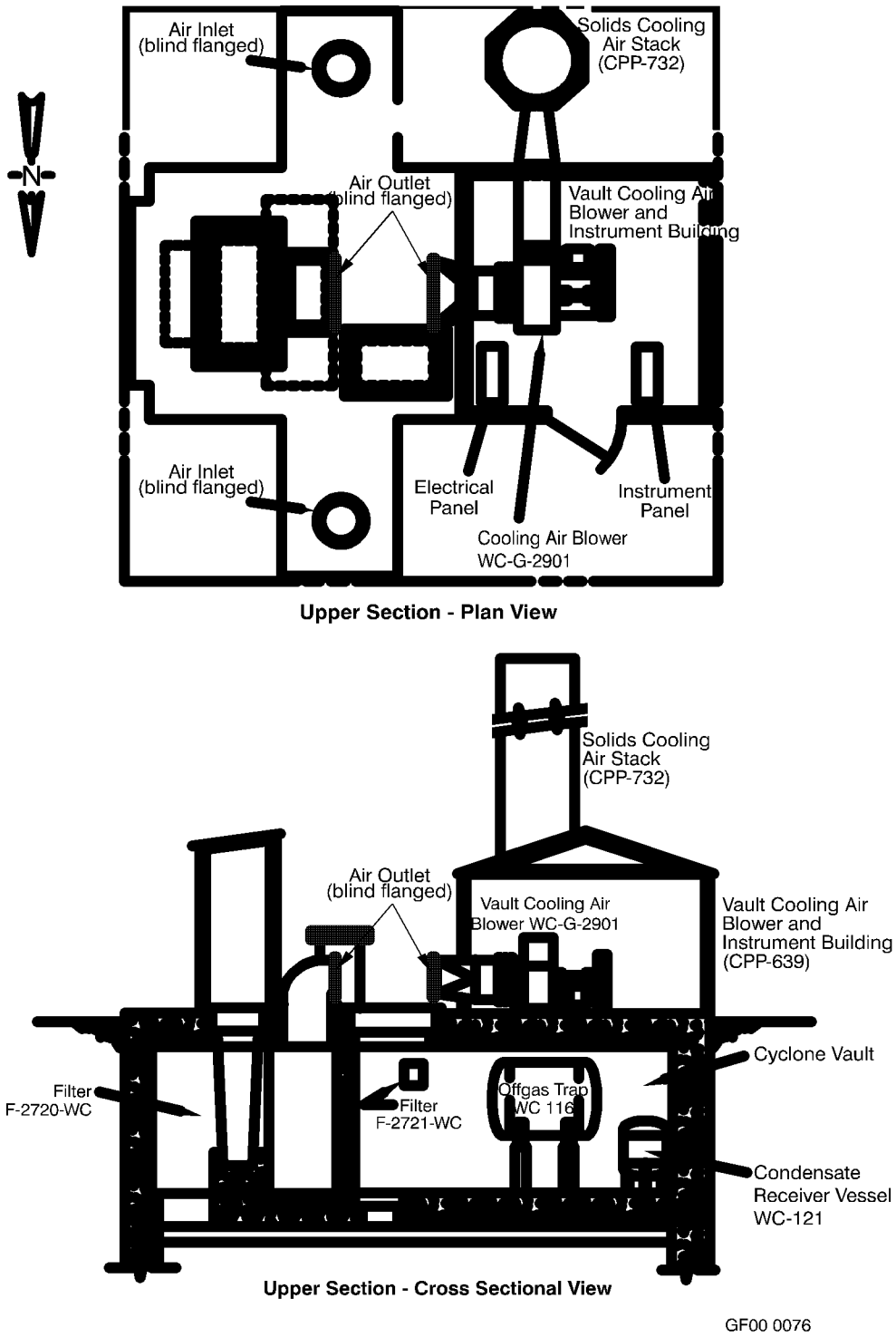

Figure 2-3. First CSSF vault upper section.

