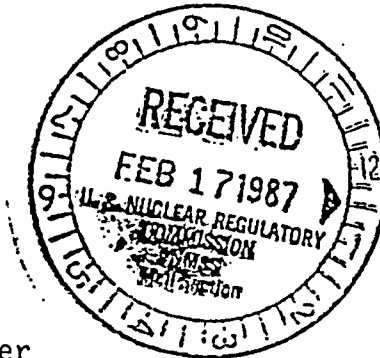


Region 111

70-36

COMBUSTION ENGINEERING



NIS/87/5005
February 12, 1987

R

Mr. W. T. Crow, Section Leader
Uranium Licensing Branch
Division of Fuel Cycle and Material Safety NMSS
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Crow:

Docket 70-36

Enclosed is a report on the current status of the Hematite evaporation pond decommissioning project. This work was accomplished as required by License Condition 19, as revised, of SNM-33.

As shown in the report, considerable effort has been expended to remove the contents of the ponds and to reduce average residual contamination to acceptable levels. Although we plan further sampling of the large pond this summer, we expect that both now meet the decommissioning criteria. We would like to proceed with filling in the small pond with material from the berm and upper sides. Uncontaminated fill material would then be used above the 4-foot elevation.

Please advise if there are any questions, or if further information is required.

Very truly yours,

COMBUSTION ENGINEERING, INC.

H. E. Eskridge

H. E. Eskridge
Supervisor, Nuclear Licensing,
Safety and Accountability

/eg
Enclosure



H-47

DECONTAMINATION
OF
EVAPORATION PONDS

COMBUSTION ENGINEERING, INC.
HEMATITE PLANT
MATERIAL LICENSE NO. SNM-33

DECEMBER, 1986

INTRODUCTION

In 1956 Mallinckrodt Chemical Works commissioned a commercial nuclear fuel fabrication facility located on a 152 acre tract near Hematite Missouri. During 1958 two retention ponds were dug in the southwest corner of the fenced manufacturing area. Location of the ponds are shown in figure I.

The two ponds were excavated to a depth of 3 feet 4 inches. The excavation was filled with a 6 inch bed of 3 inch diameter rock followed with a 4 inch bed of 1/2 inch diameter rock. The remaining reservoir was 2 1/2 feet deep. The soil removed was used to construct a 1 1/2 foot high berm around each pond. The ponds are separated by 12 feet. The primary pond is 30 feet X 45 feet and the secondary pond is 30 feet X 85 feet.

The low level liquid waste streams were discharged into the primary retention pond where insoluble uranium bearing precipitates and other solids were allowed to settle. As additional liquids were added, the overflow from the primary pond flowed through a pipe into the secondary pond. The accumulation of sludge in the secondary pond was minimal because of the small amount of solids in the overflow.

