

EA-142 PROTOTYPE TEST

Supplement to
NUCLEAR PACKAGING, INC.
ENVIRALLOY
HIGH INTEGRITY CONTAINERS

February 1985

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PDR WASTE
WM-85 PDR

Enviralloy 190 Cubic Foot Prototype Drop Test

The Nuclear Packaging EA-142 High Integrity Container was tested in accordance with the requirements of the NRC branch position on high integrity containers and the State of Washington requirements for high integrity containers for burial at the Hanford Burial Site. This prototype testing is done in accordance with Section 15 of Nuclear Packaging's Enviralloy High Integrity Containers Topical Report dated June 29, 1984.

The EA-142 High Integrity Container is a container approximately 64 inches in diameter by 70-1/4 inches high. The container is made out of Ferralium Alloy 255. The model that was dropped was Nuclear Packaging series A container using a locking lug closure configuration. This container has four internal supports that come to bear beneath the closure ring. The container has approximately 24 inch diameter opening. The container is fabricated from 3/8 inch thick material except the closure ring and wedges which are 1/2 inch material. The gross weight the container is licensed for is 10,000 pounds. This weight corresponds to the license payload weight of Nuclear Packaging's 142 cubic foot Type B cask. The tare weight of the empty EA-190 container is approximately 2,575 pounds.

The gross weight of the container that was dropped was approximately 10,200 pounds. The payload for the drop container consisted of moist sand. The sand approximates the consistency of dewatered resins which is the typical radioactive waste that is shipped within these containers. In addition to the sand, steel pipes (see picture) were placed in the container to simulate worst case internals since normal dewatering internals are fabricated from plastic pipe. The container was closed in the normal way by placing a silicon rubber gasket top and placing the 3/8" thick lid on top of the gasket and driving in eight wedges that sealed the container. It should be noted that during all drop tests, these wedges were not resecured and no leakage did occur.

The container was drop tested with the polyethylene and carbon optional seal as shown in Attachment 1. The seal was located in the center of the lid. The seal did not fail or cause any release of contents.

The container was dropped from both four foot orientations as required for a Type A package and from 25 foot orientations. The four foot drops took place on an unyielding surface, a heavy duty drop pad that was designed for drop testing of casks. The 25 foot drops were done in a parking lot for heavy trucks that was basically a gravel bed over compacted soil.

The container was dropped in five orientations from each drop height. These orientations were the bottom down, flat down, bottom corner down with center of gravity over struck corner, side drop, top straight down, and the top corner down with center of gravity over struck corner. One container was used for all ten drops.

The container did not sustain any significant damage from any of the drops. The only damage that was sustained by the container was a slightly dented lift lug on the top due to the four foot drop on the top straight down, and some damage on the corners due to the four foot drop. The lifting lug was not bent or deformed sufficiently to prevent its use. The container was slightly bowed due to the corner drop on the four foot drop. Also the ends, top and bottom were plastically deflected from the corner drop. None of these deformations were in the excess of 1/2 inch. The container did not sustain any loss of contents as a result of any of these drops. The container was not damaged either on the outside or on any of the inside supports, such that it would prevent its use. The container was cleaned up after the drop and all welds were magnetic particle tested to detect any damage to the welds. No damage was detected.

In addition to the drop test the container under went a pressure test verifying the seal of the gasket. The container was pressurized to 57 psi before leakage was detected. This was performed as a soap bubble test with an air over water prior to the drop tests. Under this test no detectable deformation was noted.

A successful lug load test was also performed on this container. Each lug was load tested to 300% of its rated capacity. All three lugs were used to lift the container by its full weight one lug at a time.

The following pictures show the container during some of the drop tests and afterwards.