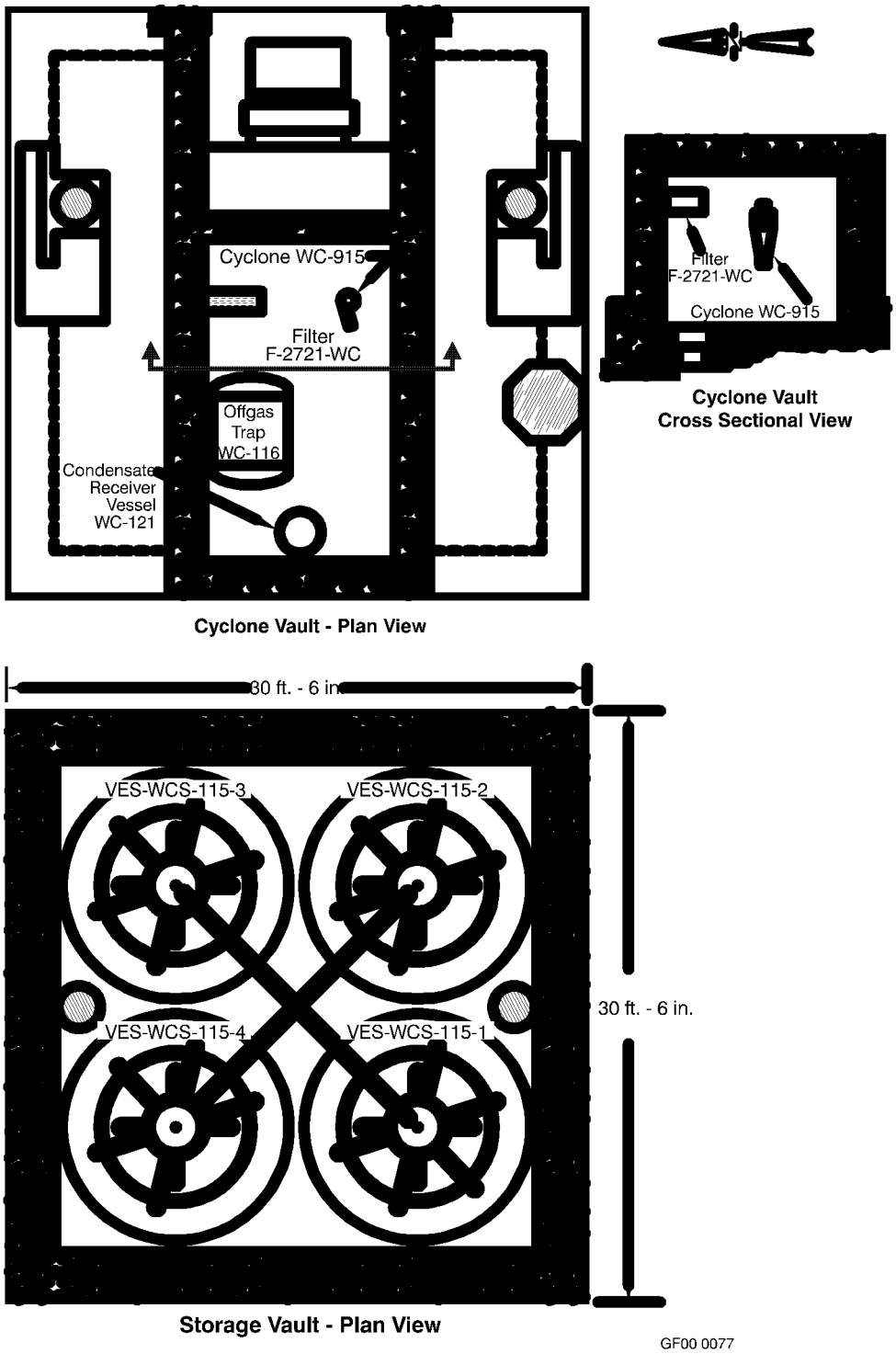

Figure 2-4. First CSSF lower section plan views.

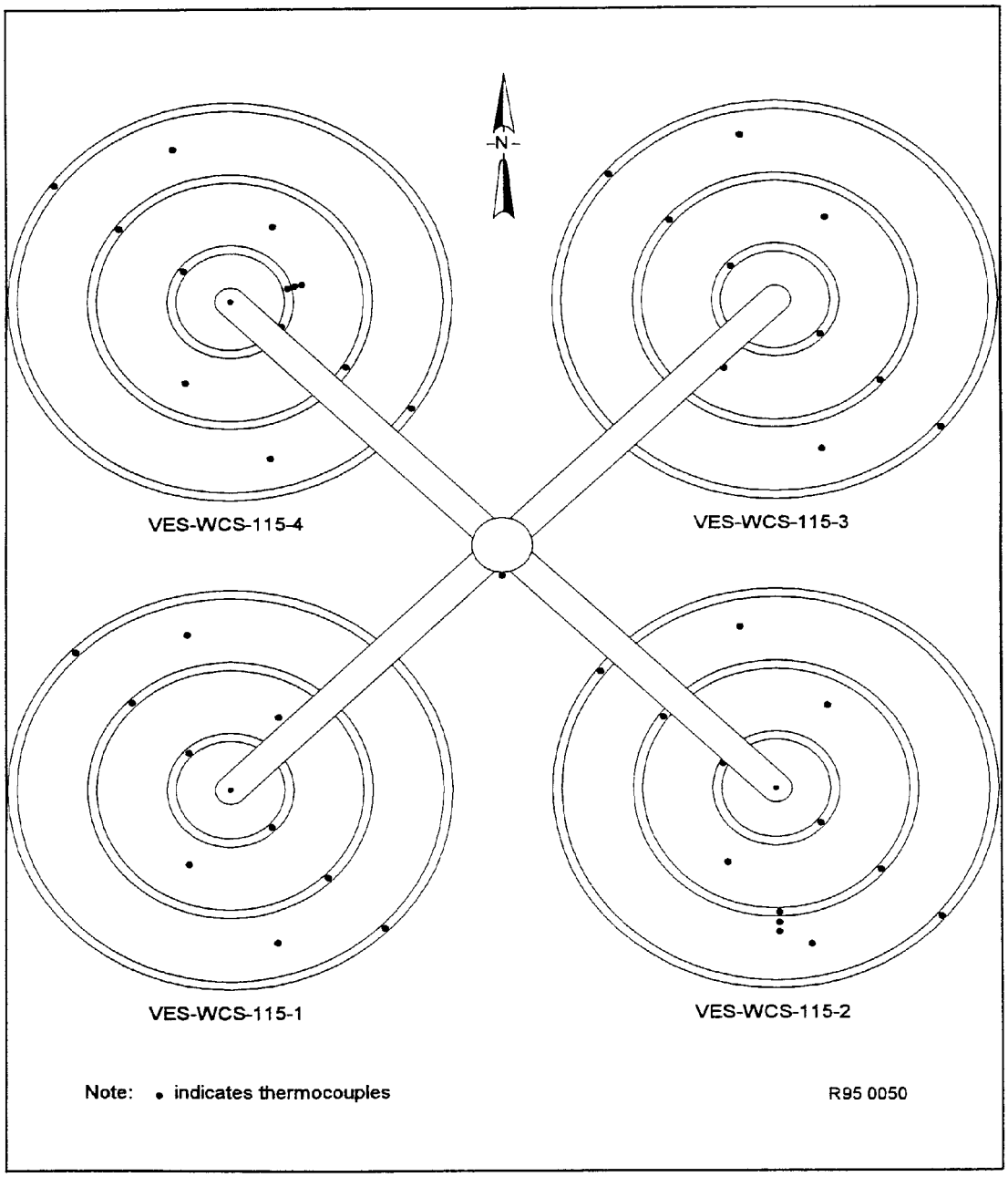

Figure 2-5. Plan view of the First CSSF bins with representative thermocouple locations shown.