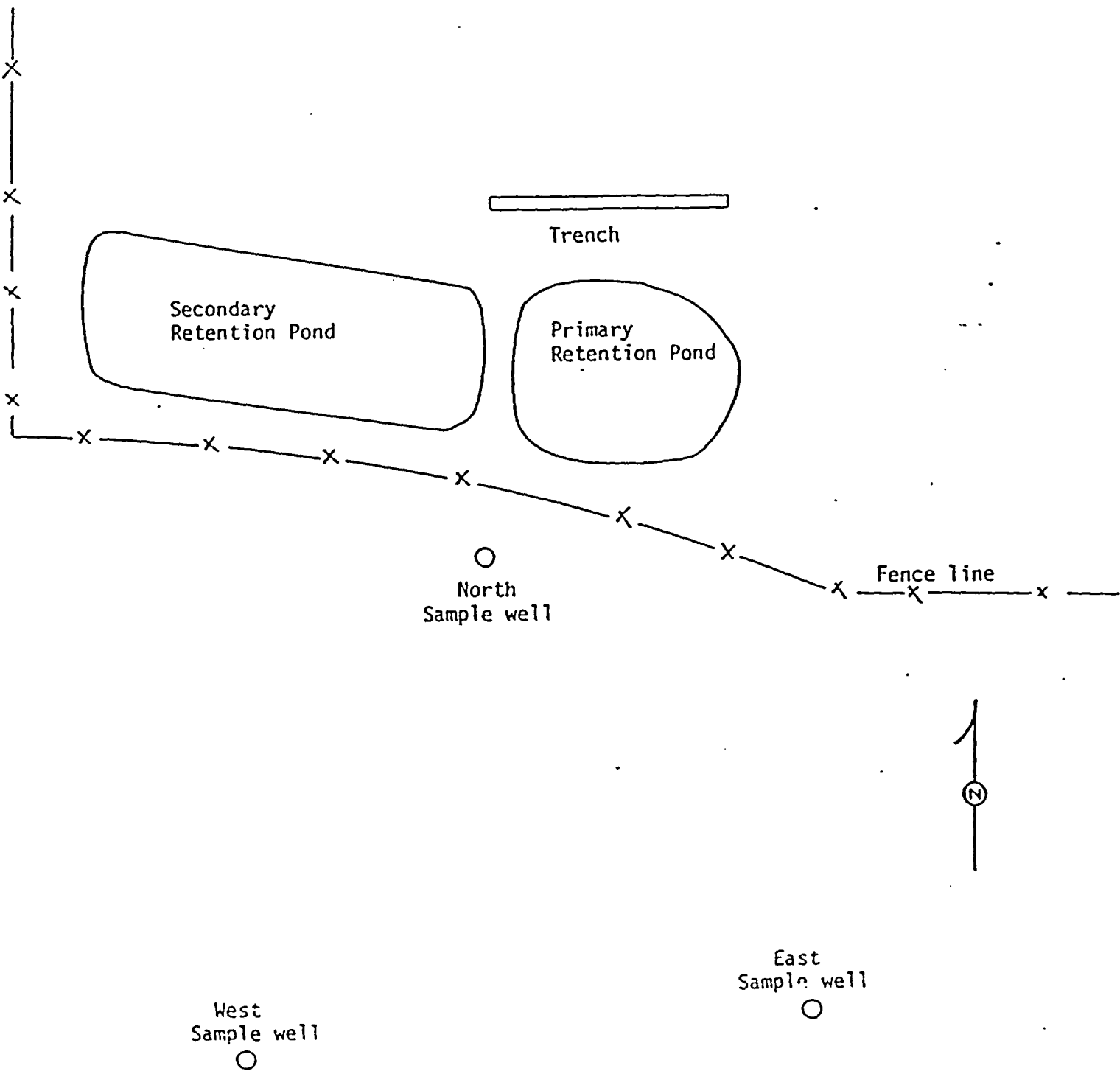
The ponds were originally installed to receive limed filtrates from the low enriched ADU conversion facility, but were subsequently used by United Nuclear Corporation and Gulf United Nuclear Corporation, for the disposal of both high and low enrichment recovery waste liquids after liming.

Immediately after the purchase of the plant, by Combustion Engineering in 1974, the only low level liquid wastes produced in significant quantities were spent potassium hydroxide scrubber solution from the recycle/recovery furnaces.

Ground water sample wells were dug in the fall of 1976 to monitor for nitrate and uranium migration at the request of the NRC. The wells were located and constructed in accordance with consultation provided by a geologist with the Missouri Department of Natural Resources. The north well was located very close to the ponds so that detectable variations would occur. Location of the wells are shown in Figure I.

With the startup of recovery operations in 1977, limited quantities of filtrate were discharged to the retention ponds. These discharges were discontinued in September 1978.* Although neither the ponds (Table I & II), nor the sample wells (Figure III) approached a level which would represent a hazard to the public decommissioning of the ponds was initiated at the request of the NRC. A brief history of the decontamination work follows.

*During Combustion Engineering's ownership 12.5 Kg of uranium was released to the ponds.



Retention Ponds
&
Ground water
sample wells
scale 1" = 30'

TABLE I

Primary Retention Pond Water Samples

<u>DATE</u>	<u>ALPHA (pCi/Lt)*</u>	<u>BETA (pCi/Lt)*</u>
Sept 1980	31,800	3,600
June 1981	59,400	6,800
Nov 1981	54,900	200
May 1982	58,200	7,400
May 1982	68,100	8,800
Aug 1986	41,100	1,600
Sept 1986	36,000	800
Oct 1986	70,200	7,800
Oct 1986	24,300	1,000

TABLE II

Secondary Retention Pond Water Samples

<u>DATE</u>	<u>ALPHA (pCi/Lt)*</u>	<u>BETA (pCi/Lt)*</u>
Sept 1980	4,200	800
June 1981	5,700	800
Dec 1981	5,100	800
May 1982	2,700	400
May 1982	2,100	200
Oct 1986	600	120

*Maximum permissible concentration established by the NRC for release to uncontrolled areas are:

Alpha - 30,000 picouries per liter
Beta - 20,000 Picouries per liter

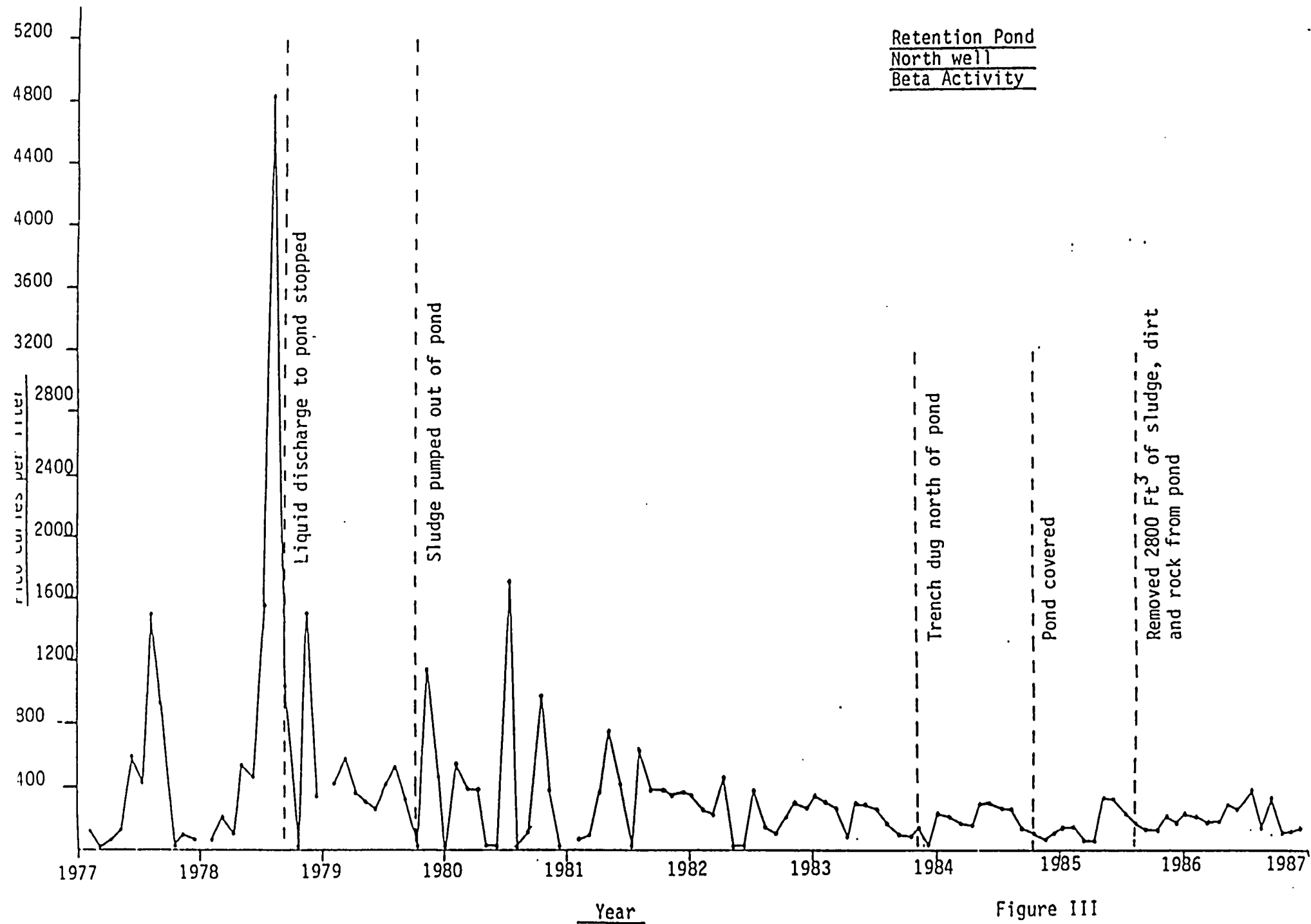


Figure III

DECONTAMINATION CHRONOLOGY

PRIMARY & SECONDARY RETENTION PONDS

<u>Sept 1978</u>	Primary -	Discharge of liquid waste discontinued.
<u>Oct 1979</u>	Primary -	Over a period of 6 working days, 20,470 lts of liquified sludge was removed from the pond. As it was pumped into 136 55 gallon drums, a sample was taken from each drum. Six drums of dirt and rock were also removed.
<u>Oct 1980</u>	Primary -	After a year in storage the supernate in the drums was decanted, combined and concentrated prior to ADU precipitation. The 2530 liters of supernate yielded 5.9 KGS of uranium. Filtrate from this operation was concentrated, solidified and buried with 52 grams of uranium.
<u>Aug 1981</u>	Primary -	The sludge remaining after decanting the supernate contained 40 to 60 W/% water. Drying of the sludge, in preparation for burial, started in August 1981 and was completed in March 1983. Drying time for each drum was 96 hours. The dried sludge was packaged and shipped to burial. Uranium content was based on the samples of each drum taken in 1979. The dates and volumes shipped are shown in the summary of sludge shipments.
<u>June 1982</u>	Secondary -	Pumped 145,000 liters of water, with 2100 pCi/Lt alpha and 200 pCi/Lt beta to storm drain.
<u>Sept 1983</u>	Secondary -	Removed all sludge down to rock bed. The 360 Ft ³ of sludge contained 0.03% uranium, 14% water, 45% sludge and 41% rock.
<u>Nov 1983</u>	Primary -	A trench, 3 ft. wide, 7 ft. deep and 50 ft. long, was dug parallel to and 15 ft. north of the pond to intercept the ground water before it reached the pond. The contained water was pumped out and discharged to the storm drain at frequent intervals. A sample of sludge from the bottom of the pond, was taken for thorium analysis. The analysis, completed by Teledyne, detected no thorium.

Oct
1984

Primary - The pond was covered to exclude rain water from entering the pond.