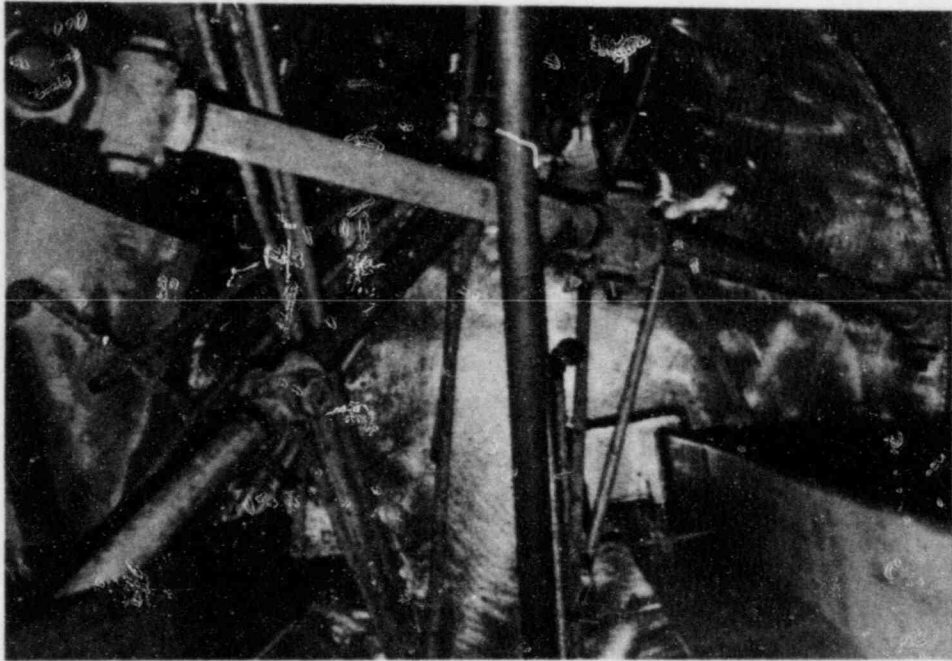


Figure 1 Simulated Internals

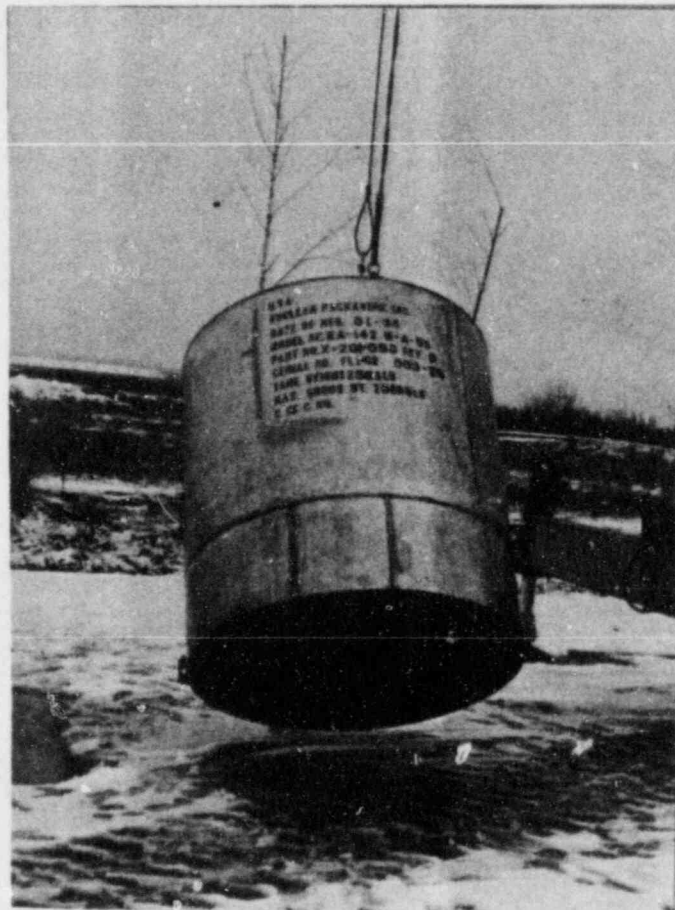


Figure 2 Lug Test



Figure 3 Four Foot Bottom Down

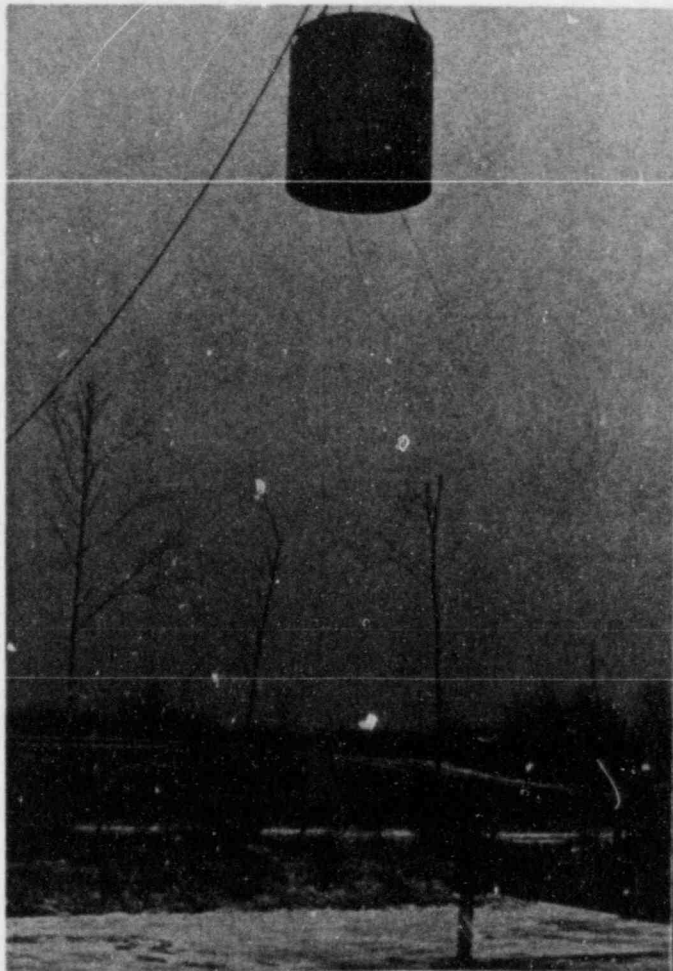


