

Rocky Flats Environmental Technology Site

Building 776/777

Area V

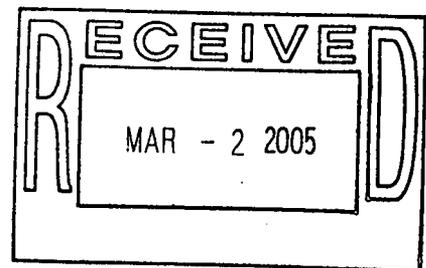
Final

Survey Report

**Survey Units:
776013**

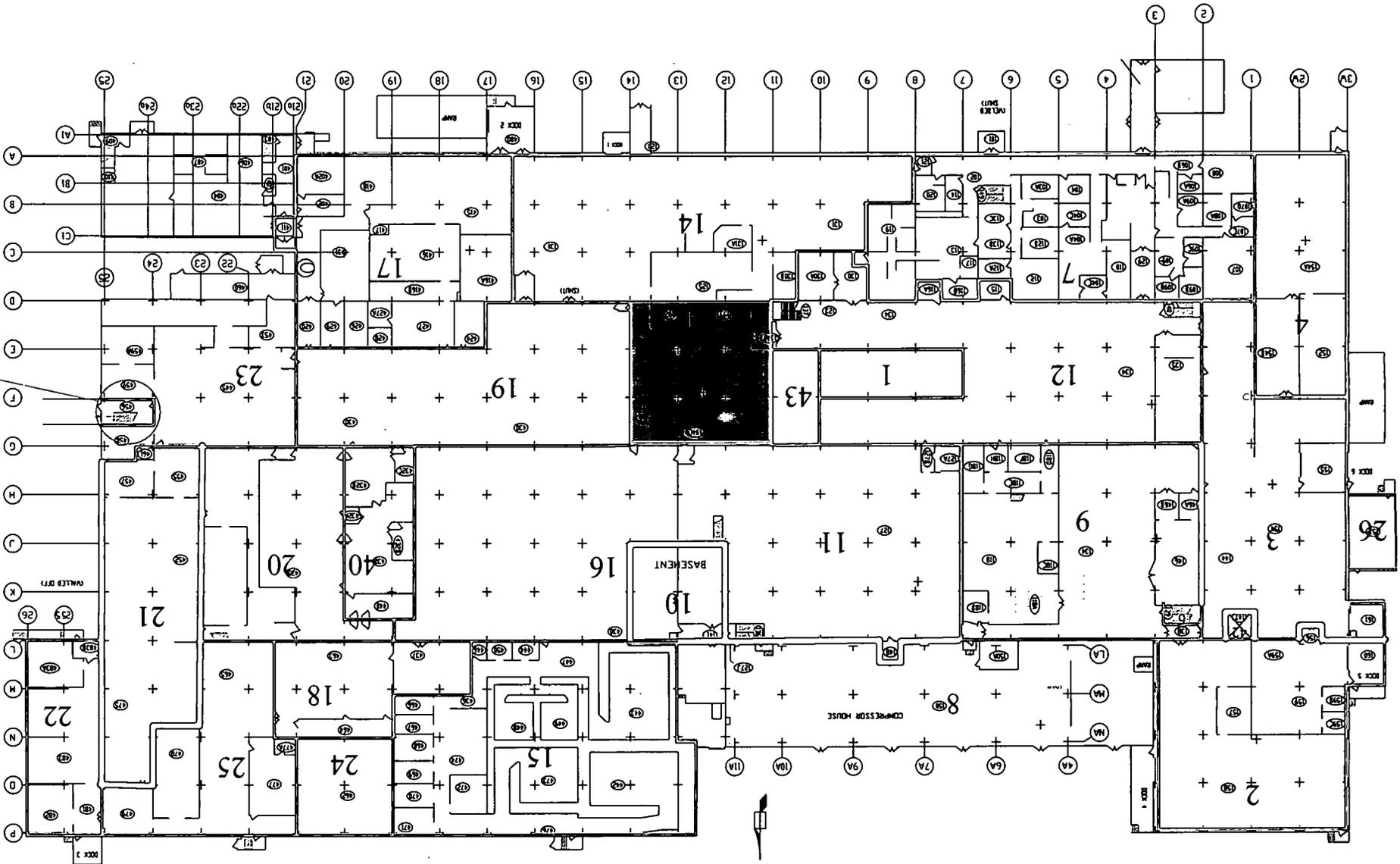
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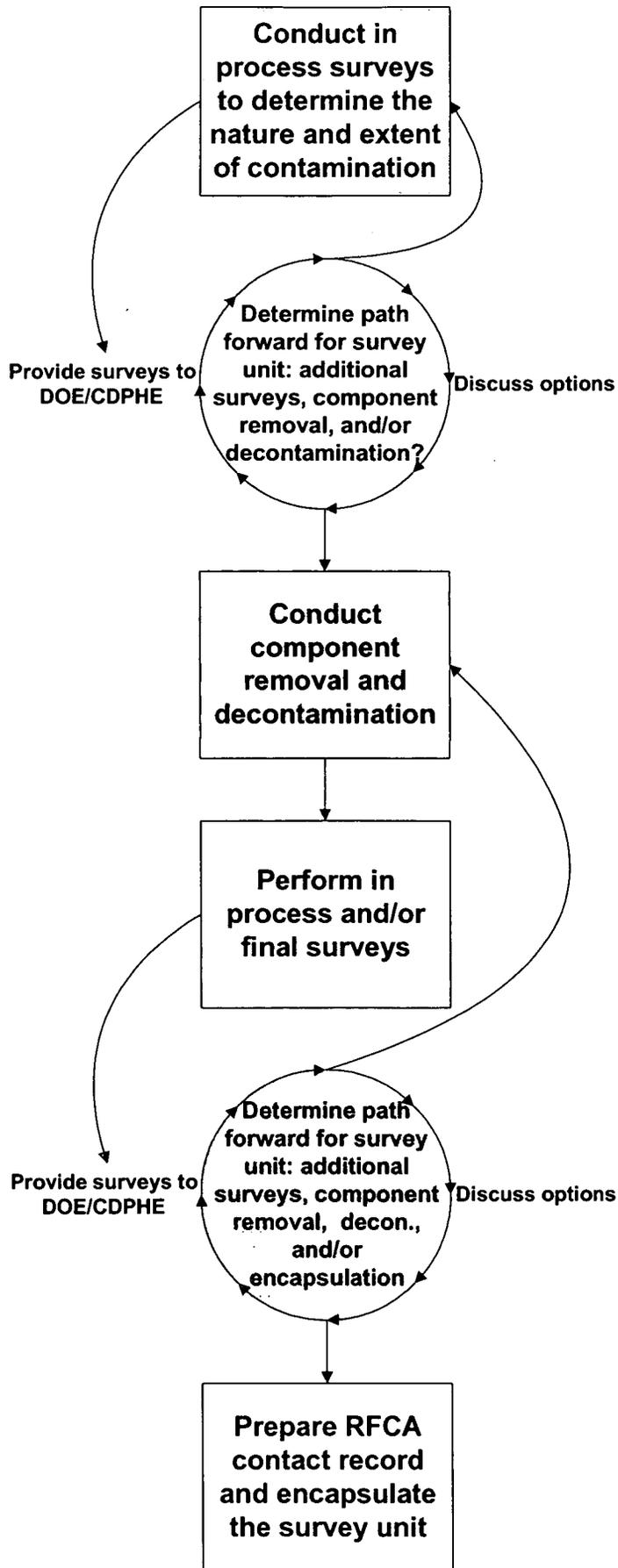
ADMIN RECORD

B776/777 SURVEY UNITS 1st FLOOR



ABOVE RMS 456,
459 AND 459A
INCLUDES RM456

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Final Survey Instructions
Building 776 1st Floor
Survey Unit 776013

Purpose:

This instruction provides guidance for collecting gross gamma and removable contamination data to quantify the amount of residual contamination in Survey Unit 776013 prior to demolition. NaI measurements are performed in accordance with "INS-535-Ludlum2350-1 with Sodium Iodide Detector".

