RS-TD-313196-005

La Crosse Open Air Demolition Limits

Revision 0

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Summary of Changes in this Revision:

- Rev. 0 –Initial issuance.

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1. PURPOSE

This Technical Support Document (TSD) provides the basis for the Open Air demolition Radiological Control Indicators that are applied to buildings and structures for open air demolition. These indicators are designations used to characterize the acceptable removable contamination and concrete contact deep dose equivalent radiation levels that are acceptable for open air demolition. Structural materials other than concrete, such as metals, do not tend to sorb radionuclides and are not evaluated for acceptable embedded total contamination dose rates. Activated materials are also not evaluated under this TSD and should be evaluated and modeled separately using the radiological mix of nuclides present. The radiological control indicators evaluated in this TSD will ensure that open air demolition can proceed without creating a Contaminated Area, requiring radiological PPE, or resulting in environmentally significant airborne radioactivity releases.

2. DISCUSSION OR BACKGROUND

2.1. Off-Site Dose Impact Method

Several decommissioning facilities established open air demolition criteria based upon the offsite dose impact from airborne radioactivity released during demolition. The facilities (1) (2) (3) used a conventional nuclear industry approach for safety related bounding calculations to establish limits for open demolition. This approach calculates the acceptable levels of fixed and removable contamination based upon re-suspension factors and site specific ground release dispersion models (*X*/Q). The limits at these facilities are based upon the calculated member of the public dose at the site boundary using Off Site Dose Calculation Manual (ODCM) (4) methodologies for a ground level airborne radioactivity release. As shown in Table 1 this approach results in relatively high levels of removable contamination being acceptable for open air demolition with minor off-site dose consequences.

Table 1 - Summary of Offsite Dose Evaluations

Facility	Removable Contamination Level	Total Contamination Level	Offsite Dose (mrem)	Control Criteria Summary
SONGS Unit 1	N/A	1.5E+6 dpm/100 cm^2	1.7E-3 instantaneous release	$\geq$ 25,000 dpm/100 cm^2 removable of 250,000 dpm/100 cm^2 total requires contamination control measure (e.g., fixative, local ventilation, enclosures) Air samples not to exceed 0.05 DAC beta/gamma or >MDA alpha. Personnel contamination controls below 25,000 dpm/100 cm^2 required.
Maine Yankee	5000 dpm/100 cm^2 beta/gamma 20 dpm/100 cm^2 alpha	500,000 dpm/100 cm^2 beta/gamma 100 dpm/100 cm^2 alpha	6.66E-2 entire decommissioning based upon estimated surface area of buildings and average contamination levels	Could result in up to 4600 dpm/100 cm^2 deposition within 50 feet of demolition with 10% plate out. May require layer of soil to be removed for FSS. Will have to be managed for equipment release.
Yankee Rowe		Average < 5000 dpm/100 cm^2	2E-3 mrem/yr max organ	Maintain work zone air concentrations less than 0.25 DAC to maintain member of public dose below 0.2 mrem/yr. No other limits specified.

Similar offsite dose evaluations of airborne radioactivity ground releases were performed at Connecticut Yankee (CY) as documented in reference (5). This TSD evaluated the offsite dose consequences of an instantaneous release of a 2000 DAC Am-241 source term due to a HEPA filter failure at CY. The calculated member of the public dose at the unrestricted area boundary was 1.77 mrem for a release of this magnitude. Similarly the LACBWR Post Shutdown Decommissioning Activity Report (PSDAR) Accident Analysis (6) evaluated a series of accidents with potential for source term releases to the environment. These calculations assumed that 30% of the remaining estimated approximately 1.175 Ci of radioactive material present on plant surfaces in 2014 was released (e.g., 0.35 Ci, 7.83E+11 dpm) through the plant stack as airborne radioactivity. Resulting doses at 50, 70 and 120 meters were calculated. The maximum dose was 65 mrem at 50 meters. (6) Thus, demolition and sizing of contaminated structures and materials can be performed at high contamination levels without significantly increasing the radiation exposure of members of the public at the site boundary.

2.2. Radiological Objectives for Open Air Demolition

Other objectives, in addition to the member of the public dose at the site boundary, should be considered when establishing Radiological Control Indicators for open air demolition of structures. The off-site dose based approach does not address additional considerations such as:

- Allowing open air demolition without instituting Contaminated Area controls such as, posting, clearance, and protective clothing controls in outside areas.
- Impact of the liberated source term on soil concentrations (Derived Concentration Guideline Levels - DCGLs) required for License Termination.
- Ensuring radioactivity concentrations in high conductivity, high pH demolition water remain low enough to release without use of demineralizers. Groundwater intrusion during demolition at Connecticut Yankee required large quantities of water to be processed and released as part of the demolition process due to groundwater intrusion.

Given the above considerations, the objectives of the open air demolition limits are the following:

- Ensure ground level airborne radioactivity levels and off-site dose consequences remain ALARA and within regulatory limits.
- Ensure demolition liquid concentrations remain at levels which can be collected, processed and released using plant water treatment systems and discharge points.
- Minimize the spread on contamination within the site boundary such that there is not a significant effect on groundwater or the scope of soil remediation required for License Termination.
- Ensure open air demolition activities can be conducted using conventional demolition techniques with minimal radiological restrictions or controls (e.g., without area, equipment or personnel contamination controls).

2.3. Radiological Control Indicator Method and Pre-Test Values

Initial pre-test Radiological Control Indicators (RCI) similar to those at other facilities were developed at Connecticut Yankee as part of the request for proposals and contract agreements with the Decommissioning Operation Contractor (DOC). The RCIs provided the contractual basis for radiologically acceptable levels for various phases and types of structure demolition. These indicators

were used to clearly specify contractual requirements for the demolition of buildings with regards to acceptable levels of fixed and removable contamination. The CY RCIs were defined as the following:

- **R1** was designated for structures where the radiological contamination is indistinguishable from background. This designation was only applied to structures outside a Radiologically Controlled Area (RCA) of the facility. Prior to Release of a structure for R1 demolition, an Unconditional Release Survey (URS) was completed. The URS provides data to demonstrate that secondary side structures are suitable for unconditional release from the Site, (i.e., free released as "clean" materials). This material is designated as Secondary Side Waste. For structures designated as R1, no radiological controls were required during demolition.
- **R2** was designated for structures that reside within the RCA where the radiological contamination is greater than the R1 levels, but less than the limits specified as being suitable for open air demolition (**$R2_{Open\ Air}$**) or interior demolition (**$R2_{Interior}$**). When the structure is scheduled for open air exterior demolition, $R2_{Open\ Air}$ controls are instituted mainly to protect the environment and public whereas $R2_{Interior}$ controls are instituted to protect the worker and to limit the potential for spread of contamination to other interior areas. Prior to structure turnover for R2 demolition, a Contamination Verification Survey (CVS) was completed to verify that pre-demolition contamination levels of primary side structures were below the limits established for open air or interior demolition. The resulting demolition debris was designated as Primary Side Waste. For structures designated as R2, limited radiological controls were required, including but not limited to intermittent health physics coverage, misting, air sampling, periodic surveys, personnel protective equipment and personnel contamination monitoring upon exiting the area.
- **R3** was designated for structures, or portions of structures, within the RCA where the radiological conditions exceed the $R2_{Open\ Air}$ or $R2_{Interior}$ criteria. This material was also designated as Primary Side Waste. For structures designated as R3, significant radiological controls were required. These included but were not limited to controls such as constant health physics coverage, application of surface fixatives, use of tents and HEPA ventilation, more intense air and surface sampling and personnel protective equipment such as respirators.

Table 2 shows the original pre-test radiological criteria for fixed and removable contamination levels adopted for demolition at CY. These values were based upon regulatory requirements for R1 structures (e.g., no detectable licensed material for unrestricted release of materials) and estimates of the potential radiological consequences and controls for the demolition. Similar to other facilities, they allowed relatively high $R2_{Open\ Air}$ contamination levels on structures.

Table 2 – Original Connecticut Yankee Contractual Radiological Control Indicators

Demolition Category	Total Surface Contamination	Loose Surface Contamination	
	β / γ	β / γ	α
R1	Non Detectable	Non Detectable	Non Detectable
R2 Open Air	500,000 dpm/100cm^2 Max 50,000 dpm/100cm^2 Avg	1000 dpm/100cm^2 Max	20 dpm/100cm^2 Max
R2 Interior	10 mR/h Contact	10,000 dpm/100cm^2 Max	200 dpm/100cm^2 Max
R3	>R2 and <100 mR/h Contact	>R2 and <100,000 dpm/100cm^2 Max	>R2 and <5000 dpm/100cm^2 Max

In 2004 Connecticut Yankee released the Decommissioning Operations Contractor (DOC) and resumed direct management of the decommissioning. Thus the contractual RCI criteria in Table 2 were no longer relevant. However, radiological criteria for building demolition still needed to be established. To ensure the criteria in Table 2 would meet the open air demolition objectives, testing was performed on concrete surfaces in the Primary Auxiliary Building (PAB) to determine empirically the proper $R2_{Open\ Air}$ fixed contamination levels and the Table 2 removable contamination levels were reevaluated. The objective of the test was to determine the appropriate contact count rate or dose rate on concrete at which the concrete could be demolished or sized and meet the four objectives summarized at the end in Section 2.2 in this document. The results of the evaluation and tests are summarized in Section 3.3 of this TD. The supporting data and surveys from CY Technical Support Document (7) are provided as attachments to this TD.

3. CALCULATIONS

3.1. Summary of Connecticut Yankee Removable Contamination Limit Evaluation

During plant operations and throughout the decommissioning all of the open air demolition objectives in Section 2.2 were routinely met by maintaining the loose surface contamination levels below 1000 dpm/100 cm^2 beta/gamma and 20 dpm/100 cm^2 alpha on items stored or transported in outside areas. Any materials released off-site were surveyed to less than detectable levels as defined by Nuclear Regulatory Commission guidance. The required sensitivity levels for unrestricted release are no detectable contamination with minimum detectable activities under 5000 dpm/100 cm^2 beta/gamma total, 1000 dpm/100 cm^2 beta/gamma removable and 20 dpm/100 cm^2 alpha removable.

In practice, containers, tools, equipment were decontaminated down to less than detectable contamination levels that range from 30 dpm/100 cm^2 to several hundred dpm/100 cm^2 depending on the survey method, instrumentation, and background before they are released from buildings. The impracticality of instituting Contaminated Area Controls in outside areas, in addition to the regulatory scrutiny that such controls would illicit, is simply outweighed by the relative ease with which removable contamination can be removed or fixed. Removable contamination is easily locked down by applying a fixative such as latex paint prior to demolition. It was determined that there was already sufficient precedent and experience to justify use of these practices as acceptable targets for $R2_{Open\ Air}$ removable contamination limits. To meet the above objectives removable beta gamma contamination limits for open air demolition should not exceed 1000 dpm/100 cm^2 and should on average be less than 300 dpm100 cm^2. The removable alpha contamination should not exceed 20 dpm/100 cm^2.

3.2. Connecticut Yankee Concrete Demolition Test Results

The remaining question was what levels of fixed contamination would be acceptable to maintain work area loose surface contamination levels below 300 dpm/100 cm^2 beta/gamma and 20 dpm/100 cm^2 alpha during demolition. Maintaining loose surface contamination levels within acceptable ranges depends upon the amount of loose radioactive material present on the structure at the time of demolition and the amount of radioactive material that is liberated during the demolition process as concrete dust. Conventional demolition uses large excavators with hydraulic rams to rubbelize concrete and mechanical or thermal methods to cut metallic materials. Embedded surficial fixed contamination becomes loose as part of the dust generated when concrete is fractured or cut by the demolition equipment. Typically, the vast majority of the contamination in the concrete surfaces of building interiors is embedded in the upper most portion, near the surface. Most of the concrete structure and rebar is not contaminated and therefore the fracture dust and metallic dust or cutting smoke is “clean”. Dust generated fracturing the contaminated surface is diluted by uncontaminated dust from fracturing of

subsurface material. To develop an $R2_{Open\ Air}$ fixed contamination limit for concrete, the relationship between fixed contamination levels as indicated by surface dose rates and the resulting loose surface contamination from the fracture dust liberated was evaluated. Tests were conducted at Connecticut Yankee to determine this correlation empirically, rather than by calculation.

In order to determine the appropriate $R2_{Open\ Air}$ fixed contamination criteria for concrete a series of in-situ tests were conducted in the Primary Auxiliary Building (PAB) at CY. The PAB was chosen because it had a series of cubicles with concrete floors exhibiting a range of contact dose rates which varied from as low as no detectable radiation levels above background to as high as 20 to 30 mR/hr contact. The cubicles could be decontaminated to low pre-test loose surface activity levels then sealed off to contain dust and contamination generated during demolition of concrete test areas of various dose rates, then surveyed after the test to evaluate the resulting contamination levels. The objective of these tests was to rubbelize concrete surfaces with different contact dose rates in the absence of engineering controls or dust suppression methods and monitor the airborne radioactivity and removable contamination levels generated.

The tests were performed by pre-surveying the area to determine average contact dose rates in order to select a test location with the appropriate contact levels to be evaluated. The cubicle was then decontaminated or locked down to provide low levels of initial removable contamination and sealed off using clear poly with no negative pressure ventilation applied. This provided a static environment in which airborne radioactivity levels and removable contamination levels resulting directly from the demolition could be evaluated. A test location was then remediated using needle guns, or jack hammers while an air sample was running. After the remediation was completed, the test area and cubicle contamination levels were assessed by smear survey and large area swipes (LAS). The test area was also re-surveyed to determine the post remediation contact dose rates and evaluate the amount of source term removed.

The first test area was in B Charging Pump Cubicle. The Test 1 surveys, air samples, and demolition debris gamma spectroscopy results from reference (7) are provided in Attachment 1. The pre-remediation survey was conducted on 3/3/04 at 16:00. The maximum pre-remediation test area contact dose rate was 1.5 mR/hr and averaged 0.66 mR/hr. Table 3 summarizes the pre-test data from this survey.

Table 3 - Test 1 Pre-remediation Survey Data

Test Area Removable				Test Area Contact		Cubicle Removable Outside Test Area			
Smear Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm	mR/hr	Cpm	Smear Location	beta/gamma dpm/100 cm^2	Alpha dpm/100 cm^2	LAS ccpm
31	< MDA	< MDA		1.5	8,000	2	62.17	< MDA	
32	< MDA	< MDA		0.7	14,000	4	122.84	< MDA	
33	< MDA	< MDA		0.6	13,000	23	62.17	< MDA	
34	79.5	< MDA		0.7	40,000	All Other	<MDA	< MDA	
35	< MDA	< MDA		0.9	28,000				
36	< MDA	< MDA		0.8	28,000				
37	105.51	< MDA		0.4					
38	< MDA	< MDA		0.3					
39	62.17	< MDA		0.3		A			NDA
40	62.17	< MDA		0.4		B			NDA
41	< MDA	< MDA				C			NDA
42	< MDA	< MDA							
43	< MDA	< MDA							
Total Test Area Smears			13	**Avg**	**Avg**	**Total Outside Test Area Smears**			30
beta/gamma Smear Average			23.80	0.66	21,833	**beta/gamma Smear Average**			0.97
						Total Cubicle Smears			43
						Total Cubicle Average			12.94

Note: Blank Entries have no corresponding data for that column. Alphabetical locations are LAS locations. NDA = No Detectable Activity, MDA = Minimum Detectable Activity Contact Dose Rate and Smear are not at same locations or at the smear locations in the test area.

The test area was remediated by chipping concrete using a jack hammer and needle guns in the sealed cubicle. After the surface concrete was removed a post remediation survey was conducted to establish test area contact dose rates and contamination levels in the cubicle. The CY post remediation survey for Test 1 was conducted on 3/4/04 at 12:00 P.M. A copy is provided in Attachment 1. The post remediation survey data is summarized in Table 4 and shows a drop in the maximum contact dose rates from 1.5 mR/hr to 0.7 mR/hr with the average dose rate dropping from 0.66 mR/hr to 0.43 mR/hr. The smear survey data shows that removable contamination levels remained well below 1000 dpm/100 cm^2 in the cubicle with a maximum level of 253 dpm/100 cm^2. LAS survey results increased from pre-remediation levels of No Detectable Activity (NDA) to up to 3000 ccpm in the cubicle. In addition, surveys of the remediation tooling, booties and gloves showed no detectable removable activity.

Table 5 provides the gamma spectroscopy results from samples of remediation dust and debris, the gross beta air sample result and the scaled Effluent Concentration. Air sample results are also provided in Attachment 1. They indicated very low levels of gross beta/gamma airborne radioactivity at 8.66E-12 µCi/cc or 0.043 DAC. Gamma spectroscopy of a sample of the fines and concrete chips generated during the remediation identified Co-60, Cs-134 and Cs-137 in the concrete as seen in Attachment 1. The gross beta/gamma activity on the air sample was scaled to the radionuclide fraction in the debris and compared to the 10 CFR 20 Appendix B Table 2 Effluent Concentrations for Air as shown in Table 5.

This demonstrated that even though the remediation was performed in a tented cubicle with no dust suppression, ventilation or engineering controls, the resulting airborne radioactivity was well below the 10 CFR 20 Appendix B, Table 2, Effluent Concentrations.

Table 4 - Test 1 Post Remediation Survey Data

Test Area Removable				Test Area Contact		Cubicle Removable			
Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm	mR/hr	Cpm	Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm
21	53.5	< MDA		0.2	5,000	10	62.17	< MDA	
22	< MDA	< MDA		0.3	1,000	11	235.53	< MDA	
23	< MDA	< MDA		0.6	5,000	All Other	<MDA	< MDA	
24	< MDA	< MDA		0.7	8,000				
25	< MDA	< MDA		0.5	10,000				
26	< MDA	< MDA		0.3	15,000	A			3000
27	< MDA	< MDA			80,000	B			3000
28	< MDA	< MDA			25,000	C			3000
29	131.51	< MDA			10,000				
30	< MDA	< MDA							
Total Test Area Smears			10	**Avg**	**Avg**	**Total Outside Test Area Smears**			20
Beta/gamma Smear Average			18.50	0.43	17,667	**Beta/gamma Smear Average**			14.89
						Total Cubicle Smears			30
						Total Cubicle Average			16.09

Note: Blank Entries have no corresponding data for that column. Alphabetical locations are LAS locations. NDA = No Detectable Activity, MDA = Minimum Detectable Activity Contact Dose Rate and Smear are not at same locations or at the smear locations in the test area.

Table 5 - Test 1 Debris Gamma Spectroscopy Results and Scaled Air Sample Results

Nuclide	µCi/gm	Fraction of Total	Scaled Air Sample µCi/cc	DAC µCi/cc	Weighted DAC Fraction (DACf)	Eff. Conc. µCi/cc	Weighted EC Fraction (ECf)
Co-60	2.77E-05	2.56E-02	2.21E-13	1.00E-08	2.21E-05	5.00E-11	4.43E-03
Cs-134	1.01E-05	9.35E-03	8.09E-14	4.00E-08	2.02E-06	2.00E-10	4.05E-04
Cs-137	1.04E-03	9.65E-01	8.36E-12	6.00E-08	1.39E-04	2.00E-10	4.18E-02
Total	1.08E-03	1.00E+00	8.66E-12	N/A	**1.63E-04**	N/A	**4.66E-02**
Air Sample Result		8.66E-12	µCi/cc				

A second area in Charging Pump Cubicle B with higher contact dose rates was selected for the next test. This area had contact dose rates in the 1 to 2 mR/hr range with an average contact dose rate of

approximately 1.4 mR/hr. The pre-remediation and post remediation surveys as well as the gross air sample results and debris gamma spectroscopy results are provided in Attachment 2.

The Test 2 pre-remediation survey was conducted on 3/8/04 at 11:00 A.M. The data for the survey area is shown in Table 6. There was no detectable removable contamination in the cubicle prior to Test 2.

Table 6 - Test 2 Pre-remediation Survey Data

Test Area Removable				Test Area Contact		Cubicle Removable			
Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm	mR/hr	cpm	Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm
1	< MDA	< MDA		1.5	50,000	10	< MDA	< MDA	
2	< MDA	< MDA		1.2	16,000	11	< MDA	< MDA	
3	< MDA	< MDA		1.7	25,000	12	< MDA	< MDA	
4	< MDA	< MDA		1.9	15,000	13	< MDA	< MDA	
5	< MDA	< MDA		1.4	20,000	14	< MDA	< MDA	
6	< MDA	< MDA		1.2	75,000	15	< MDA	< MDA	
7	< MDA	< MDA		1.7	75,000	16	< MDA	< MDA	
8	< MDA	< MDA		2	30,000				
9	< MDA	< MDA		1.2	10,000	A			500
				1.2		B			500
				1.4		C			200
				1.5		D			200
				1.5		E			200
				1.2		F			200
				1					
				1.4					
				1.5					
				1					
				1.5					
				1					
				1.7					
				1					
				2					
Total Test Area Smears			9	**Avg**	**Avg**	**Total Outside Test Area Smears**			10
Beta/gamma Smear Average			<MDA	1.42	35,111	**Beta/gamma Smear Average**			<MDA
						Total Cubicle Smears			19
						Total Cubicle Average			<MDA

Note: Blank Entries have no corresponding data for that column. Alphabetical locations are LAS locations. NDA = No Detectable Activity, MDA = Minimum Detectable Activity Contact Dose Rate and Smear are not at same locations or at the smear locations in the test area.

The Test 2 Post Remediation Survey was conducted on 3/9/04 at 09:00. The post remediation surveys are provided in Attachment 2. The data is summarized in Table 7.

Table 7 - Test 2 Post-remediation Survey Data

Test Area Removable				Test Area Contact		Cubicle Removable			
Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm	mR/hr	cpm	Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm
11	< MDA	< MDA		0.3	18,000	2	200.86	< MDA	
12	< MDA	< MDA		0.3	6,000	3	192.19	<MDA	
13	< MDA	< MDA		0.5	47,000	4	235.53	<MDA	
					16,000	5	261.53	<MDA	
						6	88.17	<MDA	
						8	103.51	<MDA	
						9	183.52	<MDA	
E			200			10	96.89	<MDA	
						14	<MDA	<MDA	
						15	88.17	<MDA	
						16	96.84	<MDA	
						17	131.51	<MDA	
						18	62.17	<MDA	
						All Other	<MDA	<MDA	
						A			100
						B			150
						C			150
						D			100
						E			200
Total Test Area Smears			3	**Avg**	**Avg**	**Total Outside Test Area Smears**			28
Beta/gamma Smear Average			<MDA	0.37	21,750	**Beta/gamma Smear Average**			62.17
						Total Cubicle Smears			31
						Total Cubicle Average			56.16

Note: Blank Entries have no corresponding data for that column. Alphabetical locations are LAS locations. NDA = No Detectable Activity, MDA = Minimum Detectable Activity Contact Dose Rate and Smear are not at same locations or at the smear locations in the test area.

The maximum contact dose rate in the test area dropped from 2 mR/hr to 0.5 mR/hr. The average dose rate dropped from. 1.4 mR/hr to 0.37 mR/hr. It can be seen by the comparing post remediation removable contamination levels in Table 7 to the pre-remediation levels in Table 6, that there was an overall increase in the extent and levels of contamination in the cubicle. However, the contamination levels remained below the 1000 dpm/100 cm^2 loose surface beta/gamma objective with a maximum of

262 dpm/100 cm^2. As seen in Attachment 2, the air sample during the remediation was 2.47E-11 µCi/cc or 0.124 DAC. A LAS was analyzed by gamma spectroscopy to provide the radionuclide profile of the concrete debris. Table 8 shows the anticipated effluent concentration for this air sample is 0.14 effluent concentrations. This is higher than the Test 1 air sample results but well below ground release concentrations that would result in any significant dose at the site boundary. There would be no significant off-site dose consequences from releases of this magnitude.

Table 8 - Test 2 Debris Gamma Spectroscopy Results and Scaled Air Sample Results

Nuclide	dpm per sample	Fraction of Total	Scaled Air Sample µCi/cc	DAC µCi/cc	Weighted DAC Fraction (DACf)	Eff. Conc µCi/cc	EC Weighted Fraction
Co-60	2.15E+02	3.91E-02	9.65E-13	1.00E-08	9.65E-05	5.00E-11	1.93E-02
Cs-134	5.89E+01	1.07E-02	2.64E-13	4.00E-08	6.60E-06	2.00E-10	1.32E-03
Cs-137	5.24E+03	9.50E-01	2.35E-11	6.00E-08	3.91E-04	2.00E-10	1.17E-01
Total	**5.51E+03**	**1.00E+00**	**2.47E-11**	**N/A**	**4.94E-04**	**4.50E-10**	**1.38E-01**
Air Sample Result		2.47E-11	µCi/cc				

Test 3 was conducted on an area with average contact dose rates of approximately 1.8 mR/hr with a maximum contact dose rate of 2.5 mR/hr. As shown in the Test 3 surveys provided in Attachment 3, the cubicle had low removable contamination levels on 3/9/04 at 15:30 prior to the test. The pre-remediation contact dose rates are the ones at the left hand side of the test area shown in survey 04-1758 conducted on 3/10/04 at 10:00. This data is summarized in Table 9.

Table 9 - Test 3 Pre-remediation Survey Data

Test Area Removable				Test Area Contact		Cubicle Removable			
Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm	mR/hr	cpm	Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm
12	62.4	<MDA		1.2	10,000	3	69	<MDA	
13	52.9	<MDA		2.5	15,000	10	52.9	<MDA	
14	55.3	<MDA		1.4	>50000	16	60	<MDA	
A			225	2.0	>50000	All Others	<MDA	<MDA	
						B			155
						C			225
						D			175
Total Test Area Smears			3	**Avg**	**Avg**	**Total Outside Test Area Smears**			27
Beta/gamma Smear Average			56.87	1.78	20,833	**Beta/gamma Smear Average**			6.74
						Total Cubicle Smears			30
						Total Cubicle Average			11.75

Note: Blank Entries have no corresponding data for that column. Alphabetical locations are LAS locations. NDA = No Detectable Activity, MDA = Minimum Detectable Activity Contact Dose Rate and Smear are not at same locations or at the smear locations in the test area.

The post remediation survey was conducted on 3/10/04 at 15:30. The post remediation survey results are also provided in Attachment 3 and summarized in Table 10. The maximum contact dose rate dropped from 2.5 mR/hr to 1.9 mR/hr and the average dropped from 1.8 mR/hr to 1.17 mR/hr. These results show similar removable contamination levels to those in Test 2 (Table 7) with a post remediation maximum of 200 dpm/100 cm^2.