Figure 4 25 Foot Bottom

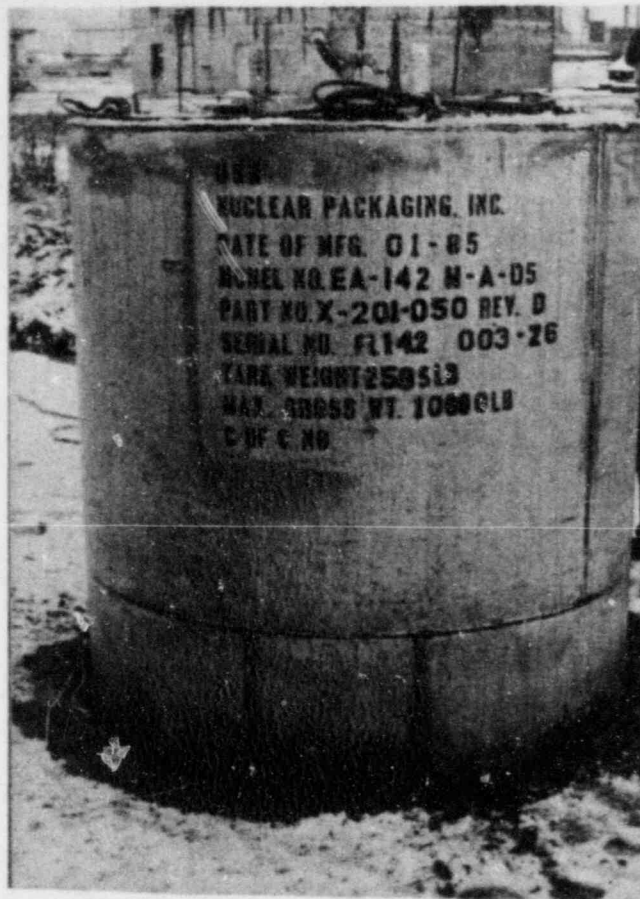


Figure 5 After 25 Foot Bottom



Figure 6 Bottom Corner Four Foot Drop

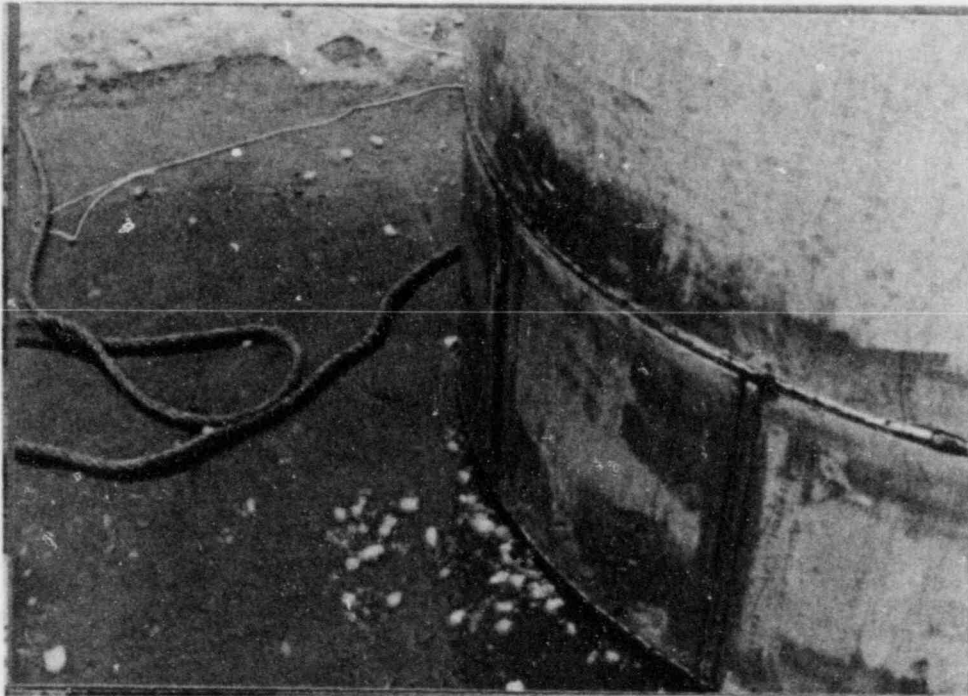


