(4) Enrichment

The maximum planar-average enrichment for any one fuel assembly is 2.60 wt. % ^{235}U.

The minimum planar-average enrichment for any one fuel assembly is 2.089 wt. % ^{235}U.

(5) External Condition

The fuel cladding surface is fairly uniformly coated with a crud layer, which appears to be primarily oxide from the carbon steel piping system. The actual thickness of the oxide has not been determined. However, NUREG 0649 states that typically, the oxide buildup on BWR pins is on the order of 25 to 100 microns and in the form of FE_2O_3. The NUREG further states that a calculation was made to determine whether a 100 micron buildup would affect heatup of the pins during a pool drainage accident, and found that the overall effect on pin temperature was less that one degree. There are several assemblies that have additional loose crud material attached.

3.1.1.3 Non-fuel Hardware and Neutron Sources

No non-fuel hardware or neutron sources are to be stored at the Humboldt Bay ISFSI.

3.1.1.4 Greater Than Class C Waste

Table 3.1-3 lists neutron activated components and process waste materials at HBPP that may potentially be classified as GTCC and stored at the ISFSI. ~~Items~~ The activated metals have been placed on this list due to close proximity to the reactor core (e.g., within approximately 12 inches of active fuel) and exposure to a peak core thermal neutron flux of slightly greater than 1×10^{13} neutrons/sec/cm^2 during 13 years of reactor operation. The actual quantity of ~~waste that is GTCC~~activated metals may be less than that listed, due to the conservatism used in this assumption. An accurate classification of this waste material will be performed prior to loading into the GTCC cask.

The process waste material was generated during cleanup of the spent fuel pool. The material consists of distributed and particulate SNM waste mixed with resins, metallic oxides, and small Stellite particles. The total activity is 4.87E+4 mCi, of which there are 18.3 grams of SNM waste. After thermal processing, the process waste material will be in the form of a powder with all organics destroyed.

As shown on Figure 3.3-4, the GTCC cask contains a container referred to as the GTCC Waste Container (GWC). The GWC is equivalent to the Multi-Purpose Canister (MPC) within a spent fuel cask. Also shown is the Outer Container that is welded onto the bottom of the GWC. The process waste will be contained in a process waste container (PWC), shown on Figure 3.3-5, that is designed to be an inerted, stainless

steel, seal welded cylindrical container, approximately 12 inches in diameter and 24 inches high. The PWC will be placed within the Outer Container inside the GWC. The Outer Container is open on the top, and is designed to provide stabilization for the PWC. The activated metals will be placed inside the GWC and outside of the Outer Container.

After loading the GTCC into the GWC, the GWC and GTCC cask will be drained, and grout will be evenly distributed within the GWC. The addition of grout will prevent movement of the activated metals and the PWC within the GWC. A lid will be placed on top of the GWC and welded shut. Then a lid will be placed on top of the GTCC cask and bolted shut.

The process waste will be stored in a dry, inerted, welded shut, stainless steel container, with all organics destroyed. Therefore, the process waste is prevented from co-mingling with the GTCC activated metals. Also, no galvanic or chemical reaction will occur between the process waste and the PWC.

The radiation dose ~~and decay heat~~at the surface of the GTCC cask ~~attributed to the GTCC material~~ is bounded by that assumed in the analysis performed for a HI-STAR HB cask containing spent nuclear fuel. GTCC is stored in a separate cask from spent fuel in accordance with 10 CFR 72.120(b)(1). There are no criticality or decay heat issues associated with the storage of GTCC waste.

3.1.2 REFERENCES

1. Interim Staff Guidance 1, Damaged Fuel, USNRC, Revision 0, May 1999 and Revision 1, October 2002.

2. General Electric Drawing GE 731E272 (GE Type II Fuel Assembly), PG&E Drawing #6019924, Sheet 13.
3. General Electric Drawing GE 731E228 (GE Type III Fuel Assembly), PG&E Drawing #6019924, Sheet 14.

4. Exxon Nuclear (Jersey Nuclear) Drawing Nuclear R-1330 (Exxon Type III Fuel Assembly), PG&E Drawing #6019924, Sheet 15.