Equipment and materials:

1. A Ludlum 44-17 attached to a Ludlum 2350-1 set to collect five-minute counts that will be displayed on its LCD window.
2. A Bicon G-5 attached to a Ludlum 2350-1 set to collect five-minute counts that will be displayed on its LCD window.
3. One Electra with attached DP-6, calibrated and daily response checked.
4. Two probe holders, one for the G-5 and one for the 44-17 with tin shielding.
5. Calibrated and daily response checked SAC-4.
6. Measuring tape or laser range finder.

Note: The NE Electra with DP-6 probe and the Eberline SAC-4 shall be used in accordance with RSP- 7.01 and 7.02

Procedure:

1. Inspect instrument for obvious damage and ensure battery voltage is equal to or greater than 4.6 volts. If battery voltage is less than 4.6 volts change the batteries.
2. Complete daily performance checks for Sodium Iodide detectors to ensure the instrument is functioning properly by using Americium-241 source TS-912. Record results on Sodium Iodide Data Sheet.
3. For floor and concrete wall background measurements, perform a 300-second background count (on contact with floor) with a Bicon G-5 for floors or Ludlum 44-17 for walls at background location in room 404. Record background counts next to "Bkg Floor" or "Bkg Concrete Wall" in background column of attached "Sodium Iodide Data Collection" sheets as needed.
4. For block wall background measurements, perform a 300-second background count (on contact with block wall) with a Ludlum 44-17 at background location in room 404. Record background counts next to "Bkg Block Wall" in background column of attached Sodium Iodide data collection sheets as needed.
5. For ceiling background measurements, perform a 300-second background count with a Ludlum 44-17 at background location in room 404. Hold the probe waist high, pointed toward ceiling and place a sheet metal plate in front of the detector (take background measurement in this configuration). Record background counts next to "Bkg Metal Ceiling" in background column of attached Sodium Iodide data collection sheets as needed.
6. Mark the sample locations on the surfaces to be measured. Take all measurements on contact with the marked surface using tin side shields on the Bicon G-5 and tin side and back shields on the Ludlum 44-17. All Sodium Iodide readings shall have 300 second count times.
7. Collect sodium Iodide, total surface activity and removable surface activity measurements (60 second count times for TSA and RSA measurements, including local area backgrounds) at all locations marked on the attached map.
8. Record the NaI and NE Electra measurements on the attached sheets. Note any items or conditions that may have affected the measurement in the "remarks" section.
9. Count swipes for 60 seconds with a SAC-4, record result on attached sheet for removable contamination.

Final Survey Instructions

Building 776 1st Floor

Survey Unit 776013

Table 776013-1: Survey Requirements

Surface	Type of Survey	Probe	Placement	Count Time
Floors and cement walls	Total Alpha Activity	Bicron G-5 or Ludlum 44-17	On contact	300 seconds
All Surfaces	Total Alpha Activity	Electra with DP-6	On contact	60 seconds
Block walls	Total Alpha Activity	Bicron G-5 or Ludlum 44-17	On contact	300 seconds
All Surfaces	Removable Alpha	SAC-4	Swipe in placed in tray	60 seconds
Ceiling	Total Alpha Activity	Ludlum 44-17	On Contact	300 seconds
Block Walls	Background measurement	Bicron G-5 or Ludlum 44-17	On contact with block wall at background location in room 404.	300 seconds
Floors and cement walls	Background measurement	Bicron G-5 or Ludlum 44-17	On contact with floor at background location in room 404.	300 seconds
Metal ceilings	Background measurement	Ludlum 44-17	Probe waist high, pointed toward ceiling with sheet metal plate on end at background location in room 404.	300 seconds

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Survey Unit 776013

1) Introduction and Scope

A pre-demolition radiological survey (PDS) is performed prior to building demolition to define the radiological conditions of a facility. A PDS survey for survey unit 776013 has been completed in accordance with guidelines outlined in the "Radiological Pre-Demolition Survey Plan Building 776/777". Based on the results it is recommended that no further remediation is needed, and that the survey unit may be encapsulated in preparation for demolition. Isolation controls shall be put in place to prevent recontamination of the area. This report has been prepared in accordance with sections 3 and 8 of the "Radiological Pre-Demolition Survey Plan Building 776/777".

At the time of the 1969 fire room 134 east was part of room 134. The north, south and west walls were built after the fire cleanup. Room 134 east contained gloveboxes and pencil tanks that were used for machining processes. Carbon tetrachloride and trichloroethane were used as cleaning solvents during machining operations and were known to have leaked onto the concrete surfaces of room 134 east during operations.

2) PDS Methods and Techniques

The PDS survey results determine the Average Surface Contamination Value (ASCV_u) and source term for the survey unit. These parameters are used determine whether the building may be demolished within the limits outlined in the "Radiological Pre-Demolition Survey Plan Building 776/777".

To obtain a statistically powerful number of data points, a minimum of 30 survey points were selected per survey unit. A random start, systematic grid method was used to identify the survey point locations. Three types of surveys are performed at each survey point as follows:

- a) Painted surfaces are evaluated for potential contamination under coatings using sodium iodide (NaI) gamma detectors attached to a single channel analyzer windowed for the 59 keV gamma-ray (Am^{241}). The standard background reference in room 119, near column C-9, was used. Since these gamma measurements quantify contamination at depth as well as the surface, this survey data is used to estimate contamination levels on all surfaces of the survey unit.
- b) Direct alpha surface contamination measurements are performed using a NE Electra survey instrument with attached DP-6 probe. This data may be compared to the NaI survey data to show the fraction of contamination that is directly on the surface verses imbedded in the material matrix.
- c) Removable surface alpha contamination surveys were performed by swiping the survey point with a 47mm filter paper then counting the filter paper on a SAC-4 alpha counter. This data may be used to gauge the effectiveness of encapsulation following the PDS.

To conservatively determine the final Average Surface Contamination Value (ASCV_u) for the survey unit, the source term associated with inaccessible areas of the survey unit (as described in section 4 of this report) is added to the source term calculated by the PDS survey.

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3) ALARA Post Remediation Surveys

In addition to the PDS used to determine the Average Surface Contamination Value (ASCV_u) and source term for the survey unit, surveys were taken to determine the effectiveness of remediation efforts.

Remediation is performed to demonstrate a reasonable best effort is made to maintain releases to the environment and doses to the workers ALARA. Remediation may include decontamination, or removal of parts of the structure such as block wall removal.

a) Floors

The in-process surveys identified widespread contamination associated with the floors in survey unit 776013. There are three "sheep-dips" located in survey unit 776013 which were uncovered after the in-process survey was completed. The decision was made based on in-process survey data to shave the entire floor surface and re-survey unit 776013. For follow-up surveys the entire surface area of the "sheep-dips" were considered as part of the floor grids that they are located in. Approximately 26.76 m² of the concrete floor was removed with an excavator after the final PDS survey was completed to remove two large steel frames that were imbedded in the concrete. A summary of remediation results is shown below in Table 1. This data indicates a highly successful decontamination factor (DF) of 118 or a 99% reduction in source term.

**Table 1:
Floor Remediation Results**

	Pre-Remediation (In-process)	Post-Remediation (Follow-up)
Maximum (dpm/100cm ²)	135,995,093	171,972
Minimum (dpm/100cm ²)	19,229	16,600
Average (dpm/100cm ²)	8,872,773	75,430
Average (μCi/m ²)	399.67	3.40
Source Term (μCi)	133,671.52	1,136.38

b) Walls

"High density" NaI surveys were performed on walls in Area III to develop a risk based classification of walls. Additionally, a series of holes were made in the hollow block to provide internal contamination levels. The general trend of contamination levels showed the highest levels at the top and the lowest levels at the bottom. This data along with the identification of load-bearing walls provided the basis for classification of building 776 area V walls into three categories:

- i) Type I – Structural or non-structural wall with average contamination levels ranging from < MDA to approximately 100,000 dpm/100 cm². These walls require no further remediation.

