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FINAL REPORT
for the
LIQUID AND SLUDGE REMOVAL PROJECT
at the
LEHR FACILITY
at the
UNIVERSITY OF CALIFORNIA AT DAVIS

RPT-NWD-0792-001
REVISION 0

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1.0 INTRODUCTION

The overall objective of this project was the removal of waste from the Imhoff and Radium Septic tanks at the Laboratory for Energy Related Health Research (LEHR) at the University of California, Davis (UC Davis), treatment of the waste, proper packaging, and shipment of waste to the Department of Energy (DOE) Hanford site near Richland, Washington. A two phased approach was planned to achieve this objective. Phase I included additional sampling of the waste in the Imhoff and Radium Septic tanks which was used to complete waste characterization as required by the Westinghouse Hanford Company (WHC) and treatability studies as required to complete the overall project objective. The DOE Hanford site is operated by WHC. Phase II included preparation of appropriate documentation for the removal, on site treatment, packaging and shipment of the waste to the DOE Hanford site. In addition to the removal of the waste from the tanks, the inside surfaces of the tanks were surveyed and core samples were taken from each tank and the soil beneath each tank.

All radiological field activities were conducted under the Chem-Nuclear Systems, Inc. (CNSI) Radioactive Material License No. 287-05. The on site Radiological Controls Supervisor and Project Manager were assigned primary and alternate duties, respectively, for the administration and oversight of activities which will be conducted under the CNSI Radioactive Material License No. 287-05. The CNSI Radioactive Material License was used to conduct the work at the LEHR Facility because the DOE, Battelle EMO, and UC Davis did not have a license in place to conduct the activities required to process the waste.

This final report provides a brief project history for the LEHR Facility and this project in Section 3.0. Section 4.0 provides a summary of project activities. Section 5.0 presents the solidification and process control program records for the project. Section 6.0 provides the survey results for the Imhoff and Radium Septic Tanks following waste removal. Section 7.0 provides analytical results for the core and soil samples taken from each tank. Additional analytical results are provided for samples taken throughout the project as well as during Phase I of the project. Section 8.0 will present personnel radiation exposure records for the project including bioassay results. Section 9.0 will discuss project waste shipments. Section 10.0 will discuss problems and lessons learned from the project. Section 11.0 provides conclusions and recommendations.

2.0 REFERENCES

2.1 Plan No. PL-CNES-91-011, "Quality Assurance Project Plan for Phase II of the Imhoff and Radium Septic Tank Liquid and Sludge Removal Project at the Laboratory for Energy Related Health Research (LEHR) at the University of California at Davis (UC Davis)"

2.2 USNRC Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors"

2.3 Code of Federal Regulations, Title 10, Part 20, Appendix B, "Concentrations in Air and Water Above Natural Background"

3.0 PROJECT HISTORY

3.1 LEHR Project

The Laboratory for Energy Related Health Research (LEHR) began as a small research project on the Davis campus of the University of California in 1951 in which studies were done on the biological effects of X-rays on laboratory animals under the support of the U.S. Atomic Energy commission (AEC). In 1957, a major project was initiated by the AEC to study the biological effects associated with low level chronic exposure of the skeleton to beta particle irradiation from the bone seeking radionuclide Strontium 90 (Sr-90) which is a fission product found in fallout from atmospheric tests of nuclear weapons and a constituent of nuclear wastes from nuclear power plants.

Parallel studies were also conducted utilizing the bone seeking radionuclide Radium 226 (Ra-226) which some people had been exposed in watch-dial painting and in medicine earlier in the century. This main study was the basis for the 1962 AEC contract and the establishment of the Radiobiology laboratory as an Organized Research Unit of the University of California, Davis. These studies involved the feeding and injection of Sr-90 and Ra-226 to laboratory animals making it necessary to design and construct LEHR (Radiobiology Laboratory) to safely and effectively handle excreted biological waste (the sludge) from the laboratory animals.

3.2 General Description of Tanks and Waste

Two physically separate waste handling systems, the Imhoff (Sr-90) and the Radium (Ra-226) systems were constructed to process and store waste generated for the

experiments. The Imhoff tanks were used mainly to store the waste associated with the Sr-90 experiments while the Radium Septic Tanks were constructed to handle the waste associated with the Ra-226 experiments. The Imhoff and Radium Septic tanks contain both sludge and liquid waste. The sludge consistency varied from tank to tank which ranges from very hard and compacted to thick liquid (containing chunks) to a yellowish liquid.

The Imhoff tanks consist of a series of tanks. The tanks are subsurface concrete tanks coated with Mastic. The tanks are located beneath and incorporated in the Imhoff building. The biological waste from the laboratory animals was initially drained into the Imhoff Sump Tank. The waste in the sump tank was then pumped to a series of settling and digestion Imhoff Tanks (3 tanks total) each separated by a overflow weir. When the settling tanks were approximately 80% full, the supernatant was pumped to the first tank in a series of chemical treatment tanks (6 tanks total). After treatment, the final effluent was pumped to a series of holding tanks for final analyses prior to final disposition.

The Radium Septic tank system also held and processed laboratory animal biological waste. The two radium septic tanks have two compartments each with a weir separating the compartments. The septic tanks have no above ground structure associated with them. The septic systems primarily received wastes containing Radium 226. This disposal system primarily acted as a conventional septic system. Over the project's life, sludge was periodically removed and disposed of in accordance with the regulations in place at the time.

3.3 Waste Processing License Overview

All radiological work tasks performed as part of Phase II of this project complied with the requirements of Chem-Nuclear Systems, Inc. (CNSI) South Carolina DHEC Radioactive Material License No. 287-05. These work tasks included waste removal from the tanks which included tank entry, waste processing/treatment, waste shipment to Westinghouse Hanford, and radiological surveys of the tank surfaces. The State of California authorized Chem-Nuclear to perform the radiological work under the guidance of the aforementioned license since the DOE, Battelle EMO, and the University of California at Davis do not have a license to conduct these activities.

4.0 SUMMARY OF ACTIVITIES

Provided below is a chronological summary of project events.

5/22/91	Mobilized to project site to perform sampling for Phase I of the project.
5/24/91	Demobilized from project site. Completed sampling campaign as part of Phase I.
6/18/91	Completed testing for stabilization formulations for sludge and liquid waste. Developed cement formulations for waste. Also tested waste for possible demineralization and dewatering.
7/18/91	Laboratory completed remaining analyses for Imhoff and Radium Tank sludges.
7/23/91	Completed air dose assessments for Phase II work.
8/12/91	Commenced tests to change solidification formula to exclude cement/lime and use Magnesium Oxide chemistry.
8/17/91	Completed tests to use MgO chemistry. Formulations satisfactory for liquid and sludge waste with pH less than 12.5.
9/6/91	Submitted approved plans to Battelle EMO for Phase II work.
9/12/91	Received authorization from State of California for reciprocity agreement to utilize CNSI license for Phase II work.
9/17/91	Crew arrived on site for Phase II work. Commenced setup of equipment.
9/24/91	Completed setup of equipment.
9/25/91	Commenced pumping waste from tanks to liners.
9/30/91	Commenced solidification operations (Batch 1). Experienced poor mixing in Maxon mixer due to thick formulation. After reviewing formulations will cut down on Flyash for remaining waste loads from liner.
10/1/91	Solidified two batches of drums (Batches 2 & 3). Two drums from Batch 3 "burped". No release to the environment. Drums from Batch 1 will have to be reprocessed since they did not solidify into a monolith.
10/2/91	Commenced building drum curing area with roof overhead to reduce amount of heat from sun to curing drums. Reducing heat will help prevent drums from burping.
10/4/91	Completed building drum curing area.
10/7/91	Experienced maintenance problem with hydraulic mixer for solidification system. System down for repair.
10/8/91	Repaired mixer. Solidified one batch of waste (Batch 4).
10/9/91	Solidified two batches of waste (Batches 5 & 6).
10/10/91	Solidified three batches of waste (Batches 7, 8, &

	9). Had spill of contents from hose after removing connection from pressurized hose. No release to environment. No personnel contamination.
10/11/91	Solidified three batches of waste (Batches 10, 11, & 12). Commenced transporting solidified drums to on site storage at UC Davis.
10/14/91	Solidified Batch 13. Had one drum "burp" out of batch. Force from "burp" caused burlap to come off of drum ring.
10/15/91	Will tighten burlap with drum rings to contain "burping" material. We were only placing the drum rings around the burlap. We did not tighten the bolt on drum ring. Solidified three batches of waste (Batches 14, 15, & 16).
10/16/91	Solidified three batches of waste (Batches 17, 18, & 19). Detected possible leakage of liquids from Imhoff Tank C to Imhoff Tank B.
10/17/91	Solidified two batches of waste (Batches 20 & 21). Had another "burp". Burlap bag contained "burp". No release.
10/18/91	Solidified two batches of waste (Batches 22 & 23). Had two drums "burp" from Batch 23 including one drum which bowed at the bottom due to internal pressure buildup.
10/21/91	John Carlson recommended increasing mix time for batches after chemical addition and also add boric acid to mix to help slow curing process. Completed PCP tests using boric acid.
10/22/91	Solidified three batches of waste (Batches 24, 25 & 26). Safety inspection completed by Battelle EMO personnel.
10/23/91	Completed three batches of waste (Batches 27, 28 & 29).
10/24/91	Solidified two batches of waste (Batches 30 & 31).
10/28/91	Solidified two batches of waste (Batches 32 & 33). Had hose discharge waste inside berm and approximately 1 liter outside of berm while trying to unclog transfer hose.
10/29/91	Solidified two batches of waste (Batches 34 & 35).
10/30/91	Solidified three batches of waste (Batches 36, 37, & 38).
10/31/91	Solidified four batches of waste (Batches 39, 40, 41 & 42).
11/1/91	Processed two batches of waste (Batches 43 & 44). Had two drums "burp". Burlap contained "burps".
11/4/91	Solidified three batches of waste (Batches 45, 46 & 47).
11/5/91	Solidified three batches of waste (Batches 48, 49 & 50). Two drums from batch 49 burped. Burlap contained burp.
11/6/91	Sandpiper pump out of commission. Cannot pump waste to liner for mixing. Disconnected hoses and

	pump internals. Found large amount of foreign material inside of pump including metal chunks, plastic, and concrete. Informed by UC Davis to proceed with steps to utilize boric acid in solidification matrix.
11/7/91	Repaired sandpiper pump. Solidified one batch of waste (Batch 51).
11/8/91	Solidified two batches of waste (Batches 52 & 53). Experiencing excessive clogging of sandpiper pump due to foreign material in waste. Informed by EMO Project Manager to wait on boric acid addition until "burping" is fully evaluated.
11/9/91	Processed four batches of waste (Batches 54, 55, 56 & 57).
11/11/91	Completed two batches of waste (Batches 58 & 59). Could not work after 1700 due to no support from UC Davis.
11/12/91	Completed five batches of waste (Batches 60, 61, 62, 63 & 64).
11/13/91	Completed four batches of waste (Batches 65, 66, 67 & 68).
11/14/91	Processed four batches of waste (Batches 69, 70, 71 & 72).
11/15/91	Solidified four batches of waste (Batches 73, 74, 75 & 76).
11/18/91	Completed two batches of waste (Batches 77 & 78).
11/19/91	Solidified four batches of waste (Batches 79, 80, 81 & 82). One drum burped due to mechanical impact when technician slammed drums together. Burlap contained burp. No release.
11/20/91	Sandpiper pump out of commission. Pump down due to frozen due to piston actuator.
11/21/91	Completed repair of pump. Solidified three batches of waste (Batches 83, 84 & 85).
11/22/91	Completed five batches of waste (Batches 86, 87, 88, 89 & 90).
11/23/91	Completed two batches of waste (Batches 91 & 92).
11/25/91	Completed three batches of waste (Batches 93, 94 & 95).
11/26/91	Solidified four batches of waste (Batches 96, 97, 98 & 99).
12/2/91	Solidified two batches of waste (100 & 101).
12/3/91	Processed two batches of waste (102 & 103). Having difficult time pumping remainder of waste from tanks. May have to have tank entries to complete waste removal.
12/4/91	Completed three batches of waste (104, 105 & 106).
12/5/91	Completed two batches of waste (107 & 108).
12/6/91	Solidified two batches of waste (109 & 110). Discussed demobilization with EMO to prepare for tank entries.
12/9/91	Commences stenciling drums for waste shipment.

12/10/91	Filmed the inside of tanks for residual waste with camcorder. Film showed a relatively small amount of waste remained in Radium tanks. Imhoff tanks A & B still have waste. Liquid waste remains in Tank F. This liquid will be used in sluicing operations of the waste.
12/11/91	Commenced ordering equipment for tank entries. Commenced writing work instruction for confined space entry into tanks.
12/13/91	Demobilized from site to continue preparations for tank entry.
12/19/91	Submitted approved work instruction for confined space entry to EMO.
12/20/91	Obtained additional authorization from State of California for reciprocity to use CNSI license for remediation activities.
1/3/92	Remobilized personnel to site. Commenced assembly of equipment for tank entry. Commenced training personnel on confined space entry procedures.
1/9/92	Commenced tank entries following EMO approval of equipment and procedures. Commenced removing sludge from tanks.
1/15/92	All major waste removed from Imhoff Tank B. Setup to enter Radium Tank 1.
1/16/92	Upon initial entry into Radium Tank 1, ladder took up too much room in manway which resulted in not allowing enough room for entry into tank. Solidified two batches of waste (Batches 111 & 112).
1/17/92	Solidified two batches of waste (Batches 113 & 114).
1/21/92	Entered Radium Tank 1. Discovered large amount of waste still in tanks. Video from 12/10/91 did not show this waste. Waste volume approximately 7'W x 3.5'D x 7'L. Entered the three remaining Radium Tanks. Radium Tank 3 also has a large amount of waste remaining. Tanks 2 & 4 are relatively empty. Pumped all liquid from tanks back to empty Imhoff Tank. Radium tank liquid level increased since last entered which was prior to demobilization to prepare for tank entry.
1/22/91	Commenced prepping drums for shipment. Provided sample of waste in Radium Tank 1 to UC Davis.
1/23/92	Commenced removing waste from Radium Tanks into 55 gallon drums.
1/25/92	Continued entry into Radium Tank 1 for cleanup.
1/27/92	Made first waste shipment to Westinghouse Hanford (WHC) (60 drums).
1/28/92	Made second waste shipment to WHC (60 drums). Having a hard time placing pallets into trailer due to no loading dock.
1/29/92	Made third shipment of waste to WHC (60 drums).

1/30/92	Entered Radium Tank 1 for waste removal. Made Shipment #4 to WHC (60 drums).
1/31/92	Labeling drums for next shipment.
2/3/92	Made Shipment #5 (60 drums). Informed by WHC that contamination was found on inside bed of 4th shipment. WHC performing isotopic of smear sample.
2/4/92	Shipment #6 to WHC (60 drums). Solidified two batches of waste (Batches 115 & 116).
2/5/92	Completed two batches of waste (Batches 117 & 118).
2/6/92	Smear results for contaminated trailer at WHC were reported inaccurately. Smear was a gross smear and when averaged for the area smeared, the results were less than the limits. Loaded truck for 7th shipment.
2/7/92	Entered Radium Tank 1 for waste removal.
2/10/92	Made Shipment #7 to WHC (60 drums).
2/11/92	Made Shipment #8 to WHC (60 drums). Large amount of rain resulted in high levels of water inside of the berm. Pumped down the water to 55 gallon drums and an LSA box. Removed drums from area.
2/12/92	High levels of liquid were found inside of Radium Tanks possibly from rain which had filled the berm. Based on initial rainfall calculations, tank walls must also be leaking. Redirected rain from guttering system on surrounding building away from the bermed area. Plugged pipes leading into Radium tanks.
2/13/92	Pumped down Radium tanks into liner and Imhoff Tank. Pulling berm back away from Radium Tank covers. Covering Radium Tank manways.
2/14/92	Entered Imhoff Tank A to commence removing wooden trough and shroud. Detected creosote odor from trough area. Informed by EMO not to remove shroud since odor coming from shroud area. Solidified three batches of waste (Batches 119, 120 & 121).
2/17/92	Solidified four batches of waste (122, 123, 124 & 125). Will not agitate waste in Imhoff Tank A to keep waste from mixing with creosote. Creosote was used as a protective layer on the wood used in the trough.
2/18/92	Commenced mastic removal from Tank H. Tank H completed.
2/19/92	Continued mastic removal operations. Completed Imhoff Tank B with exception of mastic on wall. While cleaning tank had one technician become slightly contaminated in a small area at the throat at 1000 dpm. Also one other technician had a contaminated shirt in about the same area. Decontaminated personnel immediately after contamination found. Deconned personnel to background levels. Had high airborne levels due to radon levels.

2/20/92	Sampled and sent water samples to laboratory for analyses.
2/24/92	Removed LSA with wood and drums from area. Performed PCP to continue solidification operations. Entered Imhoff Tank C. More waste encountered than previously measured.
2/25/92	Solidified four batches of waste (Batches 126, 127, 128 & 129). Completed waste removal and mastic removal from Imhoff Tank C.
2/26/92	Solidified two batches of waste (Batches 130 & 131). Finished up Imhoff Tank D. Found a lot of debris in Tank D including lead bricks. Commenced operations in Tank E.
2/27/92	Solidified three batches of waste (Batches 132, 133 & 134). Completed Tank E.
2/28/92	Informed EMO approximately 2 more days were needed to remove trough in Imhoff Tank A. Solidified three batches of waste (135, 136 & 137).
2/29/92	Prepared Shipment #9 to WHC.
3/2/92	Made Shipment #9 to WHC (60 drums).
3/3/92	Made Shipment #10 to WHC (60 drums). Placed berm back over Radium Tanks.
3/4/92	Entered Imhoff Tank A to commence removing sludge. Noted tar like material in bottom with strong creosote smell. "Tar" outside of shrouded area. Took sample of "tar" and sent to laboratory for analyses. Solidified one batch of waste (Batch 138).
3/5/92	Due to rainfall, rolled berm back up again. Solidified two batches of waste (Batches 139 & 140).
3/6/92	Prepared waste previously removed from Radium Tank 1 for solidification.
3/7/92	Entered Imhoff Tanks to grid for surveys.
3/9/92	Solidified four batches of waste (Batches 141, 142, 143 & 144). Continued gridding tank wall and floor surfaces. Rolled out berm and made repairs to berm. Discovered 1200 gallons of liquid in Radium Tanks which was not in tanks when the manways were sealed. UC Davis directed CWM to solidify liquid. Entered Radium Tank 1 for waste removal. Had one technician contaminate sock at frisking station when he lost his balance and placed foot inside contaminated area.
3/10/92	Entered Imhoff Tanks B & G and performed coring operations. Entered Radium Tank 1 for waste removal.
3/11/92	Entered Radium Tank 1 for waste removal. Completed waste removal from Radium Tank 1. Took core samples from Imhoff Tanks C, D, E, and H. Filled holes with grout.
3/12/92	Solidified two batches of waste (Batches 145 &

146). Completed waste removal from Radium Tank 2.

3/13/92 Solidified three batches of waste (Batches 147, 148 & 149). Completed surveying and core boring of Radium Tank 1. Continued work in Radium Tank 3.

3/14/92 Solidified three batches of waste (Batches 150, 151 & 152). Completed waste removal from Radium Tank 3. Completed survey and coring of Radium Tank 2. Commenced work on Radium Tank 4.

3/15/92 Completed waste removal from Radium Tank 4. Completed surveying and coring of Radium Tanks 3 & 4.

3/16/92 Solidified six batches of waste (Batches 153, 154, 155, 156, 157 & 158). Surveyed Imhoff Tank B. Pumped liquid from Imhoff Tank I to Baker Tank per direction of EMO/UC Davis.

3/17/92 Solidified six batches of waste (Batches 159, 160, 161, 162, 163 & 164). Continued pumping liquid from Imhoff Tank I to Baker tank. Completed surveys in Imhoff Tanks D, E, G & H.

3/18/92 Solidified six batches of drums (Batches 165, 166, 167, 168, 169 & 170). One drum "burped". Burlap bag contained burp. Completed pumping Imhoff Tank I to Baker Tank.

3/19/92 Pumped and removed remaining sludge in Imhoff Tank F. Solidified three batches of waste (Batches 171, 172 & 173). Made Shipment #11 (60 drums).

3/20/92 Solidified final batch of waste (Batch 174). Solidified two liners (A & B).

3/23/92 Prepared Shipment #12 (60 drums). Completed survey of Imhoff Tanks F & I.

3/24/92 Crane to load liners out of commission. UC Davis will lease crane to load liners. Made Shipment #12 to WHC (60 drums).

3/26/92 Made Shipment #13 (60 drums) and Shipment #14 (2 liners) to WHC. Made shipment of equipment back to CWM/CNSI. Completed demobilization of equipment and personnel.

The field project logs for the CWM Project Manager and Site Safety Officer (Radiological Controls Supervisor/RCS) are being maintained as Quality Assurance (QA) records per Reference 2.1.

5.0 SOLIDIFICATION AND PCP RECORDS

A total of forty-nine (49) Process Control Program (PCP) tests were performed to determine the proper formulation to utilize for full scale solidification. PCPs 001 through 003 were test samples run on actual samples pulled from waste in the tanks. The remaining PCP tests were performed on actual samples taken from waste removed from the tanks prior to full scale

processing. The PCP used for full scale solidification is noted on the Full Scale Solidification Worksheet.

A total one hundred seventy-four (174) batches and two (2) liners of waste were solidified. Each batch resulted in four (4) to seven (7) drums of solidified waste dependent upon the volume of waste processed and type of waste (liquid/sludge). A total of seven hundred eighty-four (784) drums of waste were solidified from the batches. Four of the drums were reprocessed in later loads due to inadequate curing. Each Full Scale Solidification Worksheet denotes the amount of chemical added to the batch/liner, drum number solidified in the batch, radiation and contamination levels on the exterior of the solidified drums, and final product inspection results.

The PCP and Full Scale Solidification Worksheets from the project are provided as Appendix A (Volumes I and II) to this document. The PCP and Full Scale Solidification Worksheet records are being maintained by CWM as QA Records per Reference 2.1.

6.0 TANK AND FINAL PROJECT SURVEY RESULTS

Provided as Appendix B to this document are the final survey results for the Imhoff Building, Area surrounding the Imhoff Building (under location of berm), and tank survey results following waste removal. Calibration records, Scaler Instrumentation Reliability Factor Check Sheets, Daily Instrument Check Sheets and the radiological surveys are being maintained by CWM/CNSI as QA records in accordance with Reference 2.1. Also, all Radiation Work Permits and Confined Space Entry Permits are being maintained as QA Records. Provided in the table below is a summary of the loose surface contamination survey results for these areas.

SURVEY RESULT SUMMARY

SURVEY ZONE	Average ALPHA (dpm/100 cm^2)	Avg Beta /Gamma (dpm/100 cm^2)	Maximum ALPHA (dpm/100 cm^2)	Max Beta /Gamma (dpm/100 cm^2)
Imhoff Building (#032592-04-UCD)	4	758	20	2162
Imhoff Laboratory (#032692-02-UCD)	0.5	65	1	184
Covered Berm Area (#032692-04-UCD)	0.1	178	1	456

SURVEY ZONE	Average ALPHA (dpm/100 cm^2)	Avg Beta /Gamma (dpm/100 cm^2)	Maximum ALPHA (dpm/100 cm^2)	Max Beta /Gamma (dpm/100 cm^2)
Imhoff Tank B (#031692-03-UCD)	37	6617	128	20869
Imhoff Tank C (#031792-01-UCD)	10	1938	36	7766
Imhoff Tank D (#031792-02-UCD)	1	318	4	1197
Imhoff Tank E (#031792-03-UCD)	3	353	10	1034
Imhoff Tank F (#032392-04-UCD)	15	2295	47	7875
Imhoff Tank G (#031792-05-UCD)	1	169	4	1251
Imhoff Tank H (#031792-04-UCD)	0.5	81	4	197
Imhoff Tank I (#032392-05-UCD)	3	343	23	884
Radium Tank 1 (#031392-01-UCD)	3	88	10	129
Radium Tank 2 (#031492-02-UCD)	9	107	23	245
Radium Tank 3 (#031592-01-UCD)	5	77	15	129
Radium Tank 4 (#031592-02-UCD)	8	52	23	109

In addition to the survey results noted above, direct alpha and beta/gamma frisks were performed on the walls of the tanks. The direct frisks ranged from 9238K dpm/probe for beta/gamma in Imhoff Tank B to 23337 dpm/probe for beta/gamma in Radium Tank 1. The high direct frisk readings were mainly due to the mastic remaining on the tank surfaces in the Imhoff tanks and the pitting/erosion of the Radium tanks.