Figure 7 After Four Foot Bottom Corner Drop

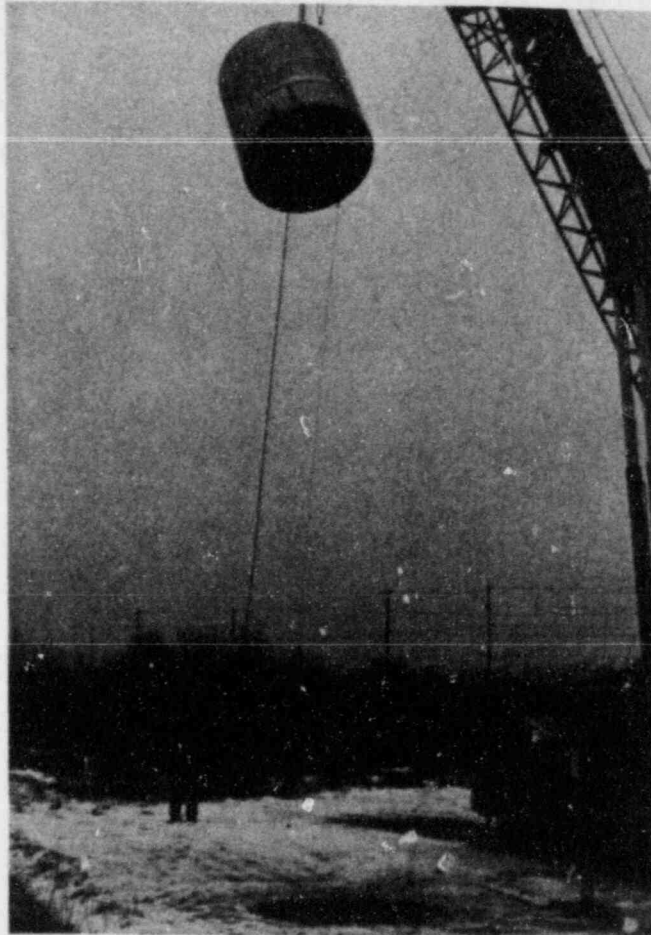


Figure 8 25 Foot Bottom Corner Drop



Figure 9 After 25 Foot Bottom Corner Drop

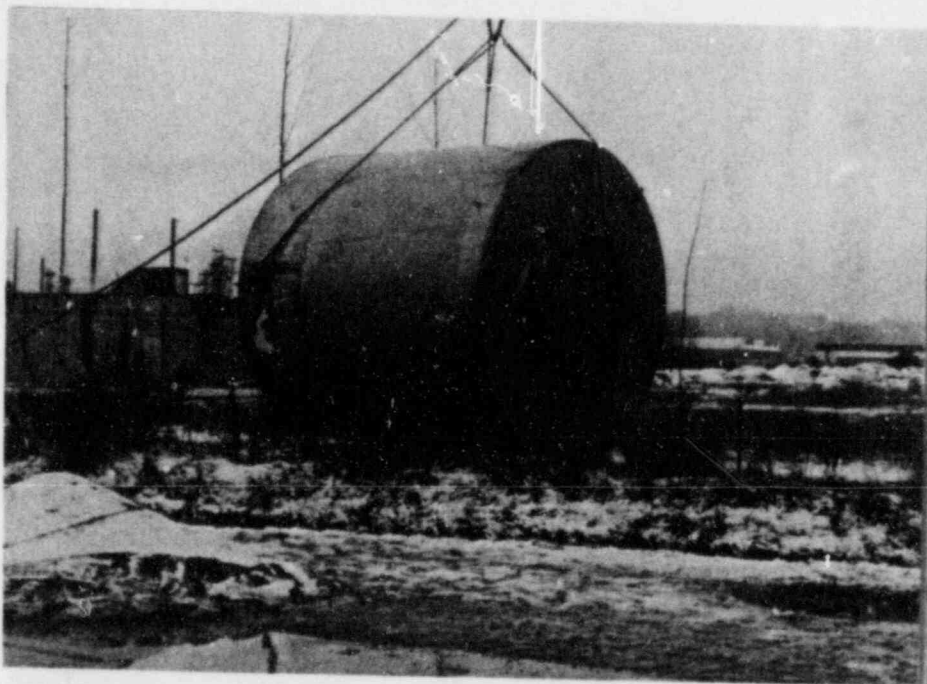