Table 10 - Test 3 Post Remediation Survey Data

Test Area Removable				Test Area Contact		Cubicle Removable			
Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm	mR/hr	cpm	Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm
				1.3	10,000	4	200.2	< MDA	
No Smears taken in test area				1.2	9,000	5	86.2	< MDA	
				1	2,000	6	71.9	< MDA	
				1.9	4,000	8	90.9	< MDA	
				1	2,500	9	171.7	< MDA	
				1	8,000	10	79.8	< MDA	
				0.8	25,000	12	131.3	< MDA	
					7,000	13	163.6	< MDA	
					1,000	All Others	<MDA	< MDA	
					9,000				
						A			125
						B			125
						C			200
						D			175
Total Test Area Smears			0	**Avg**	**Avg**	**Total Outside Test Area Smears**			34
Beta/gamma Smear Average			0.00	1.17	7,750	**Beta/gamma Smear Average**			29.28
						Total Cubicle Smears			34
						Total Cubicle Average			29.28

Note: Blank Entries have no corresponding data for that column. Alphabetical locations are LAS locations. NDA = No Detectable Activity, MDA = Minimum Detectable Activity Contact Dose Rate and Smear are not at same locations or at the smear locations in the test area.

As shown in Table 11, a composite sample of the concrete chips from this area was obtained on 3/10/04 at 14:00. The sample was analyzed by gamma spectroscopy and showed Co-60, Cs-134, Cs-137 and Am-241. At CY Am-241 was approximately 50% of the alpha emitting transuranic (TRU) source term in all waste streams. Therefore a correction factor of 2 is applied to the Am-241 results when calculating the DAC and effluent concentration fractions. The airborne radioactivity was significantly higher than in Tests 1 and 2, but still less than 0.035 DAC. The air sample showed 1.114E-10 µCi/cc of Cs-137. The beta (Co-60, Cs-134, Cs-137) to alpha (2 X Am-241) ratio was 1,188 to 1. Well over the 50:1 beta/gamma to alpha ratio at which alpha monitoring is required for personnel and equipment exiting the area. When this Cs-137 level is scaled to the concrete chip sample results, the Effluent Concentration fraction (ECf) is 5.56, exceeding the 10 CFR 20 Appendix B Effluent Concentration Limit for Air but well below a value that would result in significant exposures at the site boundary when the ground release dispersion coefficient (*X/Q*) is considered.. Without the transuranic source term the ECf was 6.46E-01.

Table 11 - Test 3 Debris Gamma Spectroscopy Results and Scaled Air Sample Results

Nuclide	µCi/gm	Fraction of Total	Scaled Air Sample µCi/cc	DAC µCi/cc	Weighted DAC Fraction	Eff. Conc µCi/cc	EC Weighted Fraction
Co-60	1.13E-04	3.72E-02	4.14E-12	1.00E-08	4.14E-04	5.00E-11	8.28E-02
Cs-134	3.54E-05	1.16E-02	1.30E-12	4.00E-08	3.24E-05	2.00E-10	6.49E-03
Cs-137	3.04E-03	1.00E+00	1.11E-10	6.00E-08	1.86E-03	2.00E-10	5.57E-01
Am-241/TRU	1.34E-06	4.41E-04	4.92E-14	3.00E-12	3.28E-02	2.00E-14	4.92E+00
Total	**3.19E-03**		**1.17E-10**		**3.51E-02**		**5.56E+00**
Air Sample Result		1.11E-10	µCi/cc Cs-137				
Gross Beta		2.04E-10	Total includes radon daughters				
Am-241/TRU Correction Factor		2	Beta to Alpha Ratio				1,188

Test 4 was also conducted in B Charging Pump Cubicle and was intended to test the contamination and airborne radioactivity levels resulting from demolition of concrete reading up to 5 mR/hr on contact. There were two attempts to perform this test, 4a and 4b, but neither test was valid because dose rates increased as each of test areas were remediated due to embedded piping in the floor under the test area. As seen in the surveys provided in Attachment 4 and the test 4a and 4b pre and post remediation survey summary tables below the maximum and average dose rates increased as concrete was removed. It was therefore not possible to quantify the dose rate change on the concrete removed.

Table 12 - Test 4a Pre-Remediation Survey

Test Area Removable				Test Area Contact		Cubicle Removable			
Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm	mR/hr	cpm	Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm
7	50.5	< MDA		4.5	50,000	1	205	< MDA	
8	< MDA	< MDA		5	25,000	2	269.1	< MDA	
9	< MDA	< MDA		3.5	4,000	3	285.7	< MDA	
10	55.3	< MDA		6	50,000	4	295.2	< MDA	
				3	45,000	5	52.9	< MDA	
				5	50,000	6	52.4	< MDA	
				3.2	45,000	11	71.9	< MDA	
				1.3	50,000	13	55.3	< MDA	
				3.5		15	62.4	< MDA	
				4.5		18	52.9	< MDA	
				2.4		25	55.3	< MDA	
				4.2		26	112.3	< MDA	
				2.7		All Others	< MDA	< MDA	
				1.5					
				3.8		A			200
				3.2		B			75
				3		C			225
				2.7		D			125
				3.2		E			25
				2.9		F			675
				2.8		G			275
				2.2		H			225
Total Test Area Smears			4	**Avg**	**Avg**	**Total Outside Test Area Smears**			26
Beta/gamma Smear Average			105.80	3.37	39,875	**Beta/gamma Smear Average**			60.40
						Total Cubicle Smears			30
						Total Cubicle Average			55.87

Note: Blank Entries have no corresponding data for that column. Alphabetical locations are LAS locations. NDA = No Detectable Activity, MDA = Minimum Detectable Activity Contact Dose Rate and Smear are not at same locations or at the smear locations in the test area.

As seen in Table 13 the maximum dose rate increased from 5 to 8 mR/hr and the average test area dose rate increased from 3.37 to 4.67 mR/hr.

Table 13 - Test 4a Post Remediation Survey Data

Test Area Removable				Test Area Contact		Cubicle Removable			
Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm	mR/hr	cpm	Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm
1	68.4	< MDA		4	32,000	3	66.8	<MDA	
7	< MDA	< MDA		7	22,000	4	77.9	<MDA	
5	< MDA	< MDA		8	8,000	11	63.6	<MDA	
6	< MDA	< MDA		3	18,000	13	66.8	<MDA	
9	73.1	< MDA		4	18,000	18	75.5	<MDA	
				5	6,000	19	132.5	<MDA	
				2	4,000	21	104.8	<MDA	
				5	10,000	22	58.8	<MDA	
				4	40,000	23	132.5	<MDA	
						26	94.5	<MDA	
						32	61.2	<MDA	
						33	49.3	<MDA	
						34	49.3	<MDA	
						37	104.8	<MDA	
						39	49.3	<MDA	
						All Others	<MDA	<MDA	
						A			200
						B			100
						C			125
Total Test Area Smears			5	**Avg**	**Avg**	**Total Outside Test Area Smears**			35
Beta/gamma Smear Average			28.30	4.67	17,556	**Beta/gamma Smear Average**			33.93
						Total Cubicle Smears			40
						Total Cubicle Average			33.23

Note: Blank Entries have no corresponding data for that column. Alphabetical locations are LAS locations. NDA = No Detectable Activity, MDA = Minimum Detectable Activity Contact Dose Rate and Smear are not at same locations or at the smear locations in the test area.

A Masslin LAS and a sample of the concrete debris generated during test 4a were analyzed by gamma spectroscopy. The analysis results and the Test 4a air sample result of 4.14E-11 µCi/ml are provided in Attachment 4. The results of the gamma spectroscopy analysis for each sample and the scaled effluent concentration fractions (ECf) are summarized in Table 14 and Table 15.

Table 14 - Test 4a Masslin Debris Gamma Spectroscopy Results and Scaled Air Sample Results

Nuclide	3/15/04 15:40 Gamma Spec Dust dpm/smear	Fraction of Total	3/15/04 Gamma Spec Dust Scaled Air Sample µCi/cc	DAC µCi/cc	Weighted DAC Fraction (DACf)	Eff. Conc µCi/cc	3/16/04 Dust EC Weighted Fraction
Co-60	2.09E+02	1.39E-01	5.77E-12	1.00E-08	5.77E-04	5.00E-11	1.15E-01
Cs-134	2.07E+01	1.38E-02	5.70E-13	4.00E-08	1.43E-05	2.00E-10	2.85E-03
Cs-137	1.27E+03	8.47E-01	3.51E-11	6.00E-08	5.84E-04	2.00E-10	1.75E-01
Total	1.50E+03	1.00E+00		**N/A**	**1.18E-03**		**2.94E-01**
Air Sample Result Gross Beta				4.14E-11	µCi/cc		

Table 15 - Test 4a Debris Gamma Spectroscopy Results and Scaled Air Sample Results

Nuclide	3/15/04 15:40 Gamma Spec Dust µCi/gm	Fraction of Total	3/15/04 Gamma Spec Dust Scaled Air Sample µCi/cc	Eff. Conc µCi/cc	3/16/04 Dust EC Weighted Fraction
Co-60	2.90E-05	2.48E-02	1.03E-12	5.00E-11	2.06E-02
Cs-134	1.12E-05	9.61E-03	3.98E-13	2.00E-10	1.99E-03
Cs-137	1.13E-03	9.66E-01	4.00E-11	2.00E-10	2.00E-01
Total	1.17E-03	1.00E+00			**2.22E-01**
Air Sample Result Gross Beta	4.14E-11	µCi/cc			

A second test location was tried on test 4b at an area adjacent to the first location. The pre-remediation survey data is shown in Table 16.

Table 16 - Test 4b Pre Remediation Survey Data

Test Area Removable				Test Area Contact		Cubicle Removable			
Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm	mR/hr	cpm	Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm
1	< MDA	< MDA		8	25,000	5	68.4	< MDA	
2	< MDA	< MDA		7	32,000	9	99.2	< MDA	
3	< MDA	< MDA		4.5	10,000	10	49	< MDA	
				2	16,000	11	80	< MDA	

Test Area Removable				Test Area Contact		Cubicle Removable			
Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm	mR/hr	cpm	Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm
				6	47,000	16	54.1	< MDA	
				2.6	18,000	All Others	< MDA	< MDA	
				1.6	13,000				
				9.5	9,000	A			125
				2.2	8,000	B			NDA
				2	18,000	C			295
				4.5	1,200	D			25
				1.2					
Total Test Area Smears			3	**Avg**	**Avg**	**Total Outside Test Area Smears**			13
Beta/gamma Smear Average			<MDA	4.26	17,927	**Beta/gamma Smear Average**			26.98
						Total Cubicle Smears			16
						Total Cubicle Average			21.92

Note: Blank Entries have no corresponding data for that column. Alphabetical locations are LAS locations. NDA = No Detectable Activity, MDA = Minimum Detectable Activity Contact Dose Rate and Smear are not at same locations or at the smear locations in the test area.

As seen in Table 17, dose rates increased significantly up to 20 mR/hr as the concrete was removed.

Table 17- Test 4b Post Remediation Survey Data

Test Area Removable				Test Area Contact		Cubicle Removable			
Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm	mR/hr	cpm	Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm
31	< MDA	< MDA		8	32,000	1	130.1	<MDA	
32	< MDA	< MDA		20	38,000	5	355.8	<MDA	
				2	12,000	6	348.9	<MDA	
				5	50,000	7	189.5	<MDA	
				18	50,000	8	170.5	<MDA	
				13	22,000	9	113.5	<MDA	
				8	8,000	14	49.3	<MDA	
				22	45,000	20	49.3	<MDA	
				8	18,000	All Others	<MDA	<MDA	
				5	50,000				
				13	22,000				
				2.8	18,000				
Total Test Area Smears			2	**Avg**	**Avg**	**Total Outside Test Area Smears**			38

Test Area Removable				Test Area Contact		Cubicle Removable			
Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm	mR/hr	cpm	Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm
Beta/gamma Smear Average			<MDA	10.40	30,417	Beta/gamma Smear Average			37.02
						Total Cubicle Smears			40
						Total Cubicle Average			35.17

Note: Blank Entries have no corresponding data for that column. Alphabetical locations are LAS locations. NDA = No Detectable Activity, MDA = Minimum Detectable Activity Contact Dose Rate and Smear are not at same locations or at the smear locations in the test area.

A Masslin from the test area was analyzed by gamma spectroscopy, there was no corresponding air sample to accompany it since the test was abandoned due to the increasing dose rates. Am-241 was also detected on this sample but the beta to alpha ratio remained above 50:1.

Table 18 - Test 4b Maslin Gamma Spectroscopy Results

Nuclide	3/16/04 Gamma Spec Masslin dpm/smear	Fraction of Total
Co-60	2.18E+02	1.18E-01
Cs-134	2.12E+01	1.15E-02
Cs-137	1.59E+03	8.63E-01
Am-241	1.32E+01	7.18E-03
Total	1.84E+03	1.00E+00
Am-241/TRU Correction Factor		2
Beta to Alpha Ratio		69.15

Test 5 was conducted in the PAB Metering Pump Cubicle. The Pre-remediation contact dose rate survey was performed on 3/18/04. The pre-remediation smear survey was performed on 3/23/04. The surveys are provided in Attachment 5 and the data is summarized in Table 19. It can be seen that the initial removable contamination levels were higher than in the previous tests.

Table 19 - Test 5 Pre-remediation Survey Data

Test Area Removable				Test Area Contact		Cubicle Removable			
Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm	mR/hr	cpm	Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm
2	227.5	< MDA		1.5		1	73.1	< MDA	
D			400	2.5		3	118.2	< MDA	
				2		4	132.5	< MDA	
				2.5	50,000	5	130.1	< MDA	
				3.2		6	156.3	< MDA	
				2.8		7	172.9	< MDA	
				2		8	80.2	< MDA	
				10		9	144.4	< MDA	
				17		10	106.4	< MDA	
				3.8		11	244.2	< MDA	
				7		12	184.8	< MDA	
				10		13	142	< MDA	
				4.5		14	70.7	< MDA	
				8		15	427.1	< MDA	
				7.2		16	182.4	< MDA	
				3.5		17	172.9	< MDA	
				5.2		18	187.1	< MDA	
				2.5		19	123	< MDA	
				3.5		20	85	< MDA	
						All Others	< MDA	< MDA	
						A			250
						B			300
						C			200
Total Test Area Smears			1	**Avg**	**Avg**	**Total Outside Test Area Smears**			20
Beta/gamma Smear Average			227.50	5.19	50,000	**Beta/gamma Smear Average**			146.67
						Total Cubicle Smears			21
						Total Cubicle Average			150.51

Note: Blank Entries have no corresponding data for that column. Alphabetical locations are LAS locations. NDA = No Detectable Activity, MDA = Minimum Detectable Activity Contact Dose Rate and Smear are not at same locations or at the smear locations in the test area.

The post remediation smear survey was performed on 3/24/04 14:30. The results are summarized in Table 20. Initially test area post remediation dose rates ranged from 1.5 to 4.5 mR/hr. The test area was resurveyed on 3/25/04 at 10:30 after the chips and fines had been cleared and the dose rates in the test area with the debris removed were significantly lower at less than 1 mR/hr.

Table 20 - Test 5 Post Remediation Survey

Test Area Removable				Test Area Contact		Cubicle Removable			
Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm	mR/hr	cpm	Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm
1	< MDA	< MDA		0.4	450	1	244.2	< MDA	
2	56.5	< MDA		0.4	600	3	146.8	< MDA	
20	< MDA	< MDA		0.1	800	4	158.6	< MDA	
21	< MDA	< MDA		0.4	600	5	144.4	< MDA	
				0.3	700	6	80.2	< MDA	
				0.6	600	7	146.8	< MDA	
				0.6	800	8	151.5	< MDA	
				0.6	600	9	66	< MDA	
				0.7	700	10	104	< MDA	
						11	75.5	< MDA	
						12	146.8	< MDA	
						13	104	< MDA	
						15	115.9	< MDA	
						18	87.4	< MDA	
						19	681.3	< MDA	
						23	87.4	< MDA	
						24	89.7	< MDA	
						26	56.5	< MDA	
						27	94.5	< MDA	
						28	49.3	< MDA	
						29	73.1	< MDA	
						30	54.1	< MDA	
						32	61.3	< MDA	
						34	96.9	< MDA	
						36	82.6	< MDA	
						38	73.1	< MDA	
						39	51.7	< MDA	
						40	96.9	< MDA	
						41	94.5	< MDA	
						42	87.4	< MDA	
						43	113.5	< MDA	
						44	284.6	< MDA	

Test Area Removable				Test Area Contact		Cubicle Removable			
Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm	mR/hr	cpm	Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm
						45	137.5	< MDA	
						46	77.9	< MDA	
						47	35.1	< MDA	
						48	77.9	< MDA	
						49	260.8	< MDA	
						50	186	< MDA	
						All Others	< MDA	< MDA	
						A			120
						B			220
						C			120
						D			220
						E			170
						F			70
						G			270
Total Test Area Smears			4	**Avg**	**Avg**	**Total Outside Test Area Smears**			46
Beta/gamma Smear Average			14.13	0.46	650	**Beta/gamma Smear Average**			103.82
						Total Cubicle Smears			50
						Total Cubicle Average			96.64

Note: Blank Entries have no corresponding data for that column. Alphabetical locations are LAS locations. NDA = No Detectable Activity, MDA = Minimum Detectable Activity Contact Dose Rate and Smear are not at same locations or at the smear locations in the test area.

The dose rates were reduced significantly from a maximum of 17 to 0.7 mR/hr and from a pre-test average of 5.19 to a post-test average of 0.46 mR/hr. The pre-remediation and post remediation removable contamination results are similar because a thorough pre-remediation decontamination of the area was not performed. However, they were not detectably elevated by the demolition activity on concrete with an average dose rate 5 mR/hr. The highest smear read 681 dpm/100 cm^2 which is close to the 1000 dpm/100 cm^2 threshold at which posting as a Contaminated Area would be required, and is a level that would be detectable as contamination on personnel and equipment exiting the area.

A composite sample of the concrete chips from Test 5 was analyzed by gamma spectroscopy. The results identified Co-60 and Cs-137 at the concentrations shown in Table 21. The air sample had 1.85 E-10 µCi/cc of Cs-137 and 6.00E-11 µCi/cc of Co-60. This equaled 2.13 ECf which is minimal when the ground release *X/Q* is considered.

Table 21 - Test 5 Air Sample Data and Debris Gamma Spectroscopy Results

Nuclide	µC/ml	Fraction of Total	Air Sample µCi/cc	DAC µCi/cc	Weighted DAC Fraction (DACf)	Eff. Conc µCi/cc	EC Weighted Fraction
Co-60	1.29E-05	1.83E-03	6.00E-11	1.00E-08	6.00E-03	5.00E-11	1.20E+00
Cs-134	<MDA	0.00E+00	0.00E+00	4.00E-08	0.00E+00	2.00E-10	0.00E+00
Cs-137	7.02E-03	1.00E+00	1.85E-10	6.00E-08	3.08E-03	2.00E-10	9.25E-01
Total	**7.03E-03**	**1.00E+00**	**2.45E-10**	**N/A**	**9.08E-03**	**N/A**	**2.13E+00**
Air Sample Results		Cs-137	1.85E-10	µCi/cc			
		Co-60	6.00E-11	µCi/cc			
		Gross Beta	1.42E-10	µCi/cc			

Test 6 was performed on an area adjacent to Test 5. This was an additional test to verify that remediation of concrete in the 2 mR/hr range would meet the contamination control objectives of for open air demolition. The pre-test smear survey was performed on 3/25/04 at 10:30 and is provided along with the other data in Attachment 6. The pre-demolition contact dose rate survey was performed on 3/25/04 at 14:30. The pre-demolition survey data is summarized in Table 22.

Table 22 - Test 6 Pre-remediation Survey Data

Test Area Removable				Test Area Contact		Cubicle Removable			
Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm	mR/hr	Cpm	Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm
2	104	< MDA		2.3	20,000	4	99.2	< MDA	
3	87.4	< MDA		1.5	25,000	5	118.2	< MDA	
19	< MDA	< MDA		1.8	15,000	6	111.1	< MDA	
				1.9	16,000	7	125.4	< MDA	
				0.8	10,000	8	70.7	< MDA	
				1.2	2,000	9	111.1	< MDA	
				1.5	12,000	11	99.2	< MDA	
				1.2	49,000	12	61.2	< MDA	
				1.2	35,000	13	87.4	< MDA	
				0.8	42,000	14	73.1	< MDA	
				0.8		15	54.1	< MDA	
				1		16	80.2	< MDA	
				1.4		17	182.4	< MDA	
				1.1		18	94.5	< MDA	
				1		19	127.7	< MDA	
				1		22	125.4	< MDA	
				1		23	80.2	< MDA	
				0.8		24	70.7	< MDA	
				0.6		26	379	< MDA	
				0.1		27	109	< MDA	

Test Area Removable				Test Area Contact		Cubicle Removable			
Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm	mR/hr	Cpm	Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm
				1		All Others	< MDA	< MDA	
				0.8					
				0.8					
				0.6					
						A			120
						B			220
						C			120
						D			220
						E			170
						F			70
						G			270
Total Test Area Smears			3	**Avg**	**Avg**	**Total Outside Test Area Smears**			27
Beta/gamma Smear Average			63.80	1.09	22,600	**Beta/gamma Smear Average**			83.70
						Total Cubicle Smears			30
						Total Cubicle Average			81.71

Note: Blank Entries have no corresponding data for that column. Alphabetical locations are LAS locations. NDA = No Detectable Activity, MDA = Minimum Detectable Activity Contact Dose Rate and Smear are not at same locations or at the smear locations in the test area.

The post remediation smear survey was conducted on 3/29/04 at 10:30. After the debris was removed the post remediation dose rate survey was conducted on 3/29/04 at 14:20. This survey is mislabeled as a pre-chip survey in Attachment 6. This post demolition data is summarized in Table 23.

Table 23 - Test 6 Post Remediation Survey Data

Test Area Removable				Test Area Contact		Cubicle Removable			
Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm	mR/hr	cpm	Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm
4	< MDA	< MDA		0.6	1,000	6	56.13	< MDA	
5	< MDA	< MDA		0.5	1,000	8	64.79	< MDA	
				0.4	10,000	10	73.46	< MDA	
				0.3	1,500	11	125.47	< MDA	
				0.4	500	12	73.46	< MDA	
				0.3	1,000	17	56.13	< MDA	
				0.4	1,000	23	64.79	< MDA	

Test Area Removable				Test Area Contact		Cubicle Removable			
Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm	mR/hr	cpm	Location	beta/gamma dpm/100 cm^2	alpha dpm/100 cm^2	LAS ccpm
				0.3	600	25	108.13	< MDA	
				0.4	1,000	27	64.79	< MDA	
						34	125.47	< MDA	
						35	220.82	< MDA	
						36	99.47	< MDA	
						38	212.15	< MDA	
						45	83.13	< MDA	
						51	64.79	< MDA	
						All Others	< MDA	< MDA	
						A			260
						B			240
						C			300
						D			125
						E			280
Total Test Area Smears			2	**Avg**	**Avg**	**Total Outside Test Area Smears**			27
Beta/gamma Smear Average			<MDA	0.40	1,956	**Beta/gamma Smear Average**			55.30
						Total Cubicle Smears			29
						Total Cubicle Average			51.48

Note: Blank Entries have no corresponding data for that column. Alphabetical locations are LAS locations. NDA = No Detectable Activity, MDA = Minimum Detectable Activity Contact Dose Rate and Smear are not at same locations or at the smear locations in the test area.

The Test 6 data showed no significant change in area contamination levels and a slight increase in Large Area Smear results. Maximum dose rates dropped from 2.3 mR/hr to 0.6 mR/hr and average dose rates were reduced from 1.09 mR/hr to 0.4 mR/hr. The maximum removable surface contamination was 221 dpm/100 cm^2. This is below the personnel contamination threshold and well below the Contaminated Area posting requirement.

An LAS sample of the concrete dust generated during the remediation was analyzed by gamma spectroscopy. The results are shown in Table 24. The air sample obtained during the remediation was 2.41E-11 µCi/cc. When scaled to the gamma spectroscopy results, it is well below the effluent concentrations.

Table 24 - Test 6 Air Sample Data and Debris Gamma Spectroscopy Results

Nuclide	µCi/gm	Fraction of Total	Scaled Air Sample µCi/cc	DAC µCi/cc	Weighted DAC Fraction (DACf)	Eff. Conc µCi/cc	EC Weighted Fraction
Co-60	7.13E-05	1.72E-02	4.14E-13	1.00E-08	4.14E-05	5.00E-11	8.29E-03
Cs-134	4.11E-06	9.91E-04	2.39E-14	4.00E-08	5.97E-07	2.00E-10	1.19E-04
Cs-137	4.07E-03	9.82E-01	2.37E-11	6.00E-08	3.94E-04	2.00E-10	1.18E-01
Total	**4.15E-03**	**1.00E+00**	**2.41E-11**	**N/A**	**4.36E-04**	**N/A**	**1.27E-01**
Air Sample Result		2.41E-11	µCi/cc				

Test 6 confirmed that of concrete with contact dose rates in the 2 mR/hr range could be demolished while maintaining maximum beta/gamma removable contamination levels below 1000 dpm/100 cm^2 and average levels below 300 dpm/100 cm^2. It also confirmed that airborne radioactivity levels will remain low.

3.3. Summary and Conclusions from Connecticut Yankee Concrete Demolition Test Results

As stated in the section 2.2 of this TSD, the objectives of the R2 open air demolition limits were the following:

- Ensure ground level airborne radioactivity concentrations remain ALARA and within regulatory limits.
- Ensure demolition liquid concentrations remain at levels which can be collected, processed and released using plant water treatment systems and discharge points.
- Minimize the spread on contamination within the site boundary such that there is no significant effect on groundwater or the scope of soil remediation required.
- Ensure open air demolition activities can be conducted using conventional demolition techniques with minimal radiological restrictions or controls.

As noted previously, the test cubicles were sealed and no engineering controls or ventilation was used during the demolition tests. Air samples were obtained in the cubicles during the tests. As seen in Table 25, although Test 3 had Am-241 present which resulted in 5.56 ECf in the test area, all air samples remained well below the 0.3 DAC airborne radioactivity area limit at which posting and evaluation of respiratory protection would be required. In addition all results would be well below an effluent concentration at the site boundary when the ground release dispersion coefficient (X/Q) is considered.

Table 25 - Summary of CY Demolition Test Air Sample Results

Test	Pre-Test Max Contact mR/hr	Post-Test Max Contact mR/hr	Delta Max Contact mR/hr	Air Sample µCi/cc	DAC Fraction	Effluent Conc. Fraction ECf	Without TRU ECf	Without TRU ECf per Δ mR/hr
Test 1	1.50	0.70	0.80	8.66E-12	1.63E-04	4.66E-02	4.66E-02	5.83E-02
Test 2	2.00	0.50	1.50	2.47E-11	4.94E-04	1.38E-01	1.38E-01	9.20E-02
Test 3	2.50	1.90	0.60	1.17E-10	3.51E-02	5.56E+00	6.46E-01	1.08E+00
Test 4a	***6.00***	***8.00***	-2.00	4.14E-11	1.18E-03	2.94E-01	2.94E-01	N/A
Test 4b	***9.50***	***22.00***	-12.50	N/A	N/A	N/A	N/A	N/A

Test	Pre-Test Max Contact mR/hr	Post-Test Max Contact mR/hr	Delta Max Contact mR/hr	Air Sample µCi/cc	DAC Fraction	Effluent Conc. Fraction ECf	Without TRU ECf	Without TRU ECf per Δ mR/hr
Test 5	17.00	0.70	16.30	4.50E-10	9.08E-03	2.13E+00	2.13E+00	1.30E-01
Test 6	2.30	0.60	1.70	2.41E-11	4.36E-04	1.27E-01	1.27E-01	7.45E-02
Combined Results Test 1 - 3	6.00	3.10	2.90	1.50E-10	3.57E-02	5.75E+00	8.31E-01	**2.87E-01**
All Results Test 4 Excluded	25.30	4.40	20.90	6.24E-10	4.53E-02	8.00E+00	3.08E+00	**1.47E-01**
Target Average	1	ECf						
Combined Test 1 - 3	3.5	mR/hr						
All Results Except Test 4	6.8	mR/hr						

When results from Tests 1, 2 and 3 are treated as a composite result, they indicate that concrete up to 3.5 mR/hr can be demolished without generating greater than 1 ECf for cobalt and cesium radionuclides. All test results except Tests 4a and 4b indicate a cut off dose rate of up to 7 mR/hr would be acceptable.