In accordance with Reference 2.2, the acceptable average, maximum, and removable beta/gamma contamination surface levels for Ra-226 are 100, 300, and 20 dpm/100 cm^2 respectively.

7.0 ANALYTICAL RESULTS

The following tables/sections provide the analytical results from core and soil samples, rainwater samples, and Imhoff Tank A waste sample. The analytical results are provided as Appendix C to this document. The analytical results of these samples are being maintained as QA records in accordance with Reference 2.1.

7.1 Analytical Results for Core Samples from Tanks

The following table summarizes the analytical results of the core samples from the tanks. The middle four inches of the core sample was analyzed by the contract laboratory. The contract laboratory (CEP) order number is #92-03-654.

CORE SAMPLE ANALYTICAL RESULTS

Tank	Ra-226 (pCi/gm)	Th-228 (pCi/gm)	Th-232 (pCi/gm)	Sr-90 (pCi/gm)	H-3 (pCi/gm)
Imhoff-B	<0.1	<0.1	0.14	<0.1	0.67
Imhoff-B (Duplicate)	0.15	0.3	0.13	<0.1	<0.5
Imhoff-C	0.20	0.2	0.17	2.94	0.62
Imhoff-D	0.13	0.6	<0.1	<0.1	0.62
Imhoff-E	0.16	0.2	0.17	<0.1	0.69
Imhoff-F	<0.1	<0.5	<0.1	<0.1	<0.5
Imhoff-G	0.12	<0.4	0.14	<0.1	0.84
Imhoff-H	0.10	<0.5	<0.1	<0.1	3.34
Imhoff-I	0.14	<0.5	0.15	<0.1	0.72
Radium-1	0.63	0.8	0.53	<0.1	0.64
Radium-2	0.32	0.3	0.24	<0.1	1.14
Radium-3	033	<0.3	0.19	<0.1	1.25
Radium-3 (Duplicate)	0.34	<0.3	0.10	<0.1	1.09
Radium-4	0.39	<0.4	<0.1	<0.1	1.03

7.2 Analytical Results for Soil Samples

The following table summarizes the analytical results of

the soil samples taken underneath the tanks through the holes drilled for the core samples. The contract laboratory (CEP) order number is #92-03-655.

SOIL SAMPLE ANALYTICAL RESULTS

Tank	Ra-226 (pCi/gm)	Th-228 (pCi/gm)	Th-232 (pCi/gm)	Sr-90 (pCi/gm)	H-3 (pCi/gm)
Imhoff-B	1.05	0.8	0.92	2.11	1.16
Imhoff-B (Duplicate)	1.14	0.9	1.02	1.86	<0.5
Imhoff-C	0.32	<0.7	0.44	1.47	<0.5
Imhoff-D	0.83	0.8	0.75	0.11	<0.5
Imhoff-E	0.44	<0.6	0.53	0.25	<0.5
Imhoff-F	0.67	0.8	0.64	0.38	<0.5
Imhoff-G	0.71	0.6	0.73	0.20	0.92
Imhoff-H	0.53	<0.6	0.57	0.74	<0.5
Imhoff-I	0.43	<0.4	0.37	0.15	<0.5
Radium-1	0.42	<0.4	<0.3	0.10	<0.5
Radium-2	1.62	2.1	1.66	0.18	0.63
Radium-3	0.47	<0.6	0.52	0.15	<0.5
Radium-3 (Duplicate)	<0.2	<0.6	0.54	0.77	<0.5
Radium-4	0.40	0.4	0.45	0.18	<0.5

7.3 Rainwater/Liquid Sample Results

The following table provides the results of the liquid and rainwater samples analyzed during the project. The contract laboratory order numbers for the following samples are #92-02-463, #92-03-070, and #92-03-663.

LIQUID/RAINWATER SAMPLE RESULTS

Sample	Gamma Spec (pCi/l)	Gross Alpha (pCi/l)	Gross Beta (pCi/l)	Sr-90 (pCi/l)	H-3 (pCi/l)
Imhoff-I	ND	12	102		<500

Sample	Gamma Spec (pCi/l)	Gross Alpha (pCi/l)	Gross Beta (pCi/l)	Sr-90 (pCi/l)	H-3 (pCi/l)
Imhoff-I (Duplicate)	ND	14	129		<500
LSA-Red	ND	<2	193		<500
LSA-Green	ND	<2	29		<500
Imhoff-I				17.6	
LSA-Red				37.2	
85 Gal Drum	ND	5	105	10.8	921

7.4 Imhoff Tank A Waste Sample Results

The following table summarizes the sample results from the waste in Imhoff Tank A. The contract laboratory order number for this sample is #92-03-200. To confirm the results of creosote, a sample must be taken of the waste and analyzed per Method 8250 for Carbazole.

IMHOFF TANK A SAMPLE RESULTS

Method	Chemical	Units	Result	Detection Limit
8250	Total Xylenes	ug/kg	9400	3000
8270	2-Methylnaphthalene	mg/kg	3800	100
8270	Acenaphthene	mg/kg	1600	19
8270	Acenaphthylene	mg/kg	94	35
8270	Anthracene	mg/kg	540	19
8270	Benzo(a)anthracene	mg/kg	220	78
8270	Chrysene	mg/kg	190	25
8270	Dibenzofuran	mg/kg	1300	100
8270	Fluorene	mg/kg	2100	19
8270	Phenanthrene	mg/kg	540	54
8270	Pyrene	mg/kg	1100	19

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8.2 [redacted]

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[redacted]	[redacted]	[redacted]	[redacted]

8.3 [redacted]

[redacted]

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[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
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[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

was not available for additional analyses.

9.0 PROJECT WASTE SHIPMENTS

A total of fourteen (14) project waste shipments were made from the UC Davis site to the disposal site at Westinghouse Hanford. Thirteen (13) shipments were drum shipments with each load containing sixty (6) drums. The last shipment was the liner shipment which transported two (2) solidified liners to the disposal site for final disposition. The shipment records for these fourteen (14) waste shipments are provided in Appendix D (Volumes I, II, and III) to this document. All waste shipment records are being maintained as QA records in accordance with Reference 2.1. The following table depicts the total activity per isotope for each shipment with a total provided for all waste shipments.

SHIPMENT ACTIVITY TOTALS

Shipment	Ra226 (mCi)	Sr90 (mCi)	Y90 (mCi)	H-3 (mCi)	Pu241 (uCi)	Th228 (uCi)	Th232 (uCi)
1	0.06	0.57	0.57	0.97	0.02	1.83	3.62
2	.121	.0704	.0704	.106	.0423	.383	13.0
3	.118	.386	.386	.0125	15.7	27.5	9.26
4	.287	.668	.668	.106	3.45	45.2	13.7
5	.124	4.37	4.37	.0139	16.4	242	10.9
6	.577	6.56	6.56	.0233	15.1	224	3.59
7	.138	8.78	8.78	.0226	30.2	447	3.22
8	.0639	7.42	7.42	.0196	31.4	465	2.25
9	.249	.973	.973	.00655	13.8	76.9	161
10	.156	10.3	10.3	.0965	72.0	1030	43.6
11	.419	.0187	.0187	.00506	.878	.436	15.4
12	.419	.0187	.0187	.00506	.878	.436	15.4
13	.402	.197	.197	.006	1	9	15
14	.103	5.22	5.22	1.6	0	1	7
Totals	3.2	45.6	45.6	3.0	200.9	2,571	316.9

10.0 PROBLEM AREAS/LESSONS LEARNED

10.1 Reaction Between Waste and Stabilization Chemicals

The main problem which occurred during the project was the reaction which occurred during the curing process when the magnesium oxide (one of the solidification agents) reacted with the waste causing a "burp" in the curing billet. This problem can be traced to three (3) reasons.

The first reason is the reaction between the chemicals in the waste and the magnesium oxide. During the solidification campaign, an air sample was taken of the gas being released during the "burping" of the billet. The air sample revealed a small amount of carbon disulfide in the air sample which is reactive with magnesium oxide. Nothing could be done to correct this problem.

The second reason for the reaction is the ambient temperature surrounding the curing billet. The higher the temperature, the faster the billet cured resulting in a large internal temperature increase which could help aid the gas release. A cover was added over the drum curing area to reduce the effects of the ambient temperature by placing the drums in the shade.

The third reason for the reaction was the mixing of the chemicals with the waste. If the magnesium oxide was not properly distributed in the billet, "pockets" of magnesium oxide would form resulting in a reaction which could cause the gas release. A longer mixing time and a smaller batch were used to help the solidified product have a better mixture of chemical and waste.

10.2 Waste Removal from Tanks

The other major problem encountered during the project was the inability of the various pump matrices to remove the waste from the tanks. To correct this problem, the pumping configurations were changed to allow purging of all lines with air. Also in line screens/filter were added to the pumps to remove foreign material (metal, paper, syringes, etc.) prior to clogging the pumps. Also the tanks were entered to mechanically remove the waste by manual means.

To better prepare for future tank cleaning jobs in the future, one of two methods should be used for tank cleaning. The first method will include waste removal with pumps, but larger amounts of water would be used for

getting the sludge into solution. The first method will need to have a demineralization system in place to clean the water and the discharge of the demineralization system would be directed to the sewage system.

The second method of sludge removal would use an air moving system which would use a large blower (approximately 4000 cfm) to take a suction on the waste and dump the waste in a container between the blower suction and tank. Personnel must also be ready for tank entries to perform this method.

10.3 General Radiological Cleanliness

The last problem evolved around maintaining radiological cleanliness inside of the restricted area. Cleanliness was hampered by three conditions: (1) waste removal from tanks, (2) tank entry by personnel, and (3) drum solidification. Condition (1) could be helped by employing one of the waste removal methods discussed under Section 10.2. There are no good fixes for Condition (2). Liner solidification could be used to reduce the effects of Condition (3). Although more expensive, it would helped maintain cleanliness inside of the berm and because of the better mixing capabilities of the liner over the Maxon mixer (batch mixer), the likelihood of the "burps" could have been reduced.

11.0 CONCLUSIONS/RECOMMENDATIONS

11.1 Tank Surveys and Core Samples

Based on the surveys of the tanks and the levels specified for free release under Reference 2.2., the surfaces of the tanks may need to be scabled prior to release. Although there are no release limits for concrete in Federal or State regulations, regulatory agencies have provided release levels on a case by case basis. Based on the levels of activity in the core samples, the activity levels are less than the levels established by regulatory agencies for free release.

11.2 Soil Samples

The same hold true for the core samples as for the soil samples. There are no established Federal or State guidance for the free release of soil, although the levels in the soil are less than the levels normally provided by regulatory agencies for free release. Regulatory agencies have not routinely established

release levels for tritium.

11.3 Imhoff Tank A Waste

Although the analysis performed on the Imhoff Tank A waste does not indicate the waste would be classified as a mixed waste, the chemicals of a wood preservation process are present in the waste. Method 8250 must be performed to confirm the presence of Carbazole which will confirm the presence of creosote. EMO must classify this waste following analysis for carbazole.

11.4 Rainwater/Liquid Samples

Additional information will have to be obtained from the contract laboratory to find out the amount of Ra-226, Th-228 and Th-232 present in the samples. By listing ND (Nothing Detectable), the contract laboratory means there are no manmade isotopes present in the sample. The levels for Sr-90 and H-3 are less than the free release limits specified in Reference 2.3.

After the information is received for the Gamma Spec sample, the liquid could possibly be released to the University's sewage system.

APPENDIX A

PCP AND SOLIDIFICATION WORKSHEET RECORDS
(Two Volumes - See Attached)

APPENDIX B

SURVEY RECORDS
(39 Pages)

SURVEY RECORDS
TABLE OF CONTENTS

PROJECT NAME UC DAVIS PROJECT NUMBER 46831

Date	SURVEY ZONE	Pages	Survey No.
3/25/92	Imhoff Building	3	#032592-04-UCD
3/26/92	Imhoff Laboratory	2	#032692-02-UCD
3/26/92	Covered Berm Area	2	#032692-04-UCD
3/16/92	Imhoff Tank B	4	#031692-03-UCD
3/17/92	Imhoff Tank C	2	#031792-01-UCD
3/17/92	Imhoff Tank D	2	#031792-02-UCD
3/17/92	Imhoff Tank E	2	#031792-03-UCD
3/23/92	Imhoff Tank F	2	#032392-04-UCD
3/17/92	Imhoff Tank G	2	#031792-05-UCD
3/17/92	Imhoff Tank H	2	#031792-04-UCD
3/23/92	Imhoff Tank I	2	#032392-05-UCD
3/13/92	Radium Tank 1	3	#031392-01-UCD
3/14/92	Radium Tank 2	3	#031492-02-UCD
3/15/92	Radium Tank 3	3	#031592-01-UCD
3/15/92	Radium Tank 4	3	#031592-02-UCD

CONTAMINATION/RADIATION SURVEY REPORT

ID	DATE 3/25/92	TIME START 1500	TIME COMPL 1700
PAGE 1 OF 3			

ACTIVITY LOCATION UC DAVIS	SURVEYOR Scott Wood	PHONE N/A
ITEM - OLD DAVIS RD		
DAVIS, CA	MAP ID Imhoff building	Survey Number 032592-04-UCD

DAILY / WEEKLY / MONTHLY — CONTAMINATION AND — DAILY / WEEKLY / MONTHLY — RADIATION SURVEY

COMMENTS

PERMISSIBLE LEVELS	CSCA AREA CONTROL LEVELS	
2/1000 dpm/100 cm² ALPHA	NA dpm/100 cm² ALPHA	☐ OTHER (SEE COMMENTS)
2/1000 dpm/100 cm² BETA-GAMMA	NA dpm/100 cm² BETA-GAMMA	☐ NO ACTION REQ'D.

SOURCE CHECK DATA	CONTAMINATION SURVEYS		RADIATION
	ALPHA	BETA/GAMMA	BETA/GAMMA
SOURCE I.D.	Th-230	Tc-99	Cs-137
SOURCE STRENGTH	13900 dpm	7190 dpm	5.0 µCi ~~mRAD~~
INSTRUMENT RESPONSE	5166 cpm	1095 cpm	1.2 mR/hr.
EFFICIENCY/CORRECTION FACTOR	0.372/2.7	0.146/6.8	NA
MDA*	17 dpm	228 dpm	SAT. ☒ UNSAT. ☐
BACKGROUND	1 cpm	43 cpm	.002 mR/hr.

CONTAMINATION SURVEY INSTRUMENT TYPE TAG NO	ALPHA LUDLUM 2929 #74075		BETA-GAMMA W43-10-1 #71288
RADIATION SURVEY INSTRUMENT TYPE TAG NO	NEUTRON NA		BETA-GAMMA PRM-7/#452

RADCON REVIEW _____ DATE _____

REASON FOR SURVEY
- ☐ PROCEDURE—NO. _____
- ☒ SPECIAL Final Survey - ~~Pre~~ SW
- ☐ ROUTINE _____

SWIPE PROBE NO	ALPHA EQUIV Th 230 dpm/PROBE	ALPHA EQUIV Th 230 dpm/100 cm²	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA EQUIV Tc-99 dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
1	N/A	7	N/A	660	N/A	SEE SURVEY MAP
2		1		1047		
3		ND		476		
4		ND		1183		
5		ND		388		
6		1		340		
7		ND		422		
8		4		272		
9		ND		265		
10		9		496		
11		4		1095		
12		15		755		
13		4		510		
14		9		993		
15		7		891		
16		17		1896		
17	✓	9	✓	1836	✓	✓
18	N/A	1	N/A	1129	N/A	SEE SURVEY MAP
19		20		1748		
20		ND		959		
21		9		2162		
22		9		571		
23		1		1435		
24		9		1448		
25		4		286		
26		7		1319		
27		ND		354		
28		4		35		
29		4		558		
30		1		612		
31		1		653		
32		1		605		
33		9		945		
34		1		1235		
35		1		1340		
36		9		789		
37		1		435		
38		1		789		
39		1		755		
40	✓	1	✓	245	✓	✓

* THE KNOWING & WILLFUL RECORDING OF FALSE, FICTICIOUS, OR FRAUDULENT STATEMENTS OR ENTRIES ON THIS DOCUMENT MAY BE PUNISHABLE AS A FELONY UNDER FEDERAL STATUTES.

(MINATION/RADIATION SURVEY REPORT
CO...INUATION SHEET

TO:

ACTIVITY/LOCATION: UC Davis Davis, CA.

MAP ID: Imhoff building

PAGE 2 OF 3

COMMENTS

SURVEYOR: S. Wood

Survey Number: 032592-04-UCD

DATE: 3-25-92

NOTE: THE KNOWING & WILLFUL RECORDING OF FALSE, FICTITIOUS, OR FRAUDULENT STATEMENTS OR ENTRIES ON THIS DOCUMENT MAY BE PUNISHABLE AS A FELONY UNDER FEDERAL STATUTES.

Radcon Review Date

SWIPE/ PROBE NO.	ALPHA EQUIV Th 230 dpm/ PROBE	ALPHA EQUIV Th 230 dpm/ 100 cm²	BETA-GAMMA EQUIV Tc 99 dpm/ PROBE	BETA-GAMMA EQUIV Tc 99 dpm/ 100 cm	mrem/hr. BETA-GAMMA NEUTRON micro R/hr.	ITEM OR LOCATION
41	N/A	1	N/A	836	N/A	SEE SURVEY MAP
42		4		754		
43		1		666		
44		4		579		
45		4		95		
46		7		564		
47		4		993		
48		1		796		
49		ND		1102		
50		ND		238		
51		1		190		
52		1		190		
53		4		ND		
54		4		354		
55		ND		184		
56		4		292		
57		15		1578		
58		9		1081		
59		7		605		
60	✓	1	✓	401	✓	✓
				N		
				A		

SWIPE/ PROBE NO	ALPHA EQUIV Th 230 dpm/ PROBE	ALPHA EQUIV Th 230 dpm/ 100 cm²	BETA-GAMMA EQUIV Tc 99 dpm/ PROBE	BETA-GAMMA EQUIV Tc 99 dpm/ 100 cm	mrem/hr BETA-GAMMA NEUTRON micro R/hr	ITEM OR LOCATION
				N		
				A		

ND - Not Detectable

RADIOLOGICAL CONTROL

DATE: 3-25-92 SURVEYER(S): S.Wo

Survey # 032592-04-WO

Rev: 0; 2/13/91

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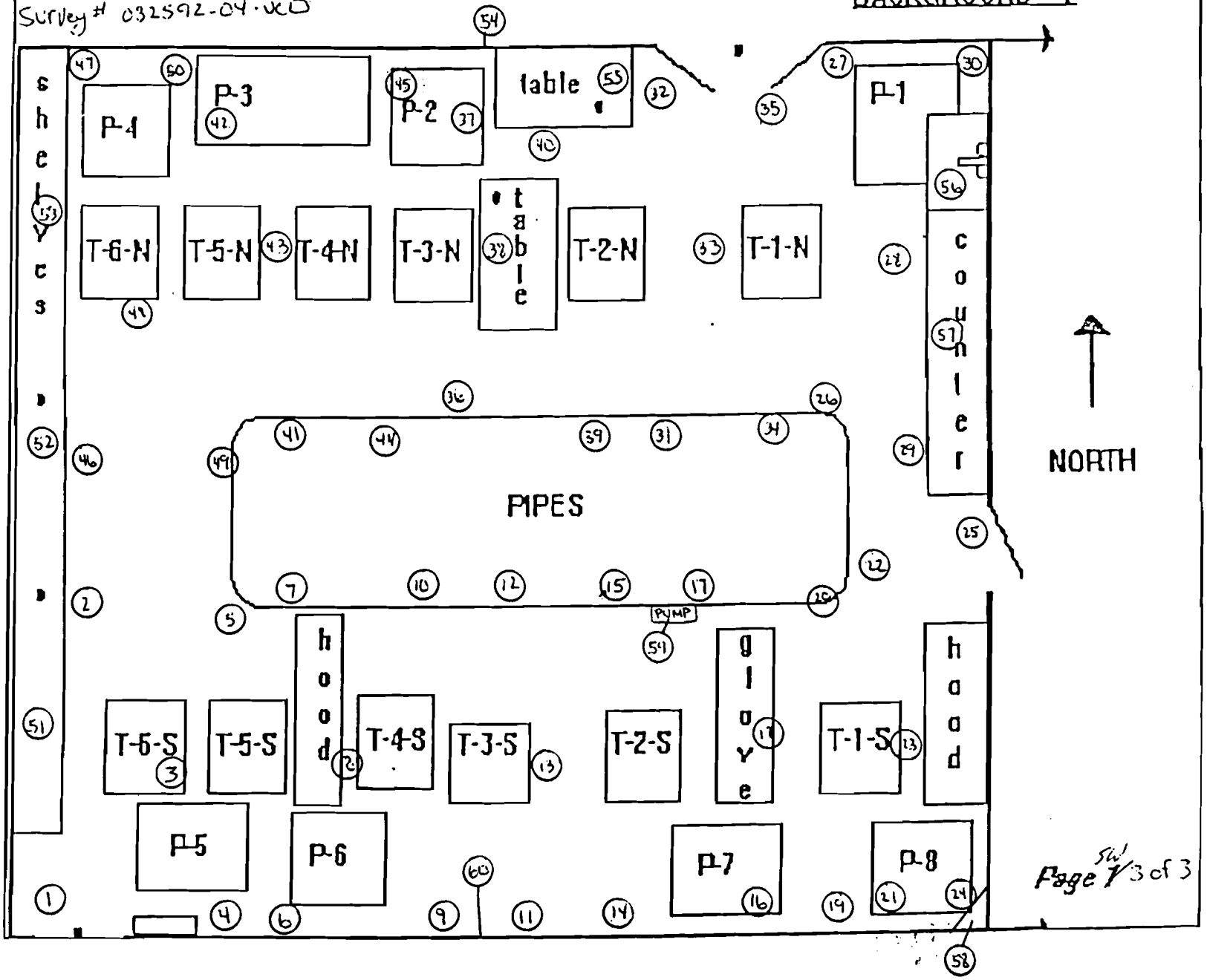

Page 3 of 3

CL IATION/RADIATION
SUR EPORT

ID

DATE 3-26-92 | TIME START 0930 | TIME COMPL 1000 | PA 1 OF 2

ACTIV. LOCATION: UC DAVIS, ITEM - OLD DAVIS RD, DAVIS, CA

SURVEYOR: V. HART | PHONE: NIT

MAP ID | Survey Number: 032692-02-UCD

DAILY / WEEKLY / MONTHLY: CONTAMINATION AND RADIATION SURVEY

COMMENTS

PERMISSIBLE LEVELS	CSCA AREA CONTROL LEVELS	
5,000 dpm/100 cm² ALPHA	NA dpm/100 cm² ALPHA	☐ OTHER (SEE COMMENTS)
5,000 dpm/100 cm² BETA-GAMMA	NA dpm/100 cm² BETA-GAMMA	☐ NO ACTION REQ'D.

SOURCE CHECK DATA	CONTAMINATION SURVEYS		RADIATION
	ALPHA	BETA/GAMMA	BETA/GAMMA
SOURCE I.D.	TH-230	Tc-99	Cs-137
SOURCE STRENGTH	13900 dpm	7190 dpm	5.0 μCi ~~mRAD~~
INSTRUMENT RESPONSE	5166 cpm	1095 cpm	1.2 mR/hr.
EFFICIENCY/CORRECTION FACTOR	0.372/2.7	0.146/6.8	NA
MDA	17 dpm	228 dpm	SAT. ☒ UNSAT. ☐
BACKGROUND	1 cpm	43 cpm	.002 mR/hr.