Figure 10 Four Foot Side Drop

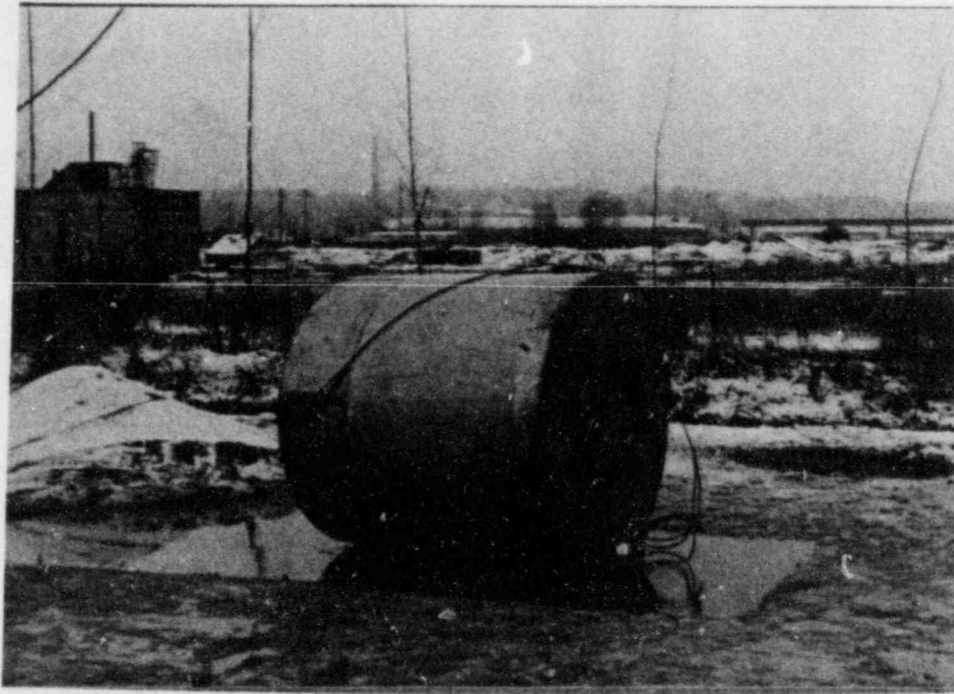


Figure 11 After Four Foot Side Drop

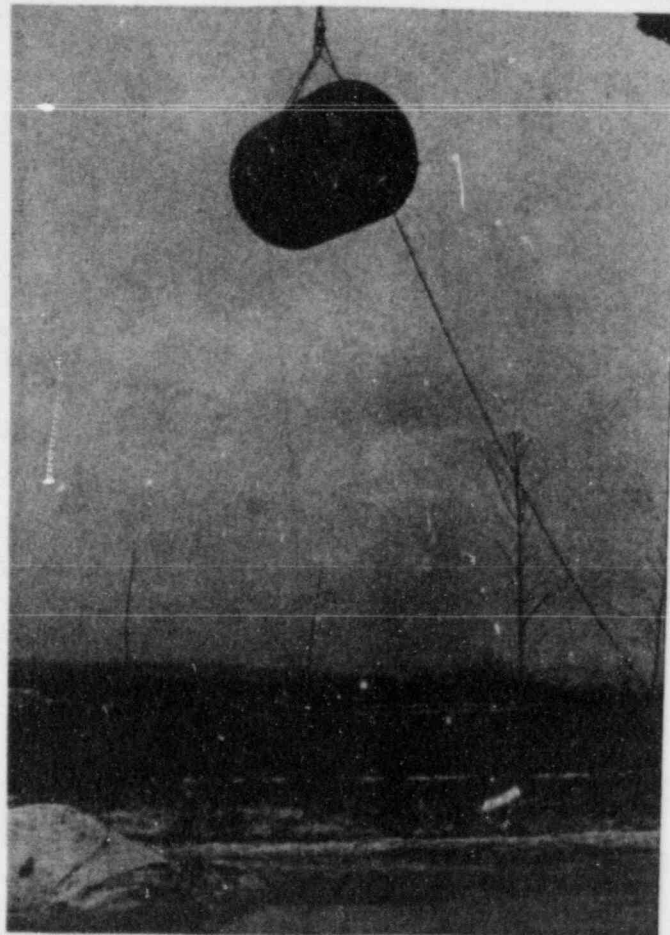


Figure 12 25 Foot Side Drop