5. Exxon Nuclear Drawing XN 300.900 (Exxon Type IV Fuel Assembly), PG&E Drawing #6019924, Sheet 16.

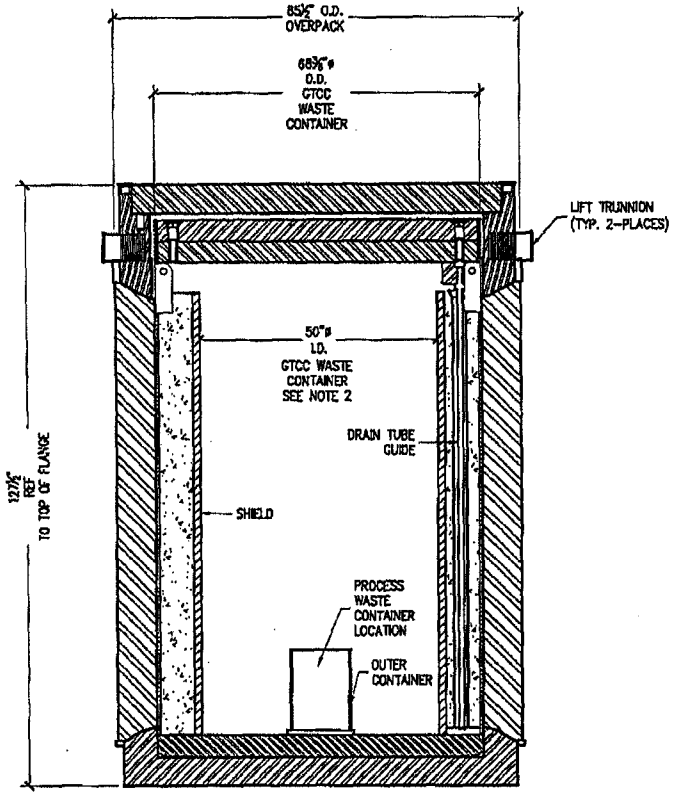
PROPOSED HUMBOLDT BAY ISFSI FSAR UPDATE TABLE 3.1-3, Sheet 3 of 3

GTCC Description	Location	Quantity	Approximate Individual Item Size	Estimated Total Volume	Material
Rod - Core Support	Reactor Vessel	4	3/8" O.D. x 11"	0.003 ft^3	304 Stainless Steel
Miscellaneous hardware for core support assembly (u-bolts, bolts, screws, nuts, dowel pins, groove pins and safety wire)	Reactor Vessel	Various	small	< 0.1 ft^3	304 Stainless Steel
Rim	Reactor Vessel	1	86" O.D. x 82-1/2" I.D.	1.0 ft^3	304 Stainless Steel
Cylinder (part of core shroud - surrounds the reactor core) - includes miscellaneous associated hardware (blocks, locating pins, gussets, etc.)	Reactor Vessel	1	96" O.D. x 95-3/8" h x 1/4" thick	Approximately 4.5 ft^3	304 Stainless Steel
Core hold down (includes all associated hardware and components)	Reactor Vessel	8	5" x 11" x 1-1/2"	0.40 ft^3	304 Stainless Steel, Inconel-X
Lower portion of fuel hold down at the top of the core	Reactor Vessel	45	Pipe: 1-1/2" O.D. x 3 ft. Latch: 1/2" x 1-1/2" x 4-1/4"	1.8 ft^3	304 Stainless Steel
Portions of support ring (below the core in close proximity) and chimney (above the core in close proximity)	Reactor Vessel	Various	Cut to fit	Estimated to be 5.0 ft^3	304 Stainless Steel
A mixture of SNM waste, metal oxides, and stellite particles.	Spent Fuel Pool	1	Approx 12" dia x 18" high	<1.0 ft^3	Process waste within a sealed 304 Stainless Steel container