CONTAMINATION SURVEY INSTRUMENT TYPE TAG NO	ALPHA	BETA-GAMMA
	LUDLUM 2929 #74075 w/43-10-1 #71288	
RADIATION SURVEY INSTRUMENT TYPE TAG NO	NEUTRON	BETA-GAMMA
	NA	PRM-7 / #452

RADCON REVIEW [signature] DATE 4/15/92

REASON FOR SURVEY ☐ PROCEDURE—NO. ☒ SPECIAL IMHOFF LAB - EXIT SURVEY ~~☐ ROUTINE~~

SWIPE PROBE NO	ALPHA EQUIV TH-230 dpm/PROBE	ALPHA dpm/100 cm²	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☒ NEUTRON ☐ micro R/hr ☒	ITEM OR LOCATION
1	NA	ND	NA	61	SEE MAP	SEE MAP
2		ND		116		
3		ND		41		
4		ND		184		
5		1		75		
6		1		109		
7		ND		54		
8		ND		88		
9		ND		34		
10		ND		7		
11		ND		ND		
12		1		82		
13		ND		68		
14		1		61		
15		ND		ND		
16						
17						

SWIPE PROBE NO	ALPHA EQUIV ___ dpm/PROBE	ALPHA dpm/100 cm²	BETA-GAMMA EQUIV ___ dpm/PROBE	BETA-GAMMA dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
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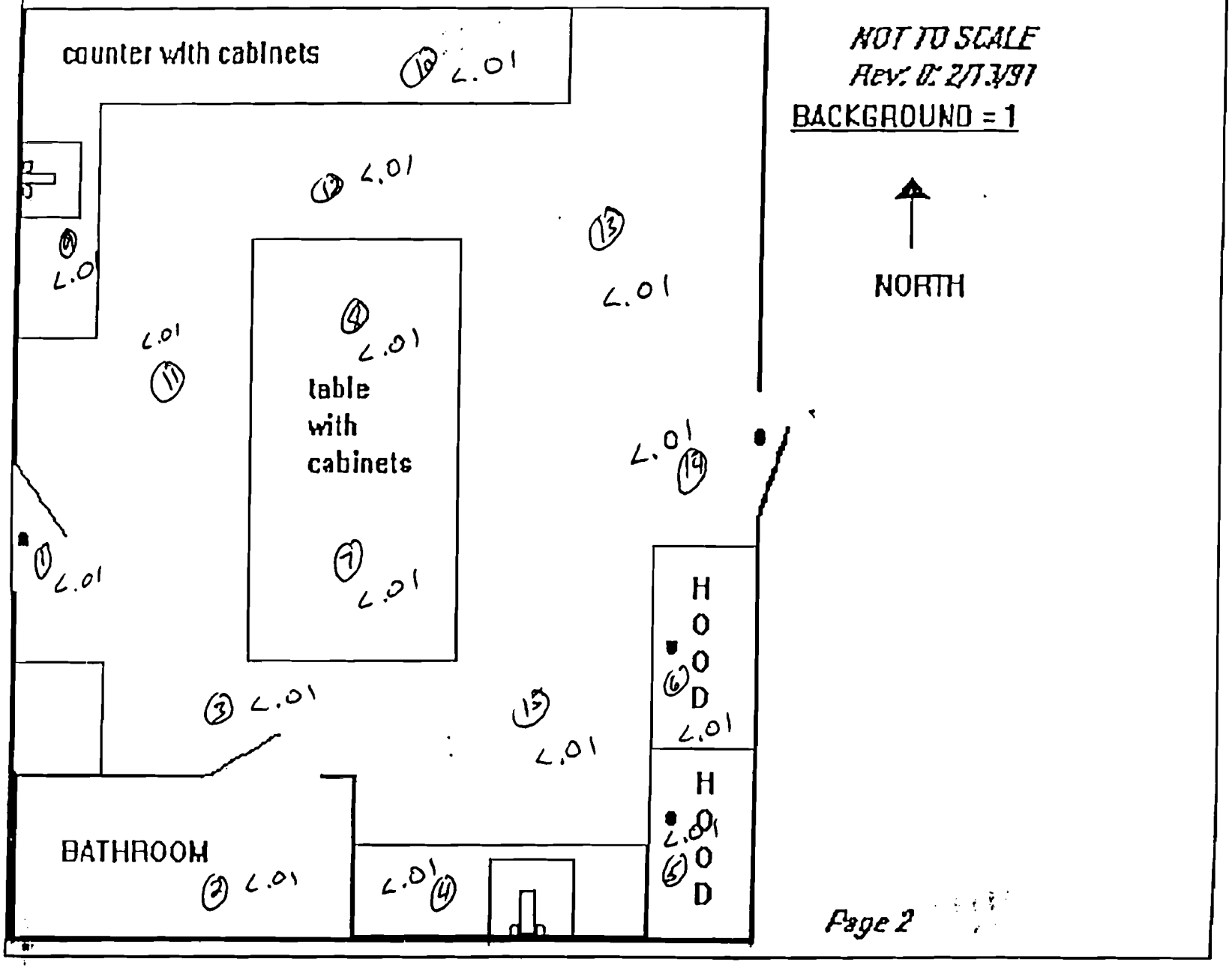
WILLFUL RECORDING OF FALSE, FICTICIOUS, OR FRAUDULENT STATEMENTS OR ENTRIES ON THIS DOCUMENT MAY BE PUNISHABLE AS A FELONY UNDER FEDERAL STATUTES.

IMHOFF LAB SECTION BUILDING SURVEY DATE:_____ SURVEYERS:_____



NOT TO SCALE
Rev: 0: 2/7.3/91

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Page 2

CONTAMINATION/RADIATION SURVEY REPORT

TO 46831

DATE 3-26-92 | TIME START 1130 | TIME COMPL 1150 | P. 1 OF 2

ACTIVITY LOCATION UC DAVIS

ITEM - OLD DAVIS RD

DAVIS, CA

SURVEYOR V. Hart

PHONE N/A

MAP ID Covered burn area

Survey Number 032692-04-UCD

DAILY WEEKLY MONTHLY ☐ CONTAMINATION AND DAILY WEEKLY MONTHLY ☐ RADIATION SURVEY

COMMENTS

PERMISSIBLE LEVELS	CSCA AREA CONTROL LEVELS	
5/000 dpm/100 cm² ALPHA	NA dpm/100 cm² ALPHA	☐ OTHER (SEE COMMENTS)
7/000 dpm/100 cm² BETA-GAMMA	NA dpm/100 cm² BETA-GAMMA	☑ NO ACTION REQ'D.

SOURCE CHECK DATA	CONTAMINATION SURVEYS ALPHA	CONTAMINATION SURVEYS BETA/GAMMA	RADIATION BETA/GAMMA
SOURCE I.D.	TH-230	Tc-99	Cs-137
SOURCE STRENGTH	13900 dpm	7190 dpm	5.0 μCi ~~mR/hr~~
INSTRUMENT RESPONSE	5166 cpm	1095 cpm	1.2 mR/hr.
EFFICIENCY/CORRECTION FACTOR	0.372/2.7	0.146/6.8	NA
MDA *	17 dpm	228 dpm	SAT. ☒ UNSAT. ☐
BACKGROUND	1 cpm	43 cpm	.002 mR/hr.

CONTAMINATION SURVEY INSTRUMENT TYPE TAG NO	ALPHA LUDLUM 2929 #74075 w/43-10-1 #71288	BETA-GAMMA
RADIATION SURVEY INSTRUMENT TYPE TAG NO	NEUTRON NA	BETA-GAMMA PCM-7/#452

RADCON REVIEW [signature] DATE 3-31-92

REASON FOR SURVEY ☐ PROCEDURE—NO. ☑ SPECIAL Final Survey ☐ ROUTINE

SWIPE PROBE NO	ALPHA EQUIV Th230 dpm/PROBE	ALPHA dpm/100 cm²	BETA-GAMMA EQUIV Tc99 dpm/PROBE	BETA-GAMMA dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
1	N/A	ND	N/A	191	N/A	SEE SURVEY MAP
2		1		82		
3		ND		68		
4		ND		184		
5		ND		388		
6		ND		14		
7		ND		395		
8		ND		7		
9		ND		456		
10	✓	ND	✓	ND	✓	✓
11						
12						
13					N	
14					A	
15						
16						
17						

SWIPE PROBE NO	ALPHA EQUIV ___ dpm/PROBE	ALPHA dpm/100 cm²	BETA-GAMMA EQUIV ___ dpm/PROBE	BETA-GAMMA dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
18						
19						
20						
21						
22						
23						
24						
25						
26						
27					N	
28					A	
29						
30						
31						
32						
33						
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40						

* THE KNOWING & WILLFUL RECORDING OF FALSE, FICTICIOUS, OR FRAUDULENT STATEMENTS OR ENTRIES ON THIS DOCUMENT MAY BE PUNISHABLE AS A FELONY UNDER FEDERAL STATUTES.

Contamination Survey Grid Map

46831

LOCATION UC Davis - Davis, CA. COVERED BERM AREA

2 OF 2

COMMENTS

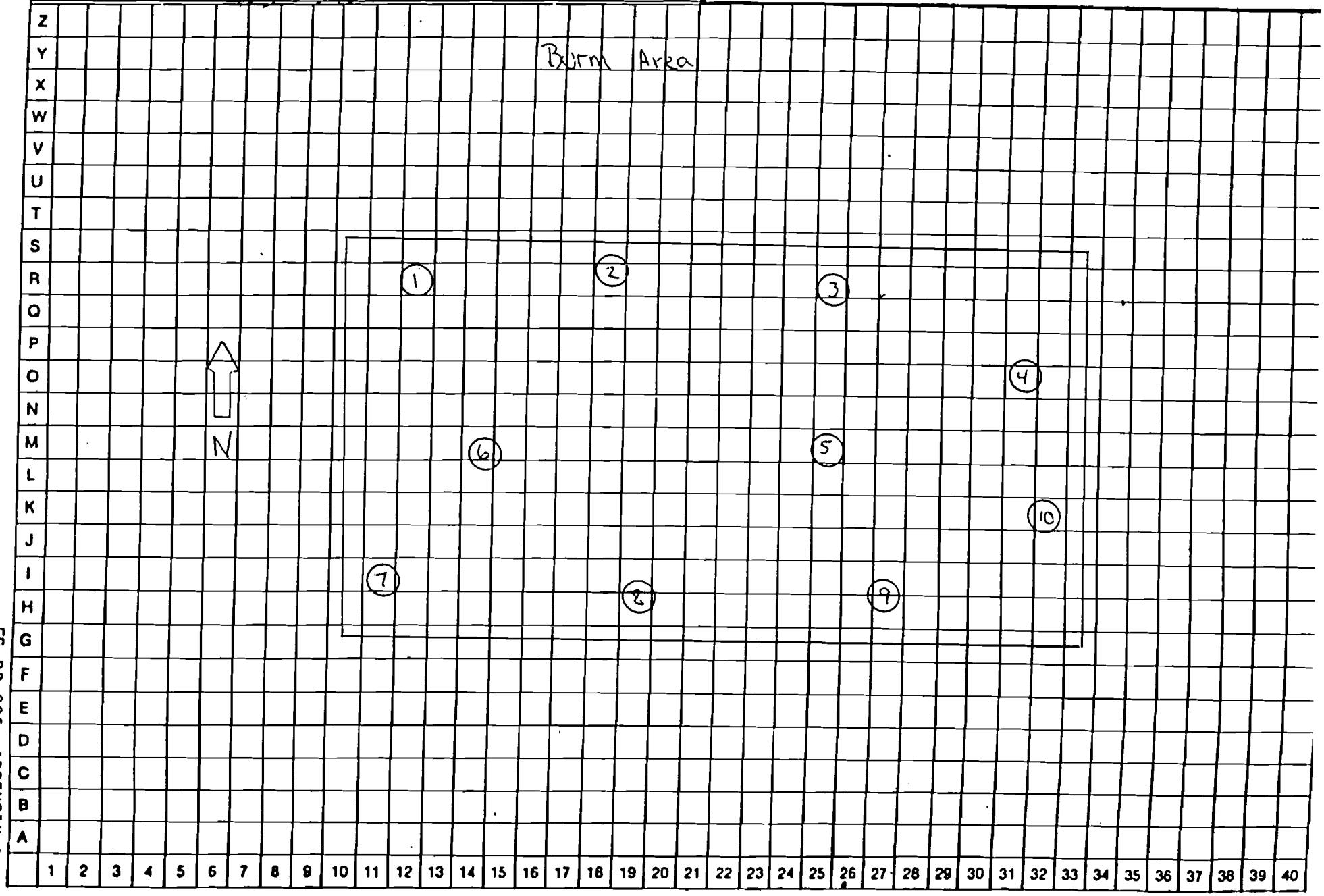
SURVEYOR V. Hart

Survey Number 032692-04-UCD

DATE 3-20-92

NOTE: THE KNOWING & WILLFUL RECORDING OF FALSE, FICTICIOUS, OR FRAUDULENT STATEMENTS OR ENTRIES ON THIS DOCUMENT MAY BE PUNISHABLE AS A FELONY UNDER FEDERAL STATUTES.

Radcon Review [signature] Date 3-31-92



MAP I.D. NUMBER _____

RADIOLOGICAL CONTROL

Scale - 1/4" = _____

C ...INATION/RADIATION
SL ... REPORT

TO: PROJECT # 46831

DATE: 3-16-92 | TIME START: 1500 | TIME COMPL: 1400 | PAGE 1 OF 4

ACTIVITY/LOCATION: UC DAVIS ITEH DAVIS, CA

SURVEYOR: BRAD WELL | PHONE:

MAP ID: IMHOFF 'B' | Survey Number: 031692-03-UCD

DAILY ☐ WEEKLY ☐ MONTHLY ☐ CONTAMINATION AND DAILY ☐ WEEKLY ☐ MONTHLY ☐ RADIATION SURVEY

COMMENTS: L/2220 w/160cm² 43-70 PROBE → MDA = 270 DPM/100cm², BKGD = 73.4 cpm, EFF = .193, ESP-2 w/ 50cm² 43-65 PROBE → MDA = 56 DPM/100cm², BKGD = 0 cpm EFF = .198, ND = NOT DETECTABLE

PERMISSIBLE LEVELS FIXED/LOOSE
300/20 dpm/100 cm² ALPHA
5000/1000 dpm/100 cm² BETA-GAMMA

CSCA AREA CONTROL LEVELS
N/A dpm/100 cm² ALPHA
N/A dpm/100 cm² BETA-GAMMA

☐ OTHER (SEE COMMENTS)
☒ NO ACTION REQ'D.

SOURCE CHECK DATA	CONTAMINATION SURVEYS ALPHA	CONTAMINATION SURVEYS BETA/GAMMA	RADIATION BETA/GAMMA
SOURCE I.D.	Th-230	Tc-99	
SOURCE STRENGTH	13900 dpm	7190 dpm	mR/hr
INSTRUMENT RESPONSE L/2929	5166 cpm	1095 cpm	mR/hr
EFFICIENCY/CORRECTION FACTOR L/2929	0.372/2.7	0.146/6.8	
MDA - L/2929	17 dpm	228 dpm	SAT. ☐ UNSAT. ☐
BACKGROUND L/2929	0.6 cpm	43.2 cpm	mR/hr

CONTAMINATION SURVEY INSTRUMENT TYPE TAG NO: ALPHA 2929/#74075 ESP-2/#1065 | BETA-GAMMA 2929/#74075 2220/#46599

RADIATION SURVEY INSTRUMENT TYPE TAG NO: NEUTRON N/A | BETA-GAMMA N/A

RADCON REVIEW: [signature] DATE: 3-31-92

REASON FOR SURVEY
☐ PROCEDURE—NO.
☒ SPECIAL: IMHOFF TANK 'B'
☐ ROUTINE

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA dpm/100 cm²	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
1	ND	20	7201K	6814	N/A	GRID AA19
2		61	444K	11846		A20
3		7	7724K	2577		AA20
4		128	9238K	20869		AB28
5		1	13K	354		ZA22
6		23	6661K	4248		AA25
7	10	79	5765K	9744		AB23
8	ND	36	6394K	5250		AB9
9		7	7969K	1904		AA10
10	10	63	538K	11920		A8
11	ND	23	7021K	5358		AA7
12	10	ND	15K	428		ZA11
13	ND	ND	~~8837K~~ 15K	279		ZA17
14		79	~~8837K~~ 8835	18068		AA12
15		104	~~1234K~~ 8653K	17388		AB5
16		20	~~1234K~~ 1234K	5562		A4

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA dpm/100 cm²	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
18	ND	9	7121K	2783	N/A	GRID M2
19	20	58	181K	7228		A17
20	ND	36	6669K	6419		AA17
21		12	7919K	3074		AA18
22		7	6713K	2251		AA30
23		23	7186K	3393		AB32
24	10	61	7631K	4379		AB31
25						
26						
27						
28						
29						
30						
31						
32					N	
33					A	
34						
35						
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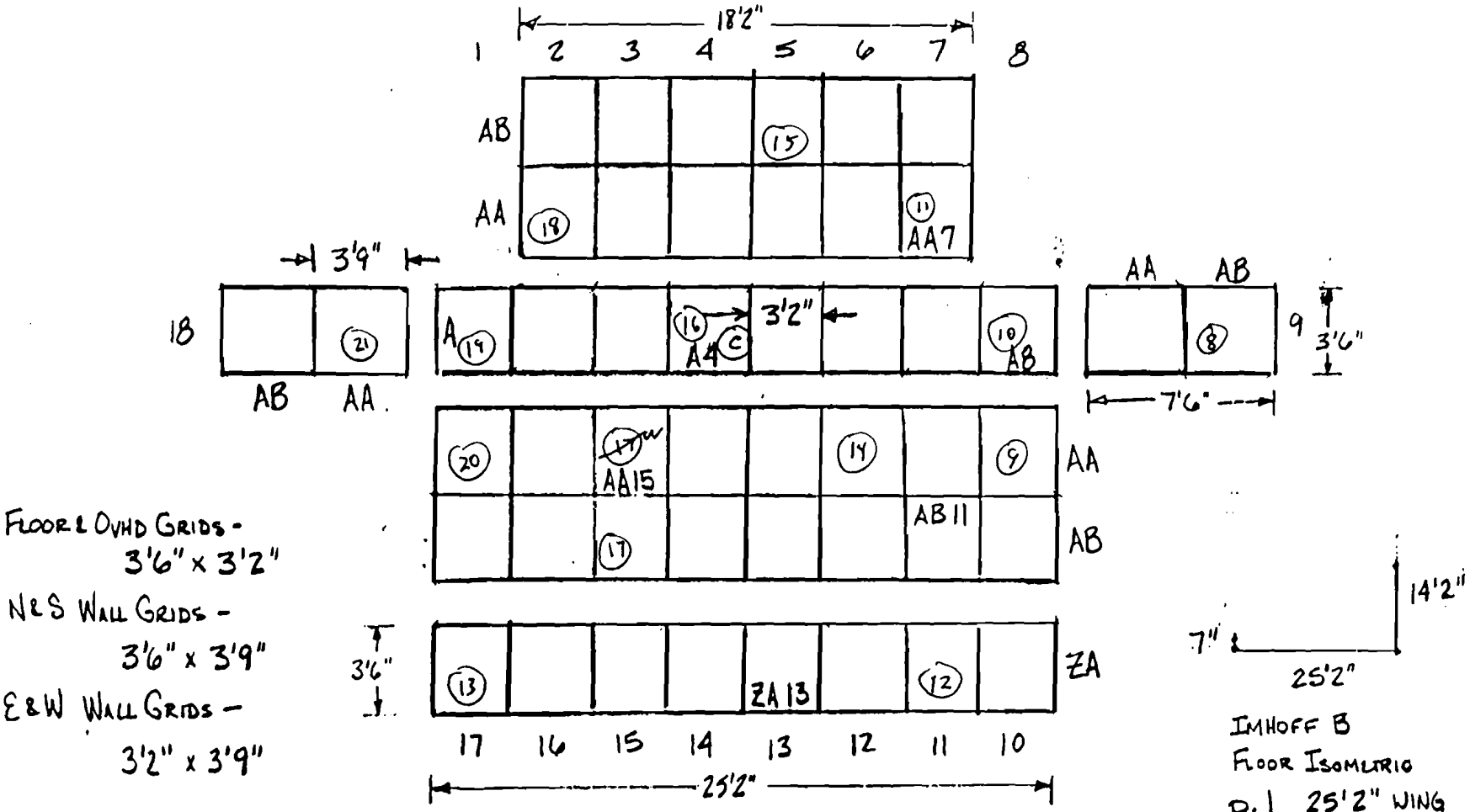
37						
38						
39						

SURVEY #
031692-03-UCD

IMHOFF TANK B

~~(3 pages)~~
~~p. 1 of 3~~



FLOOR & OVHD GRIDS -
3'6" x 3'2"

N&S WALL GRIDS -
3'6" x 3'9"

E&W WALL GRIDS -
3'2" x 3'9"

(C) = CORE BORE LOCATION

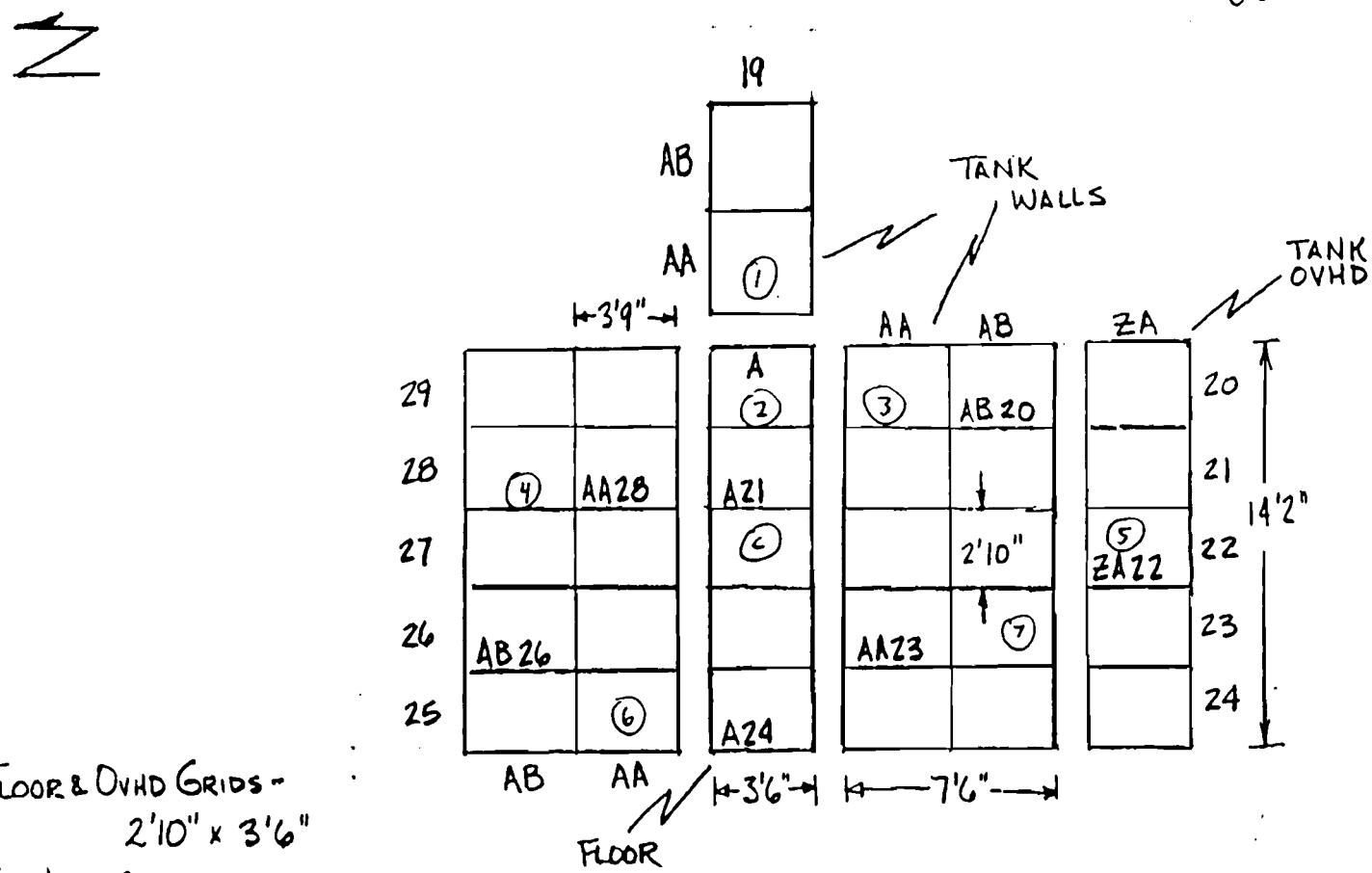
IMHOFF B
FLOOR ISOMETRIC

p. 1 25'2" WING
p. 2 14'2" WING
p. 3 7" WING

IMHOFF TANK B

~~(3 pages)~~
~~p. 2 of 3~~

SURVEY # 031692-03-UCD



FLOOR & OVHD GRIDS -
2'10" x 3'6"