With regard to the objective of maintaining removable contamination well below the Contaminated Area limits of 1000 dpm/100 cm^2 beta/gamma and 20 dpm/100 cm^2 alpha, only the Tests 1 through 3 results are meaningful for calculating a dose rate cut off level. Test area dose rates increased during Tests 4a and 4b invalidating the data and pre-test contamination levels were too high in Tests 5 and 6 resulting in minimal to negative increases in post-test contamination levels. However, Test 5 results do indicate that overall contamination levels were not significantly elevated despite the high delta in pre-test and post-test maximum dose rates.

Another goal of the open air demolition criteria is to allow demolition to proceed without protective clothing being required to prevent personnel contaminations. Tests 1, 2, 3, and 6 indicate that the contamination levels in the area can be maintained below 300 dpm/100 cm^2 when maximum dose rates on the concrete are remediated to less than 2 mR/hr prior to open air demolition. Test 5 resulted in a maximum beta/gamma removable contamination level of 681 dpm/100 cm^2 which is approaching the Contaminated Area limit and is in the range that can be reliably detected by personnel contamination monitoring equipment. The data based upon Tests 1 through 3 as shown in Table 26 indicates that maximum area contamination levels can be maintained in the range of 300 dpm/100 cm^2 at open air demolition cut off dose rates of 2 mR/hr contact on concrete. If all of the test results except 4a and 4b are considered relative to the maximum dose rates and maximum removable contamination levels, a cut off dose rate of 10 mR/hr is calculated. However, there is not enough test data at the dose rates exceeding 2 mR/hr to reliably demonstrate that contamination levels can be maintained under those at which personnel contaminations would occur.

Table 26 - Summary of Test Result Maximum Dose Rates and Maximum Beta/Gamma Removable Contamination

Test	Pre-Test Max Contact mR/hr	Post-Test Max Contact mR/hr	Delta Max Contact mR/hr	Max Pre-Test dpm/100 cm^2	Max Post-Test dpm/100 cm^2	Delta Max dpm/100 cm^2	Delta Max dpm/100 cm^2 per Delta Max mR/hr
Test 1	1.50	0.70	0.80	122.8	235.5	112.69	140.9
Test 2	2.00	0.50	1.50	0.0	261.5	261.53	174.4
Test 3	2.50	1.90	0.60	69.0	200.2	131.20	218.7
Test 4a	***6.00***	***8.00***	-2.00	***295.2***	***132.5***	-162.70	***81.4***
Test 4b	***9.50***	***22.00***	-12.50	***99.2***	***355.8***	256.60	***-20.5***
Test 5	17.00	0.70	16.30	427.1	681.3	254.20	15.6
Test 6	2.30	0.60	1.70	379.0	220.8	-158.18	-93.0
Combined Results Test 1 – 3	6.00	3.10	2.90	191.84	697.26	505.42	174.3
All Results Test 4 Excluded	25.30	4.40	20.90	997.94	1599.38	601.44	28.8
Target Average	300	dpm/100 cm^2					
Combined Test 1 – 3	1.7	mR/hr					
All Results Except Test 4	10.4	mR/hr					

Similarly, a cut off value of 7.4 mR/hr can be calculated based upon the pre and post test contact dose rate averages and pre and post-test cubicle removable contamination averages as seen in Table 27. The negative results in Table 27 for Tests 5 and 6 are due to dilution by concrete dust from the test. However, as stated above there is insufficient data at contact dose rates exceeding 2 mR/hr to establish the frequency at which personnel performing open air demolition on concrete above 2 mR/hr would be exposed to removable contamination levels exceeding 300 dpm/100 cm^2.

Table 27 - Summary of Test Result Average Dose Rates and Average Cubicle Beta/Gamma Removable Contamination

Test	Pre-Test Avg Contact mR/hr	Post-Test Avg Contact mR/hr	Delta Avg. Contact mR/hr	Max Pre-Test Avg dpm/100 cm^2	Max Post-Test Avg dpm/100 cm^2	Delta Avg dpm/100 cm^2	dpm/100 cm^2 per mR/hr
Test 1	0.66	0.43	0.23	12.9	16.1	3.15	13.9
Test 2	1.42	0.37	1.06	0.0	56.2	56.16	53.2
Test 3	1.78	1.17	0.60	11.8	29.3	17.53	29.0
Test 4a	***3.37***	***4.67***	-1.30	***55.9***	***33.2***	-22.65	***17.4***
Test 4b	***4.26***	***10.40***	-6.14	***21.9***	***35.2***	13.25	***-2.2***
Test 5	5.19	0.46	4.74	150.5	96.6	-53.87	-11.4
Test 6	1.09	0.40	0.69	81.7	51.5	-30.22	-43.7
Results Test 1 - 3	3.86	1.97	1.89	24.69	101.53	76.84	40.8
All Results Test 4 Excluded	10.14	2.83	7.32	256.91	249.66	-7.26	-1.0
Target Average		300	dpm/100 cm^2				

Test 1 – 3	7.4	mR/hr
All Results Except Test 4	-302.4	mR/hr

As seen in Table 28 the embedded source term was predominantly Cs-137 at the CY test locations. Therefore, significant TRU or non-gamma high energy beta emitters (e.g., Sr/Y-90) could result in a cut-off dose rate lower than 2 mR/hr contact on concrete in order to maintain work area airborne radioactivity and contamination levels within the target ranges.

Table 28 - Summary of Post Remediation Gamma Spectroscopy Results

Nuclide	Test 1 µCi/g	Test 2 dpm/sample	Test 3 µCi/g	Test 4 µCi/g	Test 4 µCi/g	Test 4 dpm/smear	Test 5 µCi/ml	Test 6 µCi/g
Co-60	2.77E-05	2.15E+02	1.13E-04	2.90E-05	2.90E-05	2.18E+02	1.29E-05	7.13E-05
Cs-134	1.01E-05	5.89E+01	3.54E-05	1.12E-05	1.12E-05	2.12E+01	<MDA	4.11E-06
Cs-137	1.04E-03	5.24E+03	3.04E-03	1.13E-03	1.13E-03	1.59E+03	7.02E-03	4.07E-03
Am-241	<MDA	<MDA	1.34E-06	0.00E+00	<MDA	1.32E+01	<MDA	<MDA
Total	1.08E-03	5.51E+03	3.19E-03	1.17E-03	1.17E-03	1.84E+03	7.03E-03	4.15E-03
% Cs-137	97%	95%	95%	97%	97%	86%	100%	98%

3.4. LACBWR Concrete Gamma Spectroscopy Results

RS-TD-313196-001 (8) evaluated results from twelve (12) concrete core samples from the La Crosse end state structures, six (6) in the Reactor Building, three (3) in the Waste Treatment Building (WTB) and three (3) in the Piping Tunnel. The WTB had the highest concentrations up to 10,450 pCi/g of Cs-137. Cs-127 was 87% of the mix in this core as well as in the mean distribution of all 12 cores. Most of the remaining activity was Ni-63, a weak pure beta emitter, at 8% to 9% of the mix. Co-60 was just over 1% of the mix. Thus contact dose rates are driven by Cs-137.

Table 29 - La Crosse Highest Concrete Core Sample and Average

Nuclide	WTB (selected) Avg Conc. pCi/g	WTB (selected) Avg Fraction	Mean Distribution Fraction
H-3	1.219E+00	0.01%	0.07%
C-14	6.083E+00	0.05%	0.07%
Fe-55	1.379E+01	0.11%	0.29%
Ni-59	1.629E+02	1.36%	1.04%
Co-60	1.345E+02	1.12%	1.22%
Ni-63	1.083E+03	9.02%	8.05%
Sr-90	1.089E+02	0.91%	0.91%
Nb-94	5.403E-01	0.00%	0.01%
Tc-99	6.330E-01	0.01%	0.02%
Cs-137	1.045E+04	87.03%	87.74%
Eu-152	7.413E+00	0.06%	0.09%
Eu-154	4.983E+00	0.04%	0.08%
Eu-155	3.553E+00	0.03%	0.05%

Np-237	4.840E-02	0.00%	0.00%
Pu-238	1.408E+00	0.01%	0.02%
Pu-239/240	1.329E+00	0.01%	0.01%
Pu-241	2.205E+01	0.18%	0.31%
Am-241	4.206E+00	0.04%	0.04%
Am-243	2.768E-01	0.00%	0.00%
Cm-243/244	3.275E-01	0.00%	0.01%
Total	1.201E+04		

The sample with the highest activity in the first column of Table 29 was modeled using MicroShield 8.03 with embedded contamination in the first ½ inch of a 72 inch diameter source at 1.045E+4 pCi/g. The input parameters and results are provided in Table 30 and the MicroShield report is provided in Attachment 6.

Table 30 - MicroShield Dose Rate Model Parameters

Source Parameters	Value	Units	Value	Units
Radius	36	inches	91.44	cm
Thickness	0.5	inches	1.27	cm
Volume	2035.8	in3	33360	cm3
Source Density	N/A	N/A	2.35	g/cc
Source Mass	N/A	N/A	78396	grams
Cs-137	N/A	N/A	1.05E+04	pCi/g
Source Cs-137 Activity	8.192E-04	Ci	8.192E+08	pCi
Co-60	N/A	N/A	1.345E+02	pCi/g
Source Co-60	1.054E-05	N/A	1.054E+07	pCi/g
Contact Dose Rate	**1.91**	**mR/hr**		
Open Air Demo Concentration	**1.09E+04**	**pCi/g**		

The contact dose rate calculated for the WTB Floor sample with a 1.045E+4 pCi/g source term was 1.91 mrem/hr. Based upon this, the 2 mR/hr contact open air demo limit equals approximately 1.09E+4 pCi/g of Cs-137 in the first half inch of concrete.

4. CONCLUSION

Based upon the comparison to other facilities open air demolition limits, the results of the Connecticut Yankee tests, and the La Crosse concrete data, the following open air demolition limits are recommended for La Crosse.

Table 31 – Recommended Open Air Demolition Limits

Demolition Category	Total Surface Contamination	Loose Surface Contamination	
	β / γ	β / γ	α
R2 Open Air	Less than 2 mR/hr contact on concrete Greater than 2 mR/hr contact on material other than concrete as authorized by RP	1000 dpm/100cm^2 Max 300 dpm/100cm^2 Avg.	20 dpm/100cm^2 Max

5. REFERENCES

1. San Onofre Unit 1, HP&E Position Paper, Airborne Effluent Controls During Decommissioning, September 27, 2000.
2. Maine Yankee, Technical Evaluation TE-013-01, Radiological Consequences of Hotside Building Demolition, October 10, 2002.
3. Yankee Rowe, RP-Memo File No. 03-024, Airborne Effluent Dose Consequences of Building Demolition, September 3, 2003.
4. SAFSTOR/Decommissioning Offsite Dose Calculation Manual, Vol. 4, Rev. 22, Humboldt Bay Power Plant, July 23, 2012.
5. Technical Support Document CY-HP-0029, Rev. 0, HEPA Units Environmental Release Evaluation February 9, 1999.
6. LACBWR Decommissioning Plan and Post-Shutdown Decommissioning Activities Report, March 12, 2014.
7. Technical Support Document CY-HP-0175, Rev. 0, Technical Basis for Structure/Building Open Air Demolition January 19, 2005.
8. Energy*Solutions* Technical Support Document RS-TD-313196-001, " Radionuclides of Concern During the Decommissioning of the La Crosse Boiling Water Reactor".
9. 10 CFR 20 Standards for Protection Against Radiation, Subpart E—Radiological Criteria for License Termination http://www.nrc.gov/reading-rm/doc-collections/cfr/part020/.
10. NUREG-1575, Rev. 1, Multi-Agency Radiation Survey And Site Investigation Manual (MARSSIM), August 2000.
11. Canberra 31013E V4.2 Technical Reference Manual, Model S573 ISOCS Calibration Software.
12. NRC ML112140119, Containment Liner Corrosion, Darrell Dunn, U.S.N.R.C, August 2011.
13. Lacrosse Restoration Project License Termination Plan.

6. ATTACHMENTS

6.1. Attachment 1.A - CY Test 1 “B” Charging Pump Cubicle Survey

6.2. Attachment 1.B - CY Test 1 “B” Charging Pump Cubicle Sample Data

6.3. Attachment 2 - CY Test 2 “B” Charging Pump Cubicle Survey and Sample

6.4. Attachment 3.A - CY Test 3 “B” Charging Pump Cubicle Survey

6.5. Attachment 3.B - CY Test 3 “B” Charging Pump Cubicle Sample Data

6.6. Attachment 4.A - CY Tests 4a and 4b “B” Charging Pump Cubicle Survey

6.7. Attachment 4.B - CY Tests 4a and 4b “B” Charging Pump Cubicle Sample Data

6.8. Attachment 5.A - CY Tests 5 Metering Pump Cubicle Survey and Sample Data

6.9. Attachment 5.B - CY Tests 5 Metering Pump Cubicle Survey and Sample Data

6.10. Attachment 6.A - CY Tests 6 Metering Pump Cubicle Survey

6.11. Attachment 6.B - CY Tests 6 Metering Pump Cubicle Sample Data

6.12. Attachment 7 - MicroShield Model Embedded Cs-137 for Half Inch Thick Concrete Source

Attachment 1.A

CY Test 1 "B" Charging Pump Cubicle Survey

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Page 1 of 2

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
MR Gibson	MR Gibson	B-Charging Pump Area

Date: 3-3-04 | Time: 1600 | Log #: 04-1633
Area #: 2210 | Map #: NA | Rev. #: NA

INSTRUMENTS USED

MODEL/SERIAL#	CAL DUE	PROBE/SERIAL#	CAL DUE
E140/992	5-20-04	360	
R020/1022	4-28-04	NA	
XLB-2/400454	2-21-04		

REASON FOR SURVEY

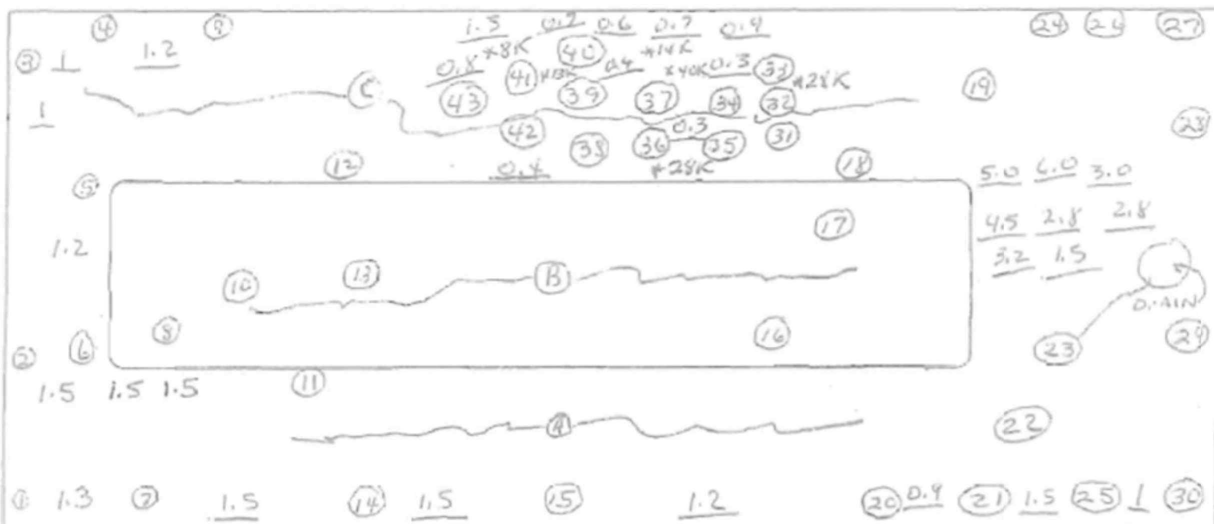
☐ ROUTINE ☐ RWP ☑ OTHER: Predecommission Post Survey

AirSample Control #: NA | Total DAC Fraction: NA

Dose in mR/hr
Frisker Contact Exposure Rate in CPM

(3)(1) Waist Level Background cpm 600 - 800 (m 90, 3-3-04)
Background mR/hr 0.3 - 0.5

All Dose + smears taken on floor



Large Area Smears Contamination Results = NDA
Listed Positive results are recount numbers.

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

βγ MDA = 49.47 | α MDA = N/A

SAMPLE #	Beta-Gamma	Alpha	SAMPLE #	Beta-Gamma	Alpha
2	62.17	<MDA	7	<MDA	<MDA
4	122.84		8		
23	62.17		9		
34	79.50		10		
37	105.51		11		
39	62.17		12		
40	62.17		13		
3	<MDA	<MDA	14		
5			15		
6			16		

Smear Continuation Sheet Used. ☑ YES ☐ NO

NDA = No Detectable Activity. **Legend:**

Dose rates are gamma and are in mrem/hr unless otherwise noted
All smears in Dpm/100cm² unless other wise noted
All LAS's in ccpm/LAS unless other wise noted

- Large Area Swipe Location
- AirSample Location
- Smear Location
- Contact Exposure Rate
- General Area Exposure Rate
- Indicates Boundary
- Step Off Pad
- Respiratory Protection Required

ARA - Airborne Radioactivity Area
RA - Radiation Area
CA - Contaminated Area
HRA - High Radiation Area
LHRA - Locked High Radiation Area
RM - Radioactive Material(s)
HCA - High Contamination Area
HPA - Hot Particle Area
RCA - Radiologically Controlled Area

Postings ☐ Other ______
☒ RCA ☒ RM ☐ CA ☒ RA ☐ LHRA
☐ Outside The RCA ☐ HCA ☐ HRA ☐ Spec 2
☐ Contact HP Prior to Entering
☐ Airborne Radioactivity Area
☐ Respiratory Protection Required

HP MANAGER OR DESIGNEE REVIEW: [signature] DATE: 3-8-04

COPY

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
Matt Gibson	MK Gibson	B-Charging Pump Area

Survey Date: 3-3-04 Survey Time: 04:16 33

Area #: 2210 Map.#: N.A Rev.#: N.A

Page 2 of 2

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
17	<MDA	<MDA	1	<MDA	<MDA						
18			42								
19			43								
20			41								
21											
22											
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
35											
36											
38											

N/A

COPY

INSTRUMENTS USED

MODEL#	SERIAL#	PROBE TYPE	CAL DUE
E140	992	360	5-16-04
RC20	1022		4-28-04
XLB-2	400452		2-21-04

CONTAMINATION RESULTS (LAS)

RESULTS	RESULTS

Note: All header information (ie. Name, Signature, Survey Area# etc.) Should match that of the original survey for which this Smear Continuation Sheet is being used.

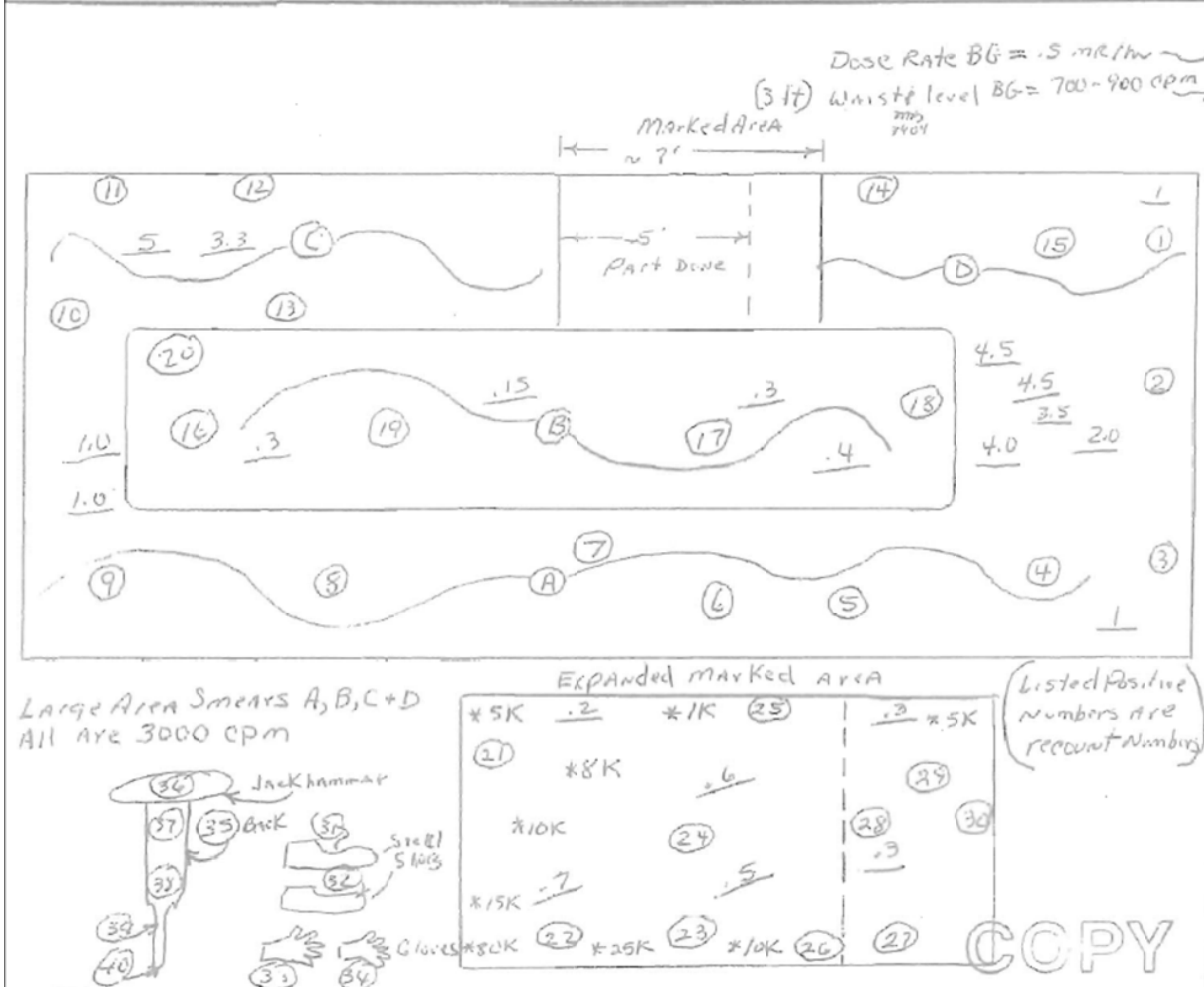
CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Page 1 of 2

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
M R Gibson	M R Gibson	B-Charging Pump Area

Date: 3-4-04 | Time: 1200 | Log #: 04-1658

Area #: 2210 | Map #: NA | Rev. #: NA



INSTRUMENTS USED

MODEL/SERIAL#	CAL DUE	PROBE/SERIAL#	CAL DUE
Bicron \ C2370	8/18/04	N/A	
E520 \ 4025	6/24/04		
XLB-2 \ 40045-2	2/21/04		
~~H-B-4 \ 400451~~	~~10-8-04~~	3-5-04	

REASON FOR SURVEY

☐ ROUTINE ☐ RWP ☑ OTHER — Post Demonstration Test

AirSample Control #: 0304-13 | Total DAC Fraction: 0.04

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

βγ MDA = 49.47 | α MDA = 16.17

SAMPLE #	Beta-Gamma	Alpha	SAMPLE #	Beta-Gamma	Alpha
10	62.17	<MDA	7	<MDA	<MDA
11	235.33		8		
21	53.50		9		
29	131.51		12		
1	<MDA		13		
2			14		
3			15		
4			16		
5			17		
6	↓	↓	18	↓	↓

Smear Continuation Sheet Used. ☑ YES ☐ NO

NDA = No Detectable Activity

Legend:

Dose rates are gamma and are in mrem/hr unless otherwise noted.
All smears in Dpm/100cm² unless other wise noted.
All LAS's in ccpm/LAS unless other wise noted.

- Large Area Swipe Location
- AirSample Location
- Smear Location
- Contact Exposure Rate
- General Area Exposure Rate
- X-X-X Indicates Boundary
- SOP Step Off Pad
- RPR Respiratory Protection Required

ARA - Airborne Radioactivity Area
RA - Radiation Area
CA - Contaminated Area
HRA - High Radiation Area
LHRA - Locked High Radiation Area
RM - Radioactive Material(s)
HCA - High Contamination Area
HPA - Hot Particle Area
RCA - Radiologically Controlled Area

Postings ☐ Other ______
☒ RCA ☒ RM ☒ CA ☒ RA ☐ LHRA
☐ Outside The RCA ☐ HCA ☐ HRA ☐ Spec 2

☐ Contact HP Prior to Entering
☐ Airborne Radioactivity Area
☐ Respirator Protection Required

HP MANAGER OR DESIGNEE REVIEW: [signature] DATE: 3-8-04

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
MATT Gibson	MR Gibson	B-Charging Area

Survey Date: 3-4-04 | Survey Time:
Area #: 2210 | Map #: NA | Rev.# NA
Page 2 of

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
19	<MDA	<MDA												
20														
22														
23														
24														
25														
26														
27														
28														
31														
32								N						
33								A						
34														
35														
36														
37														
38														
39														
40	↓		↓											
30	↓		↓											

COPY

INSTRUMENTS USED

MODEL#	SERIAL#	PROBE TYPE	CAL DUE
Bicron	C2270		8/11/04
E520	4025		6/24/04
XLB-2	40045-2		2/4/04
XLB-1	40045-1		10/8/04
	N		
	A		

CONTAMINATION RESULTS (LAS)

RESULTS		RESULTS	
		N	
		A	

Note: All header information (ie. Name, Signature, Survey Area# etc.) Should match that of the original survey for which this Smear Continuation Sheet is being used.

Health Physics Procedure

COPY

CY-HP-0175 Revision 0
Page 24 of 104

Control Number: 030413

Attachment A
Air Sample Counting Sheet
Section 1 - Collection Data

Sample Taken By: Gibson

Sample Date:	Sample Location and Work Activities Performed:				
4-Mar-04	PAB-Charging Pump Cubicle 'A': Concrete Tetn				
RWP / Job Step: 4149-1	Routine: D W M	Sampler Serial Number: 90	Sampler Type: ras	Sampler Cal Due Date: 6/15/2004	
Sample Time & Date		Collection Time (min)	Flow Rate	Sample Volume	
On: 03/04/04 10:55	Off: 03/04/04 13:30	155	1 cfm	155 Cu. Ft.	