The UC-2 and LC-2 hatch covers are rectangular. Each concrete hatch cover contains #4 steel rebar that has a 1.3 cm (0.50 in.) nominal diameter and a 40,000 psi minimum yield strength.

The lifting eyelets for UC-2 and C-3 are fabricated from #4 rebar. The lifting eyelets for LC-2 are fabricated from #5 rebar that has a 1.6 cm (0.63 in.) nominal diameter and a 40,000 psi nominal yield strength. Steel angle reinforcement is anchored to the reinforced concrete interior of the hatch cover.

Shielding is provided by the 0.53 m (1 ft 9 in.) to 0.61 m (2 ft) thick concrete walls, the ceilings of the storage and cyclone vaults, the stainless steel bins, the fact that the storage vault is below grade, and the earth berm around the cyclone vault.

The original seismic loading assumptions for facilities built during the late 1950s and early 1960s were based on seismic design requirements contained in the Uniform Building Code (UBC) for Seismic Hazard Zone 2.

The First CSSF was placed in service in 1963. The vault concrete walls were built in accordance with the construction standards then in force. The subsequent construction of the Second and Third CSSFs and of their associated berms increased the static stress on the First CSSF vault walls, thus resulting in a static overload on the vault walls.[14] The vault walls were visually inspected internally. During the inspection, no cracks, spallings, or other adverse effects associated with static stress overload were observed.[15,16] These observations indicate either that the wall integrity has been maintained in spite of the overload or that the changes in integrity, if they have occurred, are still too small to be visible. The need for a periodic inspection schedule has not been demonstrated based on the vault inspection. The static overload on the vault walls is further addressed in Chapter 3.

2.4.2 Cyclone Vault

The cyclone vault houses the solids separation cyclone, the distribution piping to the bins, and the off-gas cleanup equipment. This vault is 5.1 m (16 ft 9 in.) long by 3.1 m (10 ft) wide by 2.4 m (8 ft) high (inside dimensions). The concrete walls are 0.53 m (1 ft 9 in.) thick; the bottom (partition between upper and lower sections) is 0.53 m (1 ft 9 in.) thick, and the ceiling is 0.53 m (1 ft 9 in.) thick.

2.4.3 Vault Cooling Air Blower and Instrument Building

The vault cooling air blower and instrument building houses the vault cooling air blower (WC-G-2901) and an instrument panel. This building is located directly above the cyclone vault.

The main solids cooling blower and instrument building is 3.9 m (12 ft 10 in.) wide by 4.0 m (13 ft 2 in.) long by 2.7 m (9 ft) high. The wall and roof framing are structural steel. The wall and roof coverings consist of corrugated asbestos cement sheathing. The floor slab of this room is constructed of 0.53 m (1 ft 9 in.) thick reinforced concrete (ceiling for the cyclone vault).

2.5 Process Description

The function of the First CSSF is the safe storage of calcine solids from the WCF. The principal processes underlying this function are (1) the storage of calcine solids and (2) the cooling of stored calcine. A description of the properties of the stored calcine are discussed in Section 2.5.8 followed by a discussion on solids cooling (Section 2.5.9).

2.5.1 Storage Bins

The bins provide the primary containment for the radioactive calcine during the design lifetime (approximately 500 years) of the facility. Each bin is cylindrical with an annulus designed to permit upward airflow cooling of the bin centerline. The four annular bins received the calcined solids produced by the WCF.

Each storage bin is functionally equivalent. The bins are connected in parallel to the First CSSF calcined solids distributor system. Each bin is designed in accordance with the ASME code for Unfired Pressure Vessels. The First CSSF storage bins are designated VES-WC-115-1 through VES-WC-115-4 (Figure 2-4 and Figure 2-5). Each storage bin (Figure 2-6) is made up of type 405 stainless steel 0.33 to 0.64 cm (0.13 to 0.25 in.) thick central cylinder and two progressively larger concentric 405 stainless steel bins with annular spaces between each section. A carbon steel shell encloses the outermost bin leaving a 3.8 cm (1.5 in.) wide annular air space between the bin and the shell. The annular spaces are designed to allow upward flow of cooling air. The useable capacity of the four bins is approximately 227 m^3 (8,000 ft^3) and the bins contain approximately 220 m^3 (7800 ft^3) of calcined high-level waste. The design pressure range for each bin unit is from - 3.75 psig to +3.75 psig at a design temperature of 343°C (649°F).

The bins are equipped with thermocouples for temperature monitoring of the stored calcine. The thermocouples are discussed in Section 2.5.3.

The storage bins were designed to maintain all stored calcine material, two-year-cooled and older, below the calcine temperature limit of 400ºC (752°F). It was determined that at temperatures above 400ºC (752°F), unconverted aluminum nitrate and mercuric oxide in the stored product could decompose with the elution of oxides of nitrogen, oxygen, and mercury. These gases might entrain active dust while passing through the stored solids. At still higher temperatures, radioactive fission products may volatize. Excessive solids temperatures were avoided by limiting the distance between cooling surfaces of the bins to 0.61 m (2 ft) with the exception of the central cylinder which has a diameter of 0.92 m (3 ft). Heat was initially removed from the cooling surfaces by air flowing from the air inlets, up through the annuli between the concentric cylindrical bins, and out the exhaust stack. The vault cooling air inlet and outlet ducts have been blind flanged to permanently isolate the storage vault from the outside atmosphere. The temperature of the stored calcine within the First CSSF bins ranges from 65º to 105ºC (149º to 221ºF) as of October 2000. Heat generated within the calcine stored in the First CSSF bins is transferred to the environment via a combination of radiant, convection, and conduction heat transfer through the walls of the bins and concrete walls of the storage vault and into the surrounding soil.