E WALL GRID -
3'6" x 3'9"

N & S WALL GRIDS -
2'10" x 3'9"

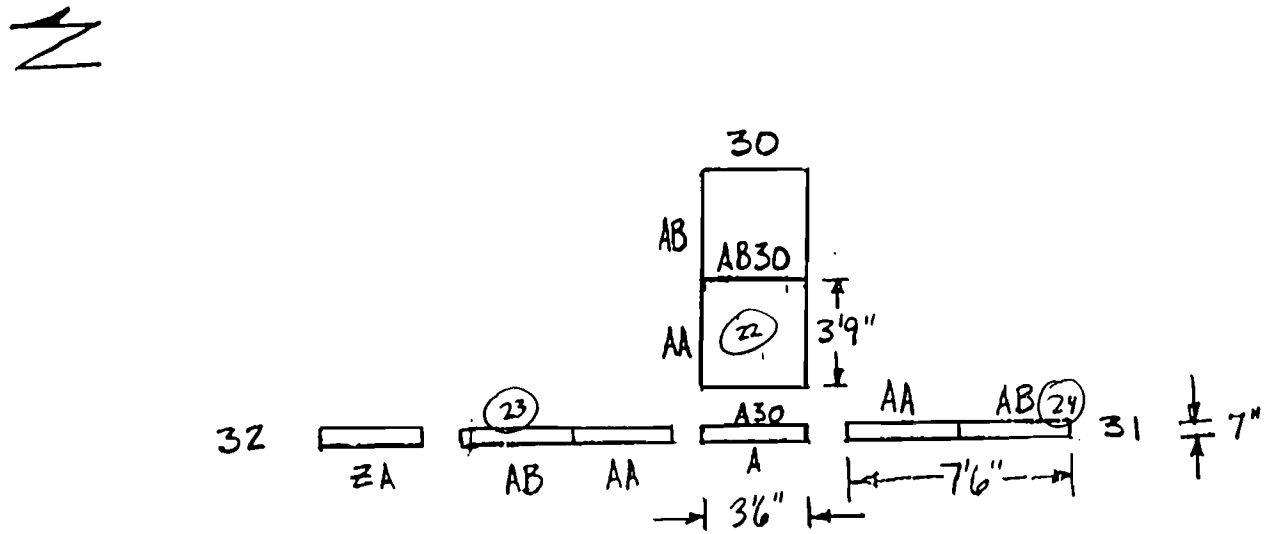
(C) = CORE BORE LOCATION

IMHOFF TANK B

~~(3 pages)~~

~~p. 3 of 3~~

SURVEY # 03/692-03-UCD



FLOOR & OVHD GRID - 7" x 3'6"
N & S WALL GRIDS - 7" x 3'9"
E WALL GRIDS - 3'6" x 3'9"

C[illegible]INATION/RADIATION SL[illegible] REPORT

TO: PROJECT # 46831

DATE: 3-17-92 | TIME START: 1100 | TIME COMPL: 1200 | PAGE 1 OF 2

ACTIVITY/LOCATION: UC DAVIS ITEH DAVIS, CA

SURVEYOR: BRAD WEIL | PHONE:

MAP ID: IMHOFF 'C' | Survey Number: 0319-92-01-UCD

DAILY / WEEKLY / MONTHLY — CONTAMINATION AND — DAILY / WEEKLY / MONTHLY — RADIATION SURVEY

COMMENTS: L/2220 w/160cm² 43-70 PROBE → MDA = 270 DPM/100cm², BKGD = 73.4 cpm, EFF = .143, ESP-2 w/50cm² 43-65 PROBE → MDA = 56 DPM/100cm², BKGD = 0 CPM EFF = .198, ND = NOT DETECTABLE

PERMISSIBLE LEVELS FIXED/LOOSE: 300/20 dpm/100 cm² ALPHA; 5000/1000 dpm/100 cm² BETA-GAMMA

CSCA AREA CONTROL LEVELS: N/A dpm/100 cm² ALPHA; N/A dpm/100 cm² BETA-GAMMA

☐ OTHER (SEE COMMENTS) ☒ NO ACTION REQ'D.

SOURCE CHECK DATA	CONTAMINATION SURVEYS ALPHA	CONTAMINATION SURVEYS BETA/GAMMA	RADIATION BETA/GAMMA
SOURCE I.D.	Th-230	Tc-99	
SOURCE STRENGTH	13900 dpm	7190 dpm	mR/hr.
INSTRUMENT RESPONSE L/2929	5166 cpm	1095 cpm	mR/hr.
EFFICIENCY/CORRECTION FACTOR L/2929	0.372/2.7	0.146/6.8	
MDA - L/2929	17 dpm	228 dpm	SAT. ☐ UNSAT. ☐
BACKGROUND L/2929	0.6 cpm	43.2 cpm	mR/hr.

CONTAMINATION SURVEY INSTRUMENT TYPE TAG NO	ALPHA 2929/#74075 ESP-2/#1065	BETA-GAMMA 2929/#74075 2220/#46599
RADIATION SURVEY INSTRUMENT TYPE TAG NO	NEUTRON N/A	BETA-GAMMA N/A

RADCON REVIEW: [signature] DATE: 5-15-92

REASON FOR SURVEY: ☐ PROCEDURE—NO. ☒ SPECIAL IMHOFF TANK C ☐ ROUTINE

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA dpm/100 cm²	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
1	ND	4	3061K	734	N/A	GRID AA8
2	↓	4	3290K	496		AA9
3		ND	3668K	721		AA10
4		15	226K	2455		A8
5	20	1	2212K	823		AA12
6	ND	30	448K	4413		A5
7	10	4	36K	1238		AB5
8	10	4	2974K	1414		AA4
9	ND	36	2642K	7766		AA14
10	↓	4	2454K	935		AA17
11		15	2824K	3760		AA18
12	10	12	4009K	1992		AA1
13	ND	23	268K	3942		A1
14	↓	ND	2K	147		ZA15
15		1	3K	116		ZA12
16	N/A	N/A	N/A	N/A	N/A	N/A

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA dpm/100 cm	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28					N/A	
29						
30						
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35						
36						
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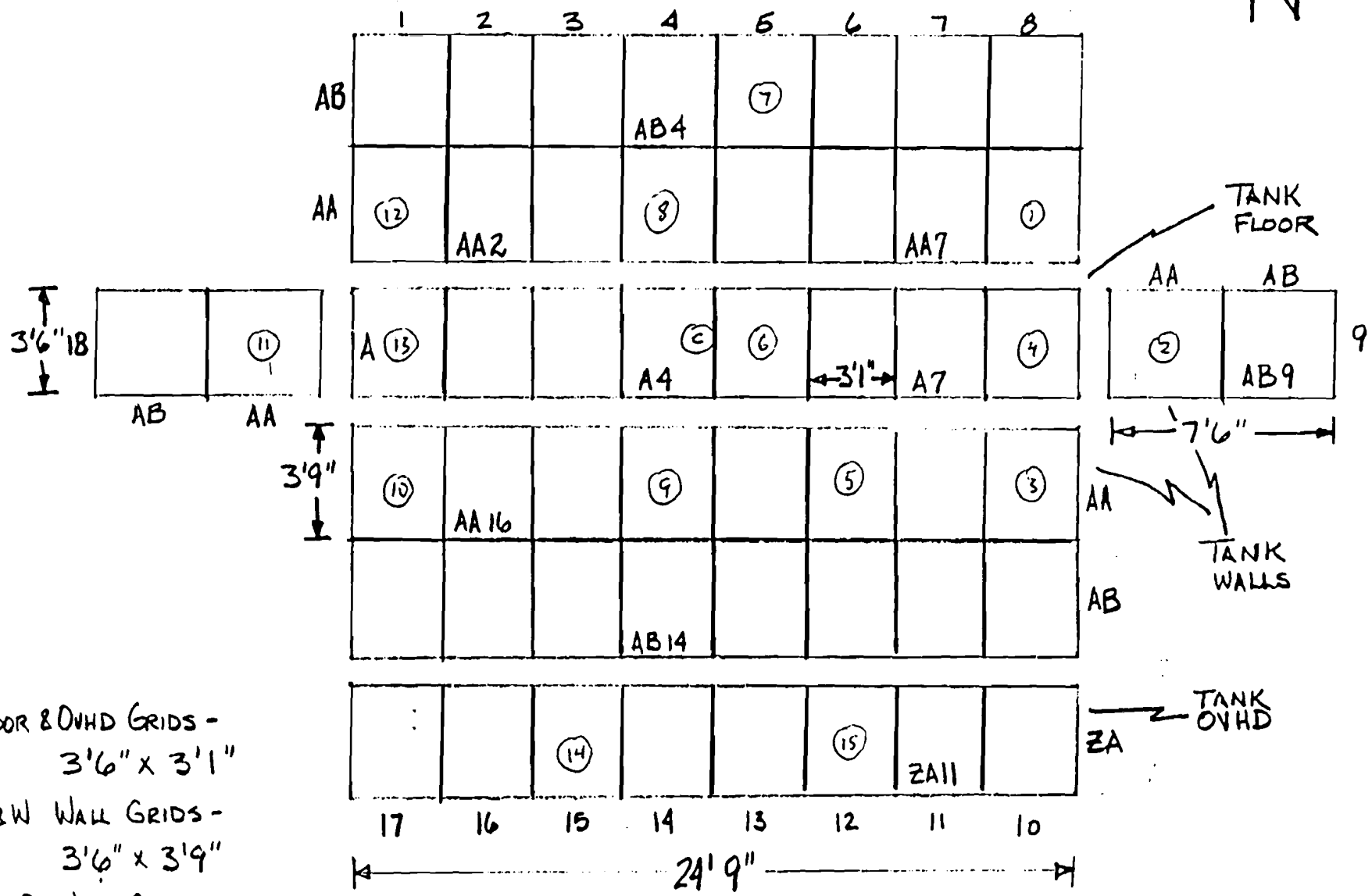
39						

IMHOFF TANK C



FLOOR & OVHD GRIDS - 3'6" x 3'1"

E&W WALL GRIDS - 3'6" x 3'9"

N&S WALL GRIDS - 3'1" x 3'9"

(C) CORE BORE LOCATION.

C ...INATION/RADIATION
SL ... REPORT

TO PROJECT # 46831

DATE 3-17-92 | TIME START 1400 | TIME COMPL 1430 | 1 OF 2

ACTIVITY/LOCATION: UC DAVIS ITEH DAVIS, CA

SURVEYOR: B. WELL

PHONE:

MAP ID: IMHOFF D

Survey Number: 031792-CL-UCD

DAILY ☐ WEEKLY ☐ MONTHLY ☐ CONTAMINATION AND DAILY ☐ WEEKLY ☐ MONTHLY ☐ RADIATION SURVEY

COMMENTS
L/2220 w/160cm² 43-70 PROBE → MDA = 270 DPM/100cm², BKGD = 73.4 CPM,
EFF = .193, ESP.2 w/ 50cm² 43-65 PROBE → MDA = 56 DPM/100cm², BKGD = 0 CPM
EFF = .198, ND = NOT DETECTABLE

PERMISSIBLE LEVELS FIXED/LOOSE
300/20 dpm/100 cm² ALPHA
5000/1000 dpm/100 cm² BETA-GAMMA

CSCA AREA CONTROL LEVELS
N/A dpm/100 cm² ALPHA
N/A dpm/100 cm² BETA-GAMMA

☐ OTHER (SEE COMMENTS)
☒ NO ACTION REQ'D.

SOURCE CHECK DATA	CONTAMINATION SURVEYS ALPHA	CONTAMINATION SURVEYS BETA/GAMMA	RADIATION BETA/GAMMA
SOURCE I.D.	Th-230	Tc-99	
SOURCE STRENGTH	13900 dpm	7190 dpm	mR/hr
INSTRUMENT RESPONSE L/2929	5166 cpm	1095 cpm	mR/hr.
EFFICIENCY/CORRECTION FACTOR L/2929	0.372/2.7	0.146/6.8	
MDA - L/2929	17 dpm	228 dpm	SAT. ☐ UNSAT. ☐
BACKGROUND L/2929	0.6 cpm	43.2 cpm	mR/hr

CONTAMINATION SURVEY INSTRUMENT TYPE TAG NO: ALPHA 2929/#74075 ESP-2/#1065 | BETA-GAMMA 2929/#74075 2220/#46599

RADIATION SURVEY INSTRUMENT TYPE TAG NO: NEUTRON N/A | BETA-GAMMA N/A

RADCON REVIEW [signature] DATE 3-31-92

REASON FOR SURVEY
☐ PROCEDURE—NO
☒ SPECIAL IMHOFF TANK 'D'
☐ ROUTINE

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA dpm/100 cm²	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
1	ND	1	51K	122	N/A	GRID AA3
2	↓	4	701K	945		B3
3	↓	ND	105K	184		AA16
4	20	ND	58K	82		AA1
5	ND	ND	47K	170		AB14
6	↓	1	60K	102		AB6
7	20	4	258K	367		B6
8	41	ND	147K	252		AA8
9	ND	1	324K	585		AA9
10	↓	ND	128K	122		AA11
11	↓	↓	860K	1147		A8
12	ND	1	5K	122		ZA8
13	↓	ND	6K	34		ZB5
14	↓	1	6K	170		ZA3
15						
16						
17						

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA dpm/100 cm²	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
18						
19						
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21						
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28					N/A	
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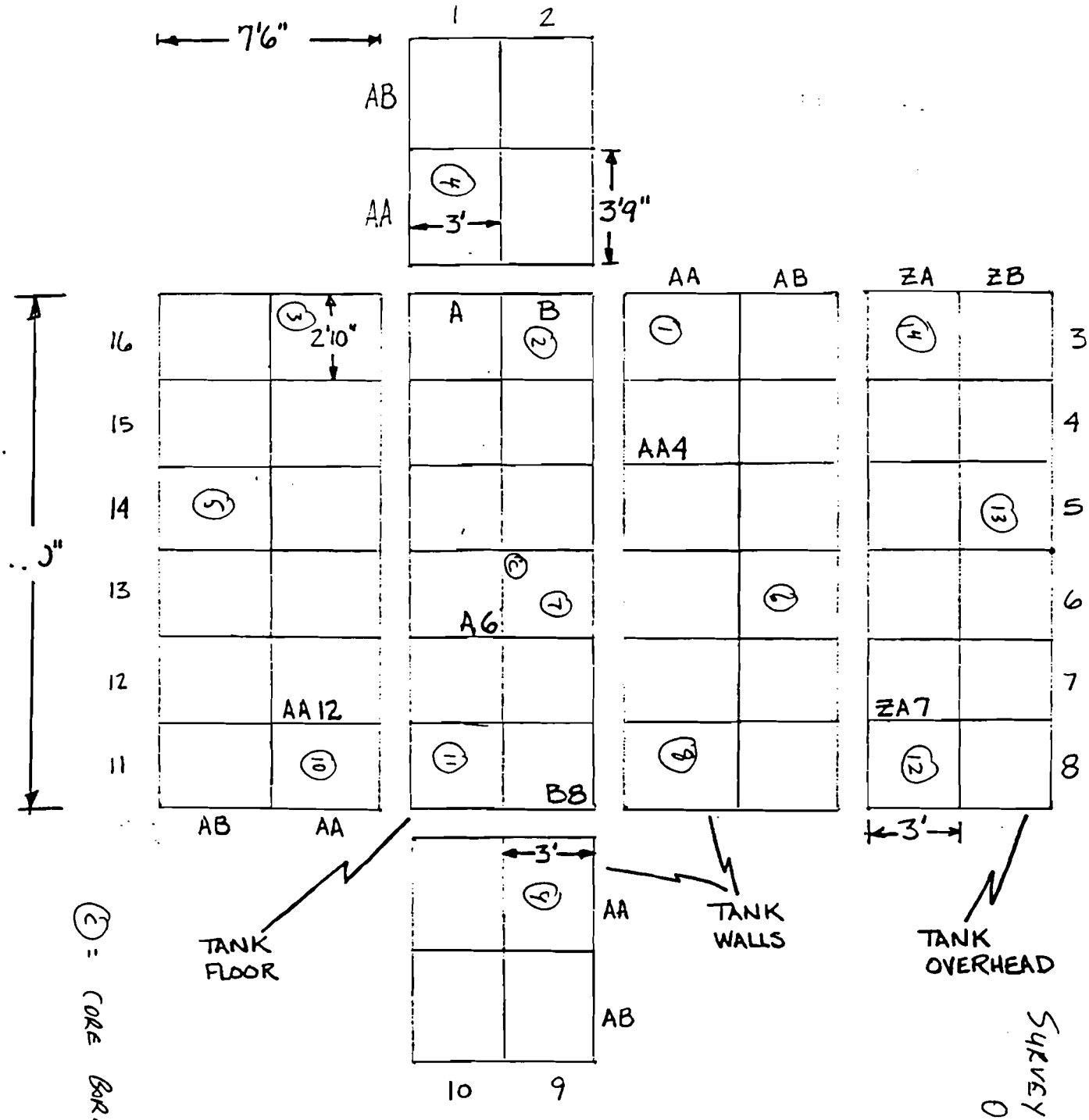
* THE KNOWING & WILLFUL RECORDING OF FALSE, FICTICIOUS, OR FRAUDULENT STATEMENTS OR ENTRIES ON THIS DOCUMENT MAY BE PUNISHABLE AS A FELONY UNDER FEDERAL STATUTES.

IMHOFF TANKS D THRU I

N



TANK D

(C) = CORE BORE LOCATION

FLOOR GRIDS - 3' x 2'10"

E & W WALL GRIDS - 2'10" x 3'9"

N & S WALL GRIDS - 3' x 3'9"

OVHD GRIDS - 3' x 2'10"

PAGE 2 OF 2

SURVEY # 031792-02-UC1

SL ...INATION/RADIATION REPORT

TO PROJECT # 46831

DATE 3-17-92 | TIME START 1430 | TIME COMPL 1500 | 1 OF ___

ACT LOC UC DAVIS
ITEM
DAVIS, CA

SURVEYOR | PHONE

MAP ID IMHOFF E | Survey Number 031792-03-UCD

DAILY ☐ WEEKLY ☐ MONTHLY ☐ CONTAMINATION AND DAILY ☐ WEEKLY ☐ MONTHLY ☐ RADI... SURVEY

COMMENTS
L/2220 w/100cm² 43-20 PROBE → MDA = 270 DPM/100cm², BKGD = 73.4 CPM, EFF = .143, ESP-2 w/ 50cm² 43-65 PROBE → MDA = 56 DPM/100cm², BKGD = 0.6 CPM, EFF = .198, ND2 NOT DETECTABLE.

PERMISSIBLE LEVELS FIXED/LOOSE
300/26 dpm/100 cm² ALPHA
5000/1600 dpm/100 cm² BETA-GAMMA

CSCA AREA CONTROL LEVELS
N/A dpm/100 cm² ALPHA
N/A dpm/100 cm² BETA-GAMMA

☐ OTHER (SEE COMMENTS)
☒ NO ACTION REQ'D

SOURCE CHECK DATA	CONTAMINATION SURVEYS ALPHA	CONTAMINATION SURVEYS BETA/GAMMA	RADIATION BETA/GAMMA
SOURCE ID	Th-230	Tc-99	
SOURCE STRENGTH	13400 dpm	7190 dpm	mR/hr
INSTRUMENT RESPONSE L/2924	5166 cpm	1095 cpm	mR/hr
EFFICIENCY/CORRECTION FACTOR L/2924	0.372/2.7	0.146/6.8	
MDA L/2924	17 dpm	228 dpm	SAT ☐ UNSAT ☐
BACKGROUND L/2924	0.6 cpm	43.2 cpm	mR/hr

CONTAMINATION SURVEY INSTRUMENT TYPE TAG NO	ALPHA 2924/#74075 ESP-2/#1065	BETA-GAMMA 2924/#74075 2220/#46599
RADIATION SURVEY INSTRUMENT TYPE TAG NO	NEUTRON N/A	BETA-GAMMA

RADCON REVIEW [signature] DATE 3-18-92

REASON FOR SURVEY
☐ PROCEDURE—NO ___
☒ SPECIAL IMHOFF TANK 'E'
☐ ROUTINE ___

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA EQUIV Th-230 dpm/100 cm²	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA EQUIV Tc-99 dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
1	ND	10	161K	428	N/A	AA3 GRID
2		7	156K	1034		B3
3		4	171K	204		AA1
4		ND	154K	224		AA16
5	10	ND	55K	340		AB14
6	ND	ND	110K	68		AB6
7	20	7	670K	952		B6
8	ND	1	151K	150		AA8
9		1	114K	184		AA9
10	10	4	96K	660		A8
11	10	ND	241K	204		A11
12	ND	1	7K	163		ZB8
13		1	4K	61		ZB5
14		ND	6K	252		ZB3
15			N/A			
16						
17						

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA EQUIV Th-230 dpm/100 cm²	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA EQUIV Tc-99 dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
18						
19						
20						
21						
22						
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29					N/A	
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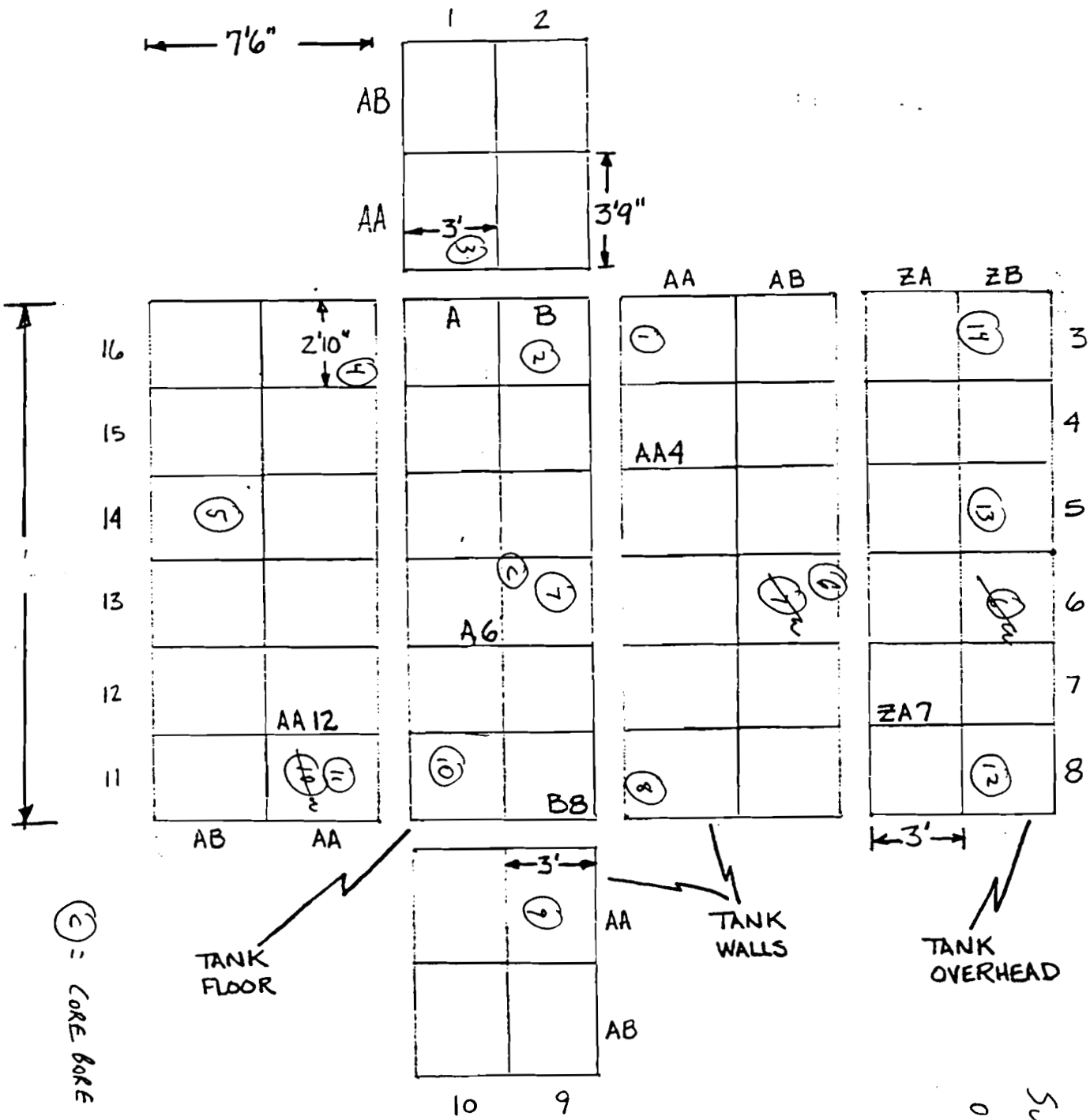
* THE KNOWING & WILLFUL RECORDING OF FALSE, FICTICIOUS, OR FRAUDULENT STATEMENTS OR ENTRIES ON THIS DOCUMENT MAY BE PUNISHABLE AS A FELONY UNDER FEDERAL STATUTES.