Gross Beta-Gamma activity of ≤ 6.0 E-11 = ≤ 0.3 Total Particulate DAC

Co-60 activity of ≤ 6.0 E-11 = ≤ 0.3 Total DAC

Conversion Factors: Liters -- 4.5E-10 liters uCi / ml dpm

Cubic Feet -- 1.6E-11 cubic feet uCi / ml dpm

Section 2 -- Gross Beta-Gamma

Gross β/γ concentration of > 6.0 E-11 uCi/cc requires MGCA Count, if available

1st Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross β/γ Concentration (uCi/cc)
3/4/04 16:45	XLB-1	40045-1	10/08/04	Brigham	8.66E-12

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume
18	0.5	36.00	2.44	12.72	33.56	2.5	1.6E-11	155 Cu. Ft.

MDA = 3.28E-12

Section 3 -- Gross Alpha

MGCA results of > 6.0E-11 uCi/cc Co-60 requires alpha count

1st Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross α Concentration (uCi/cc)
N/A	N/A	N/A	N/A	N/A	N/A

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume	SAF
N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.6E-11	155 Cu. Ft.	1.3

MDA =

Initial Gross alpha concentration of ≥ 1.0 E-12 requires a decayed recount

2nd Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross α Concentration (uCi/cc)
N/A	N/A	N/A	N/A	N/A	N/A

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume	SAF
N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.6E-11	155 Cu. Ft.	1.3

MDA =

Section 4 -- Scaled DAC Fractions

(Only for air samples taken in area less than 200 dpm/100 cm² alpha)

Type	uCi/cc	DAC Fraction	Scaling Conversion	Scaled α/β/γ DAC Fraction
Co-60 or Gross β/γ (DAC=1.0E-8)	8.66E-12	8.66E-04	50 X Co-60 OR Gross β/γ DAC Fraction	0.043

Section 5 -- Measured DAC Fractions

Type	Initial uCi/cc	Initial DAC Fraction	Final uCi/cc	Final DAC Fraction
MGCA or Gross β/γ (DAC=1.0E-8)	N/A	N/A	N/A	N/A
Gross Alpha (DAC=3.0E-12)x1.1	N/A	N/A	N/A	N/A
Total Measured DAC Fraction =		N/A		N/A

Reviewed By: _____ Date: _____

Software Control #0087-02

Connecticut Yankee Atomic Power Co.

Radiochemistry Count Room

Connecticut Yankee Decommissioning Project

Gamma Spectroscopy Sample Analysis Request Form

Sample Taken By: MR Gibson Date / Time: 1445

Copy of Results To: None Dept: _____ Ext: _____

Sample Description: Fines & Chips from Concrete Jackhammer Test

Location: Charging Pump B Room

Reason for Analysis: Unknown content

If from Personnel: Name: _____ EID 85942 RWP: 4149

Contamination Levels:

< MDA β γ CCPM / DPM < MDA α CCPM / DPM 60uR mR/hr

Sample Weight / Volume: _____ (cc, ml, grams, etc.)

Sample Container: 1 Liter

Is this sample for free release? YES or (NO) (circle one)

Is this sample being shipped offsite? YES or (NO) (circle one)

Save / Return sample after analysis? YES or NO (circle one)

Other info: _____

If this sample requires special storage requirements, please describe:

_____

Responsible Individual for Disposal of Sample

Name: _____ Dept: IP / P Ext: _____

Sample delivered to Count Room: Date / Time: _____

COPY

COUNT ROOM USE ONLY

Qualitative or Quantitative Analysis? Explain below.

Supervisor Request

Sample ID Number: 040304025

Analysis Completed By: [signature] Date: 3/4/04

Sample Storage Location: _____

Radiochemistry Supervisor Review: [signature] Date: 3-5-04

Qualitative Analysis Only

Contains Licensed Material

: QA_CHECK (V9.1) PAGE 1 OF
E : 4-MAR-2004 17:54
R : CAS

CYAPCO
HADDAM NECK STATION

POST NID QA ANALYSIS

TITLE : - CONCRETE SAMPLE: PAB-CHARGING PUMP CUBICLE B

SAMPLE No. : 040304025 OPERATOR NAME : CAS
SAMPLE TYPE : DIRT/SED/VEG SAMPLE GEOMETRY : 1LMARPAPER
COUNT TIME : 4-MAR-2004 17:14:03. SAMPLE QUANTITY : 5.14000E+02
SAMPLE TIME : 4-MAR-2004 14:45:00. DETECTOR : DET 2
LIBRARY : CHEM_DIRT

ISOTOPE	PEAK ENERGY	ENERGY DIFF (KEV)	DECAY CORR uCi/GM	COMMENTS
K-40	1460.80	0.30	8.791E-06	QA Results OK
CO-60	1332.49	0.12	2.766E-05	QA Results OK
CS-134	604.70	-0.01	1.011E-05	QA Results OK
CS-137	661.65	-0.01	1.044E-03	QA Results OK
AVG ENERGY DIFF =		0.10	1.091E-03	= TOTAL GAMMA ACTIVITY

Qualitative Analysis Only

Contains Licensed Material

UNIDENTIFIED/REJECTED PEAKS

ENERGY	NET AREA	FWHM	GAMMA/SEC	GAMMA/SEC /GM	% ERROR	FLAG	POTENTIAL ID	ACTIVITY
1168.21	136.	2.12	7.552E+00	1.469E-02	21.3	P	CS-134	2.206E-05
1365.16	142.	2.01	9.081E+00	1.767E-02	16.1	P	CS-134	1.571E-05
1400.58	155.	1.55	1.012E+01	1.968E-02	12.6	U	~~BI-214~~	3.821E-05
						U	CSSUM	0.000E+00

Total Unidentified/Rejected Peaks = 3
% Unidentified/Rejected Peaks = 25.00

Flags: U - Unknown Line
R - Rejected During Analysis
P - Positively Identified (line not in analysis library)

Performed by: [signature]

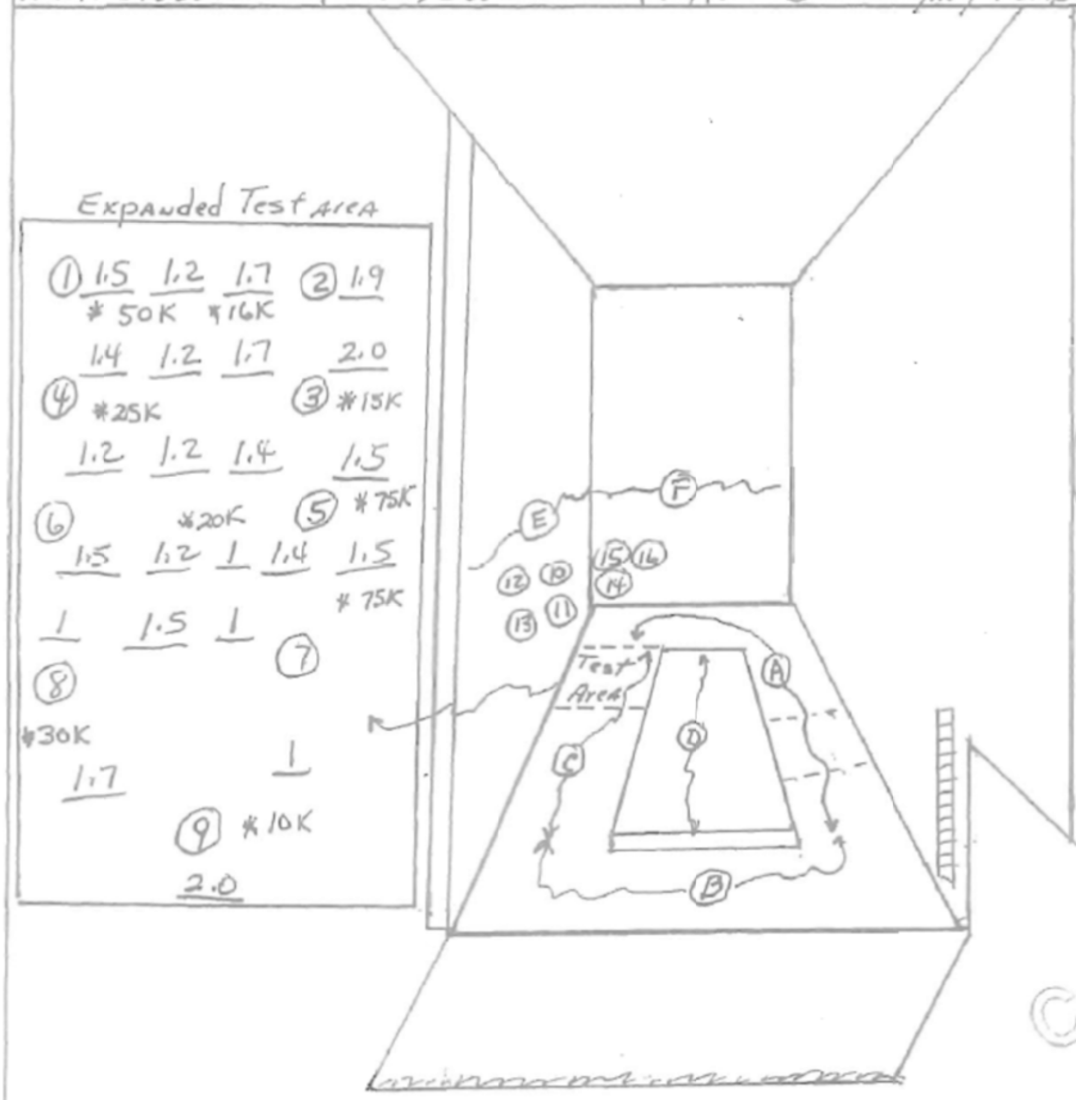
Reviewed by: [signature]

**** End Of Report (1 Page) ****

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
Matt Gibson	M R Gibson	PAB "B" Charging Pump Bay

Date: 3/8/04	Time: 1100	Log #: 04-1708
Area #: 2210	Map #: N/A	Rev. # N/A



3 ft @ 2000–3000 cpm Background
Background Smear
LAS Result
A = 500 cpm
B = 500 cpm
C = 200 cpm
D = 200 cpm
E = 300 cpm
F = 300 cpm
(LAS Counted with 200-300 Cpm Background)

INSTRUMENTS USED

MODEL/SERIAL#	CAL DUE	PROBE/SERIAL#	CAL DUE
E520 / 4903	6-26-04	360	
R020 / 2494	3-16-04	N/A	
XLB / 40045-1	10-8-04		
N/A			

REASON FOR SURVEY

☐ ROUTINE — Pre Chipping Survey
☐ RWP — N/A
☑ OTHER — N/A

AirSample Control #: N/A | Total DAC Fraction: N/A

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

βγ MDA= 46.01 | α MDA= 15.4P

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
1	< mDA	< mDA	N/A		
↓	↓	↓			
16					

Smear Continuation Sheet Used ☐ YES ☑ NO

NDA= No Detectable Activity

Legend:

Dose rates are gamma and are in mrem/hr unless otherwise noted
All smears in Dpm/100cm² unless other wise noted
All LAS's in ccpm/LAS unless other wise noted

- Large Area Swipe Location
- AirSample Location
- Smear Location
- Contact Exposure Rate
- General Area Exposure Rate
- Indicates Boundary
- Step Off Pad
- Respiratory Protection Required

ARA - Airborne Radioactivity Area
RA - Radiation Area
CA - Contaminated Area
HRA - High Radiation Area
LHRA - Locked High Radiation Area
RM - Radioactive Material(s)
HCA - High Contamination Area
HPA - Hot Particle Area
RCA - Radiologically Controlled Area

Postings ☐ Other ____
☑ RCA ☑ RM ☐ CA ☑ RA ☐ LHRA
☐ Outside The RCA ☐ HCA ☐ HRA ☐ Spec 2
☐ Contact HP Prior to Entering
☐ Airborne Radioactivity Area
☐ Respirator Protection Required

HP MANAGER OR DESIGNEE REVIEW: M. Durgin DATE: 3-11-04

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Page 1 of 2

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
Matt Gibson	M.R. Gibson	PAB "B" Charging Pump Bay

Date: 3-9-04 | Time: 0900 | Log #: 04-1707
Area #: 2210 | Map #: NA | Rev. #: NA

INSTRUMENTS USED

MODEL/SERIAL#	CAL DUE	PROBE/SERIAL#	CAL DUE
RO20/1184	3/23/04	360	
E520/4039	6/24/04	NA	
XLB-2/40095-2	2/21/05	NA	

REASON FOR SURVEY

- [ ] ROUTINE — Post Concrete Chipping
- [ ] RWP — Test
- [x] OTHER — NA

AirSample Control #: 030501 | Total DAC Fraction: 0.12

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

βγ MDA = 49.47 | α MDA = 16.17

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
1	<MDA	<MDA	11	<MDA	<MDA
2	200.86		12	<MDA	
3	192.19		13	<MDA	
4	235.53		14	<MDA	
5	261.53		15	88.17	
6	88.17		16	96.84	
7	<MDA		17	131.51	
8	105.51		18	62.17	
9	183.52		19	<MDA	
10	96.84		20	<MDA	

Smear Continuation Sheet Used. [x] YES [ ] NO

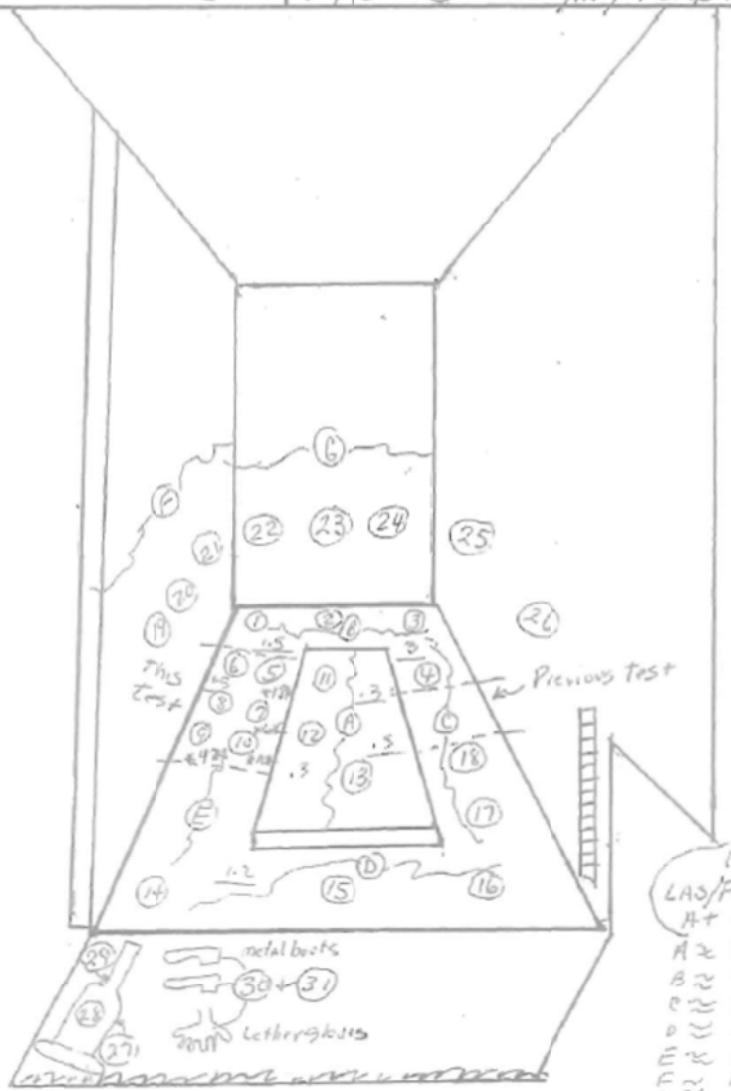
NDA = No Detectable Activity

Legend:

Dose rates are gamma and are in mrem/hr unless otherwise noted
All smears in Dpm/100cm² unless other wise noted
All LAS's in ccpm/LAS unless other wise noted.

- Large Area Swipe Location
- AirSample Location
- Smear Location
- Contact Exposure Rate
- General Area Exposure Rate
- Indicates Boundary
- SOP - Step Off Pad
- RPR - Respiratory Protection Required
- ARA - Airborne Radioactivity Area
- RA - Radiation Area
- CA - Contaminated Area
- HRA - High Radiation Area
- LHRA - Locked High Radiation Area
- RM - Radioactive Material(s)
- HCA - High Contamination Area
- HPA - Hot Particle Area
- RCA - Radiologically Controlled Area

HP MANAGER OR DESIGNEE REVIEW: DATE: 3-11-04



Postings [ ] Other
[x] RCA [x] RM [ ] CA [x] RA [ ] LHRA
[ ] Outside The RCA [ ] HCA [ ] HRA [ ] Spec 2

[ ] Contact HP Prior to Entering
[ ] Airborne Radioactivity Area
[ ] Respirator Protection Required

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Surveyor Name: (Printed): Gibson
Surveyor Name: (Signature): MR Gibson
Location: PAB "B" Charging Pump Bay
Survey Date: 3-9-04 Survey Time: 0900
Area #: 2210 Map #: NA Rev.#: NA
Page 2 of 2

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
21	<MDA	<MDA												
22														
23														
24														
25														
26														
27														
28														
29														
30														
31	↓	↓												

N/A

INSTRUMENTS USED

MODEL#	SERIAL#	PROBE TYPE	CAL DUE
RO 20	1184	360	3/23/04
E 520	4039		4/24/04
XLB-2	40045-2		2-21-05

N/A

CONTAMINATION RESULTS (LAS)

RESULTS	RESULTS

N/A

Note: All header information (ie. Name, Signature, Survey Area# etc.) Should match that of the original survey for which this Smear Continuation Sheet is being used. MM

Connecticut Yankee Atomic Power Co.

Radiochemistry Count Room

Connecticut Yankee Decommissioning Project

Gamma Spectroscopy Sample Analysis Request Form

Sample Taken By: MR Gibson Date / Time: 3/9/04 1045

Copy of Results To: DeGasperi Dept:_____ Ext:_____

Sample Description: Large Area Swipe, post concrete Chipping Tas

Location: Pumping Station 2 pit

Reason for Analysis: Information

If from Personnel: Name:_____ EID_____ RWP:_____

Contamination Levels:

400-800 β γ CCPM / DPM _____ α CCPM / DPM 3/9/04 mR/hr

Sample Weight / Volume:_____ (cc, ml, grams, etc.)

Sample Container:_____

Is this sample for free release? YES or NO (circle one)

Is this sample being shipped offsite? YES or NO (circle one)

Save / Return sample after analysis? YES or NO (circle one)

Other info:_____

If this sample requires special storage requirements, please describe:

_____

Responsible Individual for Disposal of Sample

Name:_____ Dept:_____ Ext:_____

Sample delivered to Count Room: Date / Time:_____

COUNT ROOM USE ONLY

Qualitative or Quantitative Analysis? Explain below.

1000 sec. Count on Chem-Shear library

using 47 mil filter Geometry

Sample ID Number: 040309021

Analysis Completed By: BGill Date: 03-09-04

Sample Storage Location: Count Room Trash

Radiochemistry Supervisor Review: [signature] Date: 3/10/04

Qualitative Analysis Only

Contains Licensed Material

9-MAR-2004 15:18:14.40

CONNECTICUT YANKEE
HADDAM NECK STATION

SAMPLE TITLE : - L.A.S: PAB-PUMPING STATION #2 CONCRETE CHIPS
REASON FOR ANALYSIS: Supervisor request

RWP NUMBER	: N/A	* SURVEY ID	: N/A
SAMPLE ID	: 040309021	* SAMPLE GEOMETRY	: 47/MLFILTER
SAMPLE TIME	: 9-MAR-2004 10:45:	* GEO EFFICIENCY DATE	: 24-JUN-2003
SAMPLE TYPE	: SMEAR	* SAMPLE QUANTITY	: 1.00000E+00 SMR.
DETECTOR	: DET 5	* LIBRARY	: CHEM_SMEAR
LAST ENERGY CAL	: 9-MAR-2004 01:49:	* ENERGY TOLERANCE	: 0.70000
KEV/CHANNEL	: 5.00670E-01	* HALF LIFE RATIO	: 9.00000
START CHANNEL	: 100	* END CHANNEL	: 4096
ACQ DATE & TIME	: 9-MAR-2004 15:01:	* DEADTIME (%)	: 0.0%
PRESET LIVE TIME	: 0 00:16:40	* SENSITIVITY	: 5.00000
ELAPSED REAL TIME	: 1000.4 Secs	* GAUSSIAN SEN	: 10.00000
ELAPSED LIVE TIME	: 1000.0 Secs	* CORRECTION FACTOR	: 2.22000E+06

DECAYED TO 0 DAYS HOURS
FILE IDENT : CAS$DISK:[NEU.SAMPLE.RP.NEW]040309021_ADC5_SMEAR.CNF;1

ANALYSES : PEAK V16.8 NID V3.2 MINACT V2.8 WTMEAN V1.8

Collected by : GIBSON
REVIEWED BY : _____
COMMENTS :

Contains Licensed Material

Qualitative Analysis Only

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	605.23	24	30	0.61	1209.42	1204	14	51.3		CS-134
0	661.53*	2532	10	1.48	1321.96	1315	14	2.0		CS-137
0	795.73	27	0	1.81	1590.22	1585	10	19.2		CS-134
0	1173.26*	81	4	1.85	2345.16	2337	14	12.7		CO-60
0	1332.13*	56	0	2.09	2662.95	2657	11	14.1		CO-60

Summary of Nuclide Activity Page : 2
Sample ID : 040309021 Acquisition date : 9-MAR-2004 15:01:16

Total number of lines in spectrum 5
Number of unidentified lines 0
Number of lines tentatively identified by NID 5 100.00%

Nuclide Type : AP

Nuclide	Hlife	Decay	Wtd Mean Uncorrected dpm/SMR.	Wtd Mean Decay Corr dpm/SMR.	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
CO-60	5.27Y	1.00	2.152E+02	2.152E+02	0.209E+02	9.71	
CS-134	2.06Y	1.00	5.888E+01	5.889E+01	1.098E+01	18.64	
Total Activity :			2.741E+02	2.741E+02			

Nuclide Type : FP

Nuclide	Hlife	Decay	Wtd Mean Uncorrected dpm/SMR.	Wtd Mean Decay Corr dpm/SMR.	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
CS-137	30.17Y	1.00	5.236E+03	5.236E+03	0.226E+03	4.32	
Total Activity :			5.236E+03	5.236E+03			
Grand Total Activity :			5.510E+03	5.510E+03			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

REPORT NAME : QA_CHECK (V9.1) PAGE 1 OF ___
REPORT DATE : 9-MAR-2004 15:18
REQUESTOR : CAS

CYAPCO
HADDAM NECK STATION

POST NID QA ANALYSIS

TITLE : - L.A.S: PAB-PUMPING STATION #2 CONCRETE CHIPS

SAMPLE No. : 040309021 OPERATOR NAME : CAS
SAMPLE TYPE : SMEAR SAMPLE GEOMETRY : 47MLFILTER
COUNT TIME : 9-MAR-2004 15:01:16. SAMPLE QUANTITY : 1.00000E+00
SAMPLE TIME : 9-MAR-2004 10:45:00. DETECTOR : DET 5
LIBRARY : CHEM_SMEAR

ISOTOPE	PEAK ENERGY	ENERGY DIFF (KEV)	DECAY CORR dpm/SMR.	COMMENTS
CO-60	1332.49	-0.35	2.152E+02	QA Results OK
CS-134	604.70	0.53	5.889E+01	* Peak FWHM = 0.61
				* Count Rate Error = 51.29
CS-137	661.65	-0.12	5.236E+03	QA Results OK
AVG ENERGY DIFF =		0.02	5.510E+03	= TOTAL GAMMA ACTIVITY

Qualitative Analysis Only

Contains Licensed Material

UNIDENTIFIED/REJECTED PEAKS

ENERGY	NET AREA	PWHM	GAMMA/SEC	GAMMA/SEC /SMR.	% ERROR	FLAG	POTENTIAL ID	ACTIVITY

No Unidentified/Rejected Peaks

Performed by: _____

Reviewed by: _____

**** End Of Report (1 Page) ****

Control Number: 030808	Attachment A Air Sample Counting Sheet Section 1 - Collection Data	Sample Taken By: Gibson

Sample Date: 8-Mar-04	Sample Location and Work Activities Performed: charging pit concrete chipping			
RWP / Job Step: 4149-1	Routine: D W M	Sampler Serial Number: 90	Sampler Type: ras	Sampler Cal Due Date: 8/15/2004

Sample Time & Date		Collection Time (min)	Flow Rate	Sample Volume
On: 03/08/04 13:45	Off: 03/08/04 15:15	90	1 cfm	90 Cu. Ft.

Gross Beta-Gamma activity of ≤ 6.0 E-11 = ≤ 0.3 Total Particulate DAC Co-60 activity of ≤ 6.0 E-11 = ≤ 0.3 Total DAC

Conversion Factors: Liters -- 4.5E-10 liters uCi / ml dpm Cubic Feet -- 1.6E-11 cubic feet uCi / ml dpm

Section 2 -- Gross Beta-Gamma

Gross β/γ concentration of > 6.0 E -11 uCi/cc requires MGCA Count, If available

1st Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross β/γ Concentration (uCi/cc)
3/8/04 18:42	XLB-1	40045-1	10/08/04	Conrad	2.47E-11

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume
29	0.5	58.00	2.44	12.72	55.56	2.5	1.6E-11	90 Cu. Ft.