2.5.2 Transport and Filling Systems

The transport system was originally designed to pneumatically transfer the calcined solids from the WCF to the First CSSF. The bins are filled to operating capacity and the transport air lines are no longer used. The WCF has completed Resource Conservation and Recovery Act closure and the transport air and return air lines have been cut and capped outside the First CSSF. The remaining portion of the calcine transport system within the First CSSF building consists of part of the calcine transport air line (feed), part of the transport air return line, the First CSSF solids storage cyclone, and the First CSSF distribution pipe and subsequent distribution piping. The First CSSF is not equipped with a calcine retrieval system.

2.5.2.1 Cyclone. The solids storage cyclone was designed to separate the calcined solids from the transport air. The solids then dropped through distributor lines to the four storage bins.

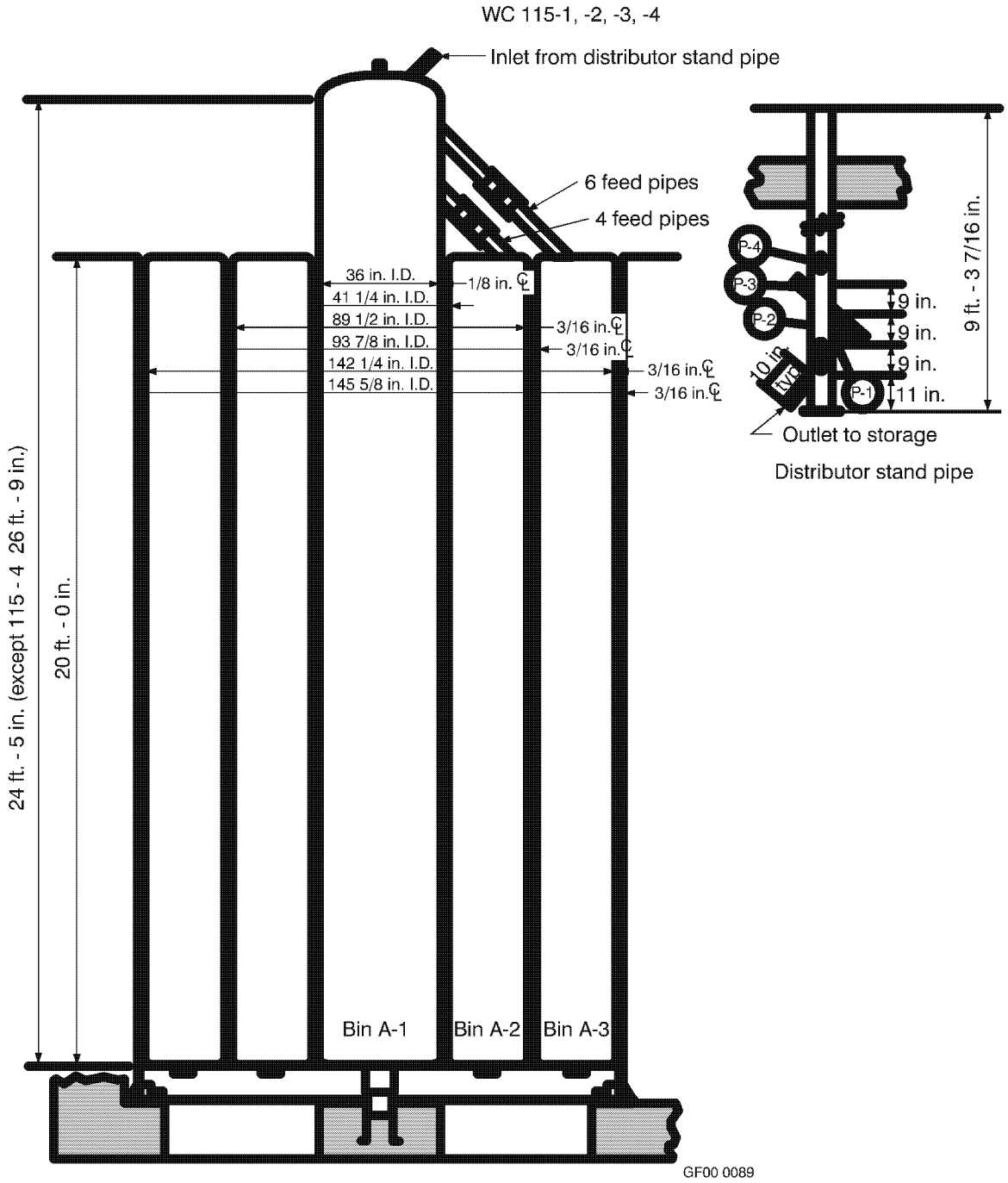

Figure 2-6. Structure of the First CSSF bins.

The cyclone (CYC-WCS-915) is no longer in use, but it and the distributor lines are still present in the First CSSF. The cyclone is constructed of 0.48 cm (0.19 in.) type 304L stainless steel and all connections are 7.6 cm (3 in.) schedule 40 pipe. The design pressure range for the cyclone is from -14.4 psig (full vacuum) to +30 psig at a design temperature of 345°C (653°F).

2.5.2.2 Solids Distributor. During operations at the WCF, calcined solids were pneumatically conveyed from the WCF into a central distributor stand pipe at the First CSSF. This stand pipe is 15 cm (6 in.) in diameter and approximately 3.1 m (10 ft) high. Four lines, at different elevations, transferred the solids from the distributor stand pipe to the storage bins. The fill lines are inclined at an angle of 45 degrees, whereas the static angle of repose of the solids is about 33 degrees. Therefore, the calcine solids would flow through the fill line. The solids filled the central cylinder of a bin until the level of the first set of distributor pipes was reached. When the central cylinder was filled to this level, the solids flowed to the first annular ring of the storage bin; similarly, when the first ring was filled, the level rose in the standpipe until the second ring started to fill. The process continued until all four storage bins were filled. The entire filling operation was automatic and required no moving equipment or maintenance. In addition, a direct path into bin VES-WCS-115-4 is provided by the sample disposal chute. A graphic representation of the material flow during the filling process of the First CSSF is shown in Figure 2-7. Each bin has a stainless steel vent pipe connected directly to the top of the bin. The bin vent pipes join a common header connected to the bin vent off-gas system.