ND - Not Detectable

RADIOLOGICAL CONTROL

IMHOFF TANKS D THRU I

N



TANK 'E'

(C) = CORE BORE LOCATION

FLOOR GRIDS - 3' x 2'10"

E & W WALL GRIDS - 2'10" x 3'9"

N & S WALL GRIDS - 3' x 3'9"

OVHD GRIDS - 3' x 2'10"

SURVEY # 031792-03-UCD

C ...INATION/RADIATION
SL ... REPORT

TO: PROJECT # 46831

DATE: 3-23-92 | TIME START: 1430 | TIME COMPL: 1500 | PAGE 1 OF 2

ACTIVITY/LOCATION: UC DAVIS	SURVEYOR	PHONE
ITEH		
DAVIS, CA	MAP ID	Survey Number 032392-04-UCD

DAILY ☐ WEEKLY ☐ MONTHLY ☐ CONTAMINATION AND DAILY ☐ WEEKLY ☐ MONTHLY ☐ RADIATION SURVEY

COMMENTS
L/2220 w/160cm² 43-70 PROBE → MDA = 270 DPM/100cm², BKGD = 73.4 cpm, EFF = .193, ESP.2 w/ 50cm² 43-65 PROBE → MDA = 56 DPM/100cm², BKGD = 0 cpm EFF = .198.

PERMISSIBLE LEVELS FIXED/LOOSE
300/20 dpm/100 cm² ALPHA
5000/1000 dpm/100 cm² BETA-GAMMA

CSCA AREA CONTROL LEVELS
N/A dpm/100 cm² ALPHA
N/A dpm/100 cm² BETA-GAMMA

☐ OTHER (SEE COMMENTS)
☒ NO ACTION REQ'D.

SOURCE CHECK DATA	CONTAMINATION SURVEYS ALPHA	CONTAMINATION SURVEYS BETA/GAMMA	RADIATION BETA/GAMMA
SOURCE ID	Th-230	Tc-99	
SOURCE STRENGTH	13900 dpm	7190 dpm	mR/hr.
INSTRUMENT RESPONSE L/2929	5166 cpm	1095 cpm	mR/hr.
EFFICIENCY/CORRECTION FACTOR L/2929	0.372/2.7	0.146/6.8	
MDA - L/2929	17 dpm	228 dpm	SAT. ☐ UNSAT. ☐
BACKGROUND L/2929	0.6 cpm	43.2 cpm	mR/hr.

CONTAMINATION SURVEY INSTRUMENT TYPE TAG NO	ALPHA 2929/#74075 ESP-2/#1065	BETA-GAMMA 2929/#74075 2220/#46599
RADIATION SURVEY INSTRUMENT TYPE TAG NO	NEUTRON	BETA-GAMMA

RADCON REVIEW: BSN DATE: 3-31-92

REASON FOR SURVEY
☐ PROCEDURE—NO
☒ SPECIAL JMHOFF 'F'
☐ ROUTINE

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA EQUIV Th-230 dpm/100 cm²	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA EQUIV Tc-99 dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
1	ND	~~1646~~ 47	441K	1646	N/A	AA1
2	ND	28	567K	5542		AA16
3	10	~~7~~ 15	237K	796		B3
4	ND	31	299K	7875		AA3
5	20	~~7~~ 20	62K	1279		AB14
6	41	~~44~~ 14	40K	429		AB6
7	ND	17	272K	1823		B6
8	ND	20	134K	3394		AA8
9	10	~~14~~ 5	97K	2000		AA9
10	ND	23	364K	3863		AA11
11	ND	26	292K	3400		A8
12	ND	ND	4K	94		ZB4
13	10	~~ND~~	3K	ND		ZB5
14	ND	1	4K	ND		ZB3
15						
16						

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA EQUIV Th-230 dpm/100 cm²	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA EQUIV Tc-99 dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
18						
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20						
21						
22						
23						
24						
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26						
27					N/A	
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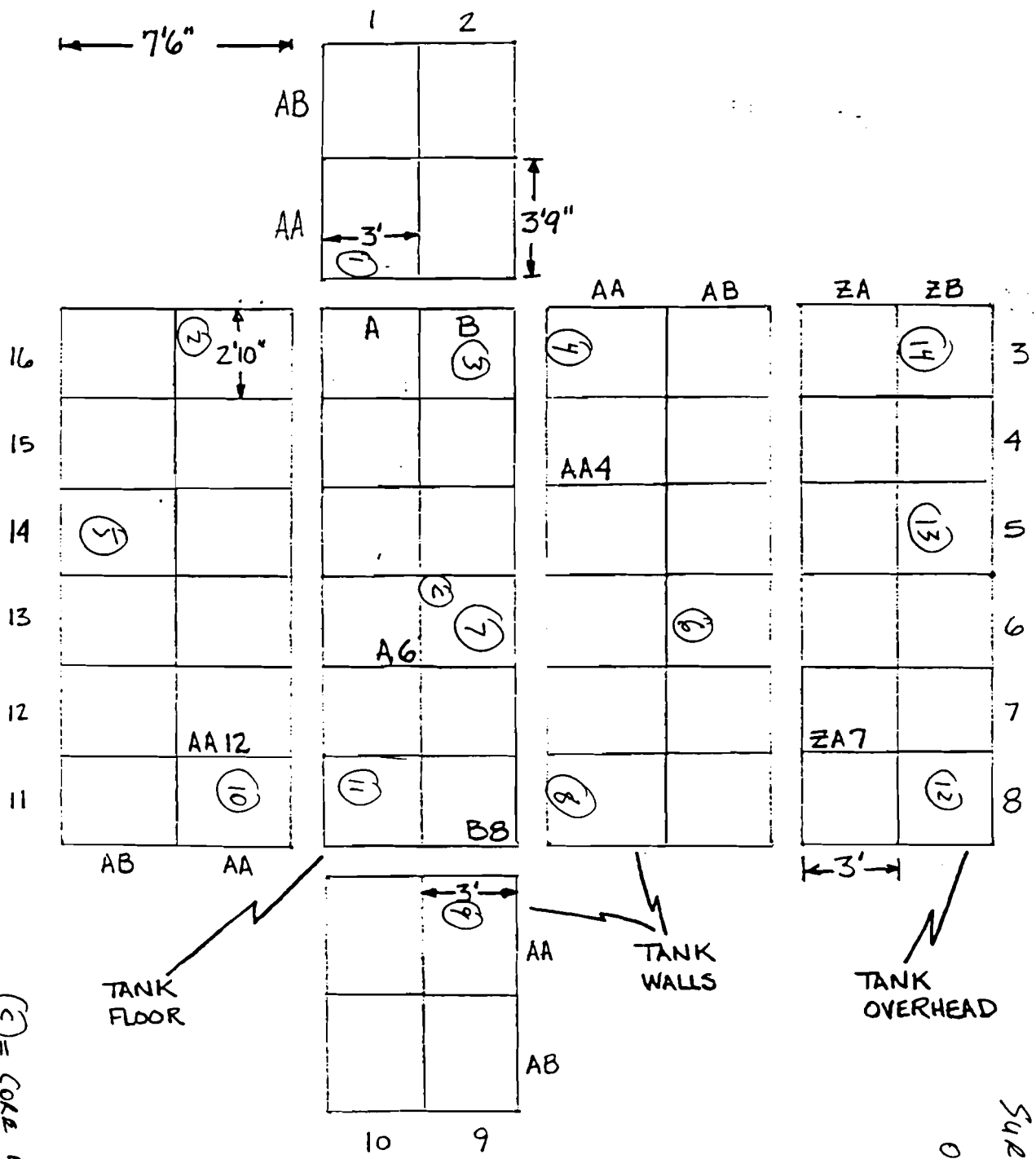
IMHOFF TANKS D THRU I

N



TANK 'F'

(C) = CORE BORE LOCATION

FLOOR GRIDS - 3' x 2'10"

E & W WALL GRIDS - 2'10" x 3'9"

N & S WALL GRIDS - 3' x 3'9"

OVHD GRIDS - 3' x 2'10"

PAGE 2 OF 2

SURVEY # 03232-04-CD

C[illegible]INATION/RADIATION
SL[illegible] REPORT

JO[illegible] PROJECT # 46831

DATE 3-17-92 | TIME START 1550 | TIME COMPL 1630 | PA[illegible] 1 OF 2

ACTIVITY/LOCATION: UC DAVIS	SURVEYOR: BRAD WELL	PHONE
ITEH		
DAVIS, CA	MAP ID: IMHOFF 'G'	Survey Number: 03/792-05-UCD

DAILY ☐ WEEKLY ☐ MONTHLY ☐ CONTAMINATION AND DAILY ☐ WEEKLY ☐ MONTHLY ☐ RADIATION SURVEY

COMMENTS
L/2220 w/160cm² 43-20 PROBE → MDA = 270 DPM/100cm², BKGD = 73.4 CPM, EFF = .193, ESP.2 w/ 50cm² 43-65 PROBE → MDA = 56 DPM/100cm², BKGD = 0 CPM EFF = .198, ND = NOT DETECTABLE

PERMISSIBLE LEVELS FIXED/LOOSE
300/20 dpm/100 cm² ALPHA
5000/1000 dpm/100 cm² BETA-GAMMA

CSCA AREA CONTROL LEVELS
N/A dpm/100 cm² ALPHA
N/A dpm/100 cm² BETA-GAMMA

☐ OTHER (SEE COMMENTS)
☒ NO ACTION REQ'D

SOURCE CHECK DATA	CONTAMINATION SURVEYS ALPHA	CONTAMINATION SURVEYS BETA/GAMMA	RADIATION BETA/GAMMA
SOURCE ID	Th-230	Tc-99	
SOURCE STRENGTH	13900 dpm	7190 dpm	mR/hr.
INSTRUMENT RESPONSE L/2929	5166 cpm	1095 cpm	mR/hr.
EFFICIENCY/CORRECTION FACTOR L/2929	0.372/2.7	0.146/6.8	
MDA - L/2929	17 dpm	228 dpm	SAT. ☐ UNSAT. ☐
BACKGROUND L/2929	0.6 cpm	43.2 cpm	mR/hr

CONTAMINATION SURVEY INSTRUMENT TYPE TAG NO	ALPHA 2929/#74075	BETA-GAMMA 2929/#74075
	ESP-2/#1065	2220/#46599
RADIATION SURVEY INSTRUMENT TYPE TAG NO	NEUTRON N/A	BETA-GAMMA N/A

RADCON REVIEW [signature] DATE 3-31-92

REASON FOR SURVEY
☐ PROCEDURE—NO
☒ SPECIAL IMHOFF TANK G
☐ ROUTINE

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA dpm/100 cm²	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
1	ND	ND	3040	150	N/A	GRID AA 3
2		ND	9999	218		B3
3		4	2705	61		AA1
4		ND	3085	75		AA16
5		ND	2883	68		AB14
6		ND	2192	20		AB6
7	10	1	4557	177		B6
8	ND	ND	3241	75		AA8
9		4	3196	52		AA9
10		ND	4021	68		AA11
11		1	14192	1251		A8
12	10	ND	3821	27		ZB8
13	ND	ND	2527	75		ZB5
14	20	ND	3085	20		ZB3
15						
16						

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA dpm/100 cm	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
18						
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29					N/A	
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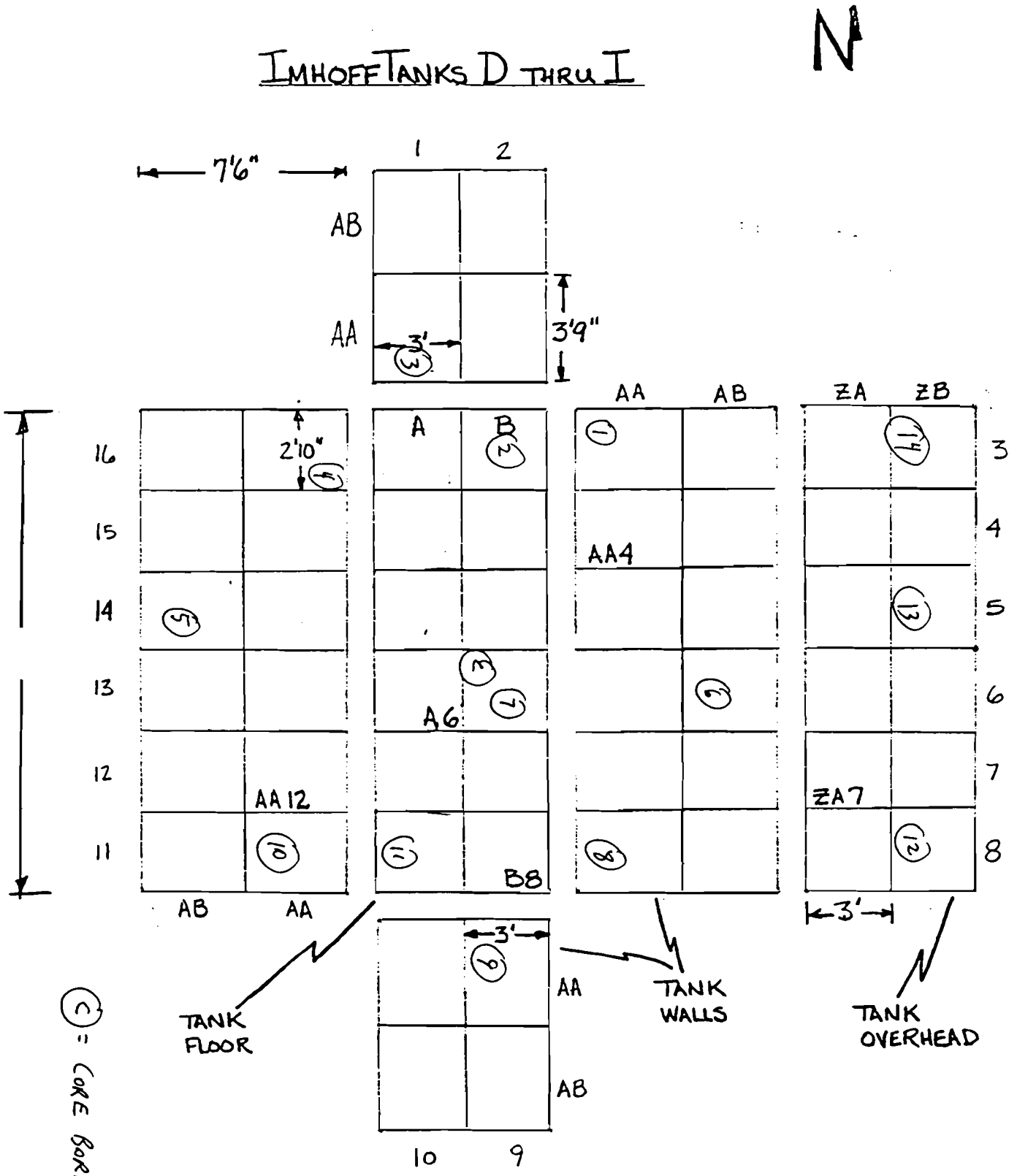
IMHOFF TANKS D THRU I



TANK G

SURVEY # 031792-05-UCI

(C) = CORE BORE LOCATION

FLOOR GRIDS - 3' x 2'10"

E & W WALL GRIDS - 2'10" x 3'9"

N & S WALL GRIDS - 3' x 3'9"

OVHD GRIDS - 3' x 2'10"

C[illegible]INATION/RADIATION
SL[illegible] REPORT

TO PROJECT # 46831

DATE 3-17-92 | TIME START 1500 | TIME COMPL 1530 | PAGE 1 OF 2

ACTIVITY/LOCATION: UC DAVIS, ITEH, DAVIS, CA

SURVEYOR: BRAD WELL | PHONE:

MAPID: JMHOFF H | Survey Number: 031792-09-UCD

DAILY ☐ WEEKLY ☐ MONTHLY ☐ CONTAMINATION AND DAILY ☐ WEEKLY ☐ MONTHLY ☐ RADIATION SURVEY

COMMENTS: L/2220 w/160cm² 43-70 PROBE → MDA = 270 DPM/100cm², BKGD = 73.4 CPM, EFF = .193, ESP-2 w/ 50cm² 43-65 PROBE → MDA = 56 DPM/100cm², BKGD = 0 CPM EFF = .198, ND = NOT DETECTABLE

PERMISSIBLE LEVELS FIXED/LOOSE
300/20 dpm/100 cm² ALPHA
5000/1000 dpm/100 cm² BETA-GAMMA

CSCA AREA CONTROL LEVELS
N/A dpm/100 cm² ALPHA
N/A dpm/100 cm² BETA-GAMMA

☐ OTHER (SEE COMMENTS)
☒ NO ACTION REQ'D.

CONTAMINATION SURVEY INSTRUMENT TYPE TAG NO: ALPHA 2929/#74075; ESP-2/#1065 | BETA-GAMMA 2929/#74075; 2220/#46599

RADIATION SURVEY INSTRUMENT TYPE TAG NO: NEUTRON N/A | BETA-GAMMA N/A

RADCON REVIEW [signature] DATE 3-31-92

SOURCE CHECK DATA	CONTAMINATION SURVEYS ALPHA	CONTAMINATION SURVEYS BETA/GAMMA	RADIATION BETA/GAMMA
SOURCE I.D.	Th-230	Tc-99	
SOURCE STRENGTH	13900 dpm	7190 dpm	mR/hr
INSTRUMENT RESPONSE L/2929	5166 cpm	1095 cpm	mR/hr
EFFICIENCY/CORRECTION FACTOR L/2929	0.372/2.7	0.146/6.8	
MDA - L/2929	17 dpm	228 dpm	SAT ☐ UNSAT ☐
BACKGROUND L/2929	0.6 cpm	43.2 cpm	mR/hr

REASON FOR SURVEY
☐ PROCEDURE NO
☒ SPECIAL JMHOFF TANK 'H'
☐ ROUTINE

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA EQUIV Th-230 dpm/100 cm²	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA EQUIV Tc-99 dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
1	10	4	6809	95	N/A	GRID AA3
2	ND	ND	4200	104		AA16
3		ND	4222	95		AA1
4	ND	ND	11516	ND		B3
5	ND	ND	2884	102		B14
6	20	1	2125	68		AB6
7	41	ND	7540	163		B6
8	ND	ND	3018	54		AA8
9		ND	4267	104		AA9
10		1	3545	41		AA11
11		1	42607	197		A8
12		ND	5382	34		ZB8
13		ND	3620	68		ZB5
14		ND	5560	ND		ZB3
15						
16					N/A	
17						
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27					N/A	
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IMHOFF TANKS D THRU I

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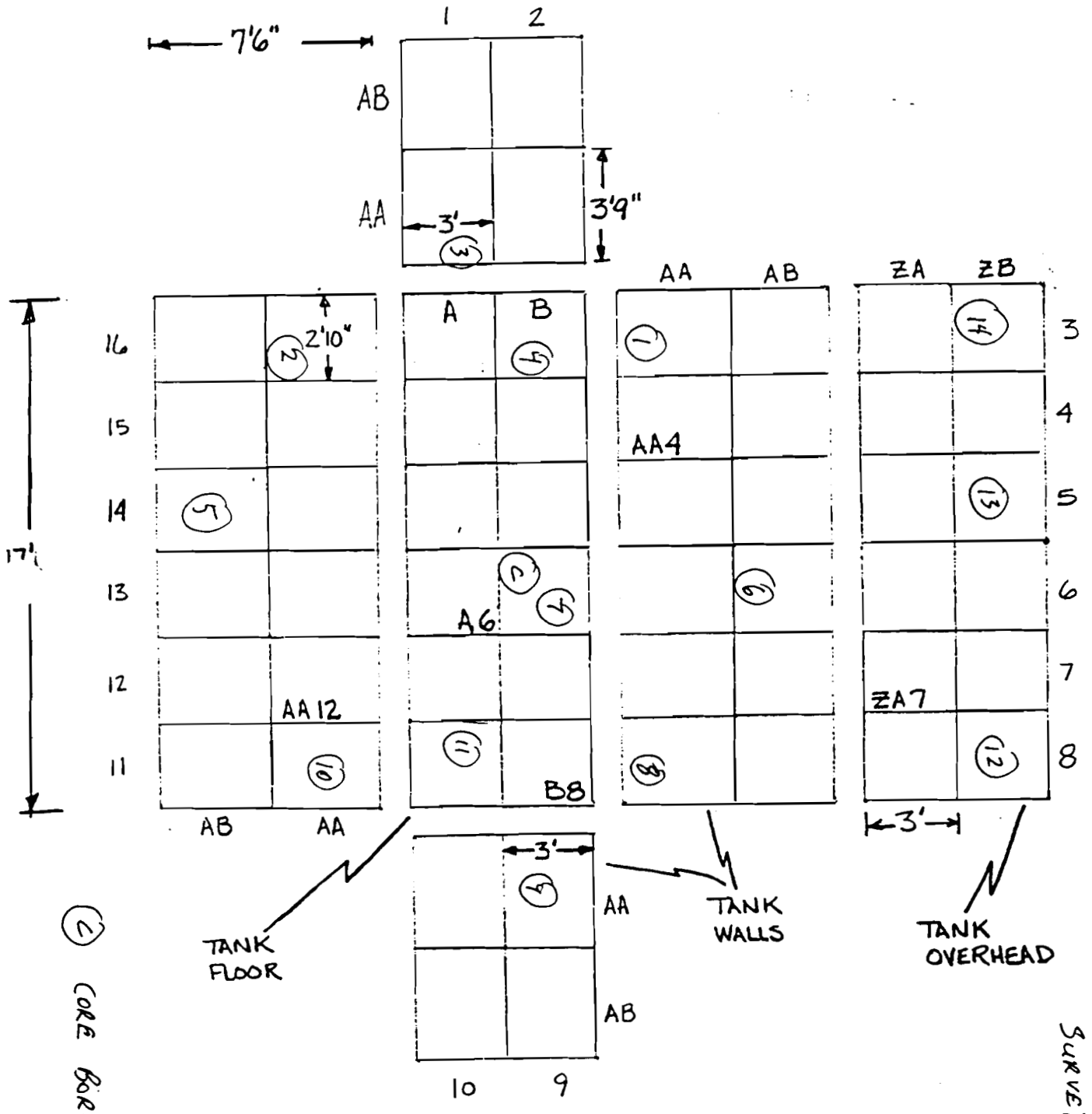

TANK 'H'

PAGE 2 OF 2

SURVEY # 031792-04-VCD

(1) CORE BORE LOCATION

FLOOR GRIDS - 3' x 2'10"

E & W WALL GRIDS - 2'10" x 3'9"

N & S WALL GRIDS - 3' x 3'9"

OVHD GRIDS - 3' x 2'10"

C[illegible]INATION/RADIATION
SL[illegible] REPORT

TO: PROJECT # 46831

DATE: 3-23-92 | TIME START: 1400 | TIME COMPL: 1420 | PA[illegible] 1 OF 2

ACTIVITY/LOCATION: UC DAVIS ITEH, DAVIS, CA

SURVEYOR: B. WELL | PHONE:

MAP ID: | Survey Number: 032392-05-UCD

DAILY / WEEKLY / MONTHLY ☐ CONTAMINATION AND DAILY / WEEKLY / MONTHLY ☐ RADIATION SURVEY

COMMENTS: L/2220 w/ 160 cm² 43-70 PROBE → MDA = 270 DPM/100 cm², BKGD = 73.4 CPM, EFF = .193. ESP 2 w/ 56 cm² 47-65 PROBE → MDA = 56 DPM/100 cm², BKGD = 0.6 CPM, EFF = .198.