MDA = 5.65E-12

Section 3 -- Gross Alpha

MGCA results of > 6.0E-11 uCi/cc Co-60 requires alpha count

1st Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross α Concentration (uCi/cc)
N/A	N/A	N/A	N/A	N/A	N/A

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume	SAF
N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.6E-11	90 Cu. Ft.	1.3

MDA =

Initial Gross alpha concentration of ≥ 1.0 E-11 requires a decayed recount

2nd Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross α Concentration (uCi/cc)
N/A	N/A	N/A	N/A	N/A	N/A

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume	SAF
N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.6E-11	90 Cu. Ft.	1.3

MDA =

Section 4 -- Scaled DAC Fractions

(Only for air samples taken in area less than 200 dpm/100 cm² alpha)

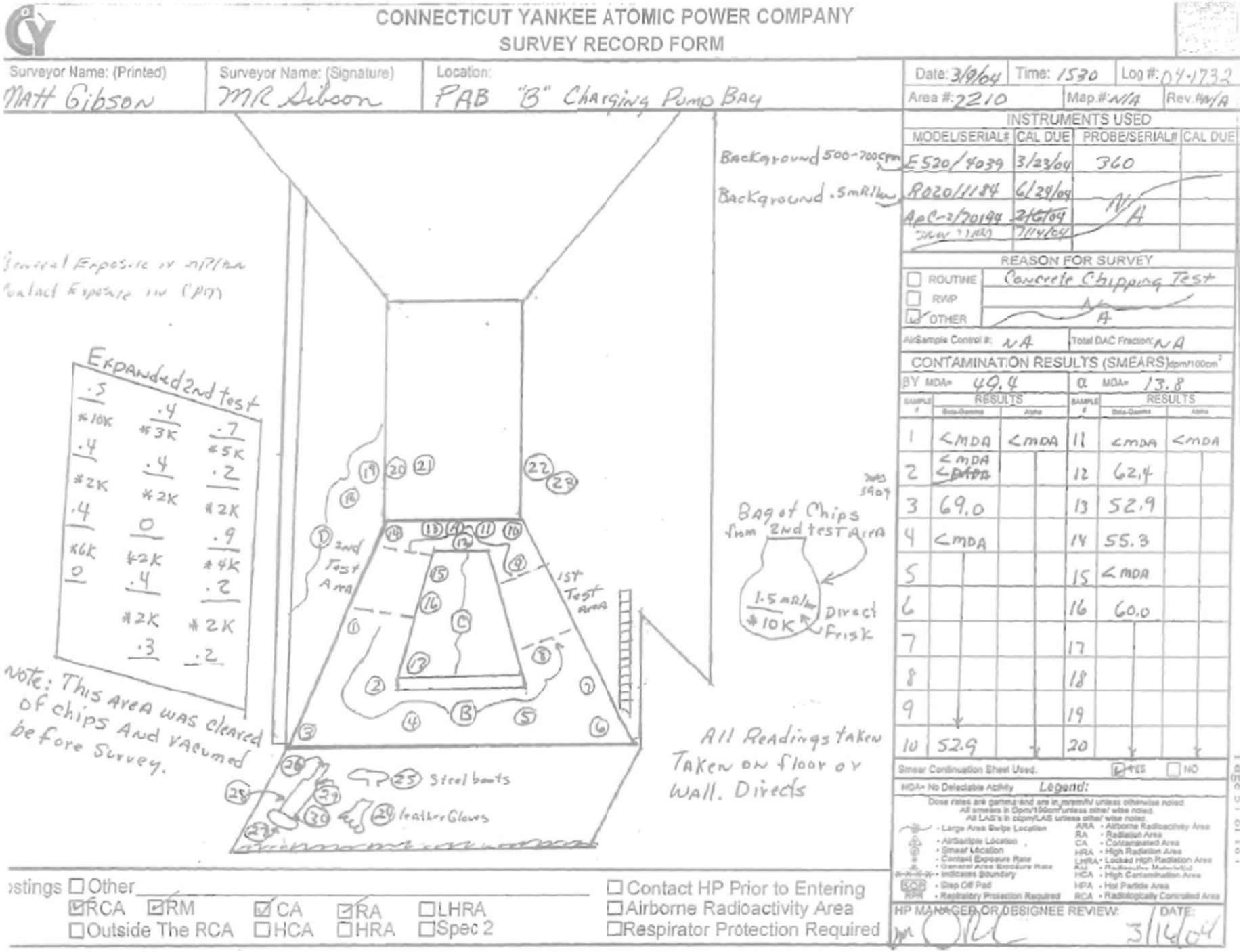
Type	uCi/cc	DAC Fraction	Scaling Conversion	Scaled α/β/γ DAC Fraction
Co-60 or Gross β/γ (DAC=1.0E-8)	2.47E-11	2.47E-03	50 X Co-60 OR Gross β/γ DAC Fraction	0.124

Section 5 -- Measured DAC Fractions

Type	Initial uCi/cc	Initial DAC Fraction	Final uCi/cc	Final DAC Fraction
MGCA or Gross β/γ (DAC=1.0E-8)	N/A	N/A	N/A	N/A
Gross Alpha (DAC=3.0E-12)x1.1	N/A	N/A	N/A	N/A
Total Measured DAC Fraction =		N/A		N/A

Reviewed By: [signature] Date: 3-25-04

Software Control #0007-02



CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Surveyor Name: (Printed): Matt Gibson
Surveyor Name: (Signature): MR Gibson
Location: PAB "B" Charging Pump Bay
Date: 3/9/04 Time: 1530 Log #: 04-1732
Area #: 2210 Map #: N/A Rev. #: N/A

INSTRUMENTS USED

MODEL/SERIAL#	CAL DUE	PROBE/SERIAL#	CAL DUE
E520/4039	3/23/04	360	
R020/1184	6/29/04	N/A	
AeC-3/20194	2/6/04		
[illegible]	7/14/04		

REASON FOR SURVEY
☐ ROUTINE
☐ RWP
☑ OTHER — Concrete Chipping Test

AirSample Control #: NA
Total DAC Fraction: NA

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

βγ MDA = 49.4 α MDA = 13.8

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
1	<MDA	<MDA	11	<MDA	<MDA
2	<MDA		12	62.4	
3	69.0		13	52.9	
4	<MDA		14	55.3	
5			15	<MDA	
6			16	60.0	
7			17		
8			18		
9			19		
10	52.9		20		

Smear Continuation Sheet Used. ☑ YES ☐ NO

NDA = No Detectable Activity

Legend:
Dose rates are gamma and are in mrem/hr unless otherwise noted
All smears in Dpm/100cm² unless other wise noted.
All LAS's in cdpm/LAS unless other wise noted.
- Large Area Swipe Location
- AirSample Location
- Smear Location
- Contact Exposure Rate
- General Area Exposure Rate
- Indicates Boundary
- Step Off Pad
- Respiratory Protection Required

ARA - Airborne Radioactivity Area
RA - Radiation Area
CA - Contaminated Area
HRA - High Radiation Area
LHRA - Locked High Radiation Area
HCA - High Contamination Area
HPA - Hot Particle Area
RCA - Radiologically Controlled Area

HP MANAGER OR DESIGNEE REVIEW: [signature] DATE: 3/14/04

☐ Postings ☐ Other
☑ RCA ☑ RM ☑ CA ☑ RA ☐ LHRA
☐ Outside The RCA ☐ HCA ☐ HRA ☐ Spec 2

☐ Contact HP Prior to Entering
☐ Airborne Radioactivity Area
☐ Respirator Protection Required

General Exposure in mR/hr
Contact Exposure in CPM

Background 500-700cpm
Background .5mR/hr

Expanded 2nd test

.5 *10K	.4 *3K	.7 *5K
.4 *2K	.4 *2K	.2 *2K
.4 *6K	0 *2K	.9 *4K
0	.4 *2K	.2 *2K
	.3	.2

Note: This area was cleared of chips and vacuumed before survey.

2nd Test Area

1st Test Area

Bag of Chips from 2nd test area
1.5 mR/hr *10K Direct Frisk

All Readings taken taken on floor or wall. Directs

Steel boots
Leather Gloves

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:	Survey Date:	Survey Time:
Matt Gibson	MR Gibson	PAB "B" Charging Area	3/9/04	1530

Area #: 2210 Map.#: NA Rev.#: NA

Page 2 of 2

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
21	< MDA	< MDA
22	↓	↓
23	↓	↓
24	↓	↓
25	↓	↓
26	↓	↓
27	↓	↓
28	↓	↓
29	↓	↓
30	↓	↓

N/A

INSTRUMENTS USED

MODEL#	SERIAL#	PROBE TYPE	CAL DUE
E570	4039	360	3-23-04
R020	1184	N/A	6-24-04
APC-2	70194	3/4/04	~~7-14-04~~ 7-6-04

N/A

CONTAMINATION RESULTS (LAS)

	RESULTS		RESULTS
A	225 ccpm		
B	155 ccpm		
C	225 ccpm		
D	175 ccpm		

N/A

Note: All header information (ie. Name, Signature, Survey Area# etc.) Should match that of the original survey for which this Smear Continuation Sheet is being used.

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
MAH Gibson	MR Gibson	PAB "B" Charging Pump BAY

Date: 3-10-04 | Time: 1000 | Log #: 04-175
Area #: 2210 | Map #: NA | Rev. #: N

INSTRUMENTS USED

MODEL/SERIAL#	CAL DUE	PROBE/SERIAL#	CAL DUE
RO-20/1257	5-3-04	NA	
E520 14803	6-26-04	360	
	NA		
	4		

REASON FOR SURVEY

- ☐ ROUTINE
- ☐ RWP
- ☑ OTHER — Pre Test + 3 Additional Dose & Contact readings

Air Sample Control #: | Total DAC Fraction:

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

βγ MDA= NA | α MDA= NA

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha

Smear Continuation Sheet Used: ☐ YES ☑ NO

MDA= No Detectable Activity

Legend:

Dose rates are gamma and are in mrem/hr unless otherwise noted.
All smears in Dpm/100cm² unless other wise noted.
All LAS's in 4dpm/LAE unless other wise noted.

- Large Area Swipe Location
- AirSample Location
- Smear Location
- Contact Exposure Rate
- General Area Exposure Rate
- Indicates Boundary
- SOP — Step Off Pad
- RPR — Repiratory Protection Required
- ARA — Airborne Radioactivity Area
- RA — Radiation Area
- CA — Contaminated Area
- HRA — High Radiation Area
- LHRA — Locked High Radiation Area
- VHRA — Very High Radiation Area
- HCA — High Contamination Area
- HPA — Hot Particle Area
- RCA — Radiologically Controlled Area

HP MANAGER OR DESIGNEE REVIEW: DATE: 3/17/04

Background 0.3 - 0.5 mR/hr
Background 700 - 900 cpm

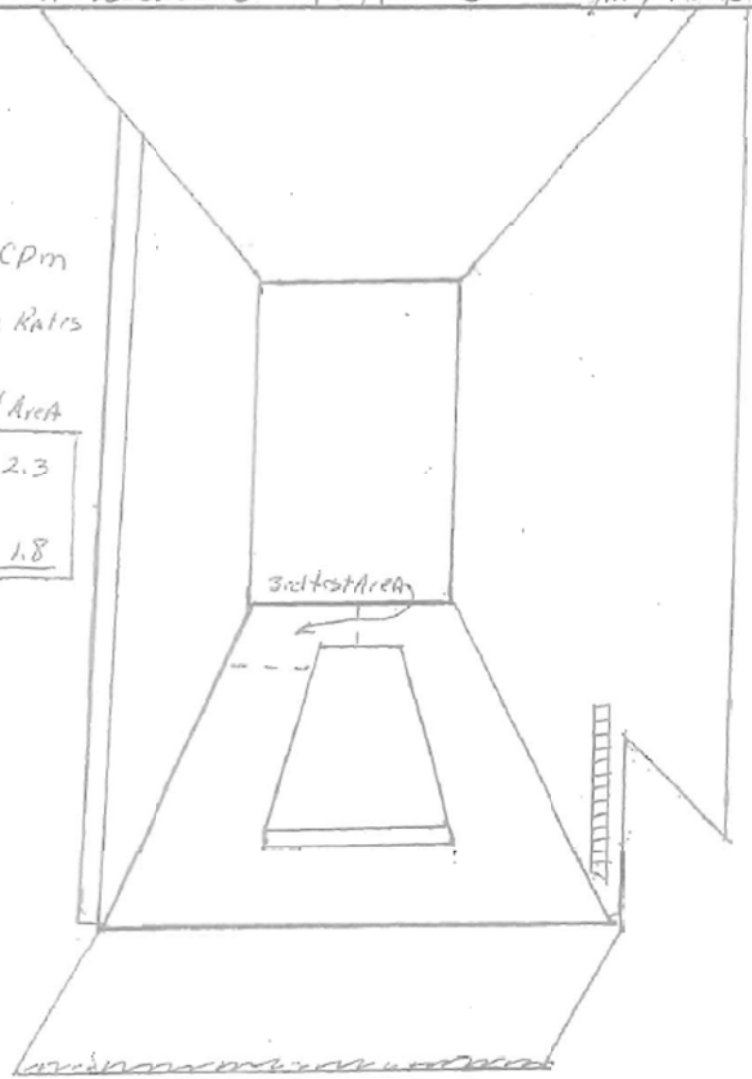
Contact Exposure in CPM

General Area Exposure Rates in mR/hr

Expanded 3rd test Area

1.2	1.2	2.3
*10K	*14K	
2.5	2.6	1.8
*15K	*20K	
1.4	1.3	
CRACK >50K	>50K	
2.0		
1.3	2.0	

All ~~Smears And~~ dose Rates done on floor



Postings ☐ Other _____
☑ RCA ☑ RM ☑ CA ☑ HRA ☐ LHRA
☐ Outside The RCA ☐ HCA ☐ HRA ☐ Spec 2

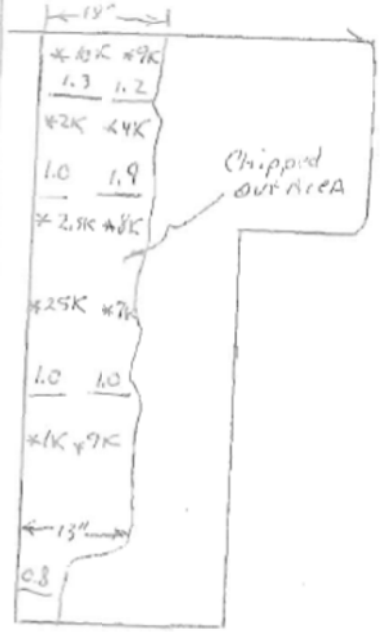
☐ Contact HP Prior to Entering
☐ Airborne Radioactivity Area
☐ Respirator Protection Required

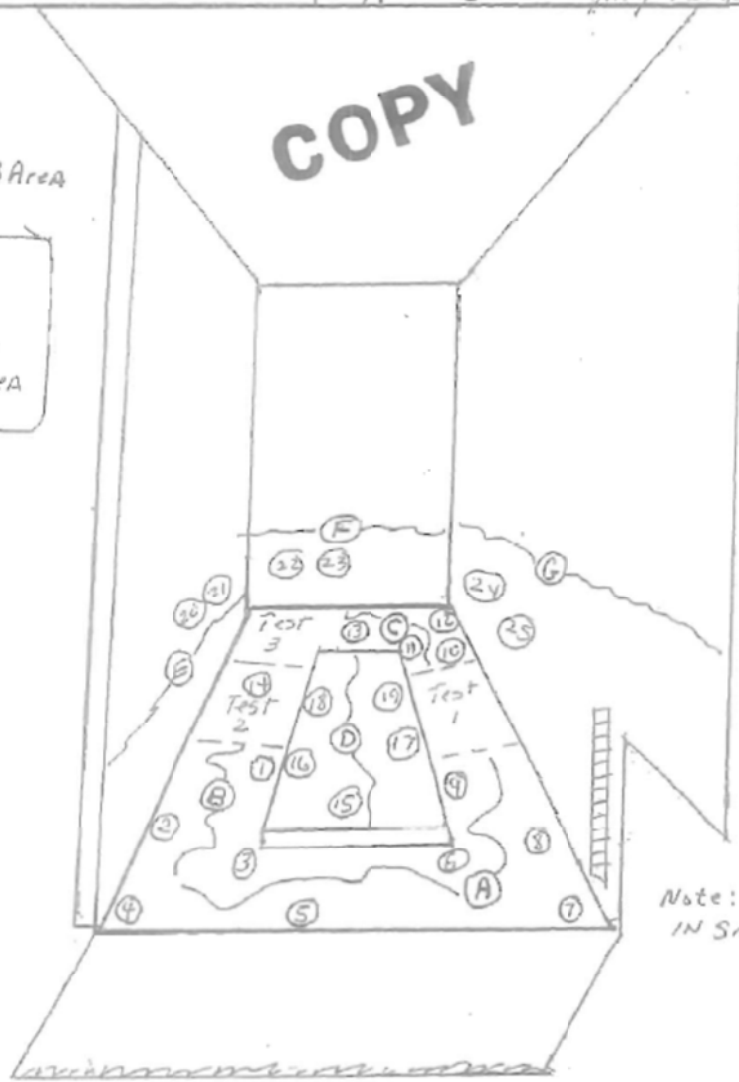
CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
Matt Gibson	M.R. Gibson	FAB "B" Charging Pump Bay

Date: 3/10/04 Time: 1530 Log #:
Area #: 2210 Map #: NA Rev. #: NA

Expanded Test 3 Area





Background .5mR/hr
Background 500-700cpm

Background for Large Area Swipe Reading was 125cpm

Large Area Swipes
A 125 cpm
B 125 cpm
C 200 cpm
D 175 cpm
E 125 cpm
F 125 cpm
G 200 cpm

Note: No Confindence IN Smears 16-30

INSTRUMENTS USED

MODEL/SERIAL#	CAL DUE	PROBE/SERIAL#	CAL DUE
RO20/12557	5-5-04		
E520/4903	6-26-04	360	
APCII/70194	7-14-04		

REASON FOR SURVEY

☐ ROUTINE ☐ RWP ☑ OTHER — Post Chipping Test Survey

AirSample Control #: Total DAC Fraction:

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

βγ MDA= α MDA=

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
1	<MDA	<MDA	11	<MDA	<MDA
2	<MDA		12	<MDA	
3	<MDA		13	131.3	
4	200.2		14	183.6	
5	86.2		15	<MDA	
6	71.9				
7	<MDA				
8	90.9				
9	171.7				
10	79.8				

Smear Continuation Sheet Used. ☐ YES ☑ NO

NDA= No Detectable Activity

Legend:

Dose rates are gamma and are in mrem/hr unless otherwise noted.
All smears in Dpm/100cm² unless otherwise noted.
All LAS's in cpm/LAS unless otherwise noted.

- Large Area Swipe Location
- AirSample Location
- Smear Location
- Contact Exposure Rate
- General Area Exposure Rate
- Radiation Boundary
- Step Off Pad
- Respiratory Protection Required

ARA - Airborne Radioactivity Area
RA - Radiation Area
CA - Contaminated Area
HRA - High Radiation Area
LHRA - Locked High Radiation Area
RM - Radioactive Material(s)
HCA - High Contamination Area
HPA - Hot Particle Area
RCA - Radiologically Controlled Area

HP MANAGER OR DESIGNEE REVIEW: DATE:

postings ☐ Other
☐ RCA ☐ RM ☐ CA ☐ RA ☐ LHRA
☐ Outside The RCA ☐ HCA ☐ HRA ☐ Spec 2

☐ Contact HP Prior to Entering
☐ Airborne Radioactivity Area
☐ Respirator Protection Required

18, 2004

GROUP A — ALPHA and BETA COUNTING

SAMPLE NO.	COUNT TIME	BETA COUNTS	BKGB CPM	BETA CPM	BETA CCPM	BETA DPM	ALPHA COUNTS	BKGA CPM	ALPHA CPM	ALPHA CCPM	ALPHA DPM	T.O.D. CLOCK
1 24	1.0	37.0	29.7	37.0	7.2	17.3	0	0.0	0	-0.0	-0.1	15:55:41
2 10	1.0	47.0	29.7	47.0	17.2	41.0	0	0.0	0	-0.0	-0.1	15:57:50
3 84	1.0	44.0	29.7	44.0	14.2	33.9	0	0.0	0	-0.0	-0.1	15:59:58
4 20	1.0	114.0	29.7	114.0	84.2	200.2	0	0.0	0	-0.0	-0.1	16:02:07
5 26	1.0	66.0	29.7	66.0	36.2	86.2	0	0.0	0	-0.0	-0.1	16:04:15
6 50	1.0	60.0	29.7	60.0	30.2	71.9	1.0	0.0	1.0	0.9	3.9	16:06:24
7 47	1.0	49.0	29.7	49.0	19.2	45.8	0	0.0	0	-0.0	-0.1	16:08:33
8 11	1.0	68.0	29.7	68.0	38.2	90.9	0	0.0	0	-0.0	-0.1	16:10:41
9 38	1.0	102.0	29.7	102.0	72.2	171.7	0	0.0	0	-0.0	-0.1	16:12:50
10 79	1.0	63.0	29.7	63.0	33.2	79.0	0	0.0	0	-0.0	-0.1	16:14:59
11 96	1.0	41.0	29.7	41.0	11.2	26.8	0	0.0	0	-0.0	-0.1	16:17:07
12 98	1.0	35.0	29.7	35.0	5.2	12.5	0	0.0	0	-0.0	-0.1	16:19:16
13 23	1.0	85.0	29.7	85.0	55.2	131.3	0	0.0	0	-0.0	-0.1	16:21:25
14 19	1.0	107.0	29.7	107.0	77.2	183.6	1.0	0.0	1.0	0.9	3.9	16:23:33
15 10	1.0	21.0	29.7	21.0	-8.7	-20.6	0	0.0	0	-0.0	-0.1	16:25:42
16 94	1.0	32.0	29.7	32.0	2.2	5.4	0	0.0	0	-0.0	-0.1	16:27:51
17 46	1.0	22.0	29.7	22.0	-7.7	-18.3	0	0.0	0	-0.0	-0.1	16:29:59
18 86	1.0	27.0	29.7	27.0	-2.7	-6.4	1.0	0.0	1.0	0.9	3.9	16:32:08
19 30	1.0	45.0	29.7	45.0	15.2	36.3	0	0.0	0	-0.0	-0.1	16:34:17
20 32	1.0	57.0	29.7	57.0	27.2	64.8	0	0.0	0	-0.0	-0.1	16:36:25
21 41	1.0	60.0	29.7	60.0	30.2	71.9	0	0.0	0	-0.0	-0.1	16:38:34
22 27	1.0	60.0	29.7	60.0	30.2	90.9	0	0.0	0	-0.0	-0.1	16:40:43
23 35	1.0	48.0	29.7	48.0	18.2	43.4	0	0.0	0	-0.0	-0.1	16:42:51
24 28	1.0	62.0	29.7	62.0	32.2	76.7	1.0	0.0	1.0	0.9	3.9	16:45:00
25 100	1.0	41.0	29.7	41.0	11.2	26.8	0	0.0	0	-0.0	-0.1	16:47:09
26 68	1.0	44.0	29.7	44.0	14.2	33.9	0	0.0	0	-0.0	-0.1	16:49:17
27 21	1.0	32.0	29.7	32.0	2.2	5.4	0	0.0	0	-0.0	-0.1	16:51:26
28 11	1.0	38.0	29.7	38.0	8.2	19.6	0	0.0	0	-0.0	-0.1	16:53:34
29 24	1.0	41.0	29.7	41.0	11.2	26.8	0	0.0	0	-0.0	-0.1	16:55:43
30 4	1.0	41.0	29.7	41.0	11.2	26.8	0	0.0	0	-0.0	-0.1	16:57:52
31 18	1.0	44.0	29.7	44.0	14.2	33.9	0	0.0	0	-0.0	-0.1	17:00:00
32 50	1.0	28.0	29.7	28.0	-1.7	-4.0	0	0.0	0	-0.0	-0.1	17:02:09
33 38	1.0	78.0	29.7	78.0	48.2	114.7	0	0.0	0	-0.0	-0.1	17:04:18
34 19	1.0	37.0	29.7	37.0	7.2	17.3	0	0.0	0	-0.0	-0.1	17:06:27

Gamma Spectroscopy Sample Analysis Request Form

Sample Taken By: MR Gibson Date / Time: 1945

Copy of Results To: None Dept: Ext:

Sample Description: Fines & Chips from Concrete Jackhammer test

Location: Charging Pump B Room

Reason for Analysis: Unknown Content

If from Personnel: Name: EID 83942 RWP: 4149

Contamination Levels:

< mDA βγ CCPM / DPM < mDA α CCPM / DPM 60 mR mR/hr

Sample Weight / Volume: (cc, ml, grams, etc.)

Sample Container: 1 Liter

Is this sample for free release? YES or NO (circle one) [NO circled]

Is this sample being shipped offsite? YES or NO (circle one) [NO circled]

Save / Return sample after analysis? YES or NO (circle one)

Other info:

If this sample requires special storage requirements, please describe:

Responsible Individual for Disposal of Sample

Name: Dept: N/A Ext:

Sample delivered to Count Room: Date / Time:

COUNT ROOM USE ONLY

Qualitative or Quantitative Analysis? Explain below. [Qualitative circled]

Spectrum Report

Sample ID Number: 040304025

Analysis Completed By: [signature] Date: 3/4/04

Sample Storage Location:

Radiochemistry Supervisor Review: [signature] Date: 3-5-04

COPY

Qualita Analys Only

Contai Licens Materi

REPORT NAME : QA_CHECK (V9.1) PAGE 1 OF ___
REPORT DATE : 10-MAR-2004 20:42
REQUESTOR : CAS

CYAPCO
HADDAM NECK STATION

POST NID QA ANALYSIS

TITLE : - PAB B-CHG PIT CONCRETE CHIPS

SAMPLE No. : 040310057 OPERATOR NAME : CAS
SAMPLE TYPE : DIRT/SEDIMENT SAMPLE GEOMETRY : 1LMARSAND
COUNT TIME : 10-MAR-2004 19:51:05 SAMPLE QUANTITY : 1.40100E+03
SAMPLE TIME : 10-MAR-2004 14:00:00 DETECTOR : DET 5
LIBRARY : CHEM_DIRT

ISOTOPE	PEAK ENERGY	ENERGY DIFF (KEV)	DECAY CORR uCi/GM	COMMENTS
K-40	1460.80	0.22	6.249E-06	QA Results OK
CO-60	1332.49	-0.10	1.129E-04	QA Results OK
CS-134	604.70	-0.10	3.539E-05	QA Results OK
CS-137	661.65	-0.13	3.038E-03	QA Results OK
TH-228	84.37	-0.10	3.011E-05	QA Results OK
AM-241	59.54	-0.11	1.341E-06	QA Results OK
AVG ENERGY DIFF =		-0.05	3.224E-03	= TOTAL GAMMA ACTIVITY

Contains Licensed Material

UNIDENTIFIED/REJECTED PEAKS

ENERGY	NET AREA	FWHM	GAMMA/SEC	GAMMA/SEC /GM	% ERROR	FLAG	POTENTIAL ID	ACTIVITY
74.96	3188.	0.89	3.367E+01	2.403E-02	14.7	R	PB_X-RAY	0.000E+00
						R	PB_X-RAY	0.000E+00
						U	TL-208	1.912E-05
						R	PB-212	6.130E-06
						R	PB-214	1.042E-05
475.38	4966.	1.99	1.111E+02	7.927E-02	12.9	P	CS-134	1.468E-04
						R	BI-214	1.810E-03
651.26	1018.	1.41	2.950E+01	2.105E-02	23.2	U		
693.04	808.	1.35	2.468E+01	1.761E-02	22.1	U	EU-154	2.817E-05
038.75	336.	1.53	1.444E+01	1.030E-02	34.9	P	CS-134	2.786E-05
167.91	866.	1.99	4.090E+01	2.919E-02	14.4	P	CS-134	4.384E-05
322.20	4676.	2.71	2.435E+02	1.738E-01	2.43	U		
365.06	1529.	2.15	8.159E+01	5.824E-02	4.53	P	CS-134	5.179E-05
400.42	1386.	1.89	7.540E+01	5.382E-02	4.37	U	CSSUM	0.000E+00
764.09	106.	3.88	6.772E+00	4.834E-03	35.4	R	BI-214	8.241E-07
833.55	233.	2.17	1.528E+01	1.090E-02	17.4	U		
993.32	118.	1.98	8.136E+00	5.807E-03	25.3	U		

COPY

Control Number: 031023	Attachment A Air Sample Counting Sheet Section 1 - Collection Data	Sample Taken By: Gibson

Sample Date: 10-Mar-04	Sample Location and Work Activities Performed: PAB-Charging Pump 'B': Chipping Concrete			
RWP / Job Step: 4149-1	Routine: D W M	Sampler Serial Number: 90	Sampler Type: ras	Sampler Cal Due Date: 6/15/2004

Sample Time & Date		Collection Time (min)	Flow Rate	Sample Volume
On:	Off:			
03/10/04 11:00	03/10/04 13:00	120	1 cfm	120 Cu. Ft.