2.5.3 Bin Temperature Instrumentation

The bins are equipped with thermocouples located at various points in thermowells on the four bins. Five 40-point rotary switches are located in the vault cooling air and blower and instrument building (CPP-639) and are used to take calcine temperature readings. The rotary switches are connected to 186 of the 202 thermocouples located on the four bins. The representative locations of the thermocouples on the bins are shown in Figure 2-5.

The temperature of the calcine contained in the First CSSF bins is monitored yearly via instrument (TI-WCS-115-1) in accordance with approved procedures. This yearly recording of temperature readings is used to monitor heat generation from fission product decay. No safety credit is taken for temperature monitoring or the thermocouples, because the temperatures of the calcine in the bins have stabilized and are well below the calcine agglomeration temperature and the bin wall and vault wall design temperatures. Solids cooling is discussed in Section 2.5.9.

2.5.4 Bin Vent Off-Gas Filter System

The bin vent off-gas filter system provides for venting of the bins. The major components of the bin vent off-gas filter system include the off-gas piping, the off-gas trap (VES-WCS-116) and its associated condensate receiver (VES-WCS-121), the off-gas filter, and associated valves downstream from the trap. The majority of the bin vent piping is located in the cyclone and storage vaults. Each bin has a stainless steel vent pipe connected directly to the top of the bin. The bin vent pipes join a common header connected to the off-gas filter and pressure relief system.

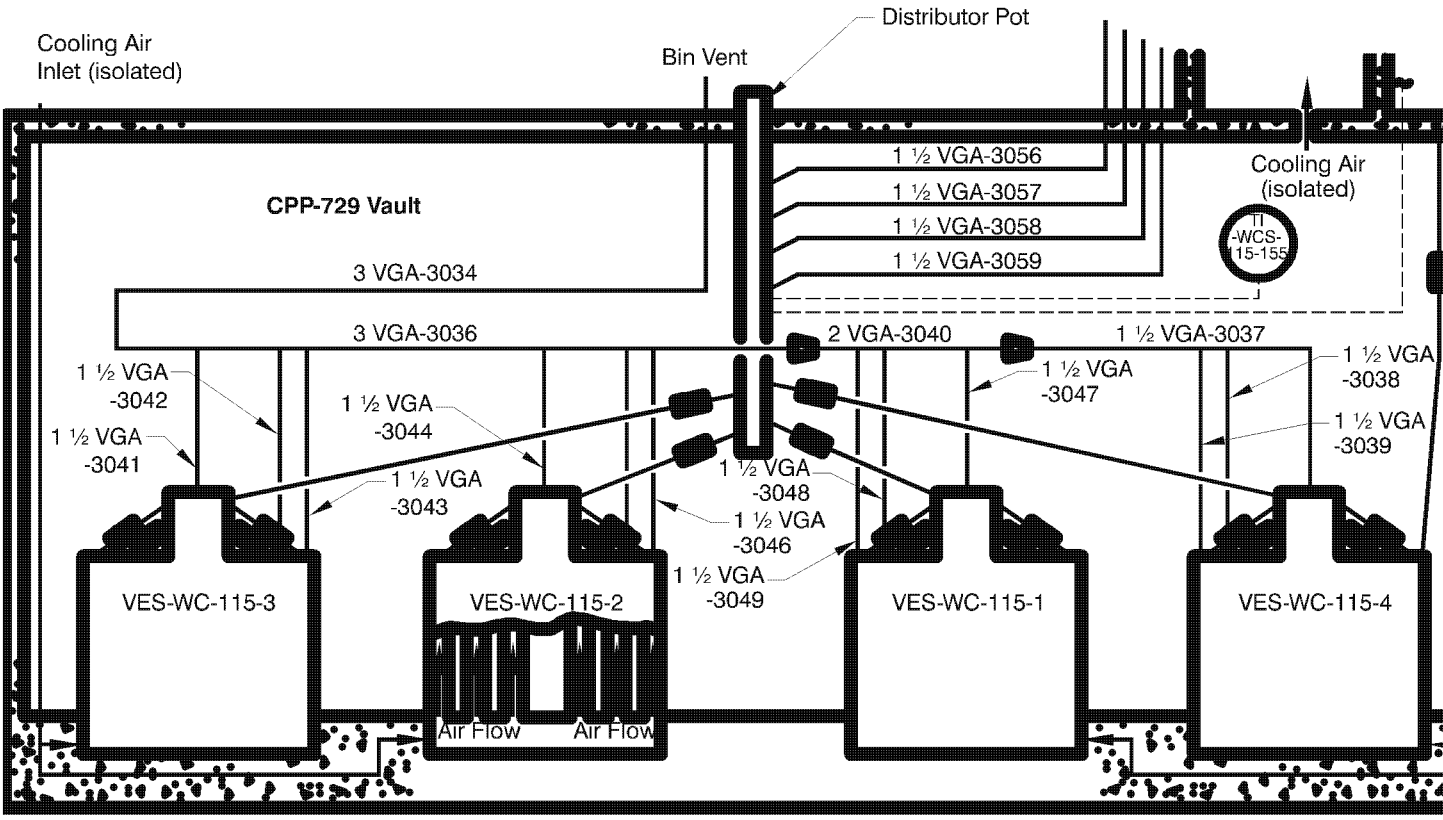

Figure 2-7. First CSSF solids distribution system.

The piping was fabricated, assembled, and inspected according to applicable codes and standards in effect at the time of construction of the First CSSF. The piping attached to the bins and located within the vault is designed to withstand the heat stress caused by the thermal displacement of the bins.

Expansion joints were installed in the clean out stubs and individual bin vent lines to protect the bins and piping from the effects of thermal expansion. Special sleeved expansion joints were installed in the solids gravity flow lines from the distributor pipe and central stand pipes.