After the sludge was removed in 1979, the pond water was checked for alpha and beta activity, pumped out, concentrated and solidified for burial. Pumping out the water continued until additional sludge, dirt and rock were removed in August 1985. Approximately 85,000 liters of water, containing 1.7 Kgs of uranium was pumped out over the 7 year period. The alpha and beta activity of the pond water are shown in table.I.

Aug
1985

Primary - About 2800 Ft³ of wet sludge, soil and rock were removed, from the pond, to an elevation of 10 1/2 feet below the top of the berm. The material was transferred to a drying tank fabricated from plastic laminated sheet and railroad ties. This material contained from 50 to 60% water. The tank was covered to exclude rain water and uncovered during fair weather. After the top of dry material was removed, the remainder of the material was rototilled to aid drying.

Oct
1986

Secondary - Pumped out water to storm drain. Activity levels were alpha 600 pCi/Lt and 120 beta pCi/Lt.

Nov
1986

Primary - The packaging of the dried material, which averaged 0.16% uranium, 25% rock, 59% soil and 16% water, started in November 1985 and was completed in August 1986. A total of 2070 Ft³ (111 ton) was packaged in 23 metal B-25 tote boxes.

Secondary - Random sample taken at east end of pond, alpha activity was 14 PCI/GM.

Aug
1986

Primary - Preliminary sampling of the pond was done in the early part of August to determine the degree of contamination remaining and to formulate a game plan for final sampling.

The final sampling plan was initiated during the latter part of August. All sampling, removal of soil with high activity levels and resampling was completed on October 18, 1986. A topographical map with 200 sample locations and analysis in picouries per gram, is shown in figure II. It should be noted that of the 42 spot areas that were cleaned, to a depth of 4 to 6 inches, and resampled, only 12 remained above the 250 pCi/Gm decontamination limit.

Oct
1986

Primary - A detailed topographical survey of the pond was made with elevations every 2 ot 3 feet.