Gross Beta-Gamma activity of ≤ 6.0 E-11 = ≤ 0.3 Total Particulate DAC

Co-60 activity of ≤ 6.0 E-11 = ≤ 0.3 Total DAC

Conversion Factors: Liters -- 4.5E-10 liters uCi / ml dpm

Cubic Feet -- 1.6E-11 cubic feet uCi / ml dpm

Section 2 -- Gross Beta-Gamma

Gross β/γ concentration of > 6.0 E -11 uCi/cc requires MGCA Count, If available

1st Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross β/γ Concentration (uCi/cc)
3/10/04 16:20	XLB-1	40045-1	10/08/04	Brigham	MGCA Count Required 2.04E-10

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume
307	0.5	614.00	2.44	12.72	611.56	2.5	1.6E-11	120 Cu. Ft.

MDA = 4.24E-12

Section 3 -- Gross Alpha

MGCA results of > 6.0E-11 uCi/cc Co-60 requires alpha count

1st Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross α Concentration (uCi/cc)
3/12/04 12:28	XLB-1	40045-1	10/8/2004	Brigham	<MDA

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume	SAF
0	2.5	0.00	0.09	1.72	<MDCR	4.16	1.6E-11	120 Cu. Ft.	1.3

MDA = 1.24E-12

Initial Gross alpha concentration of ≥ 1.0 E-12 requires a decayed recount

2nd Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross α Concentration (uCi/cc)
N/A	N/A	N/A	N/A	N/A	N/A

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume	SAF
N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.6E-11	120 Cu. Ft.	1.3

MDA =

Section 4 -- Scaled DAC Fractions

(Only for air samples taken in area less than 200 dpm/100 cm² alpha)

Type	uCi/cc	DAC Fraction	Scaling Conversion	Scaled α/β/γ DAC Fraction
Co-60 or Gross β/γ (DAC=1.0E-8)	1.63E-11	1.63E-03	50 X Co-60 OR Gross β/γ DAC Fraction	< 0.082

Co-60 result is less than MDA

COPY

Section 5 -- Measured DAC Fractions

Type	Initial uCi/cc	Initial DAC Fraction	Final uCi/cc	Final DAC Fraction
MGCA or Gross β/γ (DAC=1.0E-8)	2.04E-10 (By Gross Analysis)	0.020	See Printout (By MGGA)	< 0.002
Gross Alpha (DAC=3.0E-12)x1.1	<MDA	<MDA	N/A	N/A
Total Measured DAC Fraction =		0.020		0.002

Reviewed By: _____ Date: 3-25-04

10-MAR-2004 16:43:13.67

CONNECTICUT YANKEE
HADDAM NECK STATION

SAMPLE TITLE : - PAB-CHARGING PUMP B: CONCRETE CHIPPING
REASON FOR ANALYSIS: Air Filter count for Beta Limit
RWP NUMBER : 4149-1 * SURVEY ID : 031023
SAMPLE ID : 040310046 * SAMPLE GEOMETRY : 47MLFILTER
GEO EFFICIENCY DATE : 13-OCT-1998

AIR SAMPLER ID# : 90 * CAL DUE DATE : 15-JUN-2004
START TIME : 10-MAR-2004 11:00 * END TIME : 10-MAR-2004 13:00
START FLOW RATE: 1.0000 * END FLOW RATE : 1.0000
SAMPLE TIME : 10-MAR-2004 13:00:00.00
SAMPLE TYPE : AIR PARTICULATE * SAMPLE QUANTITY : 3.39802E+06 CC

DETECTOR : DET 1 * LIBRARY : CHEM_SMEAR
LAST ENERGY CAL : 10-MAR-2004 00:54 * ENERGY TOLERANCE: 1.00000
KEV/CHANNEL : 5.00418E-01 * HALF LIFE RATIO : 9.00000
START CHANNEL : 100 * END CHANNEL : 4096
ACQ DATE & TIME : 10-MAR-2004 16:32 * DEADTIME (%) : 0.0%
PRESET LIVE TIME : 0 00:10:00 * SENSITIVITY : 5.00000
ELAPSED REAL TIME : 600.03 Secs * GAUSSIAN SEN : 10.00000
ELAPSED LIVE TIME : 600.00 Secs * CORRECTION FACTOR : 1.00000E+00
DECAYED TO 0 DAYS HOURS
FILE IDENT : CAS$DISK:[NEU.SAMPLE.RP.NEW]040310046_ADC1_AIR.CNF;1

ANALYSES : PEAK V16.8 NID V3.2 MINACT V2.8 WTMEAN V1.8

COLLECTED BY : GIBSON
REVIEWED BY : _____
COMMENTS :

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	77.05	20	9	0.58	154.23	152	6	32.[illegible]		PB-214
0	103.44	14	4	0.97	206.96	202	8	36.4		
	149.93	21	3	2.37	299.89	295	12	28.0		
	349.74	10	1	1.37	699.32	698	10	22.4	1.96E-01	
	351.33	12	5	1.44	702.50	698	10	46.4		PB-214
	609.15*	31	2	1.58	1218.08	1213	10	20.6		BI-214
	661.43*	172	6	1.53	1322.64	1317	10	8.1		CS-137

Derived Air Concentration Report Page : 2
Sample ID : 040310046 Acquisition date : 10-MAR-2004 16:32:57

Nuclide Type : NP

Nuclide	Activity (uCi/CC)	1-Sigma % Error	DAC (uCi/CC)	Fractional DAC
BI-214	3.342E-11	21.0	- 0 - (-)	- 0 -
PB-214	1.179E-11	33.2	- 0 - (-)	- 0 -
Totals:	4.521E-11			0.000E+00

Nuclide Type : FP

Nuclide	Activity (uCi/CC)	1-Sigma % Error	DAC (uCi/CC)	Fractional DAC
CS-137	1.114E-10	8.8	6E-08 (D)	1.857E-03
Totals:	1.114E-10			1.857E-03
Grand Totals:	1.566E-10			1.857E-03

REPORT NAME : DET LIM (V1.1) PAGE 1 OF ___
REPORT DATE : 10-MAR-2004 16:43
REQUESTOR : CAS

CYAPCO
HADDAM NECK STATION

DETECTION LIMIT CONFIRMATION REPORT

Sample ID : 040310046
Sample Title : - PAB-CHARGING PUMP B: CONCRETE CHIPPING
Sample Time : 10-MAR-2004 13:00
Count Time : 10-MAR-2004 16:32
Sample Qauntity : 3.39802E+06 CC
Nuclide Library : CHEM_SMEAR
Analyzed By : CAS
Sample Media : 47MLFILTER
Sample Shelf : 0
Detector : 1
Required LLD File : CAS_LLD:PGE_HP_PART.DAT - HEALTH PHYSICS AIR PARTICUL

Nuclide	Required LLD (uCi/CC)	Measured VALUE (uCi/CC)	LLD MET
CO-60	6.000E-11	< 1.631E-11	Passed

**** End Of Report (1 Page) ****

REPORT NAME : QA_CHECK (V9.1) PAGE 1 OF ___
REPORT DATE : 10-MAR-2004 16:43
REQUESTOR : CAS

CYAPCO
HADDAM NECK STATION

POST NID QA ANALYSIS

TITLE : - PAB-CHARGING PUMP B: CONCRETE CHIPPING

SAMPLE No. : 040310046 OPERATOR NAME : CAS
SAMPLE TYPE : AIR PARTICULATE SAMPLE GEOMETRY : 47MLFILTER
COUNT TIME : 10-MAR-2004 16:32:57 SAMPLE QUANTITY : 3.39802E+06
SAMPLE TIME : 10-MAR-2004 13:00:00 DETECTOR : DET 1
LIBRARY : CHEM_SMEAR

ISOTOPE	PEAK ENERGY	ENERGY DIFF (KEV)	DECAY CORR uCi/CC	COMMENTS
CS-137	661.65	-0.22	1.114E-10	QA Results OK
BI-214	609.31	-0.16	3.342E-11	QA Results OK
PB-214	351.92	-0.59	1.179E-11	QA Results OK
AVG ENERGY DIFF =		-0.32	1.566E-10 = TOTAL GAMMA ACTIVITY	

UNIDENTIFIED/REJECTED PEAKS

ENERGY	NET AREA	FWHM	GAMMA/SEC	GAMMA/SEC /CC	% ERROR	FLAG	POTENTIAL ID	ACTIVITY
103.44	14.	0.97	2.381E-01	7.007E-08	36.4	R	NP-239	8.354E-12
149.93	21.	2.37	3.536E-01	1.041E-07	28.0	U		
349.74	10.	1.37	3.656E-01	1.076E-07	22.4	U		

Total Unidentified/Rejected Peaks = 3
% Unidentified/Rejected Peaks = 42.86

Flags: U - Unknown Line
R - Rejected During Analysis
P - Positively Identified (line not in analysis library)

Performed by: _____

Reviewed by: _____

**** End Of Report (1 Page) ****

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Page 1 of 2

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
Matt Gibson	MR Gibson	PAB "B" Charging Pump Bay

Date: 3-11-04 | Time: 1330 | Log #: 24 1810
Area #: 2210 | Map #: N.A | Rev. #: N/A

INSTRUMENTS USED

MODEL/SERIAL#	CAL DUE	PROBE/SERIAL#	CAL DUE
E529/5016	6-24-04	360	
RO20/1257	5-5-04	N/A	
ARC-1/701 94	7-14-04		

REASON FOR SURVEY

- ☐ ROUTINE
- ☐ RWP
- ☑ OTHER — Pre Chipping test 4 Survey

AirSample Control #: | Total DAC Fraction:

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

βγ MDA = 49.4 | α MDA = 13.8

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
1	205.0	<MDA	11	71.9	<MDA
2	269.1		12	<MDA	
3	285.7		13	55.3	
4	295.2		14	<MDA	
5	52.9		15	62.4	
6	52.9		16	<MDA	
7	50.5		17	<MDA	
8	<MDA		18	52.9	
9	<MDA		19	<MDA	
10	55.3		20	<MDA	

Smear Continuation Sheet Used. ☑ YES ☐ NO

NDA = No Detectable Activity

Legend:

Dose rates are gamma and are in mrem/hr unless otherwise noted.
All smears in Dpm/100cm² unless other wise noted.
All LAS's in ccpm/LAS unless other wise noted.

- Large Area Swipe Location
- AirSample Location
- Smear Location
- Contact Exposure Rate
- General Area Exposure Rate
- Indicates Boundary
- Step Off Pad
- RPR - Respiratory Protection Required
- ARA - Airborne Radioactivity Area
- RA - Radiation Area
- CA - Contaminated Area
- HRA - High Radiation Area
- LHRA - Locked High Radiation Area
- RMA - Radioactive Material(s)
- HCA - High Contamination Area
- HPA - Hot Particle Area
- RCA - Radiologically Controlled Area

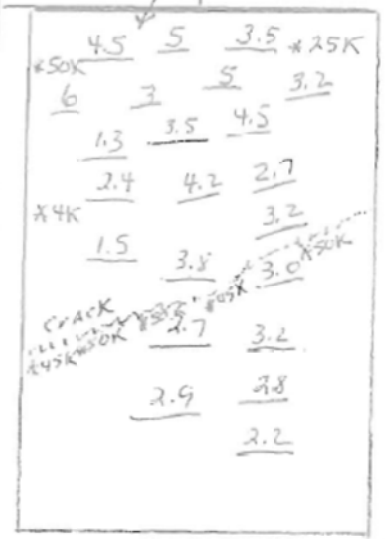
HP MANAGER OR DESIGNEE REVIEW: DATE:

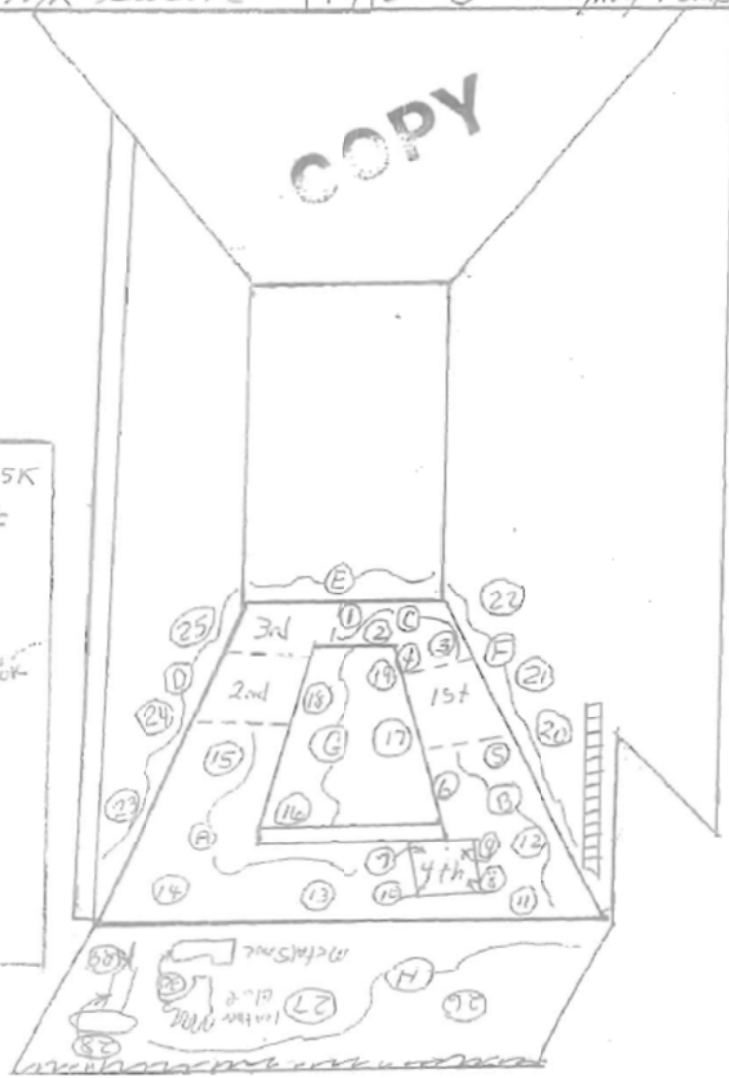
Background 600-700cpm min
Background ~5mR/hr

Background for maximum count = 125 c/m

A 200 ccpm
B 75 ccpm
C 225 ccpm
D 125 ccpm
E 25 ccpm
F 675 ccpm
G 275 ccpm
H 225 ccpm

Expanded 4th test Area





Postings ☐ Other
☑ RCA ☑ RM ☐ CA ☑ RA ☐ LHRA
☐ Outside The RCA ☐ HCA ☐ HRA ☐ Spec 2

☐ Contact HP Prior to Entering
☐ Airborne Radioactivity Area
☐ Respirator Protection Required

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

04-1810

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
M.H Gibson	M.E Gibson	FAB "B" Charging Pump Bay

Survey Date: 3-11-04 | Survey Time: 1330
Area #: 2210 | Map #: NA | Rev.#: NA
Page 2 of 2

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
21	<MDA	<MDA									
22	<MDA										
23	<MDA										
24	<MDA										
25	55.3										
26	112.3										
27	<MDA										
28	<MDA										
29	<MDA										
30	<MDA										

INSTRUMENTS USED

MODEL#	SERIAL#	PROBE TYPE	CAL DUE
E520	5016	360	6-24-04
RO20	1257		5-5-04
AMC-II	70194		7-14-04

CONTAMINATION RESULTS (LAS)

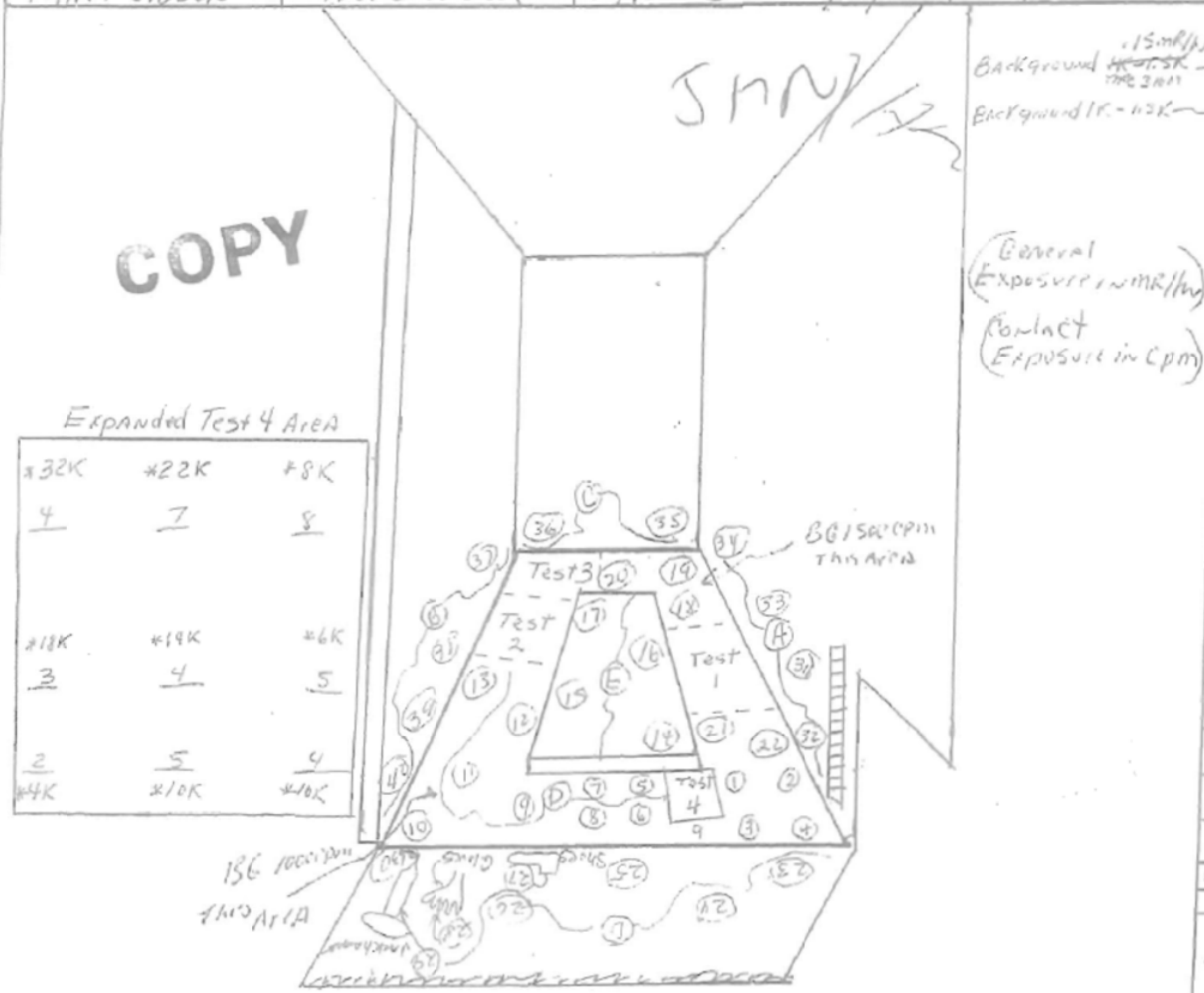
RESULTS	RESULTS

Note: All header information (ie. Name, Signature, Survey Area# etc.) Should match that of the original survey for which this Smear Continuation Sheet is being used.

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Page 1 of 2

Surveyor Name (Printed)	Surveyor Name: (Signature)	Location:	Date: 3/15/04	Time: 1430	Log #:
Matt Gibson	M.R. Gibson	PAB "B" Charging Pump Bay	Area #: 2210	Map #: NA	Rev. #: NA



INSTRUMENTS USED

MODEL/SERIAL#	CAL DUE	PROBE/SERIAL#	CAL DUE
RO20/1022	4/28/04	NA	
E520/5520	6/24/04	360	
ApC II/70194	7/14/04		NA
			NA

REASON FOR SURVEY

☐ ROUTINE Post Charging Test
☐ RWP #4 Survey
☑ OTHER

AirSample Control #: 031504 Total DAC Fraction: 0.04

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

βγ MDA= 48.3 α MDA= 14.1

SAMPLE #	RESULTS Beta-Gamma	Alpha	SAMPLE #	RESULTS Beta-Gamma	Alpha
1	68.4	<MDA	11	63.6	<MDA
2	>MDA	↓	12	<MDA	↓
3	66.8		13	66.0	
4	77.9		14	<MDA	
5	>MDA		15	<MDA	
6	↓		16	<MDA	
7			17	<MDA	
8	↓		18	75.5	
9	73.1		19	132.3	
10	<MDA	↓	20	>MDA	↓

Smear Continuation Sheet Used. ☑ YES ☐ NO

NDA= No Detectable Activity

Legend:

Dose rates are gamma and are in mrem/hr unless otherwise noted
All smears in Dpm/100cm² unless other wise noted
All LAS's in ccpm/LAS unless other wise noted

- Large Area Swipe Location
- AirSample Location
- Smear Location
- Contact Exposure Rate
- Indicates Boundary
- SOP - Step Off Pad
- RPR - Respiratory Protection Required

- ARA - Airborne Radioactivity Area
- RA - Radiation Area
- CA - Contaminated Area
- HRA - High Radiation Area
- LHRA - Locked High Radiation Area
- HCA - High Contamination Area
- HPA - Hot Particle Area
- RCA - Radiologically Controlled Area

HP MANAGER OR DESIGNEE REVIEW DATE

Postings ☐ Other
☑ RCA ☑ RM ☑ CA ☑ RA ☐ LHRA
☐ Outside The RCA ☐ HCA ☐ HRA ☐ Spec 2
☐ Contact HP Prior to Entering
☐ Airborne Radioactivity Area
☐ Respirator Protection Required

MON MAR 15, 2004

	GROUP A SAMPLE NO.	COUNT TIME	ALPHA and BETA COUNTING: BETA COUNTS	BKGD CPM	BETA CPM	BETA CCPM	BETA DPM	ALPHA COUNTS	BKGA CPM	ALPHA CPM	ALPHA CCPM	ALPHA DPM	T.O.D. CLOCK
1	56	1.0	57.0	28.2	57.0	28.7	68.4	0	0.0	0	-0.0	-0.2	14:41:34
2	15	1.0	39.0	28.2	39.0	10.7	25.6	0	0.0	0	-0.0	-0.2	14:43:42
3	36	1.0	56.0	28.2	56.0	27.7	66.8	0	0.0	0	-0.0	-0.2	14:45:51
4	48	1.0	61.0	28.2	61.0	32.7	77.9	0	0.0	0	-0.0	-0.2	14:48:00
5	96	1.0	41.0	28.2	41.0	12.7	30.3	0	0.0	0	-0.0	-0.2	14:50:08
6	20	1.0	32.0	28.2	32.0	3.7	9.0	0	0.0	0	-0.0	-0.2	14:52:17
7	22	1.0	39.0	28.2	39.0	10.7	25.6	0	0.0	0	-0.0	-0.2	14:54:25
8	23	1.0	45.0	28.2	45.0	16.7	39.8	1.0	0.0	1.0	0.9	3.8	14:56:34
9	94	1.0	59.0	28.2	59.0	30.7	73.1	1.0	0.0	1.0	0.9	3.8	14:58:43
10	31	1.0	44.0	28.2	44.0	15.7	37.5	0	0.0	0	-0.0	-0.2	15:00:51
11	82	1.0	55.0	28.2	55.0	26.7	63.6	0	0.0	0	-0.0	-0.2	15:03:00
12	86	1.0	44.0	28.2	44.0	15.7	37.5	1.0	0.0	1.0	0.9	3.8	15:05:09
13	27	1.0	56.0	28.2	56.0	27.7	66.8	0	0.0	0	-0.0	-0.2	15:07:17
14	31	1.0	37.0	28.2	37.0	8.7	20.8	0	0.0	0	-0.0	-0.2	15:09:26
15	38	1.0	35.0	28.2	35.0	6.7	16.1	0	0.0	0	-0.0	-0.2	15:11:34
16	24	1.0	42.0	28.2	42.0	13.7	32.7	0	0.0	0	-0.0	-0.2	15:13:43
17	26	1.0	44.0	28.2	44.0	15.7	37.5	0	0.0	0	-0.0	-0.2	15:15:52
18	28	1.0	60.0	28.2	60.0	31.7	75.5	1.0	0.0	1.0	0.9	3.8	15:18:00
19	41	1.0	84.0	28.2	84.0	55.7	132.5	1.0	0.0	1.0	0.9	3.8	15:20:09
20	91	1.0	43.0	28.2	43.0	14.7	35.1	0	0.0	0	-0.0	-0.2	15:22:18
21	83	1.0	72.0	28.2	72.0	43.7	104.0	0	0.0	0	-0.0	-0.2	15:24:26
22	98	1.0	53.0	28.2	53.0	24.7	58.8	2.0	0.0	2.0	1.9	7.9	15:26:35
23	37	1.0	84.0	28.2	84.0	55.7	132.5	3.0	0.0	3.0	2.9	12.0	15:28:44
24	40	1.0	42.0	28.2	42.0	13.7	32.7	0	0.0	0	-0.0	-0.2	15:30:52
25	44	1.0	48.0	28.2	48.0	11.7	28.0	0	0.0	0	-0.0	-0.2	15:33:01
26	10	1.0	68.0	28.2	68.0	39.7	94.5	0	0.0	0	-0.0	-0.2	15:35:10
27	59	1.0	17.0	28.2	17.0	-11.2	-26.6	0	0.0	0	-0.0	-0.2	15:37:19
28	43	1.0	36.0	28.2	36.0	7.7	18.5	0	0.0	0	-0.0	-0.2	15:39:27
29	9	1.0	26.0	28.2	26.0	-2.2	-5.2	0	0.0	0	-0.0	-0.2	15:41:36
30	95	1.0	46.0	28.2	46.0	17.7	42.2	0	0.0	0	-0.0	-0.2	15:43:45
31	20	1.0	48.0	28.2	48.0	11.7	28.0	0	0.0	0	-0.0	-0.2	15:45:53
32	18	1.0	54.0	28.2	54.0	25.7	61.2	0	0.0	0	-0.0	-0.2	15:48:02
33	68	1.0	49.0	28.2	49.0	20.7	49.3	0	0.0	0	-0.0	-0.2	15:50:11
34	50	1.0	49.0	28.2	49.0	20.7	49.3	0	0.0	0	-0.0	-0.2	15:52:20
35	97	1.0	52.0	28.2	52.0	23.7	56.5	0	0.0	0	-0.0	-0.2	15:54:28
36	100	1.0	23.0	28.2	23.0	-5.2	-12.3	0	0.0	0	-0.0	-0.2	15:56:37
37	28	1.0	72.0	28.2	72.0	43.7	104.0	0	0.0	0	-0.0	-0.2	15:58:46
38	42	1.0	35.0	28.2	35.0	6.7	16.1	0	0.0	0	-0.0	-0.2	16:00:55
39	18	1.0	49.0	28.2	49.0	20.7	49.3	1.0	0.0	1.0	0.9	3.8	16:03:03
40	11	1.0	44.0	28.2	44.0	15.7	37.5	0	0.0	0	-0.0	-0.2	16:05:12