The off-gas piping from the Second and Third CSSFs are tied to the off-gas system of the First CSSF and vent to the INTEC Main Stack via the Atmospheric Protection System (APS).

2.5.4.1 Off-Gas Trap. The off-gas trap and its associated condensate receiver vessel are currently not operating. The off-gas trap was never used because volatiles were never found to be a problem. The bin off-gas passes at a very low velocity into the off-gas trap (VES-WCS-116), on through the APS, and to the INTEC Main Stack. The solids storage off-gas trap is a cylindrical, horizontal vessel with dished heads as shown in Figure 2-8. It contains a stainless steel wire mesh demister originally designed for removing large particulate solids carried in the storage bin off-gas. A water cooling coil (inactive), consisting of five 1.3 cm (0.5 in.) schedule 80 pipe headers, is imbedded in the stainless steel mesh and was intended to remove heat generated by fission products trapped in the mesh. The stainless steel mesh demister consists of four 15.2 cm (6 in.) layers of mesh fitted between the cooling coils. This unit was designed with a flowmeter (inactive) to meter the water rate to the internal cooling coils. The piping is arranged so that any condensate formed in the off-gas trap, would drain to the solids storage condensate receiver (VES-WCS-121).

The condensate receiver is a vertical, cylindrical vessel with semi-elliptical heads constructed of type 304L stainless steel. The capacity is 471 L (60 gallons) at 93°C (200°F) with a pressure range of ±3.75 psig. This vessel was designed with a liquid level alarm for detecting condensate formation. The condensate receiver was designed to drain through a 1.9 cm (0.75 in.) line inside the 7.6 cm (3 in.) solids storage off-gas vent line. In the current configuration, the drain line is capped and does not lead anywhere since drainage is not required.

2.5.4.2 Off-Gas Filter. The First CSSF off-gas system was designed with an off-gas filter (F-WCS-2721) immediately following the off-gas trap. This filter is a 30.5 by 30.5 by 30.5 cm (12 by 12 by 12 in.), high-temperature, fire resistant, high-efficiency particulate air (HEPA)-type final filter with stainless steel separators, mounted in a stainless steel frame with a one-piece gasket. No safety credit is taken for the filtration ability of the off-gas filter in the safety analysis.

2.5.4.3 Bin Vent Valves. The First CSSF bin vent off-gas filter system vents to the INTEC Main Stack via the APS. The off-gas from the bins flows through piping, valve VGV-WCS-915, VES-WCS-116, valve PSV-WCS-2721-1, the off-gas filter (F-WCS-2721), valve PSV-WCS-2721-2, and a check valve within the First CSSF cyclone vault, then out to the APS. The off-gas vent valves (VGV-WCS-915, PSV-WCS-2721-1, and PSV-WCS-2721-2) are maintained in the open position. The valves were fabricated, assembled, and inspected according to applicable codes and standards in effect at the time of construction of the First CSSF. In this configuration, the flow of off-gases evolving from the calcine stored within the First CSSF bins into the off-gas system is unlikely to involve significant volumes or rates. The importance of the off-gas system is to provide an open vent path to the APS.