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- ii) Type II – Structural or non-structural wall with average contamination levels that range from $>100,000$ dpm/100cm² to $<1,000,000$ dpm/100cm². Some of the type II walls are structural and it has been determined by Engineering that removal is not allowed. For non-structural type II walls partial removal was performed to eliminate the inaccessible area at the top of wall. This will allow additional engineering controls to be applied to minimize the risk of a localized airborne event during demolition.
- iii) Type III - Structural or non-structural wall with average contamination levels that exceed $>1,000,000$ dpm/100cm². Some of the type III walls are structural and it has been determined by Engineering that no remediation is allowed. Additional mitigating techniques will be utilized to minimize the potential of a localized airborne event during demolition. For non-structural type III walls partial removal was performed to eliminate the inaccessible area at the top of wall. This will allow additional engineering controls to be applied to minimize the risk of a localized airborne event during demolition.

Four wall sections (13-2A, 13-3A, 13-4A and 13-11A) were characterized with elevated levels of contamination during the in-process survey. Wall section 13-2A was completely removed and the remaining three sections were remediated to the fullest extent possible taking into consideration their structural characteristics. This remediation was done by block removal and removal of painted surfaces. Two of the sections (13-4A and 13-11A) were remediated to below 100,000 dpm/100cm², section 13-3A is a structural load-bearing wall and could not be remediated below 221,886 dpm/100cm². The wall remediation effort resulted in a significant reduction in source term, yielding a decontamination factor (DF) of 1.98, or an overall decrease of 49.6%

Table 2
B776/777 Survey Unit 13, Area V Wall Summary

Wall	Section	Structural	Value	Initial Characterization			Follow-up Characterization		
				Type I	Type II	Type III	Type I	Type II	Type III
776013-1	A	X	30,347						
776013-1	B	X	45,580						
776013-2	A	X	153,087						REMOVED
776013-2	B	X	41,786						REMOVED
776013-2	C	X	6,350						
776013-3	A	X	221,886						
776013-3	B	X	34,650						
776013-3	C	X	52,528						
776013-4	A	X	820,431						
776013-4	B	X	47,373						
776013-4	C	X	38,937						
776013-5	A		61,898						
776013-6	A		8,564						
776013-7	A		90,273						
776013-8	A		48,923						
776013-9	A	X	17,652						

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Wall	Section	Structural	Value	Initial Characterization			Follow-up Characterization		
				Type I	Type II	Type III	Type I	Type II	Type III
776013-10	A		10,361						
776013-11	A		159,829						
776013-12	A		21,163						
776013-13	A		6,508						
776013-14	A		25,044						
776013-15	A		12,939						
776013-16	A		92,777						
Type 1: <100,000 dpm/100 cm2									
Type 2: >100,000 dpm/100 cm2 to <1,000,000 dpm/100 cm2									
Type 3: >1,000,000 dpm/100 cm2									

Table 3
B776/777 Survey Unit 776013, Area V Wall Source Term

Wall Designation	Wall Section	Wall Type	Area (m.sq)	Average (dpm/100 cm ²)	Total Activity (uCi)	Comments
776013-1	A	I	32.372	30,347	44.2519	structural
776013-1	B	I	32.372	45,580	66.4647	structural
776013-2	A		REMOVED			
776013-2	B		REMOVED			
776013-2	C	I	19.51	6,350	5.58056	structural
776013-3	A	II	22.534	221,886	225.224	structural
776013-3	B	I	21.948	34,650	34.2567	structural
776013-3	C	I	30.408	52,528	71.9492	structural
776013-4	A	I	21.948	49,636	49.0726	structural
776013-4	B	I	32.372	33,923	49.4665	structural
776013-4	C	I	23.659	34,375	36.6341	structural
776013-5	A	I	7.584	61,898	21.1457	
776013-6	A	I	7.695	8,564	2.96847	
776013-7	A	I	17.419	32,494	25.4961	
776013-8	A	I	17.419	44,686	35.0624	
776013-9	A	I	22.632	23,981	24.4477	structural
776013-10	A	I	7.695	10,361	3.59135	
776013-11	A	I	7.584	92,923	31.7445	
776013-12	A	I	1.000	21,163	0.95329	
776013-13	A	I	2.991	6,508	0.87682	
776013-14	A	I	5.574	25,044	6.28807	
776013-15	A	I	2.991	12,939	1.74327	
776013-16	A	I	5.574	92,777	23.2945	
Totals			343.28	44,886	760.51	

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c) Ceilings

The In-Process NaI survey of the ceilings identified six survey grids exceeding 100,000 dpm/100cm².

During follow-up surveys it was determined that elevated readings in three survey grids (13-62, 13-71 and 13-72) were due to shine from contaminated filters providing ventilation to the main plenum. Contact measurements were collected on these points to reduce the influence of shine and the levels were found to be considerably lower. One survey point (13-44) was elevated due to a small process pipe stub that passed through the ceiling from the second floor. The pipe stub was removed. One survey point (13-78) was resurveyed after floor shaving was completed and found to be below instrument MDA. One survey grid (13-41) contained a ventilation pass through from the second floor. The ventilation duct was removed. Ceiling remediation resulted in a reduction in source term, yielding a decontamination factor (DF) of 1.20, or a reduction of 16.6%.

**Table 4:
Ceiling Remediation Results**

	Pre-Remediation (In-process)	Post-Remediation
Maximum (dpm/100cm²)	665,380	403,928
Minimum (dpm/100cm²)	21,704	15,588
Average (dpm/100cm²)	80,079	66,814
Average (μCi/m²)	3.61	3.01
Source Term (μCi)	1,206.42	1,006.58

4) Inaccessible Areas

Note:
This report reflects the results of the remediation of floor expansion joint areas greater than 1,000,000 dpm/100cm².

a) Floors

Concrete shaving of the contaminated sections of the floors uncovers cracks and concrete seams including floor and column expansion joints as well as imbedded bolts in the floor. These seams and bolts trap contamination and can contain significant source term. Upon completion of the shaving effort, NaI readings along the seams showed higher levels of contamination than the general floor area.

The In-Process Survey Report for survey unit 776013 did not account for all of this added floor activity. In order to calculate a more realistic decontamination factor (DF), this activity will be added to the source term reported in the 776013 In-Process Report, and then compared to the post remediation source term.

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Areas greater than 1,000,000 dpm/100cm² were remediated. The result of the remediation effort for the inaccessible areas of the floor is summarized in Table 5 below. Total inventory calculations assume contamination does not extend beyond eight inches deep and an average remediation depth of four inches deep.

220 linear feet of cracks and expansion joints (seams/cracks) were remediated to an average depth of four inches yielding an estimated total surface area of 13.49 m² (accounting for two-sided cracks) according to the following calculation:

$$\frac{220 \text{ linear ft} \mid .66 \text{ ft}^2 \mid .0929 \text{ m}^2}{\mid 1 \text{ linear ft} \mid \mid 1 \text{ ft}^2} = 13.49 \text{ m}^2$$

58 bolts were remediated in survey unit 776013. Each bolt hole was considered to have a surface area of 17.8 cm² (one Ludlum 44-17 probe area) yielding a total bolt hole surface area of 0.10 m² according to the following calculation:

$$\frac{58 \text{ bolts} \mid 17.8 \text{ cm}^2 \mid 1 \text{ m}^2}{\mid 1 \text{ bolt} \mid \mid 10,000 \text{ cm}^2} = 0.10 \text{ m}^2$$

b) Walls

No inaccessible areas were identified on the walls of survey unit 776013.

c) Ceilings

No inaccessible areas were identified on the ceilings of survey unit 776013.

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d) Inaccessible Area Summary

The inaccessible area remediation effort resulted in reducing the source term from 68,339.68 μCi to 390.92 μCi providing a decontamination factor (DF) of 174.82 or a source term reduction of approximately 99.4%.