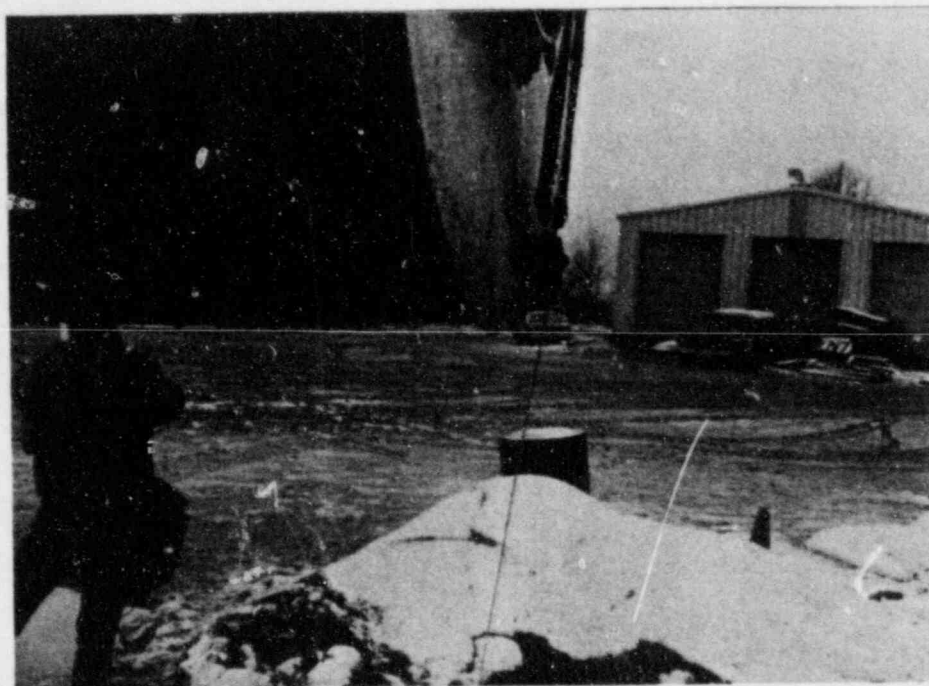


Figure 13 After 25 Foot Side Drop



Figure 14 After Four Foot Top Corner Drop

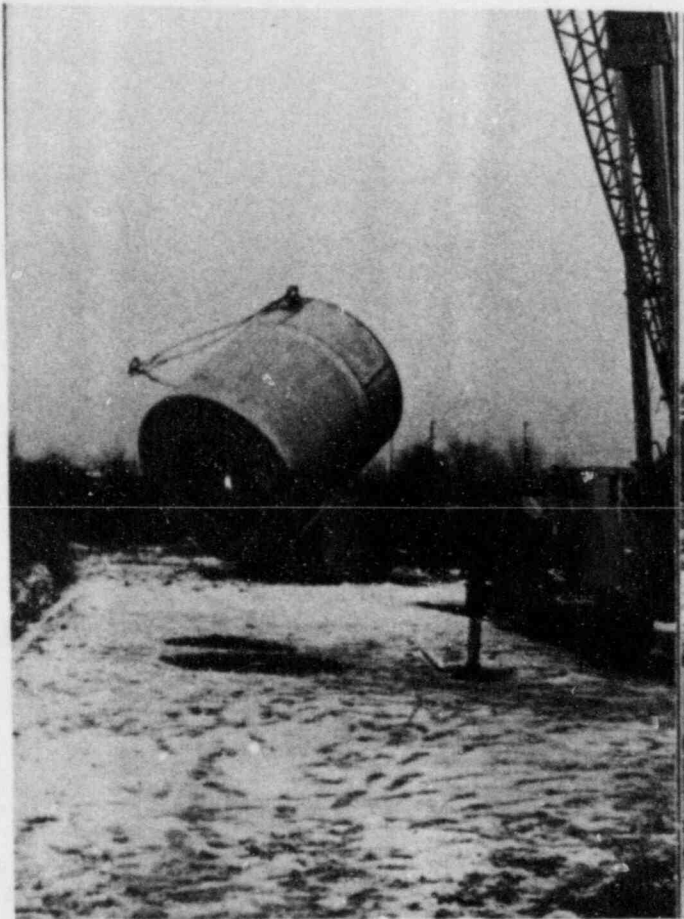
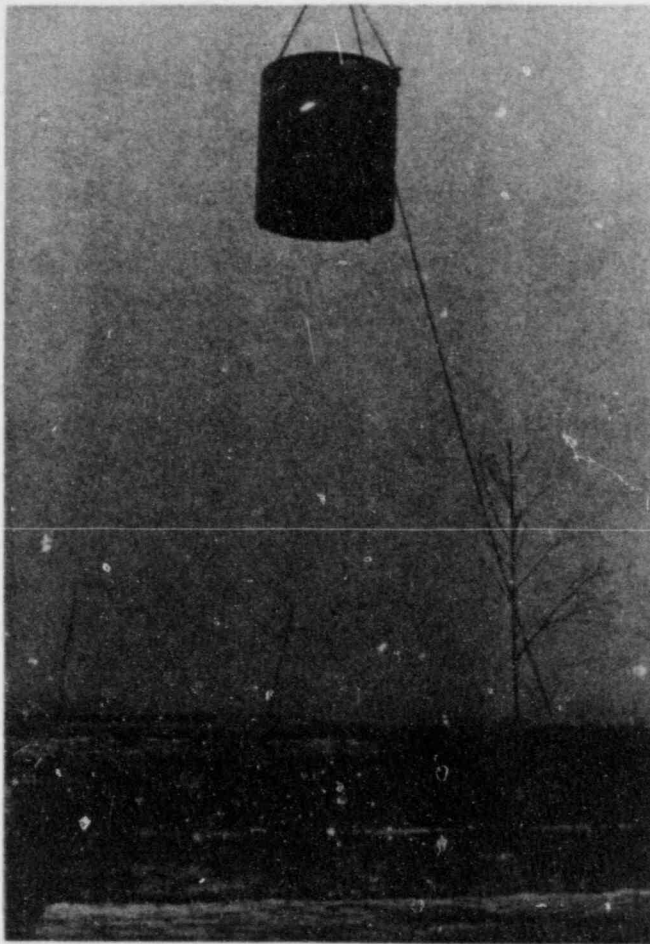