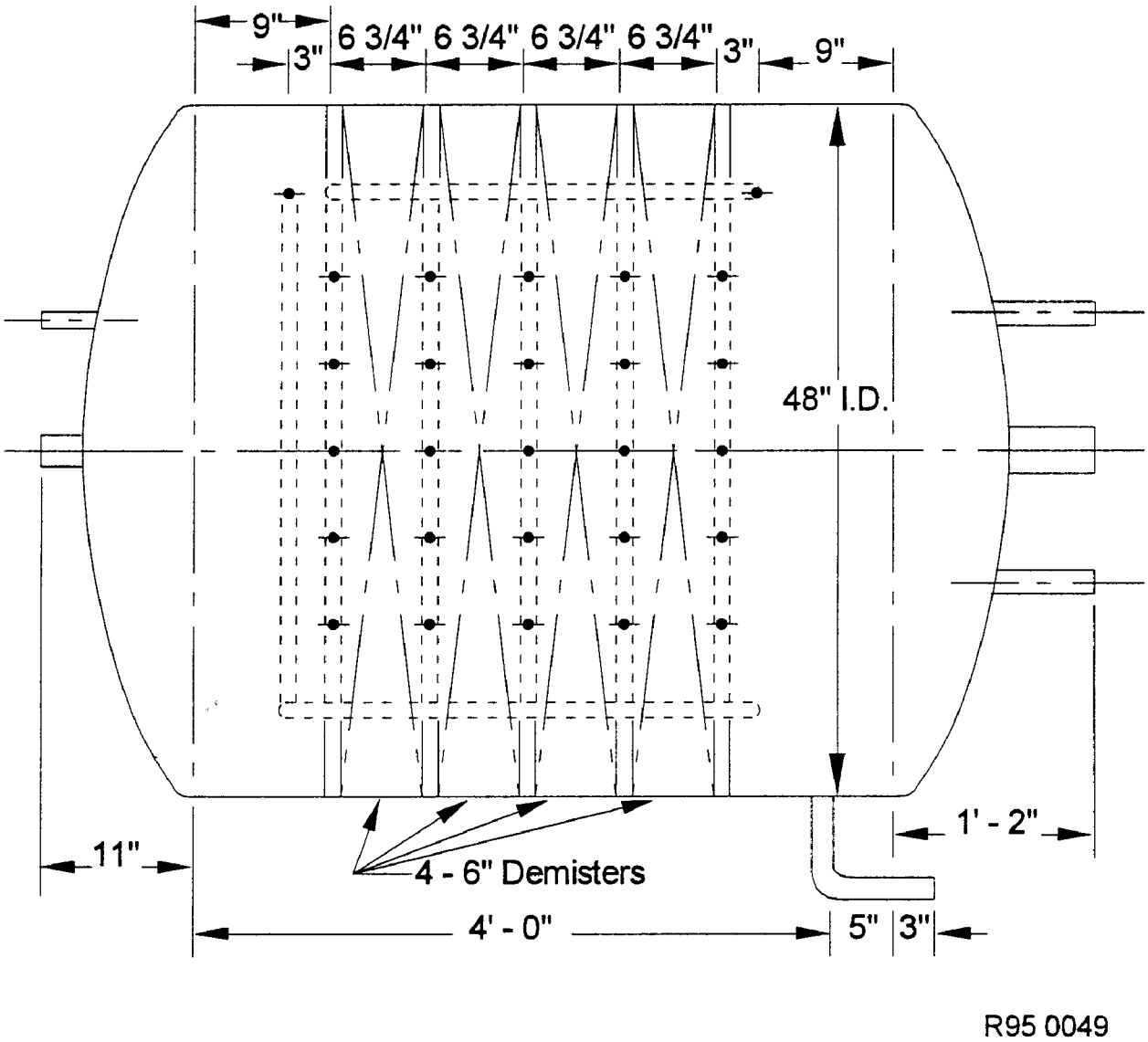

Figure 2-8. First CSSF off-gas trap.

During bin filling operations, the off-gas system was isolated and any gases generated were returned to the WCF with the transport air. Once the bins were filled, the transport air line and return air line were isolated by closing the transport air valves (TAV-WCS-915-1 and TAV-WCS-915-2), and the off-gas vent valves (VGV-WCS-915, PSV-WCS-2721-1, and PSV-WCS-2721-2) were opened to place the bin vent off-gas filter system in service. The transport air line and return air line are now physically isolated (cut and capped). The only remaining source of air pressure connected to the bins is an air purge (50 psia) installed downstream of one of the off-gas relief valves (PSV-WCS-115-2) to maintain the off-gas lines between the First CSSF and the APS clear and dry.[17]

2.5.5 Relief System

The First CSSF relief system protected the bins from excessive pressure and vacuum when the bins were being filled. Protection of the bins against excessive pressure and vacuum was provided by three pressure relief valves (PSV-WCS-115-1, PSV-WCS-115-2, and PSV-WCS-115-3). These relief valves were intended as safety features only during the WCF filling operation. Since the valves have not been maintained, and their operability cannot be verified, no credit is taken for their ability to perform a pressure relief function.

2.5.6 Vault Cooling Air System

The First CSSF vault is permanently isolated from the outside environment. The air inlet filters have been removed and the vault cooling air inlet and outlet ducts have been blind flanged. The forced-air cooling equipment, though provided, was never used to circulate air around the bins. Cooling was initially accomplished by natural convection of atmospheric air.

Cooling air inlet ducts run outside the north and south walls of the upper level vault. The ducts then continue down along the inside of the walls of the lower level of the vault, to the vault floor. Each duct is a 61 cm (24 in.) diameter, spiral-wound, carbon steel pipe that connects to a 45.7 cm (18 in.) square distribution duct on the vault floor. The distribution duct was used to distribute cooling air to the bottom of the concentric solids storage bins. From there, the air rose through the annuli between the bin sections. The air was then discharged through the First CSSF 15.2 m (50 ft) high exhaust stack (CPP-732). The vault has been physically isolated from the environment. Heat generated within the calcine stored in the First CSSF bins is transferred to the environment via a combination of radiant, convection, and conduction heat transfer through the walls of the bins and the concrete walls of the storage vault and into the surrounding soil.

2.5.7 Vault Sump Jet

A sump is located in the vault floor, directly beneath the central solids distribution stand pipe. A steam siphon jet (JET-WCS-515) is located in this sump. This jet can be used to remove liquid from the vault sump. The jet has a 2.5 cm (1 in.) suction line, a 2.5 cm (1 in.) discharge line, and a 2.5 cm (1 in.) steam inlet line. It is rated for 10 gpm at 23.5 °C (100°F), using 110 psig steam. The jet is constructed of type 304L stainless steel. A steam supply line and a waste transfer line would have to be connected to operate the jet. The sump has a liquid-level instrument loop (LIA-WCS-115), which is currently operational. The level instrument detects the presence of any liquid that might accumulate in the vault sump and has a readout on the NWCF Distributive Control System (DCS).

2.5.8 Alumina Calcine Properties

The calcined solids produced by the WCF and stored in the First CSSF, are from the calcination of Tank Farm first cycle A1 waste containing approximately 91% Al_2O_3 and the remaining 9% containing

chemically stable forms of fission products and other elements (Reference 12). The calcine product contains no volatiles. The calcine produced by the WCF is free flowing and can be pneumatically transported through pipes. The WCF calcination process resulted in mostly amorphous and some crystalline forms of alumina calcine being produced. The bulk density of the calcined solids is in the range of 1.0 to 1.1 g/cm^3.[18] The mass median particle diameter of calciner product is 0.57 mm.

2.5.9 Solids Cooling

Conductive and radiant cooling through the walls of the bins and the vault were determined to be sufficient to maintain the calcined solids temperature below the allowable design limits. New calculations, using modern-based analyses and an updated heat-loading inventory, were performed for the First CSSF.[19] The calculations assumed both the inlet and outlet ducts are closed. The results indicate that the maximum calcine temperature was calculated to be 137°C (278°F), which is well below the calcine agglomeration design temperature of 700°C (1292°F) and the bin design temperature of 343°C (649°F). The maximum calculated vault wall temperature is 66°C (151°F), which is well below the concrete wall design temperature of 121°C (250°F). Process data has confirmed the validity of the calculations.

2.6 Confinement Systems

The following sections describe the First CSSF confinement systems used during calcined solids storage.

2.6.1 Protection by Multiple Confinement Barriers and Systems

The fundamental feature for maintaining safe storage operations at the First CSSF is the confinement of the stored calcined solids. Confinement of the calcined solids is provided by the bins and by the concrete vault. A spill of solids from a bin would be contained within the vault. The expected performance of the vault, in view of the overstressed condition of the walls, is discussed in Chapter 3.