COPY

70194
7/14/04
α 14.1
β 48.3
AJS
08/504
0.04 DAC

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:	Date:	Time:	Log #:
Matt Gibson	MR Gibson	PAB "B" Charging Pump Bay	3/17/04	1330	04-199

Area #:	Map #:	Rev. #:
2210	NA	NA

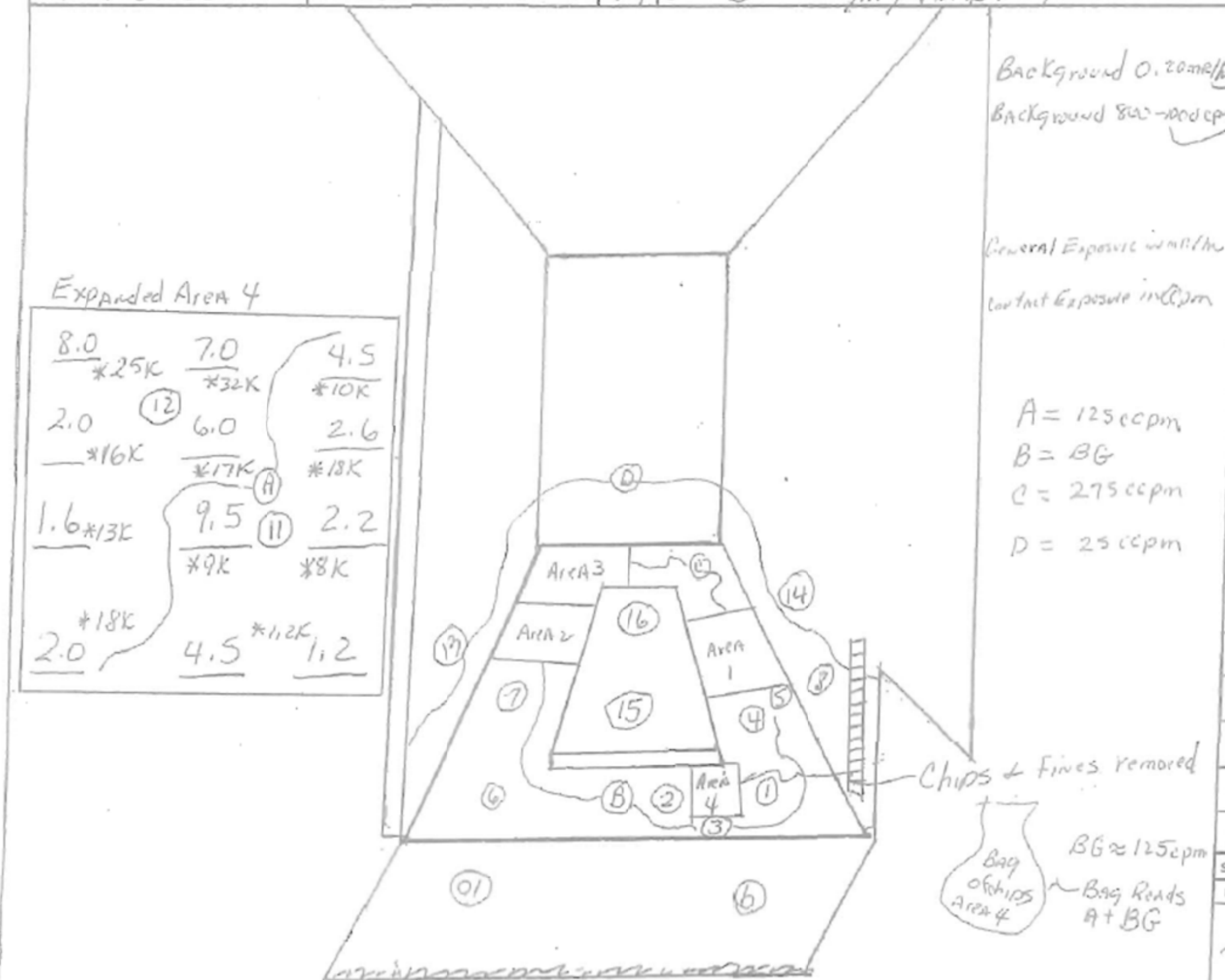
INSTRUMENTS USED

MODEL/SERIAL#	CAL DUE	PROBE/SERIAL#	CAL DUE
E520 \ 4903	6/26/04	360	
RO20 \ 1257	5/15/04	NA	NA
APC II / 70194	7/14/04		

REASON FOR SURVEY

☐ ROUTINE Pre test of Area 4
☐ RWP Second Chipping of this
☑ OTHER Area.

AirSample Control #: N/A | Total DAC Fraction: N/A



CONTAMINATION RESULTS (SMEARS) dpm/100cm²

βY MDA= 48.3 | α MDA= 14.7

SAMPLE #	Beta-Gamma	Alpha	SAMPLE #	Beta-Gamma	Alpha
1	<MDA	<MDA	11	80.2	<MDA
2	<MDA		12	<MDA	
3	<MDA		13	<MDA	
4	<MDA		14	<MDA	
5	68.4		15	101.6	
6	<MDA		16	54.1	
7	<MDA				
8	<MDA			NA	
9	99.2				
10	49.0				

Smear Continuation Sheet Used. ☐ YES ☐ NO

NDA= No Detectable Activity **Legend:**

Dose rates are gamma and are in mrem/hr unless otherwise noted.
All smears in Dpm/100cm² unless other wise noted.
All LAS's in ccpm/LAS unless other wise noted.

- Large Area Swipe Location
- AirSample Location
- Smear Location
- Contact Exposure Rate
- General Area Exposure Rate
- Indicates Boundary
- SOP - Step Off Pad
- RPR - Respiratory Protection Required

ARA - Airborne Radioactivity Area
RA - Radiation Area
CA - Contaminated Area
HRA - High Radiation Area
LHRA - Locked High Radiation Area
RM - Radioactive Material(s)
HCA - High Contamination Area
HPA - Hot Particle Area
RCA - Radiologically Controlled Area

Postings ☐ Other
☑ RCA ☑ RM ☑ CA ☑ RA ☐ LHRA
☐ Outside The RCA ☐ HCA ☐ HRA ☐ Spec 2

☐ Contact HP Prior to Entering
☐ Airborne Radioactivity Area
☐ Respirator Protection Required

HP MANAGER OR DESIGNEE REVIEW: [signature] DATE: 3/22/04

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Page 1 of 2

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
Matt Gibson	[signature]	PAB "B" Charging Pump Bay

Date: 3-17-04	Time: 1430	Log #: 04-2038
Area #: 2210	Map #: NA	Rev. #: NA

INSTRUMENTS USED

MODEL/SERIAL#	CAL DUE	PROBE/SERIAL#	CAL DUE
Ro20/1022	4/28/04	NA	
E520/4903	6-26-04	360	
APC II/70194	7/14/04	N/A	

REASON FOR SURVEY

☐ ROUTINE
☐ RWP
☑ OTHER Concrete Test Area 4 test 2

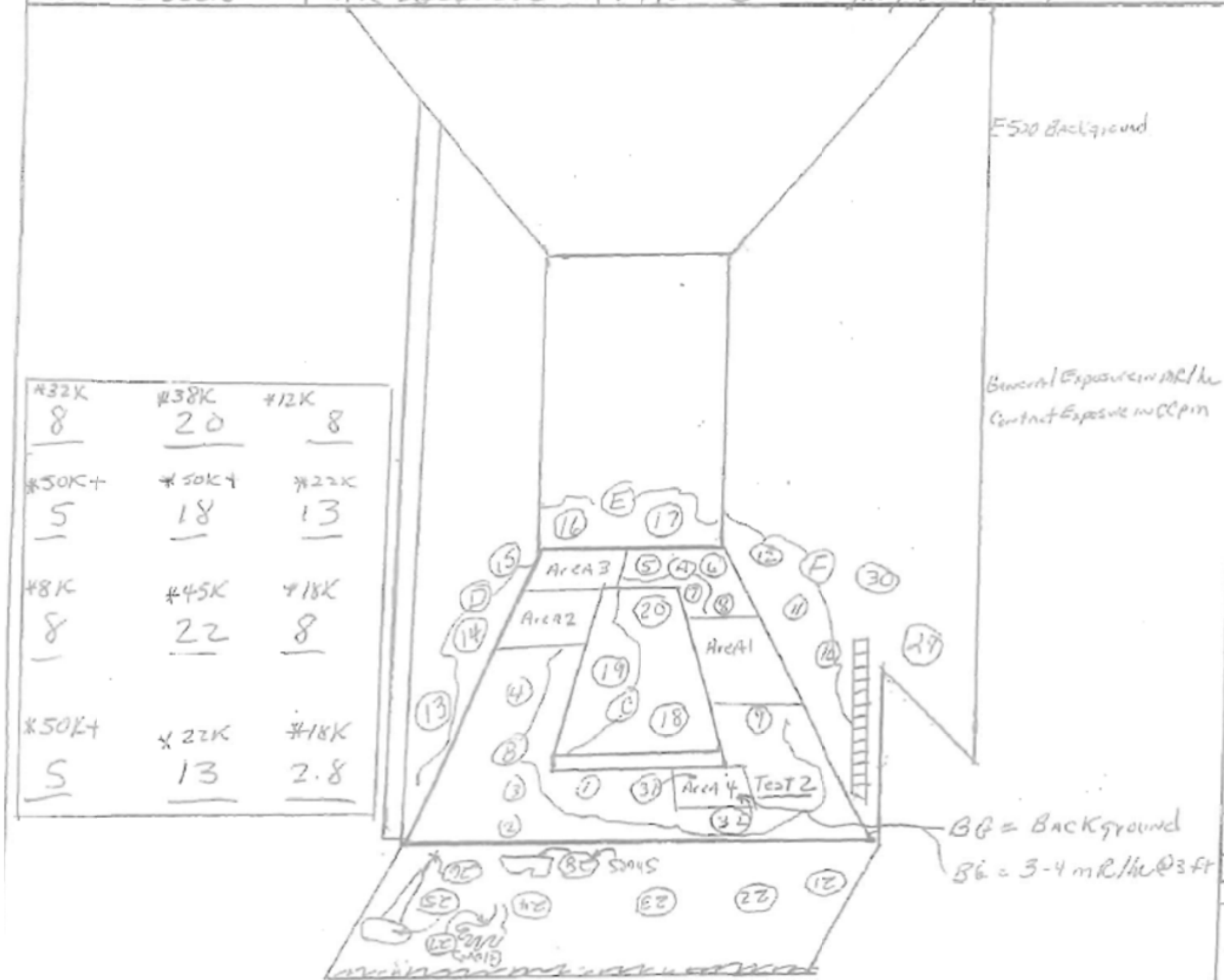
AirSample Control #: 03/806 Total DAC Fraction: 0.04

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

βY MDA= 48.3 α MDA= 14.1

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
1	130.1	< MDA	11	< MDA	< MDA
2	< MDA		12		
3	< MDA		13		
4	< MDA		14	49.3	
5	355.8		15	< MDA	
6	348.9		16		
7	189.5		17		
8	170.5		18		
9	113.5		19		
10	< MDA		20	49.3	

Smear Continuation Sheet Used. ☑ YES ☐ NO



NDA = No Detectable Activity **Legend:**

Dose rates are gamma and are in mrem/hr unless otherwise noted.
All smears in Dpm/100cm² unless other wise noted.
All LAS's in ccpm/LAS unless other wise noted.

- Large Area Swipe Location	ARA - Airborne Radioactivity Area
- AirSample Location	RA - Radiation Area
- Smear Location	CA - Contaminated Area
- Contact Exposure Rate	HRA - High Radiation Area
- General Area Exposure Rate	LHRA - Locked High Radiation Area
- Indicates Boundary	RM - Radioactive Material(s)
SOP - Step Off Pad	HCA - High Contamination Area
RPR - Respiratory Protection Required	HPA - Hot Particle Area
	RCA - Radiologically Controlled Area

Postings ☐ Other ______
☑ RCA ☑ RM ☑ CA ☑ RA ☐ LHRA
☐ Outside The RCA ☐ HCA ☐ HRA ☐ Spec 2

☐ Contact HP Prior to Entering
☐ Airborne Radioactivity Area
☐ Respirator Protection Required

HP MANAGER OR DESIGNEE REVIEW: [signature] DATE: 3/22/04

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
Matt Gibson	MR Gibson	PAB "B" Charging Pump Bay

Survey Date: 3-17-04 | Survey Time: 1430
Area #: 2210 | Map #: NA | Rev. #: NA
Page 2 of 2

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
21	<MDA	<MDA									
22											
23											
24											
25											
26											
27											
28											
29											
30											
31											
32	↓	↓									

N/A

INSTRUMENTS USED

MODEL#	SERIAL#	PROBE TYPE	CAL DUE
RO20	1072	NA	4-28-04
E520	4903	360	6-26-04
APC II	70194	NA	7-14-04

N/A

CONTAMINATION RESULTS (LAS)

	RESULTS	RESULTS
A	200 ccpm	
B	100 ccpm	
C	125 ccpm	
D	125 ccpm	
E	100 ccpm	
F	100 ccpm	

N/A

Note: All header information (ie. Name, Signature, Survey Area# etc.) Should match that of the original survey for which this Smear Continuation Sheet is being used.

Connecticut Yankee Atomic Power Co.

Radiochemistry Count Room

Connecticut Yankee Decommissioning Project

Gamma Spectroscopy Sample Analysis Request Form

Sample Taken By: M R Gibson Date / Time: 0800

Copy of Results To: Degnaspeel Dept: ____ Ext: ____

Sample Description: Concrete Chips + Fines Test 4A

Location: PAB B-pumping

Reason for Analysis: Test

If from Personnel: Name: ____ EID ____ RWP: 4149-1

Contamination Levels:

< MDA βγ CCPM / DPM < MDA α CCPM / DPM < MDA mR/hr

Sample Weight / Volume: ____ (cc, ml, grams, etc.)

Sample Container: ____

Is this sample for free release? YES or NO (circle one) — NO circled

Is this sample being shipped offsite? YES or NO (circle one) — NO circled

Save / Return sample after analysis? YES or NO (circle one) — NO circled

Other info: ____

If this sample requires special storage requirements, please describe:

____

Responsible Individual for Disposal of Sample

Name: ____ Dept: ____ Ext: ____

Sample delivered to Count Room: Date / Time: ____

COUNT ROOM USE ONLY

Qualitative or Quantitative Analysis? Explain below.

3600 Sec. Count on Chem Smear library

using 47 ml filter geometry

Sample ID Number: 040318005

Analysis Completed By: [signature] Date: 03-18-04

Sample Storage Location: Count Room Trash

Radiochemistry Supervisor Review: [signature] Date: 3-19-04

Contains Licensed Material

Qualitative Analysis Only

```
*****************************************
          18-MAR-2004 11:12:10.45

              CONNECTICUT YANKEE
              HADDAM NECK STATION
*****************************************

SAMPLE TITLE : - L.A.S.: PAB-CHARGING PUMP B CUBICLE
REASON FOR ANALYSIS: Site Characterization
RWP NUMBER    : N/A                    * SURVEY ID        : N/A
SAMPLE ID     : 040318005              * SAMPLE GEOMETRY  : 47MLFILTER
SAMPLE TIME   : 18-MAR-2004 08:00      * GEO EFFICIENCY DATE: 24-JUN-2003
SAMPLE TYPE   : SMEAR                  * SAMPLE QUANTITY  : 1.00000E+00 SMR.
*****************************************************************************

DETECTOR          : DET 5              * LIBRARY          : CHEM_SMEAR
LAST ENERGY CAL   : 18-MAR-2004 01:39  * ENERGY TOLERANCE: 0.70000
KEV/CHANNEL       : 5.00592E-01        * HALF LIFE RATIO : 9.00000
START CHANNEL     : 100                * END CHANNEL      : 4096
ACQ DATE & TIME   : 18-MAR-2004 10:11  * DEADTIME (%)     : 0.0%
PRESET  LIVE TIME : 0 01:00:00         * SENSITIVITY      : 5.00000
ELAPSED REAL TIME :     3600.7 Secs    * GAUSSIAN SEN     : 10.00000
ELAPSED LIVE TIME :     3600.0 Secs    * CORRECTION FACTOR: 2.22000E+06
DECAYED TO 0 DAYS  HOURS
FILE IDENT    : CAS$DISK:[NEU.SAMPLE.RP.NEW]040318005_ADC5_SMEAR.CNF;1

*****************************************************************************
ANALYSES : PEAK V16.8 NID V3.2 MINACT V2.8 WTMEAN V1.8
*****************************************************************************

Collected by : GIBSON
REVIEWED BY  : _____
COMMENTS     :

*****************************************************************************

Post-NID Peak Search Report

It    Energy      Area    Bkgnd  FWHM Channel  Left   Pw %Err    Fit   Nuclides

 0    605.25        45       30  1.12 1209.63  1204   11 28.0          CS-134
 0    609.75        44       34  0.91 1218.61  1214   11 30.3          BI-214
 0    661.66*     2211       21  1.38 1322.40  1317   12  2.2          CS-137
 0   1173.23*      232        6  1.54 2345.39  2339   12  7.4          CO-60
 0   1332.68*      236        0  1.58 2664.37  2659   12  7.0          CO-60
```

Summary of Nuclide Activity
Page : 2
Sample ID : 040318005 Acquisition date : 18-MAR-2004 10:11:57

Total number of lines in spectrum	5
Number of unidentified lines	0
Number of lines tentatively identified by NID	5 100.00%

Nuclide Type : AP

Nuclide	Hlife	Decay	Wtd Mean Uncorrected dpm/SMR.	Wtd Mean Decay Corr dpm/SMR.	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
CO-60	5.27Y	1.00	2.091E+02	2.091E+02	0.115E+02	5.49	
CS-134	2.06Y	1.00	2.065E+01	2.065E+01	0.583E+01	28.24	
Total Activity :			2.297E+02	2.297E+02			

Nuclide Type : FP

Nuclide	Hlife	Decay	Wtd Mean Uncorrected dpm/SMR.	Wtd Mean Decay Corr dpm/SMR.	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
CS-137	30.17Y	1.00	1.270E+03	1.270E+03	0.056E+03	4.41	
Total Activity :			1.270E+03	1.270E+03			

Nuclide Type : NP

Nuclide	Hlife	Decay	Wtd Mean Uncorrected dpm/SMR.	Wtd Mean Decay Corr dpm/SMR.	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
BI-214	4.47E+09Y	1.00	4.278E+01	4.278E+01	1.305E+01	30.51	
Total Activity :			4.278E+01	4.278E+01			

Grand Total Activity : 1.542E+03 1.542E+03

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

REPORT NAME : QA_CHECK (V9.1) PAGE 1 OF ___
REPORT DATE : 18-MAR-2004 11:12
REQUESTOR : CAS

CYAPCO
HADDAM NECK STATION

POST NID QA ANALYSIS

TITLE : - L.A.S.: PAB-CHARGING PUMP B CUBICLE

SAMPLE No. : 040318005 OPERATOR NAME : CAS
SAMPLE TYPE : SMEAR SAMPLE GEOMETRY : 47MLFILTER
COUNT TIME : 18-MAR-2004 10:11:57 SAMPLE QUANTITY : 1.00000E+00
SAMPLE TIME : 18-MAR-2004 08:00:00 DETECTOR : DET 5
LIBRARY : CHEM_SMEAR

ISOTOPE	PEAK ENERGY	ENERGY DIFF (KEV)	DECAY CORR dpm/SMR.	COMMENTS
CO-60	1332.49	0.20	2.091E+02	QA Results OK
CS-134	604.70	0.55	2.065E+01	QA Results OK
CS-137	661.65	0.02	1.270E+03	QA Results OK
BI-214	609.31	0.43	4.278E+01	QA Results OK
AVG ENERGY DIFF =		0.30	1.542E+03 = TOTAL GAMMA ACTIVITY	

Contains Licensed Material

Qualitative Analysis Only

UNIDENTIFIED/REJECTED PEAKS

ENERGY	NET AREA	FWHM	GAMMA/SEC	GAMMA/SEC /SMR.	% ERROR	FLAG	POTENTIAL ID	ACTIVITY
No Unidentified/Rejected Peaks								

Performed by: _____

Reviewed by: _____

**** End Of Report (1 Page) ****

Page 61 of 104

Control Number: 031588	Attachment A Air Sample Counting Sheet Section 1 - Collection Data	Sample Taken By: Ayer

Sample Date: 15-Mar-04	Sample Location and Work Activities Performed: pab a chrg pump remove ventilation			
RWP / Job Step: 4113-1	Routine: D W M	Sampler Serial Number: 7813	Sampler Type: Radeco	Sampler Cal Due Date: 6/23/2004

Sample Time & Date		Collection Time (min)	Flow Rate	Sample Volume
On: 03/15/04 17:55	Off: 03/15/04 19:25	90	2 cfm	180 Cu. Ft.

Gross Beta-Gamma activity of ≤ 6.0 E-11 = ≤ 0.3 Total Particulate DAC

Co-60 activity of ≤ 6.0 E-11 = ≤ 0.3 Total DAC

Conversion Factors: Liters -- 4.5E-10 liters uCi / ml dpm

Cubic Feet -- 1.6E-11 cubic feet uCi / ml dpm

Section 2 -- Gross Beta-Gamma

Gross β/γ concentration of > 6.0 E -11 uCi/cc requires MGCA Count, If available

1st Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross β/γ Concentration (uCi/cc)
3/15/04 20:40	XLB-2	40045-2	02/21/05	Conrad	4.98E-11

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume
109	0.5	218.00	2.70	13.10	215.30	2.6	1.6E-11	180 Cu. Ft.

MDA = 3.03E-12

Section 3 -- Gross Alpha

MGCA results of > 6.0E-11 uCi/cc Co-60 requires alpha count

1st Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross α Concentration (uCi/cc)
N/A	N/A	N/A	N/A	N/A	N/A

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume	SAF
N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.6E-11	180 Cu. Ft.	1.3

MDA =

Initial Gross alpha concentration of ≥ 1.0 E-12 requires a decayed recount

2nd Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross α Concentration (uCi/cc)
N/A	N/A	N/A	N/A	N/A	N/A

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume	SAF
N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.6E-11	180 Cu. Ft.	1.3

MDA =

Section 4 -- Scaled DAC Fractions

(Only for air samples taken in area less than 200 dpm/100 cm² alpha)

Type	uCi/cc	DAC Fraction	Scaling Conversion	Scaled α/β/γ DAC Fraction
Co-60 or Gross β/γ (DAC=1.0E-8)	4.98E-11	4.98E-03	50 X Co-60 OR Gross β/γ DAC Fraction	0.249

COPY

Section 5 -- Measured DAC Fractions

Type	Initial uCi/cc	Initial DAC Fraction	Final uCi/cc	Final DAC Fraction
MGCA or Gross β/γ (DAC=1.0E-8)	N/A	N/A	N/A	N/A
Gross Alpha (DAC=3.0E-12)x1.1	N/A	N/A	N/A	N/A
Total Measured DAC Fraction =		N/A		N/A

Reviewed By: [signature] Date: 4-2-04

Software Control #QD07-02

Control Number: 031590

Attachment A
Air Sample Counting Sheet
Section 1 - Collection Data

Sample Taken By: Barwis

Sample Date	Sample Location and Work Activities Performed				
15-Mar-04	b chrg pump pab vent removal				
RWP / Job Step: 4113-1	Routine: D W M	Sampler Serial Number: 90	Sampler Type: ras	Sampler Cal Due Date: 6/15/2004	
Sample Time & Date: On: 03/15/04 20:30	Off: 03/15/04 22:10	Collection Time (min): 100	Flow Rate: 1 cfm	Sample Volume: 100 Cu. Ft.	

Gross Beta-Gamma activity of ≤ 6.0 E-11 = ≤ 0.3 Total Particulate DAC

Co-60 activity of ≤ 6.0 E-11 = ≤ 0.3 Total DAC

Conversion Factors: Liters – 4.5E-10 liters uCi / ml dpm

Cubic Feet – 1.6E-11 cubic feet uCi / ml dpm

Section 2 -- Gross Beta-Gamma

Gross β/γ concentration of > 6.0 E -11 uCi/cc requires MGCA Count, If available

1st Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross β/γ Concentration (uCi/cc)
3/16/04 0:53	XLB-1	40045-1	10/08/04	Conrad	4.14E-11

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume
53	0.5	106.00	2.58	12.92	103.42	2.5	1.6E-11	100 Cu. Ft.

MDA = 5.17E-12

Section 3 -- Gross Alpha

MGCA results of > 6.0E-11 uCi/cc Co-60 requires alpha count

1st Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross α Concentration (uCi/cc)
N/A	N/A	N/A	N/A	N/A	N/A

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume	SAF
N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.6E-11	100 Cu. Ft.	1.3

MDA =

Initial Gross alpha concentration of ≥ 1.0 E-12 requires a decayed recount

2nd Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross α Concentration (uCi/cc)
N/A	N/A	N/A	N/A	N/A	N/A

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume	SAF
N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.6E-11	100 Cu. Ft.	1.3

MDA =

Section 4 -- Scaled DAC Fractions

(Only for air samples taken in area less than 200 dpm/100 cm² alpha)

Type	uCi/cc	DAC Fraction	Scaling Conversion	Scaled α/β/γ DAC Fraction
Co-60 or Gross β/γ (DAC=1.0E-8)	4.14E-11	4.14E-03	50 X Co-60 OR Gross β/γ DAC Fraction	0.207

Section 5 -- Measured DAC Fractions

Type	Initial uCi/cc	Initial DAC Fraction	Final uCi/cc	Final DAC Fraction
MGCA or Gross β/γ (DAC=1.0E-8)	N/A	N/A	N/A	N/A
Gross Alpha (DAC=3.0E-12)x1.1	N/A	N/A	N/A	N/A
Total Measured DAC Fraction =		N/A		N/A

Reviewed By: [signature]

Software Control #0097-02

Date: 4-2-04

Connecticut Yankee Atomic Power Co.

Radiochemistry Count Room

Connecticut Yankee Decommissioning Project

Gamma Spectroscopy Sample Analysis Request Form

Sample Taken By: MR Gibson Date / Time: 3/15/04 1540

Copy of Results To: Mike DeGASPRI Dept: _____ Ext: _____

Sample Description: _____

Location: Pump B Concrete Study

Reason for Analysis: _____

If from Personnel: Name: _____ EID _____ RWP: _____

Contamination Levels:

<MDA β γ CCPM / DPM <MDA α CCPM / DPM <MDA mR/hr

Sample Weight / Volume: 1421 (cc, ml, grams, etc.)