SUMMARY OF SLUDGE SHIPMENTS

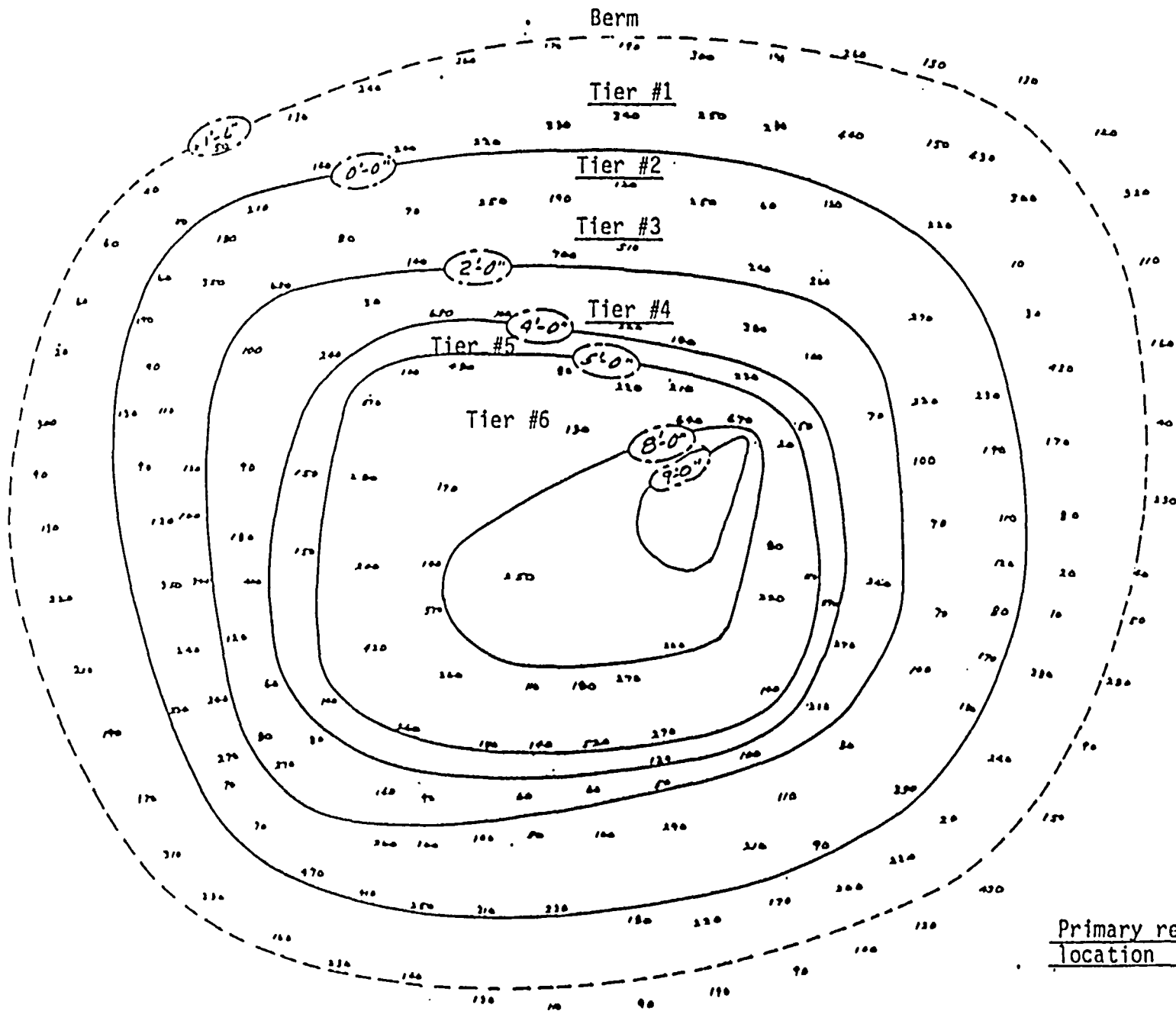
PRIMARY EVAPORATION POND SLUDGE AND DIRT SHIPMENTS

<u>Ship Date</u>	<u>Ft³</u>	<u>Kgs U</u>
Sept 1982	195	56.1
Dec 1982	203	42.9
Mar 1983	135	24.3
May 1983	45	3.0
Aug 1986	450	26.1
Nov 1986	450	24.0
On hand	1080	69.2
Total	2558	245.6

SECONDARY EVAPORATION POND

SLUDGE AND DIRT SHIPMENTS

<u>Ship Date</u>	<u>Ft³</u>	<u>Kgs U</u>
Jan 1984	270	0.11
May 1986	90	0.02
Total	360	0.13



Surface Sample Average

Berm	160	pci/gm
Tier #1	210	"
" #2	170	"
" #3	190	"
" #4	220	"
" #5	250	"
" #6	270	"

Primary retention pond sample location & analysis shown in pci/gm

Figure II

SUMMARY

Decontamination of the Mallinckrodt retention ponds is largely complete. About 156 tons of sludge, rock and clay have been removed and packaged for burial. The walls of the primary pond have been sampled and checked for beta activity. Areas of high contamination levels were cleaned and resampled. The average level of all samples is 200 picocuries per gram. This is 80% of the decommissioning criteria of 250 established by the NRC. The data suggests that if 8 inches of soil were removed from the elevation above 4 foot and used to fill the void, below the 4 foot elevation, the upper level would be well below the established criteria. A sample of the secondary pond soil indicates that this pond may also be within the decommissioning limits.