Table 5:
Inaccessible Area Remediation Results

	Pre-Remediation (In-process) **	Post-Remediation
Seam/Crack Maximum (dpm/100cm ²)	220,983,312	1,242,660
Seam/Crack Minimum (dpm/100cm ²)	1,828,684	31,692
Seam/Crack Average (dpm/100cm ²)	111,405,998	637,176
Seam/Crack Average ($\mu\text{Ci}/\text{m}^2$)	5,018.29	28.70
Seam/Crack Source Term (μCi)	67,696.71	387.18
DF	-	174.85
Source Term Reduction (%)	-	99.4
Bolt/Floor Maximum (dpm/100cm ²)	230,921,812	1,541,788
Bolt/Floor Minimum (dpm/100cm ²)	54,558,056	120,652
Bolt/Floor Average (dpm/100cm ²)	142,739,934	831,220
Bolt/Floor Average ($\mu\text{Ci}/\text{m}^2$)	6,429.73	37.44
Bolt/Floor Source Term (μCi)	642.97	3.74
DF	-	171.92
Source Term Reduction (%)	-	99.4
Total Source Term (μCi)	68,339.68	390.92
Total DF	-	174.82
Total Source term Reduction (%)	-	99.4

** - Includes all activity from cracks, expansion joints, and seams not accounted for in the In-Process Survey Report.

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Survey Unit 776013

5) PDS Survey Results Summary

Note:
This report reflects the results of the remediation of floor expansion joint areas greater than 1,000,000 dpm/100cm².

The values for the accessible areas and inaccessible areas were summed and divided by the total area for the survey unit to calculate the "Average Surface Contamination Value" (ASCV_u) and source term for the survey unit. The results are summarized in Table 6 below:

**Table 6:
PDS Final Results**

	Final Results
776013 Source Term Inaccessible Areas (μCi)	390.92
776013 Source Term Accessible Areas (μCi)	1,510.08
776013 Total Source Term (μCi)	1,901.00
Survey Unit Area (m ²)	1,129.59
ASCV _u (μCi/m ²)	1.68
ASCV _u (dpm/100cm ²)	37,361

Table 6 Notes:

- a) Inaccessible areas source term from Section 4, Table 5 of this report.
- b) Accessible area source term is the sum of source terms attributed to floors, walls, ceiling and columns as determined by the final PDS survey.
- c) Total Source Term equals the sums of the source terms of Inaccessible Area + Accessible Area. Total Source Term = (390.92 + 1,510.08) μCi = 1,901 μCi
- d) Average Surface Contamination for the Survey Unit (ASCV_u) in dpm/100cm² equals:
 $ASCV_u = (1,901 \mu Ci)(22,200 \text{ dpm}/100\text{cm}^2 / \mu Ci/m^2) / (1,129.59 \text{ m}^2) = 37,361 \text{ dpm}/100\text{cm}^2$

Survey Unit 776013
Nal Data - Floor/Ceiling

Location #	Column letter	Column Number	North	East	Surface	Gross Counts	In-process Dpm/100cm ²	Follow-up Dpm/100cm ²
13-1	F	11	15	5	Floor	3314	147,576	89,912
13-2	F	11	15	15	Floor	3321	757,861	90,880
13-3	F	12	15	5	Floor	3204	24,345,985	74,696
13-4	F	12	15	15	Floor	3233	142,581	78,708
13-5	F	13	15	5	Floor	3146	754,455	66,673
13-6	F	13	15	14	Floor	3133	348,507	64,875
13-7	F	13	5	15	Floor	3012	186,854	48,138
13-8	F	13	5	5	Floor	3103	407,764	60,725
13-9	F	12	5	15	Floor	3097	202,293	59,895
13-10	F	12	5	5	Floor	3748	413,667	149,946
13-11	F	11	5	15	Floor	3119	18,392,307	62,939
13-12	F	11	5	5	Floor	3257	662,958	82,028
13-13	E	11	15	5	Floor	2931	312,634	36,933
13-14	E	11	15	15	Floor	2930	95,118,531	36,795
13-15	E	12	15	5	Floor	3267	405,267	83,411
13-16	E	12	15	15	Floor	3669	6,989,435	139,018
13-17	E	13	15	5	Floor	2602	1,035,758	16,600
13-18	E	13	13	13	Floor	3706	740,832	144,136
13-19	E	13	6	14	Floor	3330	1,147,462	92,125
13-20	E	13	5	5	Floor	3123	855,034	63,492
13-21	E	12	5	15	Floor	3054	135,995,093	53,947
13-22	E	12	3	4	Floor	2948	10,637,292	39,285
13-23	E	11	5	15	Floor	3222	13,998,169	77,186
13-24	E	11	5	5	Floor	3000	202,520	46,478
13-25	D	11	15	5	Floor	2496	19,229	16,600
13-26	D	11	15	15	Floor	3066	344,647	55,607
13-27	D	12	15	5	Floor	3101	312,634	60,449
13-28	D	12	15	15	Floor	3232	1,846,519	78,569
13-29	D	13	15	5	Floor	3104	378,930	60,864
13-30	D	13	15	13	Floor	3667	655,238	138,741
13-31	D	13	5	15	Floor	3166	1,368,372	69,440
13-32	D	13	5	5	Floor	2919	123,737	35,273
13-33	D	12	5	12	Floor	3094	76,740	59,480
13-34	D	12	6	5	Floor	3039	19,229	51,872
13-35	D	11	17	5	Floor	2663	19,229	16,600
13-36	D	11	5	3	Floor	3224	54,490	77,463
13-73	D	11	5	5	Roof above 137B	312	171,972	171,972
13-74	D	11	15	5	Roof above 137B	246	120,380	120,380
13-77	D	14	3	3	Floor	309	169,627	169,627
13-37	F	11	16	4	Ceiling	238	51,469	51,469
13-38	F	11	16	15	Ceiling	293	68,522	68,522
13-39	F	12	17	5	Ceiling	225	47,439	47,439

Survey Unit 776013
 NaI Data - Floor/Ceiling

Location #	Column letter	Column Number	North	East	Surface	Gross Counts	In-process Dpm/100cm ²	Follow-up Dpm/100cm ²
13-40	F	12	16	15	Ceiling	195	38,137	38,137
13-41	F	13	16	2	Ceiling	648	No Data	178,592
13-42	F	13	14	12	Ceiling	177	No Data	32,556
13-43	F	13	4	14	Ceiling	193	No Data	37,517
13-44	F	13	9	5	Ceiling	467	122,472	122,472
13-45	F	12	3	17	Ceiling	268	60,771	60,771
13-46	F	12	4	4	Ceiling	267	60,461	60,461
13-47	F	11	5	17	Ceiling	283	65,422	65,422
13-48	F	11	3	8	Ceiling	291	67,902	67,902
13-49	E	11	15	5	Ceiling	257	57,360	57,360
13-50	E	11	16	14	Ceiling	290	67,592	67,592
13-51	E	12	16	5	Ceiling	261	57,980	57,980
13-52	E	12	16	15	Ceiling	276	62,631	62,631
13-53	E	13	16	5	Ceiling	245	53,020	53,020
13-54	E	13	17	15	Ceiling	189	35,656	35,656
13-55	E	13	4	16	Ceiling	158	26,045	26,045
13-56	E	13	3	4	Ceiling	214	43,408	43,408
13-57	E	12	3	16	Ceiling	209	41,858	41,858
13-58	E	12	3	6	Ceiling	294	68,212	68,212
13-59	E	11	5	14	Ceiling	235	50,539	50,539
13-60	E	11	3	5	Ceiling	216	44,648	44,648
13-61	D	11	14	5	Ceiling	175	31,316	31,316
13-62	D	11	12	12	Ceiling	558	172,701	288,337
13-63	D	12	15	4	Ceiling	213	43,718	43,718
13-64	D	12	15	15	Ceiling	218	45,268	45,268
13-65	D	13	15	4	Ceiling	202	40,307	40,307
13-66	D	13	12	13	Ceiling	165	28,835	28,835
13-67	D	13	5	17	Ceiling	179	33,176	33,176
13-68	D	13	5	7	Ceiling	190	36,587	36,587
13-69	D	12	5	17	Ceiling	142	21,704	21,704
13-70	D	12	3	3	Ceiling	186	35,346	35,346
13-71	D	11	3	11	Ceiling	62	296,723	15,588
13-72	D	11	1	3	Ceiling	738	665,380	403,928
13-75	D	11	5	5	Ceiling	197	83,256	82,077
13-76	D	11	15	5	Ceiling	148	46,095	43,775
13-78	D	14	3	3	Ceiling	120	105,826	15,588