PERMISSIBLE LEVELS FIXED/LOOSE: 300/26 dpm/100 cm² ALPHA; 5000/1000 dpm/100 cm² BETA-GAMMA

CSCA AREA CONTROL LEVELS: N/A dpm/100 cm² ALPHA; N/A dpm/100 cm² BETA-GAMMA

☐ OTHER (SEE COMMENTS) ☒ NO ACTION REQ'D

SOURCE CHECK DATA	CONTAMINATION SURVEYS ALPHA	CONTAMINATION SURVEYS BETA/GAMMA	RADIATION BETA/GAMMA
SOURCE ID	Th-230	Tc-99	
SOURCE STRENGTH	13400 dpm	7190 dpm	mR/hr
INSTRUMENT RESPONSE L/2924	5166 cpm	1095 cpm	mR/hr
EFFICIENCY/CORRECTION FACTOR L/2924	0.372/2.7	0.146/6.8	
MDA - L/2924	17 dpm	228 dpm	SAT ☐ UNSAT ☐
BACKGROUND L/2924	0.6 cpm	43.2 cpm	mR/hr

CONTAMINATION SURVEY INSTRUMENT TYPE TAG NO: ALPHA 2929/#74075; ESP-2/#1065 | BETA-GAMMA 2929/#74075; 2220/#46549

RADIATION SURVEY INSTRUMENT TYPE TAG NO: NEUTRON N/A | BETA-GAMMA N/A

RADCON REVIEW [signature] DATE 3-31-92

REASON FOR SURVEY: ☐ PROCEDURE—NO ☒ SPECIAL IMHOFF 'I' ☐ ROUTINE

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA dpm/100 cm²	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
1	~~6634~~ ND	ND	4185	680	N/A	AA1
2	ND	ND	5605	680		AA3
3	ND	ND	6180	916		B3
4		ND	4655	252		AA16
5		14	3990	ND		AB14
6		ND	3836	48		AB6
7		ND	4437	116		B6
8		ND	5570	313		AA8
9	ND	ND	5605	ND		AA9
10	ND	10	6842	576		A8
11	41	23	9499	884		AA11
12	ND	ND	1205	48		ZB8
13	ND	ND	1466	313		ZB5
14	ND	ND	2738	48		ZB3
15						
16						

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA dpm/100 cm	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
18						
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27					N/A	
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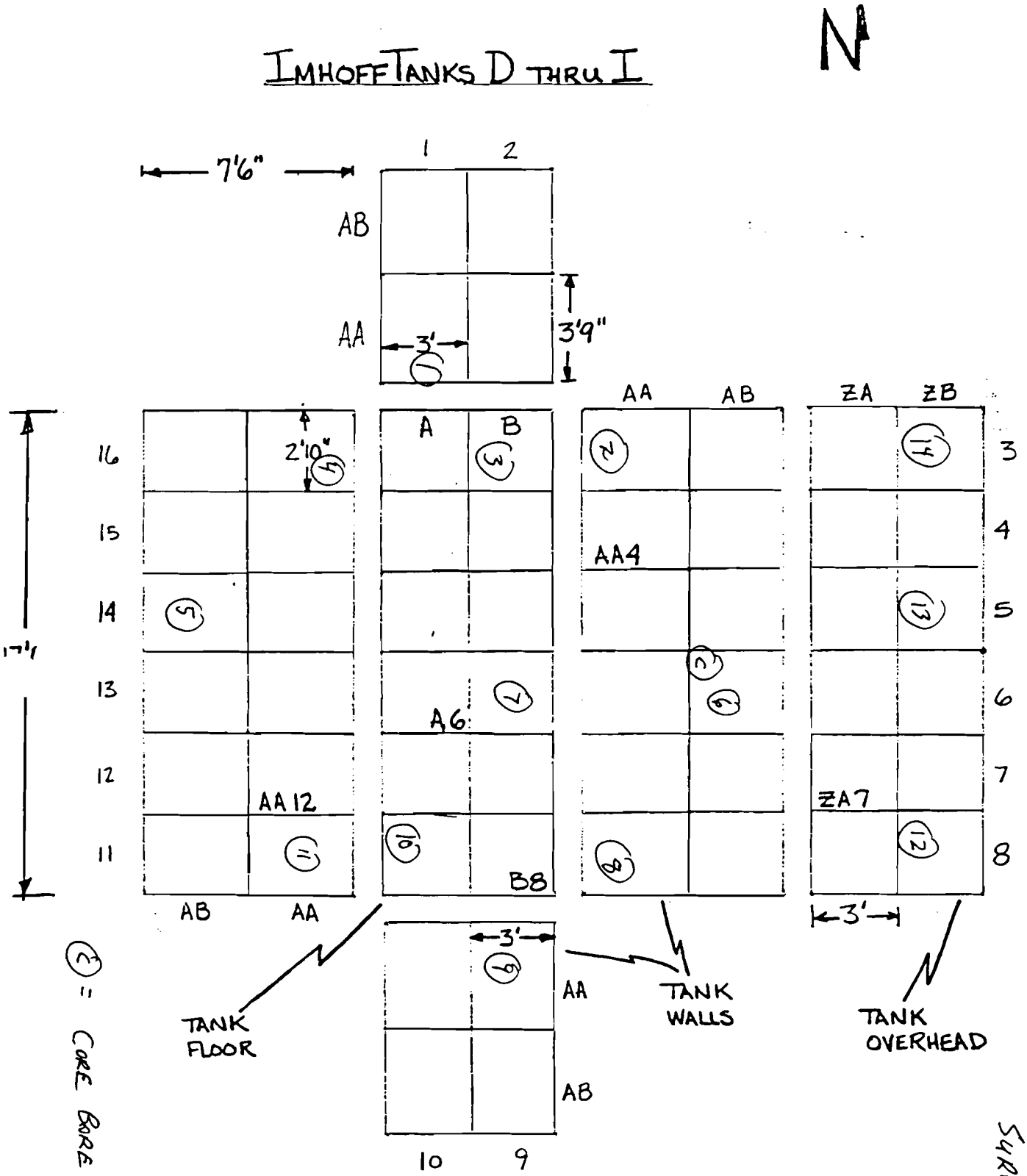
IMHOFF TANKS D THRU I



(5) = CORE BORE LOCATION

FLOOR GRIDS - 3' x 2'10"

E & W WALL GRIDS - 2'10" x 3'9"

N & S WALL GRIDS - 3' x 3'9"

OVHD GRIDS - 3' x 2'10"

TANK 'I'

PAGE 2 OF 2

SURVEY # 03.2392-05-HCD

C ‘INATION/RADIATION
SL ‘REPORT

TO PROJECT # 46831

DATE 3-13-92 | TIME START 1530 | TIME COMPL 1700 | PAGE 1 OF 3

ACTIVITY/LOCATION: UC DAVIS ITEH DAVIS, CA

SURVEYOR: BRAD WEIL | PHONE:

MARID: RADIUM #1 | Survey Number: 03 1392-01-UCD

DAILY ☐ WEEKLY ☐ MONTHLY ☐ CONTAMINATION AND DAILY ☐ WEEKLY ☐ MONTHLY ☐ RADIATION SURVEY

COMMENTS
L/2220 w/160cm² 43-20 PROBE → MDA = 270 DPM/100cm², BKGD = 73.4 CPM, EFF = .193, ESP-2 w/ 50cm² 43-65 PROBE → MDA = 56 DPM/100cm², BKGD = 0 CPM EFF = .198, ND = NOT DETECTABLE

PERMISSIBLE LEVELS FIXED/LOOSE
300/20 dpm/100 cm² ALPHA
5000/1000 dpm/100 cm² BETA-GAMMA

CSCA AREA CONTROL LEVELS
N/A dpm/100 cm² ALPHA
N/A dpm/100 cm² BETA-GAMMA

☐ OTHER (SEE COMMENTS)
☒ NO ACTION REQ'D

SOURCE CHECK DATA	CONTAMINATION SURVEYS ALPHA	CONTAMINATION SURVEYS BETA/GAMMA	RADIATION BETA/GAMMA
SOURCE ID	Th-230	Tc-99	
SOURCE STRENGTH	13900 dpm	7190 dpm	mR/hr
INSTRUMENT RESPONSE L/2929	5166 cpm	1095 cpm	mR/hr
EFFICIENCY/CORRECTION FACTOR L/2929	0.372/2.7	0.146/6.8	
MDA - L/2929	17 dpm	228 dpm	SAT ☐ UNSAT ☐
BACKGROUND L/2929	0.6 cpm	43.2 cpm	mR/hr

CONTAMINATION SURVEY INSTRUMENT TYPE TAG NO	ALPHA 2929/#74075 ESP-2/#1065	BETA-GAMMA 2929/#74075 2220/#46599
RADIATION SURVEY INSTRUMENT TYPE TAG NO	NEUTRON N/A	BETA-GAMMA N/A

RADCON REVIEW [signature] DATE 3-31-92

REASON FOR SURVEY
☐ PROCEDURE—NO
☒ SPECIAL RADIUM TANK #1
☐ ROUTINE

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA dpm/100 cm²	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
1	133	ND	17672	82	N/A	GRID AA7
2	92	1	11449	48		AB8
3	204	10	16869	75		AA5
4	31	4	3955	27		B4
5	61	7	3352	41		2A10
6	143	10	4641	129		2B11
7	61	1	23337	48		AB2
8	173	1	11962	104		AA14
9	41	1	8571	54		AA12
10	31	1	2344	95		A1
11	51	1	4780	54		M1
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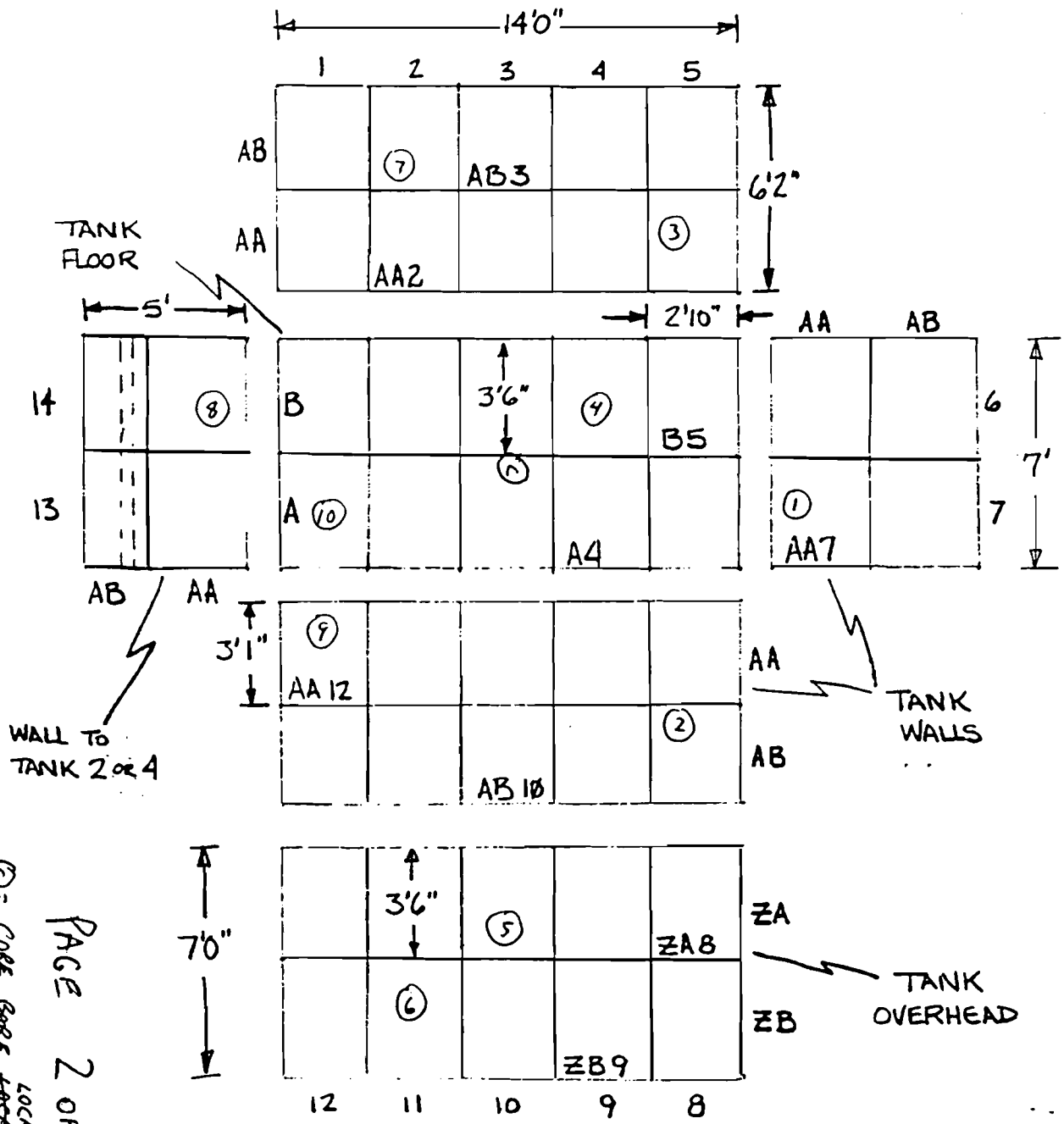
N/A

* THE KNOWING & WILLFUL RECORDING OF FALSE, FICTICIOUS, OR FRAUDULENT STATEMENTS OR ENTRIES ON THIS DOCUMENT MAY BE PUNISHABLE AS A FELONY UNDER FEDERAL STATUTES

RADIUM TANKS 1 & 3



FLOOR & OVHD GRIDS - 3'6" x 2'10"

N&S WALL GRIDS - 3'1" x 2'10"

E&W WALL GRIDS - 3'6" x 3'1"

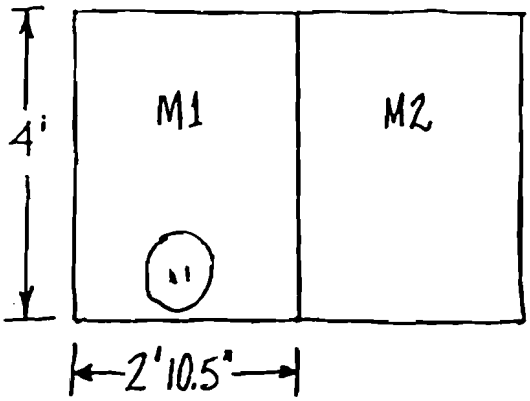
TOP GRIDS OF W. WALL - 3'1" x 1'11"

SURVEY # 031392-01-UCD

PAGE 2 OF 3

(c) = CORE BORE LOCATION

RADIUM TANK MANWAYS
(#1 thru #4)



Split manway in halves.
Label grid blocks as provided above.

SURVEY # 031392-01-UCD

22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS
AMPAD

C[illegible]INATION/RADIATION SL[illegible] REPORT

TO: PROJECT # 46831

DATE: 3-14-92 | TIME START: 1600 | TIME COMPL: 1630 | PAGE 1 OF 3

ACTIVITY/LOCATION: UC DAVIS ITEH, DAVIS, CA

SURVEYOR: B. WELL | PHONE:

MAP ID: | Survey Number: 031492-02-UCD

DAILY ☐ WEEKLY ☐ MONTHLY ☐ CONTAMINATION AND DAILY ☐ WEEKLY ☐ MONTHLY ☐ RADIATION SURVEY

COMMENTS: L/2220 w/ 160 cm² 43-70 PROBE → MDA = 270 DPM/100cm², BKGD = 73.4 CPM, EFF = .193, ESP-2 w/ 50 cm² 43-65 PROBE → MDA = 56 DPM/100cm², BKGD = 0 CPM, EFF = .198.

PERMISSIBLE LEVELS FIXED/LOOSE: 300/20 dpm/100 cm² ALPHA; 5000/1000 dpm/100 cm² BETA-GAMMA

CSCA AREA CONTROL LEVELS: N/A dpm/100 cm² ALPHA; N/A dpm/100 cm² BETA-GAMMA

☐ OTHER (SEE COMMENTS) ☒ NO ACTION REQ'D.

CONTAMINATION SURVEY INSTRUMENT TYPE TAG NO: ALPHA 2929/#74075; BETA-GAMMA 2929/#74075; ESP-2/#1065; 2220/#46599

RADIATION SURVEY INSTRUMENT TYPE TAG NO: NEUTRON N/A; BETA-GAMMA N/A

RADCON REVIEW: B. Well DATE: 3-31-92

SOURCE CHECK DATA	CONTAMINATION SURVEYS ALPHA	CONTAMINATION SURVEYS BETA/GAMMA	RADIATION BETA/GAMMA
SOURCE ID	Th-230	Tc-99	
SOURCE STRENGTH	13900 dpm	7190 dpm	mR/hr
INSTRUMENT RESPONSE L/2929	5166 cpm	1045 cpm	mR/hr
EFFICIENCY/CORRECTION FACTOR L/2929	0.372/2.7	0.146/6.8	
MDA - L/2929	17 dpm	228 dpm	SAT. ☐ UNSAT. ☐
BACKGROUND L/2929	0.6 cpm	43.2 cpm	mR/hr

REASON FOR SURVEY: ☐ PROCEDURE—NO ☒ SPECIAL RADIUM TANK # 2 ☐ ROUTINE

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA EQUIV Th-230 dpm/100 cm²	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA EQUIV Tc-99 dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
1	ND	ND	3843	ND	N/A	GRID A1
2	122	1	13188	88		A56
3	265	4	9107	102		AA8
4	408	15	4356	104		AA2
5	224	7	8081	116		AA4
6	31	23	2170	245		~~AB7~~ ZB6
7	122	15	6653	86		M1
8						
9						
10						
11						
12					N/A	
13						
14						
15						
16						

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA EQUIV Th-230 dpm/100 cm²	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA EQUIV Tc-99 dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
18						
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27					N/A	
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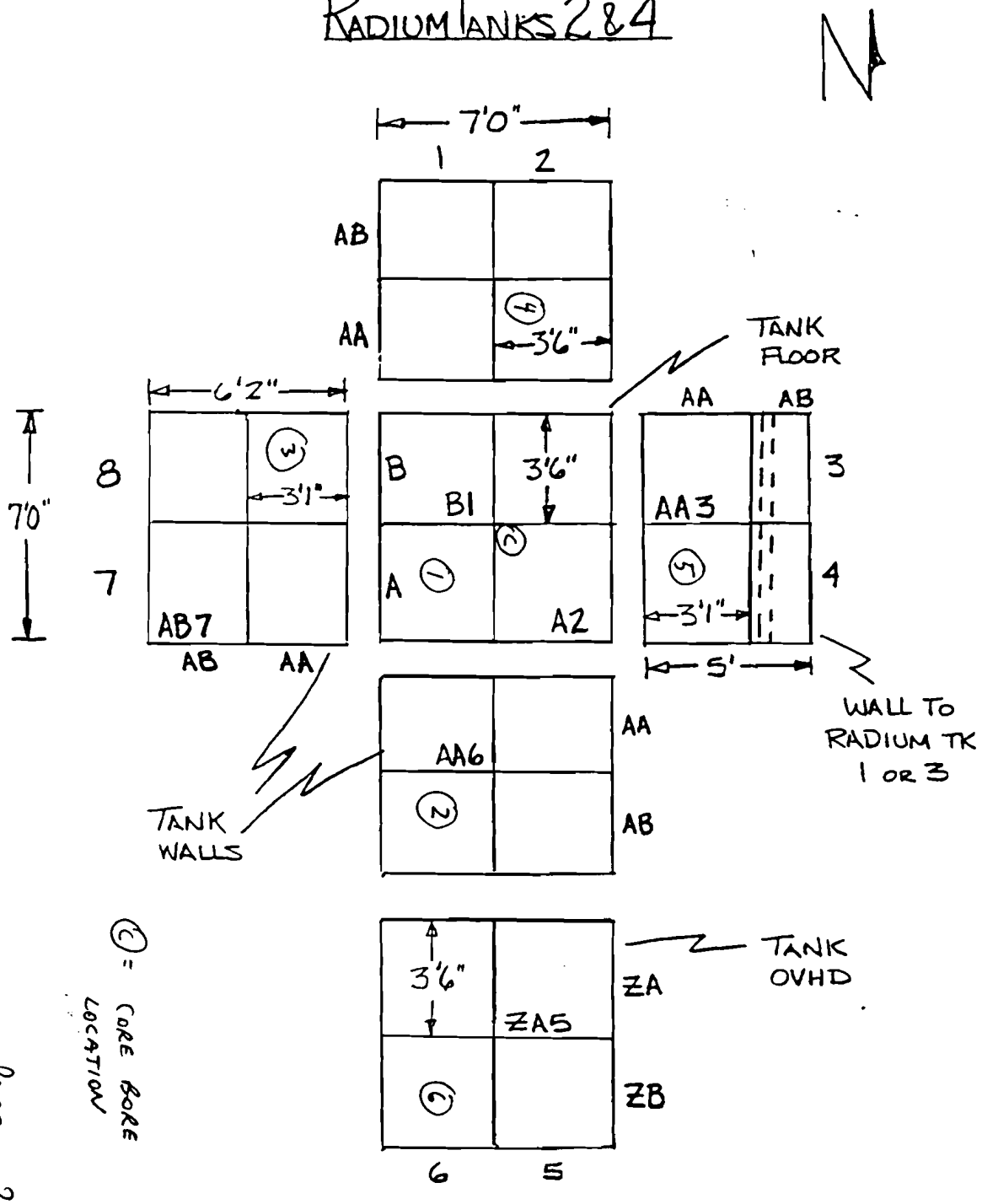
RADIUM TANKS 2 & 4

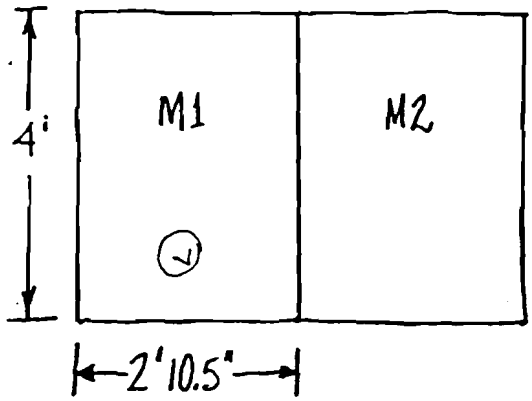


⊙ = CORE BORE LOCATION

FLOOR & OVHD GRIDS - 3'6" x 3'6"
WALL GRIDS - 3'1" x 3'6"
TOP GRIDS - E WALL - 3'6" x 1'11"

SURVEY # 03492-02-WED

RADIUM TANK MANWAYS
(#1 thru #4)



Split manway in halves.
Label grid blocks as provided above.