CHAPTER 3

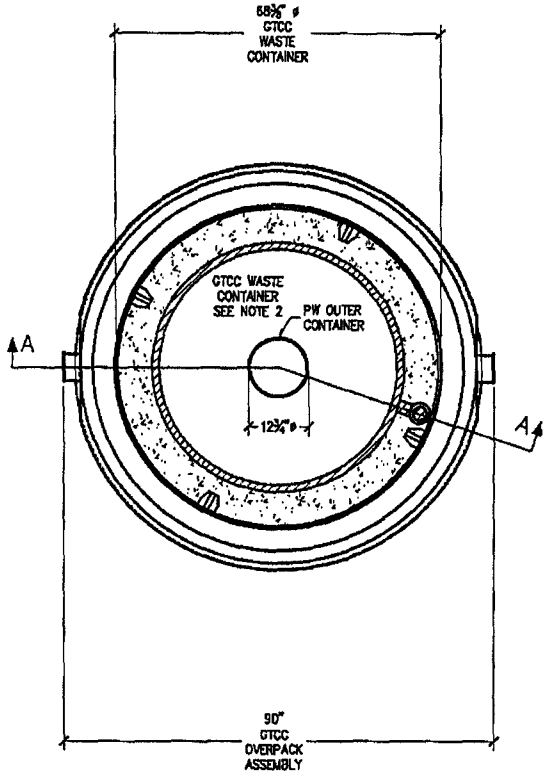
PRINCIPAL DESIGN CRITERIA

FIGURES



SECTION A – A

GTCC ASSEMBLY ARR'G
1/2" = 1'-0"



TOP VIEW
1/2" = 1'-0"

KEY:

STEEL

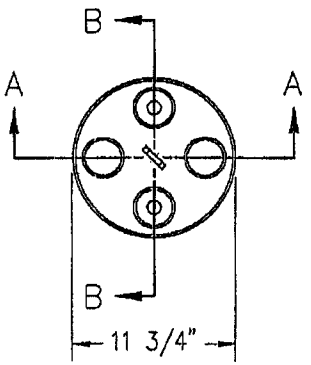
CONCRETE

NOTE:
1.) CLOSURE LIDS NOT SHOWN IN TOP VIEW FOR CLARITY.
2.) GROUTED FOLLOWING LOADING OF ACTIVATED METALS.

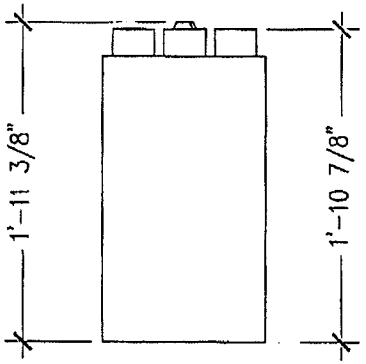
DATE	REVISION DESCRIPTION
22, MARCH 2011	
PR BSE	
CK BFR	
AP LP	

HUMBOLDT BAY ISFSI
HI-STAR HB GTCC
OVERVIEW
FIGURE 3.3 – 4

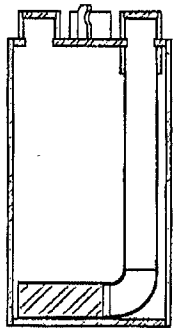
DRAWING	SHEET	REV
DSK-RXV-037	1 of 1	0



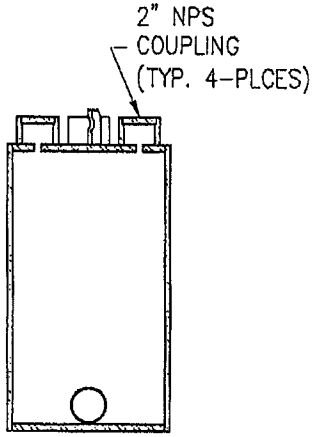
TOP VIEW



FRONT VIEW



SECTION A – A



SECTION B – B

NOTE:
1. ALL DIMENSIONS ARE NOMINAL.
2. ALL MATERIALS ARE 300 SERIES S.S.

DATE	REVISION DESCRIPTION	HUMBOLDT BAY ISFSI PROCESS WASTE CONTAINER FSAR FIGURE 3.3 – 5		
03, MARCH 2011				
PR BSE				
CK BFR				
AP LP				
		DRAWING	SHEET	REV
		DSK-RXV-042	1 of 1	0