15

Unit 13

Wall 1

Section A

Date 11/14/04

Column #							Column #
E11	5,041	5,041	5,041	33,619	5,041	68,019	E11
ELEV. (ft)							
12	30,491	69,583	55,510	24,237	33,619	35,182	Row Average #DIV/0! Row Average #DIV/0! Row Average 20,301
9	33,619	46,128	5,041	16,418	5,041	100,856	Row Average 41,437
6	41,437	14,855	5,041	57,073	32,055	94,601	Row Average 34,517
3	8,600	5,041	10,164	5,041	5,041	53,946	Row Average 40,844
0							Row Average 14,639

Probe# 1	<u>199765</u>	Background 1	<u>247</u>
Efficiency 1	<u>230</u>	RCT 1	<u>FESSENDEN</u>
Contact Eff. 1	<u>0.0800</u>		

Probe# 2		Background 2	
Efficiency 2		RCT 2	
Contact Eff. 2			

Section Average	<u>30,347</u>
dpm/100cm²	
Count Time (s)	<u>30</u>

18

Unit 13

Wall 2

Section C

Date 10/15/04

Column #							Column #
G13	1,999	2,170	4,651	1,999			G14
ELEV. (ft)							
12	5,271	11,471	1,999	9,611			Row Average 2,705
9	19,532	14,572	7,131	12,711			Row Average 7,088
6	7,131	2,170	5,891				Row Average 13,487
3	1,999	1,999	1,999				Row Average 5,064
0							Row Average 1,999

Probe# 1	15157	Background 1	247
Efficiency 1	580	RCT 1	TRUJILLO
Contact Eff. 1	0.0790		

Probe# 2	199765	Background 2	163
Efficiency 2	230	RCT 2	LANFORD
Contact Eff. 2	0.0800		

Section Average 6,350

dpm/100cm²

Count Time (s) 30

Unit 13

Wall 3

Section B

Date 11/5/01

Column #											Column #
F14											E14
ELEV. (ft)											
12	8,600	41,437			11,727	85,219					Row Average #DIV/0! Row Average #DIV/0! Row Average 36,746
9	43,000	75,837			38,309	28,928					Row Average 46,519
6	38,309	46,128			35,182	4,769					Row Average 31,097
3	52,382	74,273			22,673	33,619					Row Average 45,737
0	4,769 <small>ON CONTACT</small>	38,309 <small>ON CONTACT</small>			4,769 <small>ON CONTACT</small>	4,769 <small>ON CONTACT</small>					Row Average 13,154

Probe# 1	199765	Background 1	221
Efficiency 1	230	RCT 1	LANFORD
Contact Eff. 1	0.0800		

Probe# 2	199765	Background 2	217
Efficiency 2	230	RCT 2	LANFORD
Contact Eff. 2	0.0800		

Section Average	34,650
dpm/100cm²	
Count Time (s)	30

18

Unit 13

Wall 3

Section C

Date 11/4/04

Column #								Column #
E14	41,437	21,109	19,546	41,437	46,128	701,298	D14	Row Average #DIV/01
ELEV. (ft)								Row Average #DIV/01
12	22,673	11,727	36,746	50,819	74,273	43,000		Row Average 145,159
9	38,309	13,291	46,128	47,691	24,237	19,546		Row Average 39,873
6	55,510	49,255	43,000	38,309	7,036	4,725		Row Average 31,534
3	4,725	8,600	4,725	43,000	4,725	4,725		Row Average 32,973
0	ON CONTACT		Row Average 11,750					

Probe# 1 199765 Background 1 217

Efficiency 1 230 RCT 1 LANFORD

Contact Eff. 1 0.0800

Probe# 2 199765 Background 2 221

Efficiency 2 230 RCT 2 LANFORD

Contact Eff. 2 0.0800

Section Average 52,258

dpm/100cm²

Count Time (s) 30

Unit 13

Wall 4

Section A

Date 10/15/04

Column #	D14	D13	Row Average #DIV/01	Row Average
12			1,999	1,999
9				148,662
6				18,964
3				26,198
0				4,720

Section Average
49,636

dpm/100cm²

Count Time (s) 30

Probef# 2	Background 2
Efficiency 2	RCT 2
Contact Eff. 2	

Probef# 1	15157	Background 1	247
Efficiency 1	580	RCT 1	TRUJILLO
Contact Eff. 1	0.0790		

Date 10/14/04

Section B

Wall 4

Unit 13

Row Average #DIV/01

Row Average 63,247

Row Average 32,760

Row Average 26,973

Row Average 12,711

Section Average 39,923

Count Time (s) 30

dpm/100cm²

| Column # |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 0 | 3 | 6 | 9 | 12 | ELEV. (ft) | |
| 14,882 | 19,842 | 29,143 | 18,602 | | | |
| 16,122 | 37,204 | 42,165 | 174,859 | | | |
| 13,021 | 26,043 | 32,244 | 36,584 | | | |
| 14,882 | 25,423 | 31,003 | 50,226 | | | |
| 11,781 | 22,322 | 35,344 | 67,588 | | | |
| 5,581 | 31,003 | 26,663 | 31,624 | | | |
| Row Average |

Probe# 1 15157 Background 1 202

Efficiency 1 580 RCT 1 CHRISTMAS

Contact Eff. 1 0.0790

Probe# 2 Background 2

Efficiency 2 RCT 2

Contact Eff. 2

Date 10/14/04

Section A

Wall 6

Unit 13

Row Average
#DIV/0!
Row Average
#DIV/0!
Column #
E11

Row Average
#DIV/0!

Row Average
#DIV/0!

Row Average
1,944

Row Average
20,979

Row Average
2,770

Section Average
8.564

dpm/100cm²
Count Time (s) 30

Column #	E12	ELEV. (ft)	12	9	6	3	0
Row Average #DIV/0!							
Row Average #DIV/0!							
Row Average 1,944							
Row Average 20,979							
Row Average 2,770							

Probe# 1 15157 Background 1 207
Efficiency 1 580 RCT 1 CHRISTMAS
Contact Eff. 1 0.0790

Probe# 2 Background 2
Efficiency 2 RCT 2
Contact Eff. 2

Unit 13

Wall 9

Section A

Date 11/14/04

Column #															Column #
Dir															Dir
ELEV. (ft)															
12															Row Average #DIV/0!
9															Row Average #DIV/0!
6	63,557	85,880	1,999	1,999	9,611	1,999									Row Average 27,508
3	40,615	40,615	1,999	1,999											Row Average 28,889
0	35,654	32,554	1,999	1,999											Row Average 14,841

Probe# 1	199765	Background 1	247
Efficiency 1	580	RCT 1	FESSENDEN
Contact Eff. 1	0.0790		

Probe# 2		Background 2	
Efficiency 2		RCT 2	
Contact Eff. 2			

Section Average	23,981
dpm/100cm ²	
Count Time (s)	30

Unit 13

Wall 10

Section A

Date 11/14/04

Column #	E11	E12	Row Average #DIV/0!						
12									
9									
6									
3									
0									

Section Average 10.367

dpm/100cm²

Count Time (s) 30

Probe# 1	199765	Background 1	247
Efficiency 1	230	RCT 1	FESSENDEN
Contact Eff. 1	0.0800		
Probe# 2		Background 2	
Efficiency 2		RCT 2	
Contact Eff. 2			

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Unit 13

Wall 12

Section A

Date 11/14/04

Column #														Column #
010	25,800													011
ELEV. (ft)														
12	64,892													
9	5,041													
6	5,041													
3	5,041													
0														

Row Average
#DIV/0!