Figure 15 25 Foot Top Corner Drop



Figure 16 Four Foot Top Down Drop



EA Family/EA-142

Figure 17 25 Foot Top Down Drop

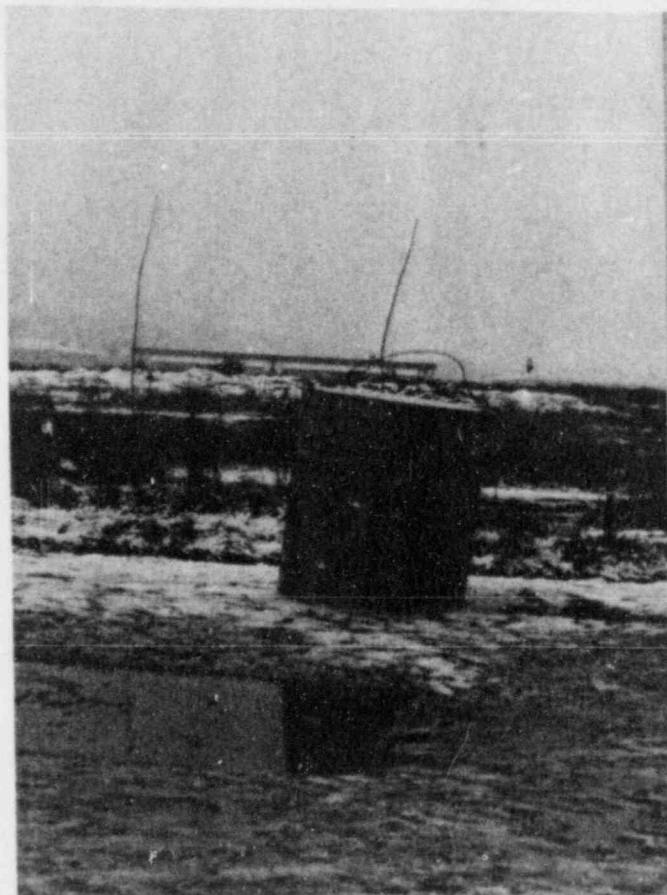


Figure 18 25 Foot Top Down Drop

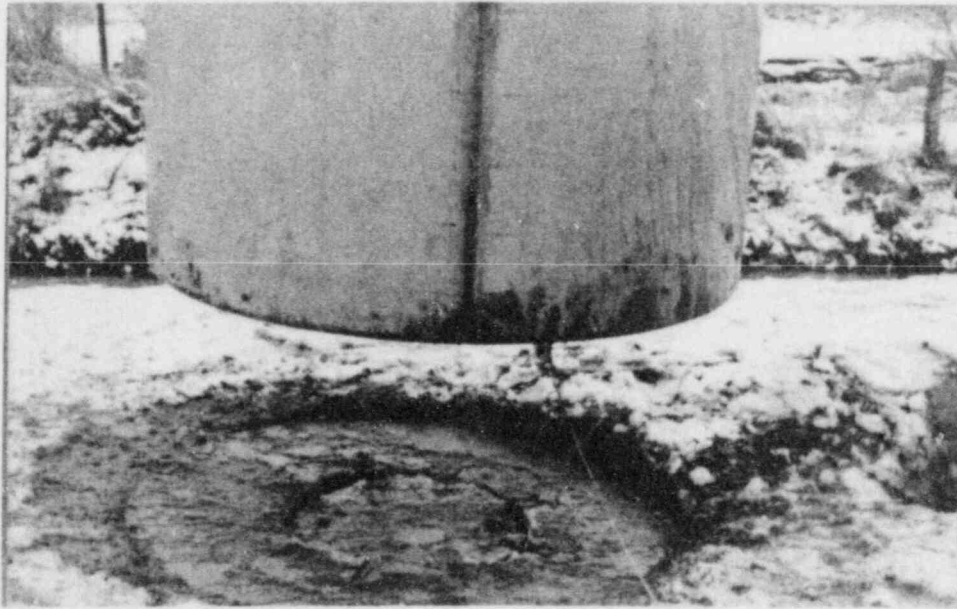


Figure 19 After 25 Foot Top Down Drop

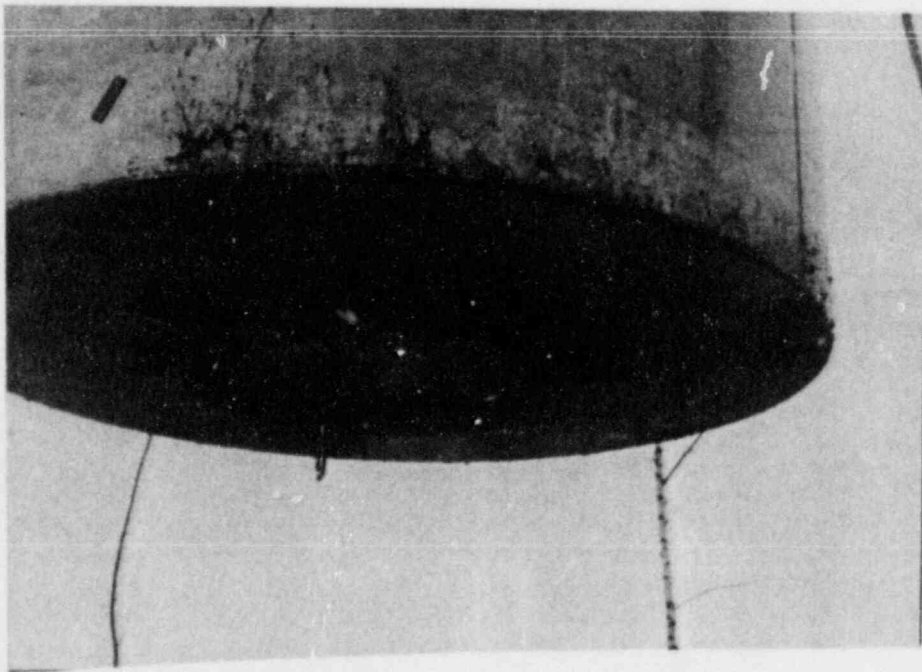