SURVEY # 03492-02-UCD

C SL ‘INATION/RADIATION REPORT

TO PROJECT # 46831

DATE 3-15-92 | TIME START 1030 | TIME COMPL 1115 | 1 OF 3

ACTIVITY/LOCATION: UC DAVIS ITEH, DAVIS, CA

SURVEYOR: BRAD WELL | PHONE:

MAP ID: RADIUM #3 | Survey Number: 0315 92-01-UCD

DAILY ☐ WEEKLY ☐ MONTHLY ☐ CONTAMINATION AND DAILY ☐ WEEKLY ☐ MONTHLY ☐ RADIATION SURVEY

COMMENTS: L/2220 w/160cm² 43-20 PROBE → MDA = 270 DPM/100cm², BKGD = 73.4 CPM, EFF = .193, ESP-2 w/ 50cm² 43-65 PROBE → MDA = 56 DPM/100cm², BKGD = 0CPM EFF = .198, ND = NOT DETECTABLE. (1) SEE BACK.

PERMISSIBLE LEVELS FIXED/LOOSE
300/20 dpm/100 cm² ALPHA
5000/1000 dpm/100 cm² BETA-GAMMA

CSCA AREA CONTROL LEVELS
N/A dpm/100 cm² ALPHA
N/A dpm/100 cm² BETA-GAMMA

☐ OTHER (SEE COMMENTS)
☒ NO ACTION REQ'D.

SOURCE CHECK DATA	CONTAMINATION SURVEYS ALPHA	CONTAMINATION SURVEYS BETA/GAMMA	RADIATION BETA/GAMMA
SOURCE I.D.	Th-230	Tc-99	
SOURCE STRENGTH	13900 dpm	7190 dpm	mR/hr.
INSTRUMENT RESPONSE L/2929	5166 cpm	1095 cpm	mR/hr.
EFFICIENCY/CORRECTION FACTOR L/2929	0.372/2.7	0.146/6.8	
MDA - L/2929	17 dpm	228 dpm	SAT. ☐ UNSAT. ☐
BACKGROUND L/2929	0.6 cpm	43.2 cpm	mR/hr.

CONTAMINATION SURVEY INSTRUMENT TYPE TAG NO	ALPHA 2929/#74075 ESP-2/#1065	BETA-GAMMA 2929/#74075 2220/#46599
RADIATION SURVEY INSTRUMENT TYPE TAG NO	NEUTRON N/A	BETA-GAMMA N/A

RADCON REVIEW BSWD DATE 3-22-92

REASON FOR SURVEY
☐ PROCEDURE—NO
☒ SPECIAL RADIUM TANK #3
☐ ROUTINE

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA dpm/100 cm²	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
1	92	ND	15903	109	N/A	GRID AA6
2	82	ND	14265	54		AB4
3	112	7	2860	75		A4
4	82	1	13960	95		AA8
5	61	15	3383	54		B2
6	133	15	10466	82		AA1
7	163	7	14500	48		AA13
8	112	4	14457	129		AB12
9	31	1	1144	75		ZA11
10	10	ND	978	75		ZB9
11	51	ND	2625	48		M1
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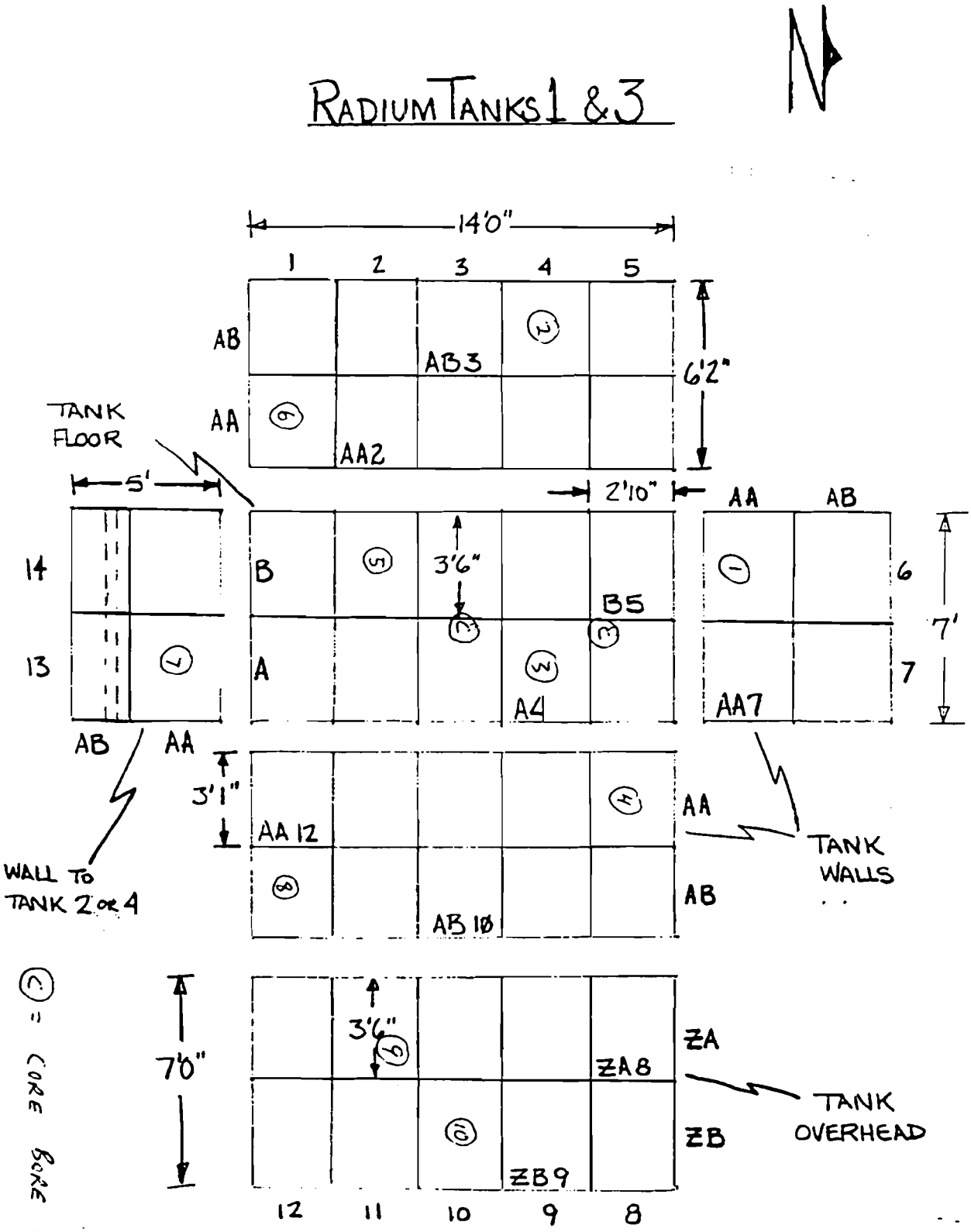
N/A

* THE KNOWING & WILLFUL RECORDING OF FALSE, FICTICIOUS, OR FRAUDULENT STATEMENTS OR ENTRIES ON THIS DOCUMENT MAY BE PUNISHABLE AS A FELONY UNDER FEDERAL STATUTES

RADIUM TANKS 1 & 3



Ⓒ = CORE BORE LOCATION

FLOOR & OVHD GRIDS - 3'6" x 2'10"

N & S WALL GRIDS - 3'1" x 2'10"

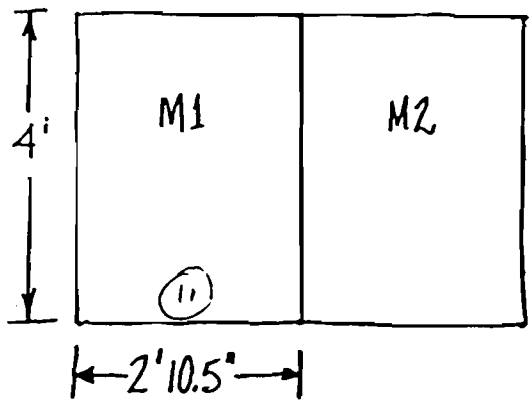
E & W WALL GRIDS - 3'6" x 3'1"

TOP GRIDS OF W. WALL - 3'1" x 1'11"

SURVEY # 031592-01-UCD

PAGE 2 OF 3

RADIUM TANK MANWAYS
(#1 thru #4)



Split manway in halves.
Label grid blocks as provided above.

SURVEY # 03159 2-01-UCD

22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS
AMPAD

C[illegible]INATION/RADIATION
SL[illegible] REPORT

TO: PROJECT # 46831

DATE: 3-15-92 | TIME START: 1120 | TIME COMPL: 1145 | PAGE 1 OF 3

ACTIVITY/LOCATION: UC DAVIS ITEH DAVIS, CA

SURVEYOR: BRAD WELL

PHONE:

MAP ID: RADIUM #4

Survey Number: 031592-02-UCD

DAILY ☐ WEEKLY ☐ MONTHLY ☐ CONTAMINATION AND DAILY ☐ WEEKLY ☐ MONTHLY ☐ RADIATION SURVEY

COMMENTS: L/2220 w/160cm² 43-20 PROBE → MDA = 270 DPM/100cm², BKGD = 73.4 CPM, EFF = .193, ESP.2 w/ 50cm² 43-65 PROBE → MDA = 56 DPM/100cm², BKGD = 0 CPM EFF = .198, ND = NOT DETECTABLE. (1) SEE BACK.

PERMISSIBLE LEVELS FIXED/LOOSE: 300/20 dpm/100 cm² ALPHA; 5000/1000 dpm/100 cm² BETA-GAMMA

CSCA AREA CONTROL LEVELS: N/A dpm/100 cm² ALPHA; N/A dpm/100 cm² BETA-GAMMA

☐ OTHER (SEE COMMENTS) ☒ NO ACTION REQ'D.

CONTAMINATION SURVEY INSTRUMENT TYPE TAG NO: ALPHA 2929/#74075 ESP-2/#1065; BETA-GAMMA 2929/#74075 2220/#46599

RADIATION SURVEY INSTRUMENT TYPE TAG NO: NEUTRON N/A; BETA-GAMMA N/A

RADCON REVIEW: [signature] DATE: 3-22-92

SOURCE CHECK DATA	CONTAMINATION SURVEYS ALPHA	CONTAMINATION SURVEYS BETA/GAMMA	RADIATION BETA/GAMMA
SOURCE I D	Th-230	Tc-99	
SOURCE STRENGTH	13900 dpm	7190 dpm	mR/hr
INSTRUMENT RESPONSE L/2929	5166 cpm	1045 cpm	mR/hr
EFFICIENCY/CORRECTION FACTOR L/2929	0.372/2.7	0.146/6.8	
MDA - L/2929	17 dpm	228 dpm	SAT ☐ UNSAT ☐
BACKGROUND L/2929	0.6 cpm	43.2 cpm	mR/hr

REASON FOR SURVEY: ☐ PROCEDURE—NO ☒ SPECIAL RADIUM TANK #4 ☐ ROUTINE

SWIPE PROBE NO	ALPHA EQUIV Th-230 dpm/PROBE	ALPHA dpm/100 cm²	BETA-GAMMA EQUIV Tc-99 dpm/PROBE	BETA-GAMMA dpm/100 cm	mrem/hr ☐ BETA-GAMMA ☐ NEUTRON ☐ micro R/hr ☐	ITEM OR LOCATION
1	235	23	4254	ND	N/A	GRID A1
2	173	7	20111	102		AB5
3	31	1	1789	88		ZB6
4	276	ND	8985	ND		AB3
5	153	4	11538	27		AA1
6	316	23	6520	41		AA3
7	31	1	1463	109		M1
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N/A

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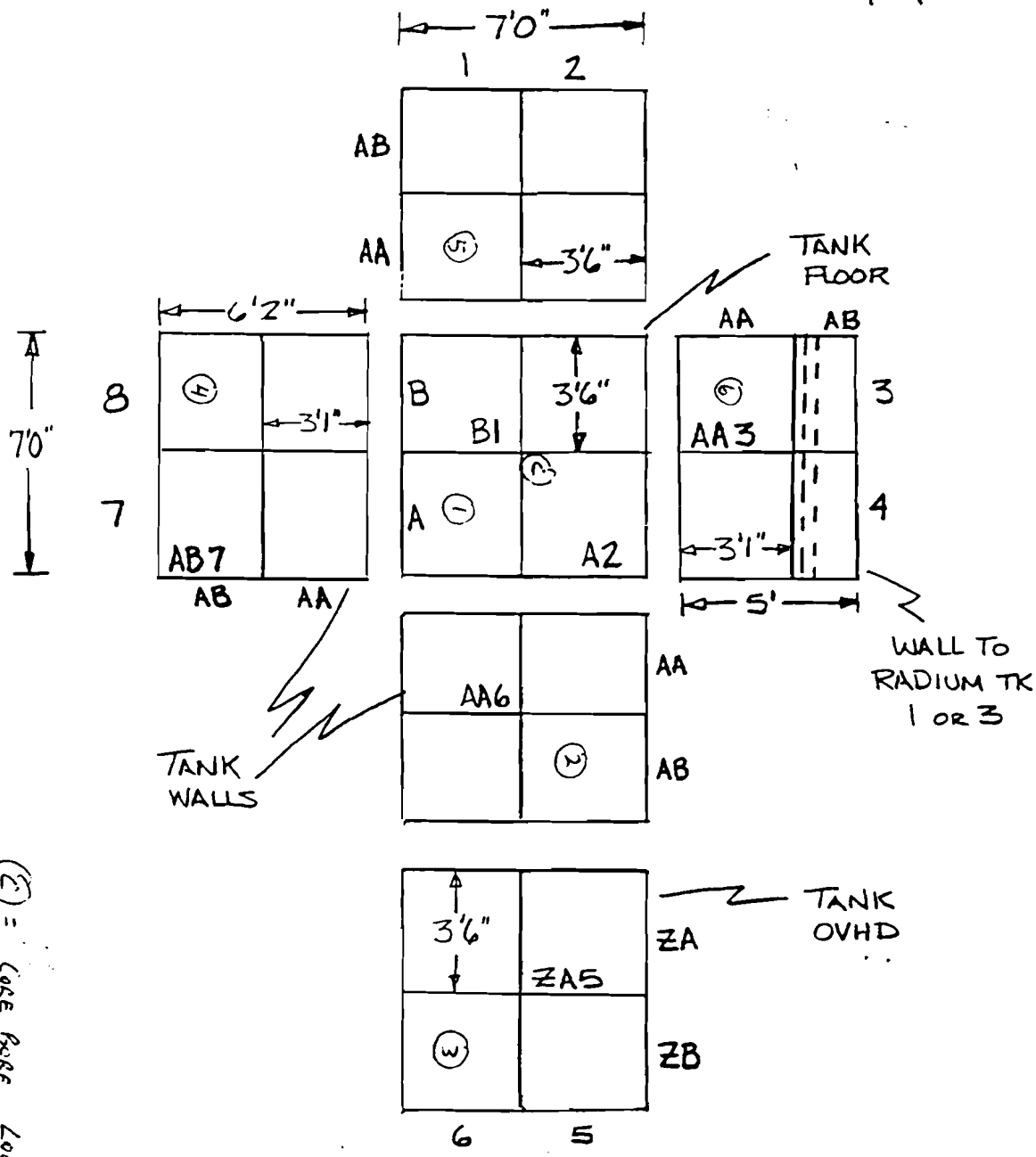
RADIUM TANKS 2 & 4

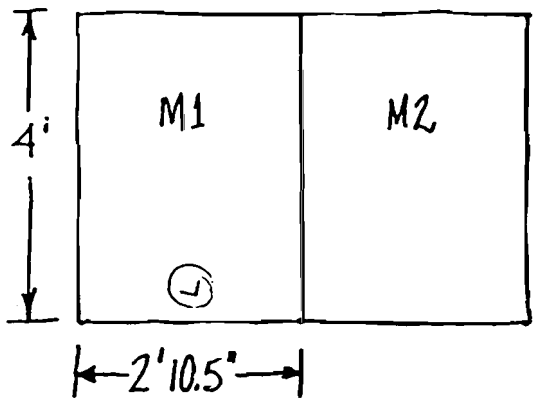


(C) = CORE BORE LOCATION.

FLOOR & OVHD GRIDS - 3'6" x 3'6"
WALL GRIDS - 3'1" x 3'6"
TOP GRIDS - E WALL - 3'6" x 1'11"

SURVEY # 031592-02-UCD

RADIUM TANK MANWAYS
(#1 thru #4)



Split manway in halves.
Label grid blocks as provided above.

22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS
AMPAD

APPENDIX C

ANALYTICAL RECORDS
(65 Pages)

ANALYTICAL RECORDS
TABLE OF CONTENTS

PROJECT NAME UC DAVIS PROJECT NUMBER 46831

Contract Lab (CEP) Order No.	Sample Description	No. of Pages
92-03-654	Tank Core Samples	24
92-03-655	Soil Samples Beneath Tanks	24
92-02-463	Liquid/Rainwater Samples	3
92-03-070	Liquid/Rainwater Samples (Sr-90)	2
92-03-663	Liquid/Rainwater Samples (85 gal drum)	5
92-03-200	Imhoff Tank A Sample Results	5

Controls for Environmental
Pollution, Inc.
P.O. Box 5351
Santa Fe, NM 87502

Phone: (505) 982-9841/(800) 545-2188

Chem Nuclear System Inc.,
140 Stoneridge Drive
Columbia, SC 29210

Attn: Stan Hodges

Purchase Order: N448644
Invoice Number:

Order #: 92-03-654
Date: 06/12/92 15:40
Work ID: Concrete (NR)
Date Received: 03/30/92
Date Completed: 06/12/92

Client Code: CHEM_NUCLEAR

cc: University of CA-Davis/CNES
ITEH - Lehr Facility
Old Davis Road, Davis CA 95616
Attn: Gary Howard

ND-No man-made
nuclides detected

SAMPLE IDENTIFICATION

Sample Number	Sample Description
01	I-B-BSW-C-003
02	I-BS-BSW-C-004
03	I-C-BSW-C-006
04	I-D-BSW-C-008
05	I-E-BSW-C-010
06	I-G-BSW-C-012
07	I-H-BSW-C-014
08	I-F-BSW-C-016
09	I-I-BSW-C-018
10	R-1-BSW-C-020
11	R-2-BSW-C-022
12	R-3-BSW-C-024
13	R-3E-BSW-C-025
14	R-4-BSW-C-027

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Remainder of sample(s) for routine analysis will be disposed of three weeks from final report date. Sample(s) for bacteria analysis only, will be disposed of immediately after analysis. This is not applicable if other arrangements have been made.

Approved By

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TEST RESULTS BY SAMPLE

Sample Description: I-B-BSW-C-003 Lab No: 01A
Test Description: Gamma Spectral Analysis Method: Test Code: GAMMS5
Collected: 03/26/92 19:00 Category: CONCRETE

Gamma Spectral Analysis

NUCLIDE	RESULT	UNITS
Radium-226	<0.1	pCi/gram
Thorium-228	<0.1	pCi/gram
Thorium-232	0.14+/-0.09	pCi/gram
No man-made nuclides detected.		

Sample Description: I-B-BSW-C-003 Lab No: 01A
Test Description: Strontium-90 Method: Test Code: SR90_5
Collected: 03/26/92 19:00 Category: CONCRETE

Type of Analysis	RESULT
Strontium-90	<0.1

All results reported in:

UNITS pCi/gram

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TEST RESULTS BY SAMPLE

Sample Description: I-B-BSW-C-003 Lab No: 01A
Test Description: Tritium Method: Test Code: H3_S_5
Collected: 03/26/92 19:00 Category: CONCRETE

Type of Analysis	RESULT
Tritium	0.67+/-0.55

All results reported in:

UNITS pCi/gram

Sample Description: I-BS-BSW-C-004 Lab No: 02A
Test Description: Gamma Spectral Analysis Method: Test Code: GAMMS5
Collected: 03/26/92 19:00 Category: CONCRETE

Gamma Spectral Analysis

NUCLIDE	RESULT	UNITS
Radium-226	0.15+/-0.04	pCi/gram
Thorium-228	0.3+/-0.2	pCi/gram
Thorium-232	0.13+/-0.04	pCi/gram
No man-made nuclides detected		

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TEST RESULTS BY SAMPLE

Sample Description: I-BS-BSW-C-004
Lab No: 02A
Test Description: Strontium-90
Method:
Test Code: SR90_5
Collected: 03/26/92 19:00
Category: CONCRETE

Type of Analysis	RESULT
Strontium-90	<0.1

All results reported in:

UNITS pCi/gram

Sample Description: I-BS-BSW-C-004
Lab No: 02A
Test Description: Tritium
Method:
Test Code: H3_S_5
Collected: 03/26/92 19:00
Category: CONCRETE

Type of Analysis	RESULT
Tritium	<0.50

All results reported in:

UNITS pCi/gram

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OUT OF STATE 800/545-2188 • FAX - 505-982-5

TEST RESULTS BY SAMPLE

Sample Description: I-C-BSW-C-006 Lab No: 03A
Test Description: Gamma Spectral Analysis Method: Test Code: GAMMS5
Collected: 03/26/92 19:00 Category: CONCRETE

Gamma Spectral Analysis

NUCLIDE	RESULT	UNITS
Radium-226	0.20+/-0.04	pCi/gram
Thorium-228	0.2+/-0.1	pCi/gram
Thorium-232	0.17+/-0.04	pCi/gram
No man-made nuclides detected.		

Sample Description: I-C-BSW-C-006 Lab No: 03A
Test Description: Strontium-90 Method: Test Code: SR90_5
Collected: 03/26/92 19:00 Category: CONCRETE

Type of Analysis	RESULT
Strontium-90	2.94+/-0.29

All results reported in:

UNITS pCi/gram

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TEST RESULTS BY SAMPLE

Sample Description: I-C-BSW-C-006
Lab No: 03A
Test Description: Tritium
Method:
Test Code: H3_S_5
Collected: 03/26/92 19:00
Category: CONCRETE

Type of Analysis	RESULT
Tritium	0.62+/-0.46

All results reported in:

UNITS pCi/gram

Sample Description: I-D-BSW-C-008
Lab No: 04A
Test Description: Gamma Spectral Analysis
Method:
Test Code: GAMMS5
Collected: 03/26/92 19:00
Category: CONCRETE

Gamma Spectral Analysis

NUCLIDE	RESULT	UNITS
Radium-226	0.13+/-0.08	pCi/gram
Thorium-228	0.6+/-0.4	pCi/gram
Thorium-232	<0.1	pCi/gram
No man-made nuclides detected.		

Order # 92-03-654 Controls for Environmental Page 8
06/12/92 15:40

TEST RESULTS BY SAMPLE

Sample Description: I-D-BSW-C-008 Lab No: 04A
Test Description: Strontium-90 Method: Test Code: SR90_5
Collected: 03/26/92 19:00 Category: CONCRETE

Type of Analysis	RESULT
Strontium-90	<0.1

All results reported in:

UNITS pCi/gram

Sample Description: I-D-BSW-C-008 Lab No: 04A
Test Description: Tritium Method: Test Code: H3_S_5
Collected: 03/26/92 19:00 Category: CONCRETE

Type of Analysis	RESULT
Tritium	0.62+/-0.52

All results reported in:

UNITS pCi/gram

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Order # 92-03-654
06/12/92 15:40

Controls for Environmental
TEST RESULTS BY SAMPLE

Sample Description: I-E-BSW-C-010 Lab No: 05A
Test Description: Gamma Spectral Analysis Method: Test Code: GAMMS5
Collected: 03/26/92 19:00 Category: CONCRETE

Gamma Spectral Analysis

NUCLIDE	RESULT	UNITS
Radium-226	0.16+/-0.04	pCi/gram
Thorium-228	0.2+/-0.1	pCi/gram
Thorium-232	0.17+/-0.05	pCi/gram
No man-made nuclides detected.		