Row Average
25,800

Row Average
64,892

Row Average
5,041

Row Average
5,041

Row Average
5,041

Probe# 1	199765	Background 1	247
Efficiency 1	230	RCT 1	FESSENDEN
Contact Eff. 1	0.0800		

Probe# 2		Background 2	
Efficiency 2		RCT 2	
Contact Eff. 2			

Section Average
21,163

dpm/100cm²

Count Time (s) 30

Unit 13

Wall 13

Section A

Date 11/5/04

Column #							Column #
ELEV. (ft)							
12							
9							
6	11,727	4,769					
3	4,769	DOOR					
0	4,769	DOOR					

Row Average
#DIV/0!

Row Average
#DIV/0!

Row Average
#DIV/0!

Row Average
8,248

Row Average
4,769

Row Average
4,769

Probe# 1 199765 Background 1 221

Efficiency 1 230 RCT 1 LANFORD

Contact Eff. 1 0.0800

Probe# 2 Background 2

Efficiency 2 RCT 2

Contact Eff. 2

Section Average
6,508

dpm/100cm²

Count Time (s) 30

h3

Unit 13

Wall 14

Section A

Date 11/5/04

Column #																		Column #
																		Row Average #DIV/0!
																		Row Average #DIV/0!
																		Row Average #DIV/0!
ELEV. (ft)																		Row Average #DIV/0!
12																		Row Average #DIV/0!
9																		Row Average #DIV/0!
6		4,769	27,364															Row Average 16,066
3		43,000	49,255															Row Average 46,128
0		21,109	4,769															Row Average 12,939

Probe# 1	199765	Background 1	221
Efficiency 1	230	RCT 1	LANFORD
Contact Eff. 1	0.0800		

Probe# 2		Background 2	
Efficiency 2		RCT 2	
Contact Eff. 2			

Section Average	25,044
dpm/100cm ²	
Count Time (s)	30

35

Unit 13

Wall 15

Section A

Date 11/5/04

Column #						
ELEV. (ft)						
12						
9						
6					27,364	4,769
3						14,855
0						4,769

Row Average #DIV/01
 Row Average #DIV/01
 Row Average #DIV/01
 Row Average #DIV/01
 Row Average 16,066
 Row Average 14,855
 Row Average 4,769

Probe# 1	199765	Background 1	221
Efficiency 1	230	RCT 1	LANFORD
Contact Eff. 1	0.0800		

Probe# 2		Background 2	
Efficiency 2		RCT 2	
Contact Eff. 2			

Section Average
 12,939
 dpm/100cm²
 Count Time (s) 30

Survey Unit 776013 PDS Summary

Total Surface Activity Measurements

30	30	
Number Required	Number Obtained	
MIN	5,253	dpm/100 cm ²
MAX	65,341	dpm/100 cm ²
Average	29,678	dpm/100 cm ²
STD DEV	22,397	dpm/100 cm ²

Total Surface Area	1129.59	m ²
Inaccessible Areas	390.92	μCi, Alpha
Accessible Surfaces	1,510.08	μCi, Alpha

Total Inventory	1,901.00	μCi, Alpha
ASCV_u	37,361	dpm/100cm ²
ASCV_u	1.68	μCi per m ²

Sample Location Number	Nal Activity Measurements				
	Measurement Used	Comment	Surface	Coating	(dpm/100 cm ²)
1	Sodium Iodide	N/A	wall	Thin/No Paint	25,595
2	Sodium Iodide	N/A	wall	Thin/No Paint	7,843
3	Sodium Iodide	N/A	Floor	Thin/No Paint	64,651
4	Sodium Iodide	N/A	Floor	Thin/No Paint	5,928
5	Sodium Iodide	N/A	Floor	Thin/No Paint	6,194
6	Sodium Iodide	N/A	Floor	Thin/No Paint	63,272
7	Sodium Iodide	N/A	Ceiling	Thin/No Paint	26,635
8	Sodium Iodide	N/A	Ceiling	Thin/No Paint	5,253
9	Sodium Iodide	N/A	Ceiling	Thin/No Paint	5,253
10	Sodium Iodide	N/A	Ceiling	Thin/No Paint	5,253
11	Sodium Iodide	N/A	Ceiling	Thin/No Paint	8,948
12	Sodium Iodide	N/A	Ceiling	Thin/No Paint	35,583
13	Sodium Iodide	N/A	Floor	Thin/No Paint	6,194
14	Sodium Iodide	N/A	Floor	Thin/No Paint	42,196
15	Sodium Iodide	N/A	Floor	Thin/No Paint	19,546
16	Sodium Iodide	N/A	Floor	Thin/No Paint	22,865
17	Sodium Iodide	N/A	Floor	Thin/No Paint	6,194
18	Sodium Iodide	N/A	Floor	Thin/No Paint	65,341
19	Sodium Iodide	N/A	Floor	Thin/No Paint	53,079
20	Sodium Iodide	N/A	Ceiling	Thin/No Paint	58,369
21	Sodium Iodide	N/A	Ceiling	Thin/No Paint	45,363
22	Sodium Iodide	N/A	Ceiling	Thin/No Paint	39,329
23	Sodium Iodide	N/A	Ceiling	Thin/No Paint	5,253
24	Sodium Iodide	N/A	wall	Thin/No Paint	15,503
25	Sodium Iodide	N/A	Ceiling	Thin/No Paint	58,681
26	Sodium Iodide	N/A	wall	Thin/No Paint	45,572
27	Sodium Iodide	N/A	wall	Thin/No Paint	51,814
28	Sodium Iodide	N/A	wall	Thin/No Paint	28,820
29	Sodium Iodide	N/A	Ceiling	Thin/No Paint	5,253
30	Sodium Iodide	N/A	wall	Thin/No Paint	60,554
				MIN	5,253
				MAX	65,341
				AVERAGE	29,678
				SD	22,397

Data and Sodium Iodide Instrument Information

Survey Area:	V	Survey Unit:	776013	Survey Date(s):	12/12/04
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Instrument Specifications

Instrument #	1	2
Meter Model:	Ludlum 2350-1	Ludlum 2350-1
Meter Serial #:	203449	201199
Detector Model:	Bicron G-5	Ludlum 44-17
Detector #:	B940T	199764
Detector Size (cm ²):	125	17.8
Calibration Due Date:	6/8/05	6/9/05
Count Time (min)	5	5
Contact Efficiency	6.05%	8.80%

Ratio Used

Pu to Am - 241	8.1
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Comments

In cases where the critical level is greater than the calculated dpm/100cm², the critical level will be used for statistical analysis.

Count Times for backgrounds and samples are equal.

Attenuation Factors: Based on observation of Walls and Ceilings. Epoxy on Floor determined by chip sampling.