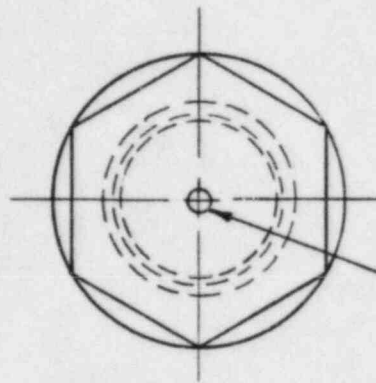
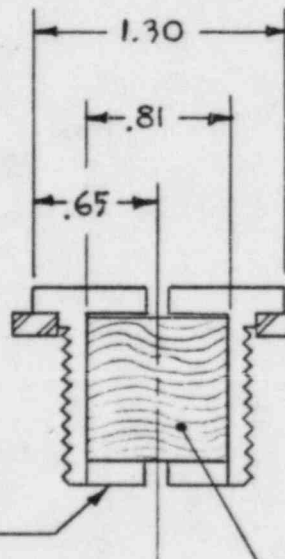


Figure 20 After 25 Foot Top Down Drop



.125 DIA. THRU TOP COVER
AND BOTTOM OF PLUG ONLY



3/4" HEX HD PLUG
STD US PIPE THREAD
MATL POLYETHYLENE

SILICONE RUBBER GASKET

CARBON BONDED CARBON FIBER
FILTER ELEMENT (CBCF)

OPTIONAL VENT

ATTACHMENT 1