The APS provides additional treatment of the off-gas for radioactive calcine that could be entrained in the storage bin off-gas. No credit is taken for the filtration ability of the First CSSF off-gas filter.

The vault air is isolated from the outside atmosphere. The air inlet filters have been removed and the air inlet and outlet ducts have been blind flanged.

2.6.2 Bins

The four annular storage bins provide the primary containment for the radioactive solids and are designed to the requirements of the ASME Unfired Pressure Vessel Code. Each bin is supported and anchored to the vault floor. The bins are contained in the reinforced concrete vault anchored to bedrock. Additional information regarding the First CSSF Storage bins is discussed in Section 2.5.1 of this safety analysis.

2.6.3 Vault

The storage vault is a reinforced concrete structure, divided into two main sections: a lower level housing the storage bins and an upper level known as the cyclone vault. Additional information regarding the First CSSF storage vault is located in Section 2.4.1.

2.7 Safety Support Systems

2.7.1 Radiation Monitoring

Radiation monitoring systems are discussed in Chapter 7.

2.8 Utility Distribution Systems

This section discusses the electrical, compressed air, water, and steam supply distribution systems for the First CSSF. See INTEC SAR, Section 1.0, for a detailed description of the INTEC utilities.[20]

2.8.1 Electrical Power

The only important electrical systems at the First CSSF are the continuous air monitor (CAM) (CAM-WCS-01) and the sump liquid level instrument (LIA-WCS-115). The power for these systems is received from the INTEC Electrical Distribution System.

Normal power to the First CSSF is provided by a 30 A, 480 V, single-phase line routed from the Radiography Building (CPP-695). The electrical power is converted to lower voltages (120 and 240 V) within a small transformer located on the outside of the west wall of the vault cooling air blower and instrument building, above the First CSSF. No dedicated standby power is provided to the First CSSF. Standby power is received via the same line from CPP-695. These new electrical connections are installed according to national standards and regulatory code requirements, current as of May 1997.

Loss of power to the First CSSF would result in the loss of the CAM and the sump liquid level monitor.

2.8.2 Compressed Air, Water and Steam Supply

Compressed air and cooling water for the off-gas condenser were supplied to the First CSSF via the WCF. In the current facility storage configuration, no water, steam, or compressed air utilities are needed in the First CSSF, except for a limited air supply to the sump liquid level instrument and the air purge on the off-gas line. None of these utilities is required to perform a safety function.

Should the vault sump level monitor detect water in the sump, a steam supply line and a waste transfer line would have to be connected to operate the sump jet (JET-WCS-515). The steam supply line (HSA-3023) to the jet is currently capped.

2.9 Auxiliary Systems and Support Facilities

There are no dedicated auxiliary facilities associated with the First CSSF. However, common INTEC facilities, systems, and services are available to provide supporting functions for the First CSSF. These facilities include maintenance and calibration services and radioactive waste management.

2.10 References

1. 10 CFR 72, "Criteria for Spent Fuel, High-Level Radioactive Waste Storage and Handling," *Code of Federal Regulations*," Office of the Federal Register.

2. 10 CFR 830.120, "Quality Assurance," *Code of Federal Regulations*, Office of the Federal Register.

3. 10 CFR 835, "Occupational Radiation Protection," *Code of Federal Regulations*, Office of the Federal Register.

4. DOE Order 5400.5, "Radiation Protection of the Public and the Environment," U.S. Department of Energy, January 7, 1993.

5. DOE Order 414.1A, "Quality Assurance," U.S. Department of Energy, September 29, 1999.

6. DOE Order 420.1, "Facility Safety," U.S. Department of Energy, October 13, 1995 (includes changes) October 24, 1996.

7. American National Standards Institute (hereafter cited as ANSI) Standard 14.5, "American National Standard Code for Leak Testing."

8. ANSI Standard B31.3, "American National Standard Code for Pressure Piping."

9. American Concrete Institute (hereafter cited as ACI) Standard 349, "Code Requirements for Nuclear Safety Related Concrete Structures."

10. American Society of Mechanical Engineers (hereafter cited as ASME), "Boiler and Pressure Vessel Code."

11. American Welding Society (hereafter cited as AWS) Standards D1.1, D1.2, and D1.4, "Structural Welding Code."

12. J. R. Berreth, *Inventories of Properties of ICPP Calcined High-Level Waste*, WINCO-1050, February 1988.

13. R. A. Kirkbride, *Inventory of Calcined Waste Stored at the ICPP as of September 1979*, ENICO-1044, September 1980.

14. Raytheon Engineers and Constructors, Inc., *Idaho Chemical Processing Plant Bin Set Vault Analysis for Static Loading Final Report*, Project No. 9354.206, Idaho National Engineering Laboratory DE-AC07-89ID-12679, February 1995.

15. N. B. Smith, letter to E. E. Hochhalter, "CSSF#1 Remote Inspection," NBS-15-97, September 17, 1997.

16. D. L. Griffith, letter to Distribution, "CSSF 1 Storage Vault Inspection Report," DLG-04-97, October 6, 1997.

17. M. C. Swenson, letter to E. E. Hochhalter, "Technical Justification for CSSF I Air Purge," MCS-05-98, May 18, 1998.

18. R. E. Commander, G. E. Lohse, D. E. Black, and E. D. Cooper, *Operation of the Waste Calcining Facility with Highly Radioactive Aqueous Waste*, June 1966, IDO-14662.

19. H. H. Nielsen, letter to M. D. Staiger, "Thermal Analysis of Calcined Solid Storage Bin I with the Vault Coolant Air Passages Sealed," Ni-07-94, September 22, 1994.

20. INTEC SAR, *Facility-Specific Safety Analyses*, Section 1.0, *Utilities*.