Background (Gross)

Instrument #	1	2
Gamma (Ceilings)	N/A	471
Gamma (Floors)	15264	N/A
Gamma (Block Walls)	N/A	1050
Gamma (Solid Walls)	N/A	N/A

Background (cpm)

Instrument #	1	2
Gamma (Ceilings)	N/A	94.2
Gamma (Floors)	3052.8	N/A
Gamma (Block Walls)	N/A	210
Gamma (Metal Walls)	N/A	N/A

Efficiencies (cpm/dpm)

Instrument #	1	2
Thin/No Paint	0.060	0.087
Epoxy	0.049	0.071
Other	0.057	0.084

Coatings

	Thickness (inches)
Thin/No Paint	0.007
Epoxy	0.250
Other	0.06

Total Activity Estimates Using Sodium Iodide Instruments

Survey Area:	V	Survey Unit:	776013	Survey Date(s):	12/12/04
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Sample Location #	RCT ID #	Instrument #	Gross Counts	Critical Level (dpm/cm2)	Total Alpha (dpm/cm2)
1	2	2	1296	7,843	25,595
2	2	2	1,010	7,843	7,843
3	1	1	18,264	6,194	64,651
N?A	N/A	N/A	N/A	N/A	N/A
5	1	1	7404	6,194	6,194
6	1	1	18200	6,194	63,272
7	2	2	727	5,253	26,635
8	2	2	506	5,253	5,253
9	2	2	432	5,253	5,253
10	2	2	360	5,253	5,253
11	2	2	557	5,253	8,948
12	2	2	813	5,253	35,583
13	1	1	14,148	6,194	6,194
14	1	1	17,222	6,194	42,196
15	1	1	16,171	6,194	19,546
16	1	1	16,325	6,194	22,865
17	1	1	12431	6,194	6,194
18	1	1	18296	6,194	65,341
19	1	1	17727	6,194	53,079
20	2	2	1,032	5,253	58,369
21	2	2	907	5,253	45,363
22	2	2	849	5,253	39,329
23	2	2	504	5,253	5,253
24	2	2	1199	7,843	15,503
25	2	2	1035	5,253	58,681
26	2	2	1488	7,843	45,572
27	2	2	1548	7,843	51,814
28	2	2	1327	7,843	28,820
29	2	2	296	5,253	5,253
30	3	2	1632	7,843	60,554

Estimate Data and Sodium Iodide Instrument Information

Survey Area:	V	Survey Unit:	776013	Survey Date(s):	12/19/04
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Instrument Specifications

Instrument #	1	2
Meter Model:	Ludlum 2350-1	N/A
Meter Serial #:	203449	N/A
Detector Model:	Bicron G-5	N/A
Detector #:	B940T	N/A
Detector Size (cm ²):	125	N/A
Calibration Due Date:	6/8/05	N/A
Count Time (min)	5	N/A
Contact Efficiency	6.05%	N/A

Ratio Used

Pu to Am - 241	8.1
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Comments

In cases where the critical level is greater than the calculated dpm/100cm², the critical level will be used for statistical analysis.

Count Times for backgrounds and samples are equal.

Attenuation Factors: Based on observation of Walls and Ceilings. Contamination assumed to be under thin layer of fixative on all surfaces

Background (Gross)

Instrument #	1	2
Gamma (Ceilings)	N/A	N/A
Gamma (Floors)	13969	N/A
Gamma (Walls)	N/A	N/A

Background (cpm)

Instrument #	1	2
Gamma (Ceilings)	N/A	N/A
Gamma (Floors)	2793.8	N/A
Gamma (Walls)	N/A	N/A

Efficiencies (cpm/dpm)

Instrument #	1	2
Thin/No Paint	0.060	N/A
Epoxy	0.057	N/A
Other	N/A	N/A

Coatings

Coatings	Thickness (inches)
Thin/No Paint	0.008
Epoxy	0.060
Other	N/A

4/

Removable Activity

Survey Area:		V	Survey Unit:		776013
Dates Counted:	12/12/04				
A priori MDA:	16				
Efficiency (c/d)	0.333				
Smear Location Number	Smear Results				
	RCT ID #	Serial Number	Gross (cpm)	Bkg.	(dpm/100 cm ²)
1	1	817	0	0.4	-1
2	1	839	0	0.5	-2
3	1	838	0	0.1	0
4	1	1270	5	0.5	14
5	1	1270	0	0.5	-2
6	1	839	1	0.5	2
7	1	1270	2	0.5	5
8	1	817	2	0.4	5
9	1	839	3	0.5	8
10	1	838	1	0.1	3
11	1	217	2	0.4	5
12	1	838	0	0.1	0
13	1	839	0	0.5	-2
14	1	817	2	0.4	5
15	1	839	1	0.5	2
16	1	839	1	0.5	2
17	1	838	0	0.1	0
18	1	817	0	0.4	-1
19	1	838	1	0.1	3
20	1	838	1	0.1	3
21	1	839	2	0.5	5
22	1	838	0	0.1	0
23	1	839	2	0.5	5
24	1	817	0	0.4	-1
25	1	1270	4	0.5	11
26	1	839	1	0.5	2
27	1	817	0	0.4	-1
28	1	839	6	0.5	17
29	1	838	1	0.1	3
30	1	1270	1	0.5	2
				MIN	-1.5
				MAX	16.5
				MEAN	2.8
				SD	4.4

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Total Surface Activity

Survey Area:		V	Survey Unit:		776013			
Meter Model:		NE Electra w/ DP6 Probe				Dates Counted:	12/12/04	
Instrument #:		2378	3265	1372	n/a	n/a	A priori MDA:	94
Cal. Due Date:		3/20/05	12/17/04	1/16/05	n/a	n/a	Avg. Local Bkgd	6.8
Efficiency (c/d):		0.225	0.217	0.226	n/a	n/a	Avg. Efficiency	0.223
Sample Location #	RCT ID #	Inst. #	Instrument (cpm)	Local Bkgd (cpm)	(dpm/100 cm ²)			
1	2	1372	6	4.0	9.0			
2	1	2378	18	8.0	44.9			
3	1	2378	11	7.0	18.0			
4	2	1372	7	2.0	22.5			
5	2	1372	11	2.0	40.4			
6	2	1372	11	8.0	13.5			
7	2	1372	39	4.0	157.2			
8	2	1372	46	4.0	188.6			
9	2	1372	6	7.0	-4.5			
10	1	2378	16	7.0	40.4			
11	2	1372	83	3.0	359.3			
12	2	1372	14	8.0	26.9			
13	2	1372	8	4.0	18.0			
14	2	1372	18	4.0	62.9			
15	1	2378	17	11.0	26.9			
16	1	2378	7	6.0	4.5			
17	1	2378	14	11.0	13.5			
18	1	2378	19	15.0	18.0			
19	2	1372	8	1.0	31.4			
20	2	1372	86	4.0	368.3			
21	2	1372	10	12.0	-9.0			
22	2	1372	7	3.0	18.0			
23	1	2378	15	18.0	-13.5			
24	2	1372	11	4.0	31.4			
25	2	1372	6	5.0	4.5			
26	2	1372	13	9.0	18.0			
27	1	2378	21	9.0	53.9			
28	2	1372	11	10.0	4.5			
29	1	2378	15	11.0	18.0			
30	2	1372	38	4.0	152.7			
				MIN	-13.5			
				MAX	368.3			
				MEAN	57.9			
				SD	95.9			