Sample Description: I-E-BSW-C-010 Lab No: 05A
Test Description: Strontium-90 Method: Test Code: SR90_5
Collected: 03/26/92 19:00 Category: CONCRETE

Type of Analysis	RESULT
Strontium-90	<0.1

All results reported in:

UNITS pCi/gram

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TEST RESULTS BY SAMPLE

Sample Description: I-E-BSW-C-010
Lab No: 05A
Test Description: Tritium
Method:
Test Code: H3_S_5
Collected: 03/26/92 19:00
Category: CONCRETE

Type of Analysis	RESULT
Tritium	0.69+/-0.55

All results reported in:

UNITS pCi/gram

Sample Description: I-G-BSW-C-012
Lab No: 06A
Test Description: Gamma Spectral Analysis
Method:
Test Code: GAMMS5
Collected: 03/26/92 19:00
Category: CONCRETE

Gamma Spectral Analysis

NUCLIDE	RESULT	UNITS
Radium-226	<0.1	pCi/gram
Thorium-228	<0.5	pCi/gram
Thorium-232	<0.1	pCi/gram
No man-made nuclides detected.		

TEST RESULTS BY SAMPLE

Sample Description: I-G-BSW-C-012 Lab No: 06A
Test Description: Strontium-90 Method: Test Code: SR90_5
Collected: 03/26/92 19:00 Category: CONCRETE

Type of Analysis	RESULT
Strontium-90	<0.1

All results reported in:

UNITS pCi/gram

Sample Description: I-G-BSW-C-012 Lab No: 06A
Test Description: Tritium Method: Test Code: H3_S_5
Collected: 03/26/92 19:00 Category: CONCRETE

Type of Analysis	RESULT
Tritium	<0.50

All results reported in:

UNITS pCi/gram

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TEST RESULTS BY SAMPLE

Sample Description: I-H-BSW-C-014 Lab No: 07A
Test Description: Gamma Spectral Analysis Method: Test Code: GAMMS5
Collected: 03/26/92 19:00 Category: CONCRETE

Gamma Spectral Analysis

NUCLIDE	RESULT	UNITS
Radium-226	0.12+/-0.07	pCi/gram
Thorium-228	<0.4	pCi/gram
Thorium-232	0.14+/-0.08	pCi/gram
No man-made nuclides detected.		

Sample Description: I-H-BSW-C-014 Lab No: 07A
Test Description: Strontium-90 Method: Test Code: SR90_5
Collected: 03/26/92 19:00 Category: CONCRETE

Type of Analysis	RESULT
Strontium-90	<0.1

All results reported in:

UNITS pCi/gram

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TEST RESULTS BY SAMPLE

Sample Description: I-H-BSW-C-014 Lab No: 07A
Test Description: Tritium Method: Test Code: H3_S_5
Collected: 03/26/92 19:00 Category: CONCRETE

Type of Analysis	RESULT
Tritium	0.84+/-0.58

All results reported in:

UNITS pCi/gram

Sample Description: I-F-BSW-C-016 Lab No: 08A
Test Description: Gamma Spectral Analysis Method: Test Code: GAMMS5
Collected: 03/26/92 19:00 Category: CONCRETE

Gamma Spectral Analysis

NUCLIDE	RESULT	UNITS
Radium-226	0.10+/-0.08	pCi/gram
Thorium-228	<0.5	pCi/gram
Thorium-232	<0.1	pCi/gram
No man-made nuclides detected.		

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TEST RESULTS BY SAMPLE

Sample Description: I-F-BSW-C-016 Lab No: 08A
Test Description: Strontium-90 Method: Test Code: SR90_5
Collected: 03/26/92 19:00 Category: CONCRETE

Type of Analysis	RESULT
Strontium-90	<0.1

All results reported in:

UNITS pCi/gram

Sample Description: I-F-BSW-C-016 Lab No: 08A
Test Description: Tritium Method: Test Code: H3_S_5
Collected: 03/26/92 19:00 Category: CONCRETE

Type of Analysis	RESULT
Tritium	3.34+/-0.57

All results reported in:

UNITS pCi/gram

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TEST RESULTS BY SAMPLE

Sample Description: I-I-BSW-C-01S Lab No: 09A
Test Description: Gamma Spectral Analysis Method: Test Code: GAMMS5
Collected: 03/26/92 19:00 Category: CONCRETE

Gamma Spectral Analysis

NUCLIDE	RESULT	UNITS
Radium-226	0.14+/-0.09	pCi/gram
Thorium-228	<0.5	pCi/gram
Thorium-232	0.15+/-0.10	pCi/gram
No man-made nuclides detected.		

Sample Description: I-I-BSW-C-018 Lab No: 09A
Test Description: Strontium-90 Method: Test Code: SR90_5
Collected: 03/26/92 19:00 Category: CONCRETE

Type of Analysis	RESULT
Strontium-90	<0.1

All results reported in:

UNITS pCi/gram

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Order # 92-03-654
06/12/92 15:40

Controls for Environmental
TEST RESULTS BY SAMPLE

Sample Description: I-I-BSW-C-018
Test Description: Tritium
Collected: 03/26/92 19:00

Lab No: 09A
Method:
Category: CONCRETE

Test Code: H3_S_5

Type of Analysis	RESULT
Tritium	0.72+/-0.55

All results reported in:

UNITS pCi/gram

Sample Description: R-1-BSW-C-020
Test Description: Gamma Spectral Analysis
Collected: 03/26/92 19:00

Lab No: 10A
Method:
Category: CONCRETE

Test Code: GAMMS5

Gamma Spectral Analysis

NUCLIDE	RESULT	UNITS
Radium-226	0.63+/-0.06	pCi/gram
Thorium-228	0.8+/-0.1	pCi/gram
Thorium-232	0.53+/-0.12	pCi/gram
No man-made nuclides detected.		

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TEST RESULTS BY SAMPLE

Sample Description: R-1-BSW-C-020 Lab No: 10A
Test Description: Strontium-90 Method: Test Code: SR90_5
Collected: 03/26/92 19:00 Category: CONCRETE

Type of Analysis	RESULT
Strontium-90	<0.1

All results reported in:

UNITS pCi/gram

Sample Description: R-1-BSW-C-020 Lab No: 10A
Test Description: Tritium Method: Test Code: H3_S_5
Collected: 03/26/92 19:00 Category: CONCRETE

Type of Analysis	RESULT
Tritium	0.64+/-0.55

All results reported in:

UNITS pCi/gram

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TEST RESULTS BY SAMPLE

Sample Description: R-2-BSW-C-022 Lab No: 11A
Test Description: Gamma Spectral Analysis Method: Test Code: GAMMS5
Collected: 03/26/92 19:00 Category: CONCRETE

Gamma Spectral Analysis

NUCLIDE	RESULT	UNITS
Radium-226	0.32+/-0.05	pCi/gram
Thorium-228	0.3+/-0.1	pCi/gram
Thorium-232	0.24+/-0.04	pCi/gram
No man-made nuclides detected.		

Sample Description: R-2-BSW-C-022 Lab No: 11A
Test Description: Strontium-90 Method: Test Code: SR90_5
Collected: 03/26/92 19:00 Category: CONCRETE

Type of Analysis	RESULT
Strontium-90	<0.1

All results reported in:

UNITS pCi/gram

Controls for Environmental
Pollution, Inc.
P.O. Box 5351
Santa Fe, NM 87502
Attn:
Phone: (505) 982-9841/(800) 545-2188

Chem-Nuclear Chemical Waste
Management/Univ. of CA-Davis
1TEH - Old Davis Road
Davis, CA 95616
Attn: Walt Paulson

Order #: 92-03-200
Date: 03/24/92 16:25
Work ID: Solid (R)
Date Received: 03/10/92
Date Completed: 03/24/92

Purchase Order: G472182
Invoice Number:

SAMPLE IDENTIFICATION

Sample Number	Sample Description	Sample Number	Sample Description
01	A-030992		

Remainder of sample(s) for routine analysis will be disposed of three weeks from final report date. Sample(s) for bacteria analysis only, will be disposed of immediately after analysis. This is not applicable if other arrangements have been made.

Approved By

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TEST RESULTS BY SAMPLE

Sample: 01A A-030992 Collected: 03/09/92 10:00

Test Description	Result	D.L.	Units	Analyzed	By
EPA - method 8240					
Chloromethane	<6000	6000	ug/kg	03/20/92	DVM
Bromomethane	<6000	6000	ug/kg	03/20/92	DVM
Vinyl Chloride	<1200	1200	ug/kg	03/20/92	DVM
Chloroethane	<6000	6000	ug/kg	03/20/92	DVM
Methylene Chloride	<1680	1680	ug/kg	03/20/92	DVM
Acetone	<6000	6000	ug/kg	03/20/92	DVM
Carbon Disulfide	<3000	3000	ug/kg	03/20/92	DVM
1,1-Dichloroethene	<1680	1680	ug/kg	03/20/92	DVM
1,1-Dichloroethane	<2840	2840	ug/kg	03/20/92	DVM
trans-1,2-Dichloroethene	<960	960	ug/kg	03/20/92	DVM
Chloroform	<960	960	ug/kg	03/20/92	DVM
1,2-Dichloroethane	<1680	1680	ug/kg	03/20/92	DVM
2-Butanone	<6000	6000	ug/kg	03/20/92	DVM
1,1,1-Trichloroethane	<2280	2280	ug/kg	03/20/92	DVM
Carbon Tetrachloride	<1680	1680	ug/kg	03/20/92	DVM
Vinyl Acetate	<6000	6000	ug/kg	03/20/92	DVM
Bromodichloromethane	<1320	1320	ug/kg	03/20/92	DVM
1,1,2,2-Tetrachloroethane	<4140	4140	ug/kg	03/20/92	DVM
1,2-Dichloropropane	<3600	3600	ug/kg	03/20/92	DVM
trans-1,3-Dichloropropene	<3000	3000	ug/kg	03/20/92	DVM
Trichloroethene	<1140	1140	ug/kg	03/20/92	DVM
Dibromochloromethane	<1860	1860	ug/kg	03/20/92	DVM
1,1,2-Trichloroethane	<3000	3000	ug/kg	03/20/92	DVM
Benzene	<2640	2640	ug/kg	03/20/92	DVM
cis-1,3-Dichloropropene	<3000	3000	ug/kg	03/20/92	DVM
2-Chloroethyl Vinyl Ether	<3000	3000	ug/kg	03/20/92	DVM
Bromoform	<2820	2820	ug/kg	03/20/92	DVM
2-Hexanone	<6000	6000	ug/kg	03/20/92	DVM

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Test Description	Result	D.L.	Units	Analyzed	By
4-Methyl-2-Pentanone	<6000	6000	ug/kg	03/20/92	DVM
Tetrachloroethene	<2460	2460	ug/kg	03/20/92	DVM
Toluene	<3600	3600	ug/kg	03/20/92	DVM
Chlorobenzene	<3600	3600	ug/kg	03/20/92	DVM
Ethyl Benzene	<4320	4320	ug/kg	03/20/92	DVM
Styrene	<3000	3000	ug/kg	03/20/92	DVM
Total Xylenes	9400	3000	ug/kg	03/20/92	DVM
EPA - method 8270					
Phenol	<15	15	mg/kg	03/19/92	DVM
Bis(2-Chloroethyl) Ether	<57	57	mg/kg	03/19/92	DVM
2-Chlorophenol	<33	33	mg/kg	03/19/92	DVM
1,3-Dichlorobenzene	<19	19	mg/kg	03/19/92	DVM
1,4-Dichlorobenzene	<44	44	mg/kg	03/19/92	DVM
Benzyl Alcohol	<200	200	mg/kg	03/19/92	DVM
1,2-Dichlorobenzene	<190	190	mg/kg	03/19/92	DVM
Bis(2-Chloroisopropyl)Ether	<57	57	mg/kg	03/19/92	DVM
4-Methylphenol	<100	100	mg/kg	03/19/92	DVM
N-Nitroso-di-N-propylamine	<46	46	mg/kg	03/19/92	DVM
Hexachloroethane	<16	16	mg/kg	03/19/92	DVM
Nitrobenzene	<19	19	mg/kg	03/19/92	DVM
Isophorone	<22	22	mg/kg	03/19/92	DVM
2-Nitrophenol	<36	36	mg/kg	03/19/92	DVM
2,4-Dimethylphenol	<27	27	mg/kg	03/19/92	DVM
Benzoic Acid	<100	100	mg/kg	03/19/92	DVM
Bis(2-Chlorethoxy)Methane	<53	53	mg/kg	03/19/92	DVM
2,4-Dichlorophenol	<27	27	mg/kg	03/19/92	DVM
1,2,4-Trichlorobenzene	<19	19	mg/kg	03/19/92	DVM
Naphthalene	<16	16	mg/kg	03/19/92	DVM
4-Chloroanaline	<200	200	mg/kg	03/19/92	DVM
Hexachlorobutadiene	<9	9	mg/kg	03/19/92	DVM
4-Chloro-3-Methylphenol	<30	30	mg/kg	03/19/92	DVM
2-Methylnaphthalene	3800	100	mg/kg	03/19/92	DVM
Hexachlorocyclopentadiene	<100	100	mg/kg	03/19/92	DVM
2,4,6-Trichlorophenol	<25	25	mg/kg	03/19/92	DVM

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Test Description	Result	D.L.	Units	Analyzed	By
2,4,5-Trichlorophenol	<100	100	mg/kg	03/19/92	DVM
2-Chloronapthalene	<100	100	mg/kg	03/19/92	DVM
2-Nitroanaline	<500	500	mg/kg	03/19/92	DVM
Dimethyl phthalate	<16	16	mg/kg	03/19/92	DVM
Acenaphthylene	94.0	35	mg/kg	03/19/92	DVM
3-Nitroaniline	<500	500	mg/kg	03/19/92	DVM
Acenaphthene	1600.0	19	mg/kg	03/19/92	DVM
2,4-Dinitrophenol	<420	420	mg/kg	03/19/92	DVM
4-Nitrophenol	<500	500	mg/kg	03/19/92	DVM
Dibenzofuran	1300.0	100	mg/kg	03/19/92	DVM
2,4-Dinitrotoluene	<57	57	mg/kg	03/19/92	DVM
2,6-Dinitrotoluene	<19	19	mg/kg	03/19/92	DVM
Diethylphthalate	<220	220	mg/kg	03/19/92	DVM
4-Chlorophenylphenylether	<42	42	mg/kg	03/19/92	DVM
Fluorene	2100.0	19	mg/kg	03/19/92	DVM
4-Nitroaniline	<500	500	mg/kg	03/19/92	DVM
4,6-Dinitro-2-methylphenol	<240	240	mg/kg	03/19/92	DVM
N-Nitrosdiphenylamine	<100	100	mg/kg	03/19/92	DVM
4-Bromophenylphenylether	<19	19	mg/kg	03/19/92	DVM
Hexachlorobenzene	<19	19	mg/kg	03/19/92	DVM
Pentachlorophenol	<36	36	mg/kg	03/19/92	DVM
Phenanthrene	540.0	54	mg/kg	03/19/92	DVM
Anthracene	540.0	19	mg/kg	03/19/92	DVM
Di-n-butylphthalate	<25	25	mg/kg	03/19/92	DVM
Fluoranthene	<22	22	mg/kg	03/19/92	DVM
Pyrene	1100.0	19	mg/kg	03/19/92	DVM
Butyl benzyl phthalate	<25	25	mg/kg	03/19/92	DVM
3,3'-Dichlorobenzidine	<440	440	mg/kg	03/19/92	DVM
Benzo(a)anthracene	220.0	78	mg/kg	03/19/92	DVM
bis(2-ethylhexyl)phthalate	<25	25	mg/kg	03/19/92	DVM
Chrysene	190.0	25	mg/kg	03/19/92	DVM
Di-n-octyl phthalate	<25	25	mg/kg	03/19/92	DVM
Benzo(b)fluoranthene	<48	48	mg/kg	03/19/92	DVM
Benzo(k)fluoranthene	<25	25	mg/kg	03/19/92	DVM

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Test Description	Result	D.L.	Units	Analyzed	By
Benzo(a)pyrene	<25	25	mg/kg	03/19/92	DVM
Indeno(1,2,3-cd)pyrene	37	37	mg/kg	03/19/92	DVM
Dibenzo(a,h)anthracene	<25	25	mg/kg	03/19/92	DVM
Benzo(g,h,i)perylene	<41	41	mg/kg	03/19/92	DVM
2-Methylphenol	<100	100	mg/kg	03/19/92	DVM

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APPENDIX D

WASTE SHIPMENT RECORDS
(Three Volumes - See Attached)

ATTACHMENT 1

RECORD COPY

LEHR RECEIVED

PROJECT: 17523 13.5.1

HAZARDOUS WORK PERMIT (HWP)

SITE NUMBER 0 0 1 - 0 7 9 4

WORK DESCRIPTION	
Initial Radiological Survey of IMHOFF BLDG.	WORK LOCATION: UNIV. of CAL. AT DAVIS IMHOFF BLDG
	EST. START DATE: 7/21/94
	REQUESTED BY: William Rankin, OHST
	REQUEST DATE: 7/20/94

HAZARDOUS CONDITIONS	SITE SURVEYS (TYPE / NUMBER / DATE / BY)
Initial Entry → unknown Hazards may exsist.	BTC and γ rad results per customer
Room Contains potential Asbestos Containing Material, perform	to be confirmed during initial survey.
No intrusive sampling.	
BTC is approximately 2000 ~ 3000 dpm/100cm².	
General Area Rad levels < 1 mr/hr	

REQUIRED PERSONNEL PROTECTIVE CLOTHING AND EQUIPMENT

HEAD / EYES	FEET	HANDS	BODY	RESPIRATORY
SAFETY GLASSES ☒	RUBBER BOOTS ☒	COTTON GLOVES ☒	COVERALLS/COTTON ☐	HALF-FACE (NEGATIVE PRESSURE)* ☐
GOGGLES ☐	PLASTIC BOOTS ☐	PLASTIC GLOVES ☐	COVERALLS/TYVEK (SECRLAB) ☒	FULL-FACE (NEGATIVE PRESSURE)* ☐
FACE SHIELD ☐	HIP WADERS ☐	RUBBER GLOVES ☒	COVERALLS/TYVEK (SPECIAL STATE TYPE) ☐	POWERED AIR PURIFYING* ☐
HARD HAT ☐	STEEL-TOE SHOES ☒	NEOPRENE GLOVES ☐		*Specify Cartridge/ Canister Type Below
	DISPOSABLE SHOE COVERS ☒	SURGICAL GLOVES ☐	TYVEK	SUPPLIED AIR HOOD ☐
		POLYVINYL ALCOHOL GLOVES ☐	RUBBER SUIT ☐	SUPPLIED AIR FULL FACE ☐
		LEATHER GLOVES ☐	ACID SUIT ☐	SANDBLAST HOOD ☐
			RAIN SUIT ☐	SELF CONTAINED (SCBA) ☐
			NOMEX SUIT ☐	

SPECIAL INSTRUCTIONS

WATCHMAN	☐	"BUDDY SYSTEM" IN EFFECT	☒
ELECTRICAL LOCKOUT	☐	JOB COVERAGE BY SAFETY PROFESSIONAL	☐
PRE-ENTRY MONITORING	☐	SPECIAL TRAINING REQUIRED	☐
EMERGENCY EQUIPMENT	☐		

MISCELLANEOUS

TAPE GLOVES AND BOOTS TO COVERALLS	☒
LIFE LINE	☐
SAFETY BELT	☐

DOSIMETRY	DIRV.	GROUP
TLD BADGE	✓	
EXTREMITY TLD		
RED 0-200 mR		
RED (High)		
DIGITAL ALARMING DOSIMETER		

I.H. MONITORING	DIRV.	GROUP

EXPIRATION DATE

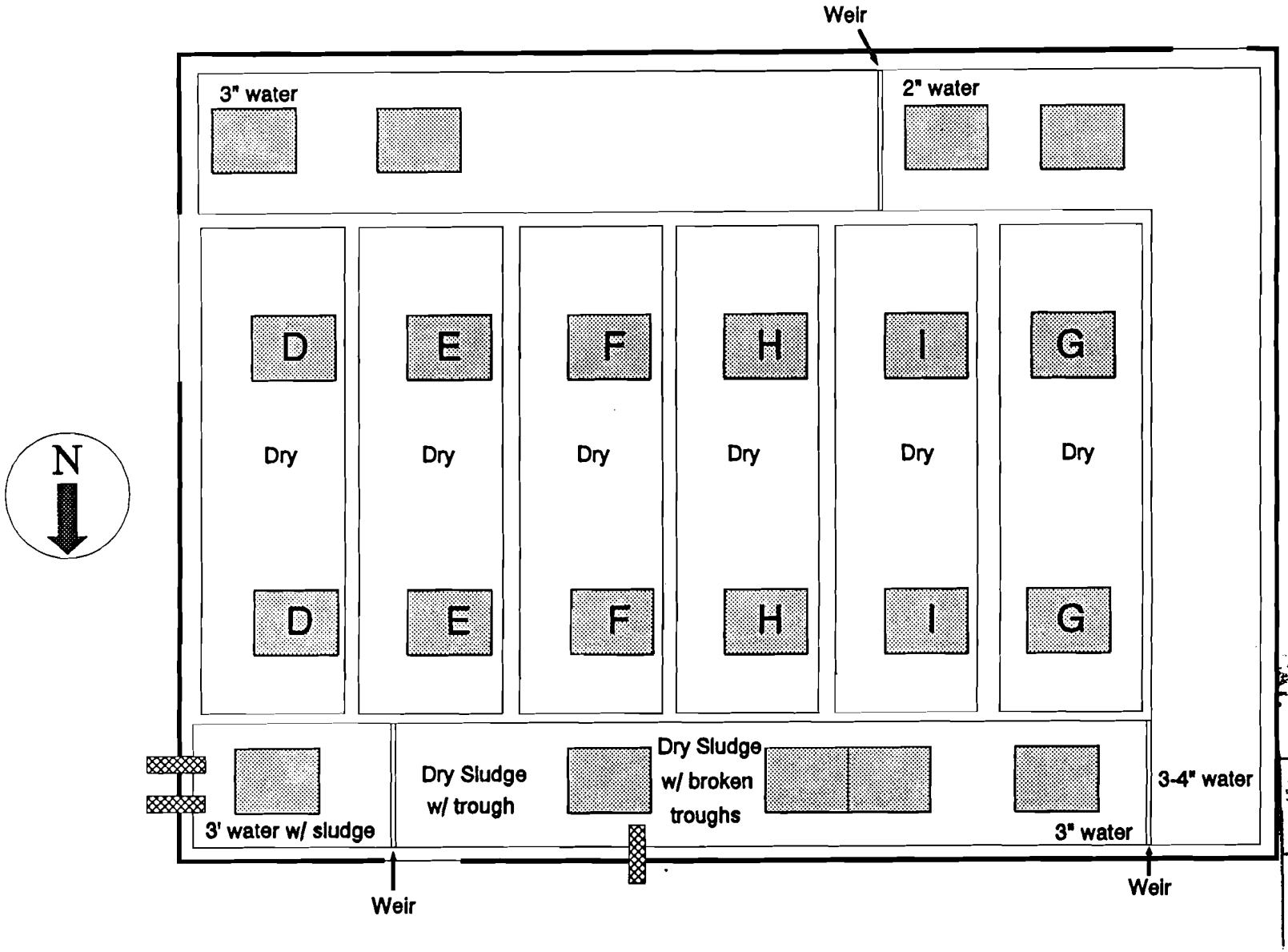
APPROVALS	DATES	TERMINATION	DATES
DESIGN Wm D. Rankin Jr. OHST	7/20/94	DESIGN	
SITE SUPERINTENDENT John O. Hansen	7/20/94	SITE SUPERINTENDENT	
		REASON	

1 14 0987.3

ATTACHMENT 1

HAZARDOUS WORK PERMIT - ROSTER
(Attached to HWP)

DATE MO./DAY/YR.			LAST NAME	INITIALS	TIME IN	TIME OUT	HWP NO.	SIGN TO ACKNOWLEDGE UNDERSTANDING OF HWP REQUIREMENTS



RECORD COPY
PROJECT: 17523
DAT. 3,5