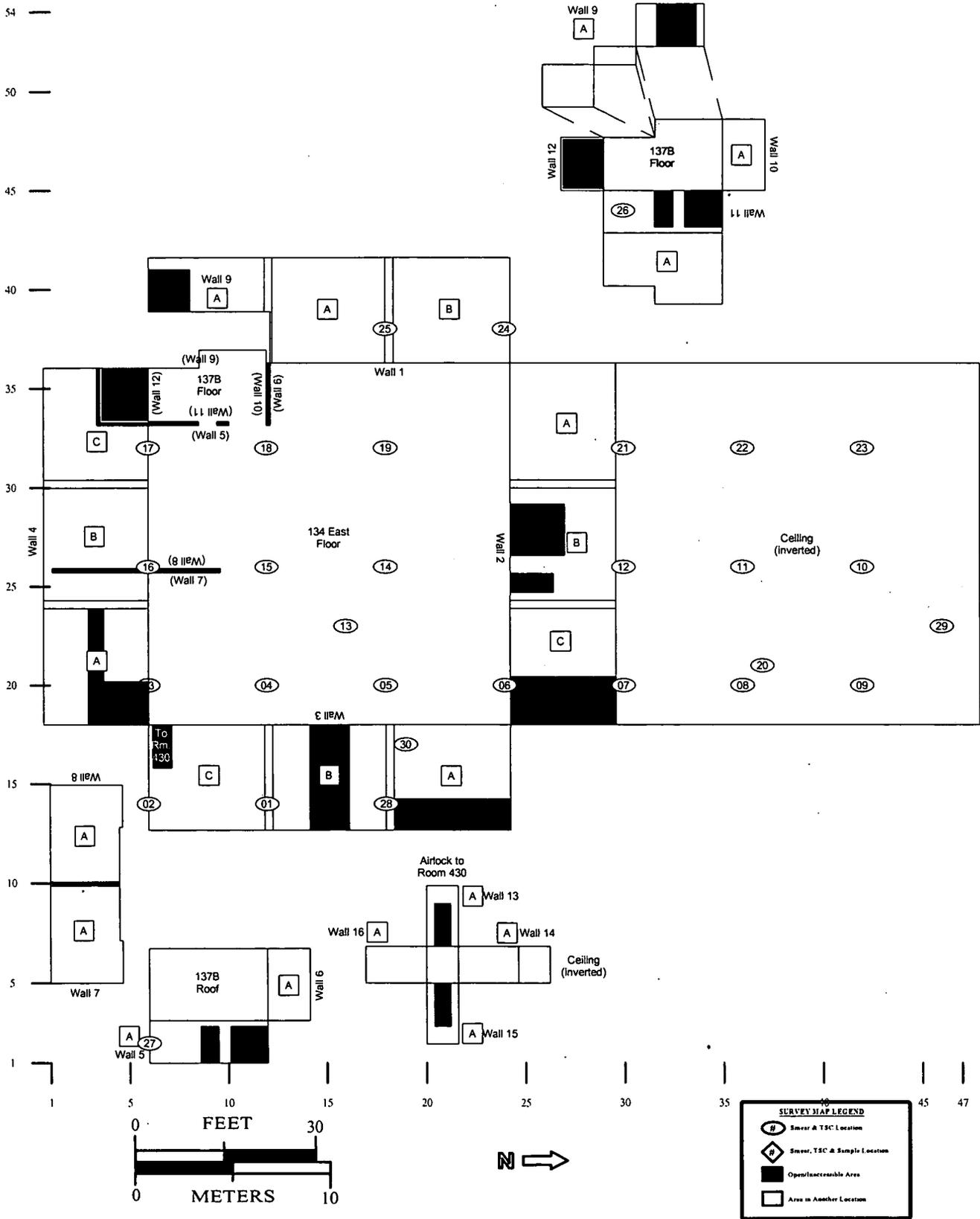
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RADIOLOGICAL CLOSEOUT SURVEY FOR THE 776 CLUSTER

Survey Area: V Survey Unit: 776013 Classification: NA
 Building: 776
 Survey Unit Description: Room 134 East

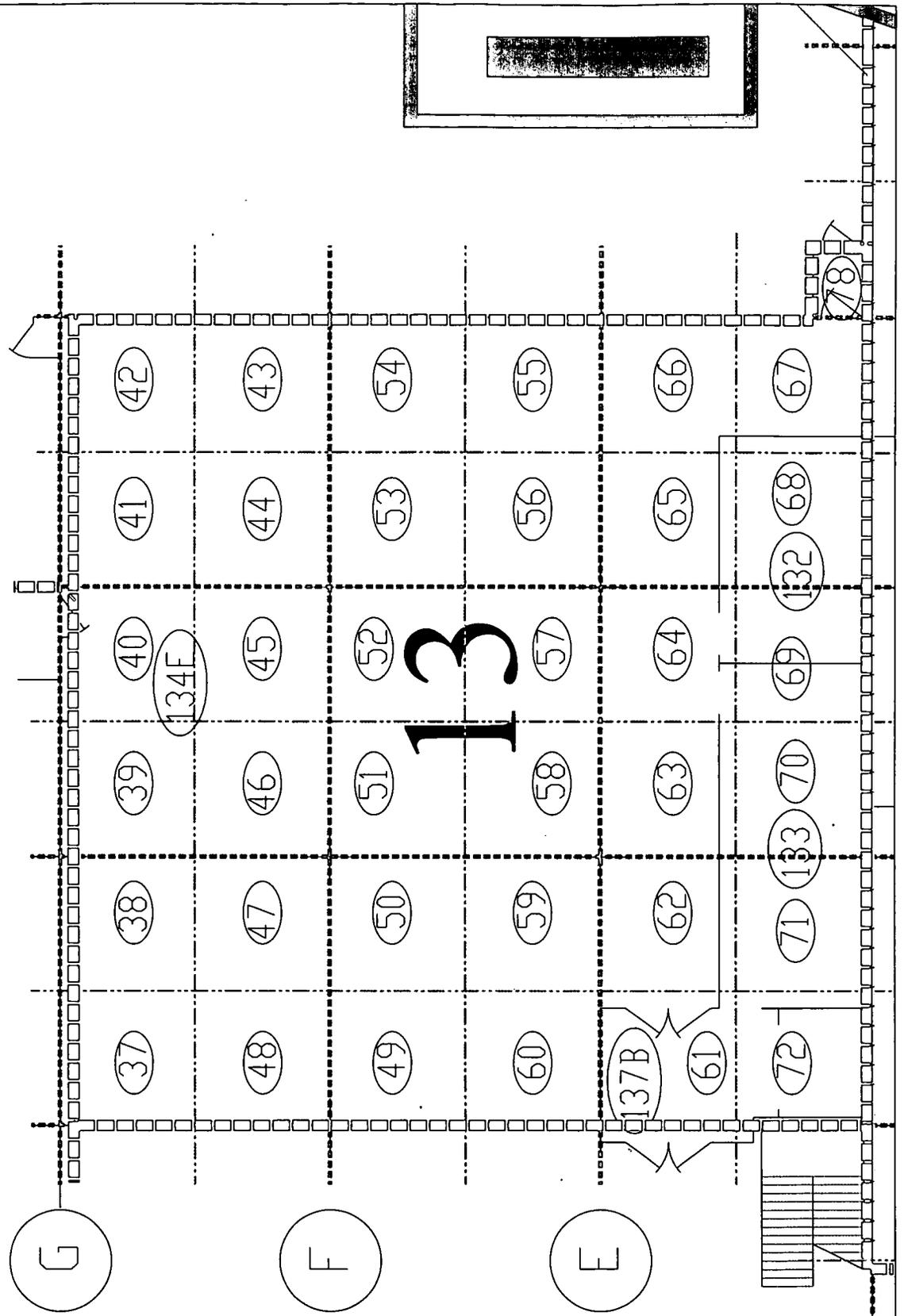
Total Floor Area: 359 sq. m Total Area: 1116 sq. m Random Start Grid Size: 6 x 6 sq. m

SURVEY UNIT 776013 - MAP 1 OF 1



45

776013
Ceiling
Survey Grids



110015

Results in dpm/100 cm²
crack/expansion joint info

G

Aprox. 220 ft of cracks remediated
initial readings prior to remediation: 134E

1,828,684
to
220,988,312

Avg. reading aprox. 11,405,998

crack readings post
remediation:

31.692
to
1,242,660

Avg. reading aprox. 637,176

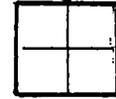
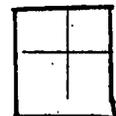
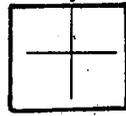
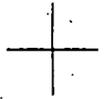
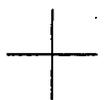
F

TRANSFER
AREA

E

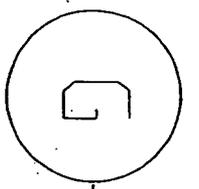
137B

13



1.18.013
results in down 1100 cm²

Bolt info



Approx. 58 bolts reworked

initial readings

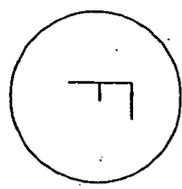
54,558,056

to

230,921,812

134E

Avg. reading approx. 142,739,734



Bolts post rework

120,652

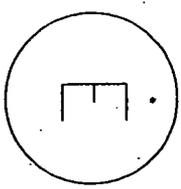
to

1,541,788

Avg. reading approx

831,220

TRANSFER AREA



137B

13