Sample Container: 1l

Is this sample for free release? YES or NO (circle one)

Is this sample being shipped offsite? YES or NO (circle one)

Save / Return sample after analysis? YES or NO (circle one)

Other info: _____

If this sample requires special storage requirements, please describe:

_____

Responsible Individual for Disposal of Sample

Name: _____ Dept: _____ Ext: _____

Sample delivered to Count Room: Date / Time: _____

COUNT ROOM USE ONLY

COPY

Qualitative or Quantitative Analysis? Explain below.

Typical Request

Sample ID Number: 040315020

Analysis Completed By: [signature] Date: 3/15/04

Contains Licensed Material

Sample Storage Location: _____

Radiochemistry Supervisor Review: [signature] Date: 4-2-04

REPORT NAME : QA_CHECK (V9.1) PAGE 1 OF ____
REPORT DATE : 15-MAR-2004 23:50
REQUESTOR : CAS

CYAPCO
HADDAM NECK STATION

POST NID QA ANALYSIS

TITLE : - PUMP B CONCRETE STUDY

SAMPLE No. : 040315020 OPERATOR NAME : CAS
SAMPLE TYPE : DIRT/SEDIMENT SAMPLE GEOMETRY : 1LMARSAND
COUNT TIME : 15-MAR-2004 23:25:24 SAMPLE QUANTITY : 1.48700E+03
SAMPLE TIME : 15-MAR-2004 15:40:00 DETECTOR : DET 5
LIBRARY : CHEM_CONCRETE

ISOTOPE	PEAK ENERGY	ENERGY DIFF (KEV)	DECAY CORR uCi/GM	COMMENTS
K-40	1460.80	-0.41	7.087E-06	QA Results OK
CO-60	1332.49	-0.18	2.900E-05	QA Results OK
CS-134	604.70	-0.12	1.123E-05	QA Results OK
CS-137	661.65	-0.14	1.128E-03	QA Results OK
AVG ENERGY DIFF =		-0.21	1.175E-03 = TOTAL GAMMA ACTIVITY	

UNIDENTIFIED/REJECTED PEAKS

ENERGY	NET AREA	FWHM	GAMMA/SEC	GAMMA/SEC /GM	% ERROR	FLAG	POTENTIAL ID	ACTIVITY
1322.66	180.	2.53	3.487E+01	2.345E-02	14.6	U	CSSUM	0.000E+00
1365.61	146.	1.76	2.903E+01	1.952E-02	13.5	P	CS-134	1.736E-05
1400.18	125.	1.66	2.532E+01	1.703E-02	16.0	U	CSSUM	0.000E+00

Total Unidentified/Rejected Peaks = 3
% Unidentified/Rejected Peaks = 25.00

Flags: U - Unknown Line
R - Rejected During Analysis
P - Positively Identified (line not in analysis library)

Performed by: Gus Conrad

Reviewed by: _____

**** End Of Report (1 Page) ****

Connecticut Yankee Atomic Power Co.

Radiochemistry Count Room

Connecticut Yankee Decommissioning Project

Gamma Spectroscopy Sample Analysis Request Form

Sample Taken By: MR Gibson Date / Time: 3/15/04 1540

Copy of Results To: Mike Degaspri Dept:____ Ext:____

Sample Description: ____

Location: Pump B Concrete study

Reason for Analysis: ____

If from Personnel: Name: ____ EID ____ RWP: ____

Contamination Levels:

<mDA β γ CCPM / DPM <mDA α CCPM / DPM <mDA mR/hr

Sample Weight / Volume: 144 (cc, ml, grams, etc.) [grams circled]

Sample Container: 1l

Is this sample for free release? YES or NO (circle one) [NO circled]

Is this sample being shipped offsite? YES or NO (circle one) [NO circled]

Save / Return sample after analysis? YES or NO (circle one) [NO circled]

Other info: ____

If this sample requires special storage requirements, please describe:

____

Responsible Individual for Disposal of Sample

Name: ____ Dept: ____ Ext: ____

Sample delivered to Count Room: Date / Time: ____

COUNT ROOM USE ONLY

Qualitative or Quantitative Analysis? Explain below. [Qualitative circled]

Dhysomin Report

Sample ID Number: 040315020

Analysis Completed By: [signature] Date: 3/15/04

Sample Storage Location: ____

Radiochemistry Supervisor Review: [signature] Date: 4-2-04

Contains Licensed Material

```
*****************************************
          15-MAR-2004 23:50:32.20

              CONNECTICUT YANKEE
              HADDAM NECK STATION
*****************************************

SAMPLE TITLE : - PUMP B CONCRETE STUDY
REASON FOR ANALYSIS: Supervisor request
SAMPLE ID     : 040315020              * SAMPLE GEOMETRY : 1LMARSAND
SAMPLE TIME   : 15-MAR-2004 15:40      * GEO EFFICIENCY DATE: 30-JUL-2003
SAMPLE TYPE   : DIRT/SEDIMENT          * SAMPLE QUANTITY : 1.48700E+03 GM
*****************************************************************************

DETECTOR          : DET 5              * LIBRARY          : CHEM_CONCRETE
LAST ENERGY CAL   : 15-MAR-2004 16:20  * ENERGY TOLERANCE: 1.00000
KEV/CHANNEL       : 5.00722E-01        * HALF LIFE RATIO : 9.00000
START CHANNEL     : 100                * END CHANNEL      : 4096
ACQ DATE & TIME   : 15-MAR-2004 23:25  * DEADTIME (%)     :  10%
PRESET  LIVE TIME : 0 00:10:00         * SENSITIVITY      : 5.00000
ELAPSED REAL TIME :     668.25 Secs    * GAUSSIAN SEN     : 10.00000
ELAPSED LIVE TIME :     600.00 Secs    * CORRECTION FACTOR: 1.00000E+00
DECAYED TO 0 DAYS  HOURS
FILE IDENT    : CAS$DISK:[NEU.SAMPLE.RP.NEW]040315020_ADC5_DIRTSEDIMENT.CNF;1

*****************************************************************************
ANALYSES : PEAK V16.8 NID V3.2 MINACT V2.8 WTMEAN V1.8
*****************************************************************************

Collected by : GIBSON
REVIEWED BY  : _____
COMMENTS     :

*****************************************************************************

Post-NID Peak Search Report

It   Energy     Area   Bkgnd  FWHM Channel  Left   Pw %Err    Fit   Nuclides

 0   562.99      410    3754  1.04 1124.88  1121    9 27.4          CS-134
 0   569.08     1006    4335  1.44 1137.06  1132   11 13.1          CS-134
 0   604.58     5852    3380  1.44 1207.98  1203   11  2.3          CS-134
 0   661.51   484023    2937  1.47 1321.76  1314   16  0.1          CS-137
 0   795.71     4203     554  1.51 1590.02  1584   14  2.0          CS-134
 0   801.76      423     433  1.83 1602.10  1598   11 10.7          CS-134
 0  1173.05     9085     241  1.88 2344.47  2339   13  1.1          CO-60
 0  1322.66      180     100  2.53 2643.68  2633   17 14.6
 0  1332.30     8160      65  1.96 2662.97  2653   20  1.1          CO-60
    1365.61      146      40  1.76 2729.59  2722   18 13.5
    1400.18      125      55  1.66 2798.75  2792   16 16.0
    1460.39      199      15  2.00 2919.20  2913   12  8.1          K-40
```

REPORT NAME : DET LIM (V1.1) PAGE 1 OF ___
REPORT DATE : 15-MAR-2004 23:50
REQUESTOR : CAS

CYAPCO
HADDAM NECK STATION

DETECTION LIMIT CONFIRMATION REPORT

Sample ID : 040315020
Sample Title : - PUMP B CONCRETE STUDY
Sample Time : 15-MAR-2004 15:40
Count Time : 15-MAR-2004 23:25
Sample Qauntity : 1.48700E+03 GM
Nuclide Library : CHEM_CONCRETE
Analyzed By : CAS
Sample Media : 1LMARSAND
Sample Shelf : 0
Detector : 5
Required LLD File : CAS_LLD:PGE_SAND_RELEASE.DAT - SEDIMENT 1LMARSAND0 FR

Nuclide	Required LLD (uCi/GM)		Measured VALUE (uCi/GM)	LLD MET
MN-54	1.500E-07	<	1.393E-07	Passed
CO-57	1.000E-06	<	2.450E-07	Passed
CO-58	1.000E-06	<	1.364E-07	Passed
CO-60	1.500E-07		2.900E-05	Okay
CS-134	1.500E-07		1.123E-05	Okay
CS-137	1.800E-07		1.128E-03	Okay

**** End Of Report (1 Page) ****

REPORT NAME : QA_CHECK (V9.1) PAGE 1 OF ___
REPORT DATE : 15-MAR-2004 23:50
REQUESTOR : CAS

CYAPCO
HADDAM NECK STATION

POST NID QA ANALYSIS

TITLE : - PUMP B CONCRETE STUDY

SAMPLE No. : 040315020 OPERATOR NAME : CAS
SAMPLE TYPE : DIRT/SEDIMENT SAMPLE GEOMETRY : 1LMARSAND
COUNT TIME : 15-MAR-2004 23:25:24 SAMPLE QUANTITY : 1.48700E+03
SAMPLE TIME : 15-MAR-2004 15:40:00 DETECTOR : DET 5
LIBRARY : CHEM_CONCRETE

ISOTOPE	PEAK ENERGY	ENERGY DIFF (KEV)	DECAY CORR uCi/GM	COMMENTS
K-40	1460.80	-0.41	7.087E-06	QA Results OK
CO-60	1332.49	-0.18	2.900E-05	QA Results OK
CS-134	604.70	-0.12	1.123E-05	QA Results OK
CS-137	661.65	-0.14	1.128E-03	QA Results OK
AVG ENERGY DIFF =		-0.21	1.175E-03	= TOTAL GAMMA ACTIVITY

UNIDENTIFIED/REJECTED PEAKS

ENERGY	NET AREA	FWHM	GAMMA/SEC	GAMMA/SEC /GM	% ERROR	FLAG	POTENTIAL ID	ACTIVITY
1322.66	180.	2.53	3.487E+01	2.345E-02	14.6	U	CSSUM	0.000E+00
1365.61	146.	1.76	2.903E+01	1.952E-02	13.5	P	CS-134	1.736E-05
1400.18	125.	1.66	2.532E+01	1.703E-02	16.0	U	CSSUM	0.000E+00

Total Unidentified/Rejected Peaks = 3
% Unidentified/Rejected Peaks = 25.00

Flags: U - Unknown Line
R - Rejected During Analysis
P - Positively Identified (line not in analysis library)

Performed by: Dan Conrad

Reviewed by: _____

**** End Of Report (1 Page) ****

Connecticut Yankee Atomic Power Co.

Radiochemistry Count Room

Connecticut Yankee Decommissioning Project

Gamma Spectroscopy Sample Analysis Request Form

Sample Taken By: MR Gibson Date / Time: 3-16-04

Copy of Results To: Mike Demaris Dept: _____ Ext: _____

Sample Description: Massileon from Concrete Chipping

Location: Pump Station B pit

Reason for Analysis: Unknown

If from Personnel: Name: _____ EID _____ RWP: 4149-1

Contamination Levels:

<mDA β γ CCPM / DPM <mDA α CCPM / DPM <mDA mR/hr

Sample Weight / Volume: _____ (cc, ml, grams, etc.)

Sample Container: _____

Is this sample for free release? YES or NO (circle one)

Is this sample being shipped offsite? YES or NO (circle one)

Save / Return sample after analysis? YES or NO (circle one)

Other info: _____

If this sample requires special storage requirements, please describe:

_____

Responsible Individual for Disposal of Sample

Name: _____ Dept: _____ Ext: _____

Sample delivered to Count Room: Date / Time: _____

COUNT ROOM USE ONLY

Qualitative or Quantitative Analysis? Explain below.

3600 Sec. Count on Chem Sewer library, Wing

47ml filter Geometry

Qualitative Analysis Only

Sample ID Number: 040316029A

Analysis Completed By: Bryan Date: 03.16.04

Sample Storage Location: Count Room Trash

Radiochemistry Supervisor Review: [signature] Date: 3-16-04

Contains Licensed Material

16-MAR-2004 15:22:18.26

CONNECTICUT YANKEE
HADDAM NECK STATION

SAMPLE TITLE : - MASSLINE: PAB-CHARGING PUMP B CUBICLE
REASON FOR ANALYSIS: Site Characterization

RWP NUMBER	: N/A	* SURVEY ID	: N/A
SAMPLE ID	: 040316029A	* SAMPLE GEOMETRY	: 47MLFILTER
SAMPLE TIME	: 16-MAR-2004 00:00	* GEO EFFICIENCY DATE	: 24-JUN-2003
SAMPLE TYPE	: SMEAR	* SAMPLE QUANTITY	: 1.00000E+00 SMR.
DETECTOR	: DET 5	* LIBRARY	: CHEM_SMEAR
LAST ENERGY CAL	: 16-MAR-2004 09:32	* ENERGY TOLERANCE	: 0.70000
KEV/CHANNEL	: 5.00679E-01	* HALF LIFE RATIO	: 9.00000
START CHANNEL	: 100	* END CHANNEL	: 4096
ACQ DATE & TIME	: 16-MAR-2004 14:22	* DEADTIME (%)	: 0.1%
PRESET LIVE TIME	: 0 01:00:00	* SENSITIVITY	: 5.00000
ELAPSED REAL TIME	: 3602.0 Secs	* GAUSSIAN SEN	: 10.00000
ELAPSED LIVE TIME	: 3600.0 Secs	* CORRECTION FACTOR	: 2.22000E+06

DECAYED TO 0 DAYS HOURS
FILE IDENT : CAS$DISK:[NEU.SAMPLE.RP.NEW]040316029A_ADC5_SMEAR.CNF;1

ANALYSES : PEAK V16.8 NID V3.2 MINACT V2.8 WTMEAN V1.8

Collected by : GIBSON
REVIEWED BY : _____
COMMENTS :

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	59.70	37	113	1.34	119.39	115	8	51.9		AM-241
0	511.50	120	103	2.02	1022.07	1015	17	21.6		
0	605.16	35	50	1.62	1209.23	1206	11	43.0		CS-134
0	661.70*	2764	53	1.43	1322.24	1315	15	2.0		CS-137
0	796.47	43	23	1.42	1591.64	1585	15	28.6		CS-134
0	1173.31*	290	3	1.76	2345.13	2339	12	6.4		CO-60
0	1332.66*	202	4	1.57	2663.84	2657	14	7.9		CO-60

Summary of Nuclide Activity Page : 2
Sample ID : 040316029A Acquisition date : 16-MAR-2004 14:22:01

Total number of lines in spectrum 7
Number of unidentified lines 1
Number of lines tentatively identified by NID 6 85.71%

Nuclide Type : AP

Nuclide	Hlife	Decay	Wtd Mean Uncorrected dpm/SMR.	Wtd Mean Decay Corr dpm/SMR.	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
CO-60	5.27Y	1.00	2.177E+02	2.177E+02	0.117E+02	5.39	
CS-134	2.06Y	1.00	2.121E+01	2.122E+01	0.532E+01	25.08	
AM-241	432.20Y	1.00	1.321E+01	1.321E+01	0.689E+01	52.15	
	Total Activity :		2.521E+02	2.522E+02			

Nuclide Type : FP

Nuclide	Hlife	Decay	Wtd Mean Uncorrected dpm/SMR.	Wtd Mean Decay Corr dpm/SMR.	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
CS-137	30.17Y	1.00	1.588E+03	1.588E+03	0.069E+03	4.32	
	Total Activity :		1.588E+03	1.588E+03			
	Grand Total Activity :		1.840E+03	1.840E+03			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

REPORT NAME : QA_CHECK (V9.1) PAGE 1 OF ___
REPORT DATE : 16-MAR-2004 15:22
REQUESTOR : CAS

CYAPCO
HADDAM NECK STATION

POST NID QA ANALYSIS

TITLE : - MASSLINE: PAB-CHARGING PUMP B CUBICLE

SAMPLE No. : 040316029A OPERATOR NAME : CAS
SAMPLE TYPE : SMEAR SAMPLE GEOMETRY : 47MLFILTER
COUNT TIME : 16-MAR-2004 14:22:01 SAMPLE QUANTITY : 1.00000E+00
SAMPLE TIME : 16-MAR-2004 00:00:00 DETECTOR : DET 5
LIBRARY : CHEM_SMEAR

ISOTOPE	PEAK ENERGY	ENERGY DIFF (KEV)	DECAY CORR dpm/SMR.	COMMENTS
CO-60	1332.49	0.18	2.177E+02	QA Results OK
CS-134	604.70	0.46	2.122E+01	QA Results OK
CS-137	661.65	0.05	1.588E+03	QA Results OK
AM-241	59.54	0.16	1.321E+01	** Count Rate Error = 52.
AVG ENERGY DIFF =		0.21	1.840E+03	= TOTAL GAMMA ACTIVITY

Qualitative Analysis Only.

Contains Licensed Material

UNIDENTIFIED/REJECTED PEAKS

ENERGY	NET AREA	FWHM	GAMMA/SEC	GAMMA/SEC /SMR.	% ERROR	FLAG	POTENTIAL ID	ACTIVITY
511.50	120.	2.02	7.678E-01	7.678E-01	21.6	U	ANN-RD	0.000E+00

Total Unidentified/Rejected Peaks = 1
% Unidentified/Rejected Peaks = 14.29

Flags: U - Unknown Line
R - Rejected During Analysis
P - Positively Identified (line not in analysis library)

Performed by: _____

Reviewed by: _____

**** End Of Report (1 Page) ****

Connecticut Yankee Atomic Power Co.
Radiochemistry Count Room
Connecticut Yankee Decommissioning Project

5nn

Gamma Spectroscopy Sample Analysis Request Form

Sample Taken By: MR Gibson Date / Time: 3-16-04
Copy of Results To: Mike Demars Dept: ____ Ext: ____
Sample Description: Massilom from Concrete Chipping
Location: Pump Station B pit
Reason for Analysis: unknown
If from Personnel: Name: ____ EID ____ RWP: 4149-1
Contamination Levels:
<mda β γ CCPM / DPM <mda α CCPM / DPM <mda mR/hr
Sample Weight / Volume: ____ (cc, ml, grams, etc.)
Sample Container: ____

Is this sample for free release? YES or NO (circle one)
Is this sample being shipped offsite? YES or NO (circle one)
Save / Return sample after analysis? YES or NO (circle one)
Other info: ____

If this sample requires special storage requirements, please describe:

Responsible Individual for Disposal of Sample
Name: ____ Dept: ____ Ext: ____
Sample delivered to Count Room: Date / Time: ____

COPY

COUNT ROOM USE ONLY

Qualitative or Quantitative Analysis? Explain below.
3600 sec. Count on Chem-Smear library, using 47mm filter geometry
Sample ID Number: 0403160291A
Analysis Completed By: Bryan Date: 03-16-04
Sample Storage Location: Count Room Trash
Radiochemistry Supervisor Review: [signature] Date: 3-16-04

Qualitati Analys Only

Conta Licen Mater

. QA_CHECK (V9.1)
: 16-MAR-2004 15:22
: CAS

CYAPCO
HADDAM NECK STATION

POST NID QA ANALYSIS

TITLE : - MASSLINE: PAB-CHARGING PUMP B CUBICLE

SAMPLE No. : 040316029A
SAMPLE TYPE : SMEAR
COUNT TIME : 16-MAR-2004 14:22:01
SAMPLE TIME : 16-MAR-2004 00:00:00
LIBRARY : CHEM_SMEAR

OPERATOR NAME : CAS
SAMPLE GEOMETRY : 47MLFILTER
SAMPLE QUANTITY : 1.00000E+00
DETECTOR : DET 5

ISOTOPE	PEAK ENERGY	ENERGY DIFF (KEV)	DECAY CORR dpm/SMR.	COMMENTS
CO-60	1332.49	0.18	2.177E+02	QA Results OK
CS-134	604.70	0.46	2.122E+01	QA Results OK
CS-137	661.65	0.05	1.588E+03	QA Results OK
AM-241	59.54	0.16	1.321E+01	* Count Rate Error = 52.
AVG ENERGY DIFF =		0.21	1.840E+03	= TOTAL GAMMA ACTIVITY

Qualitative Analysis Only

Contains Licensed Material

UNIDENTIFIED/REJECTED PEAKS

ENERGY	NET AREA	FWHM	GAMMA/SEC	GAMMA/SEC /SMR.	% ERROR	FLAG	POTENTIAL ID	ACTIVITY
511.50	120.	2.02	7.678E-01	7.678E-01	21.6	U	ANN-RD	0.000E+00

Total Unidentified/Rejected Peaks = 1
% Unidentified/Rejected Peaks = 14.29

Flags: U - Unknown Line
R - Rejected During Analysis
P - Positively Identified (line not in analysis library)

COPY

Performed by: _____

Reviewed by: _____

**** End Of Report (1 Page) ****

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
MAH Gibson	MR Gibson	PAB Metering Room

Date: 3-18-04 | Time: 1530 | Log #: 04-206
Area #: 2.2.14 | Map #: N/A | Rev. #: N/A

INSTRUMENTS USED

MODEL/SERIAL#	CAL DUE	PROBE/SERIAL#	CAL DU
RO20/1022	4-28-04	NA	
E520/4903	4-26-04	360	
		NA	

REASON FOR SURVEY

- ☐ ROUTINE
- ☐ RWP
- ☑ OTHER — Dose Rate Survey for next Test #5

AirSample Control #: NA | Total DAC Fraction: NA

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

βγ MDA= NA | α MDA= NA

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha

NA

Smear Continuation Sheet Used. ☐ YES ☐ NO

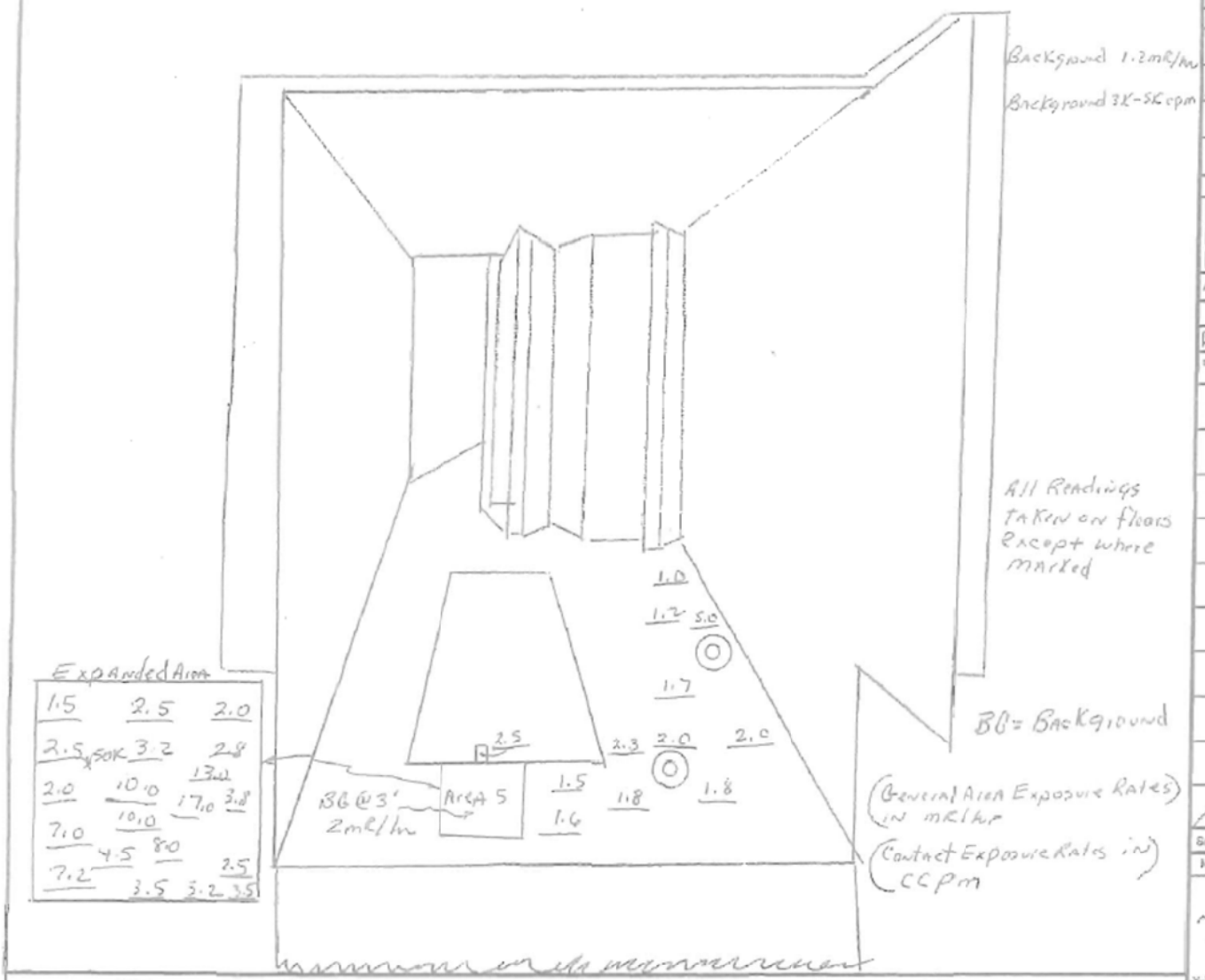
MDA= No Detectable Activity

Legend:

Dose rates are gamma and are in mrem/hr unless otherwise noted.
All smears in Dpm/100cm² unless other wise noted.
All LAS's in ccpm/LAS unless other wise noted.

- Large Area Swipe Location
- AirSample Location
- Smear Location
- Contact Exposure Rate
- General Area Exposure Rate
- Indicates Boundary
- STEP — Step Off Pad
- RPR — Respiratory Protection Required
- ARA — Airborne Radioactivity Area
- RA — Radiation Area
- CA — Contaminated Area
- HRA — High Radiation Area
- LHRA — Locked High Radiation Area
- RM — Radioactive Material(s)
- HCA — High Contamination Area
- HPA — Hot Particle Area
- RCA — Radiologically Controlled Area

HP MANAGER OR DESIGNEE REVIEW: DATE: 3-22-04



Postings ☐ Other
☑ RCA ☑ RM ☐ CA ☑ HRA ☐ LHRA
☐ Outside The RCA ☐ HCA ☐ HRA ☐ Spec 2

☐ Contact HP Prior to Entering
☐ Airborne Radioactivity Area
☐ Respirator Protection Required

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
MATT Gibson	MR Gibson	PAB Metering Pump Area

Date: 3-23-04 Time: 1250 Log #: 04-2222
Area #: 2214 Map #: N/A Rev. #: N/A

INSTRUMENTS USED

MODEL/SERIAL#	CAL DUE	PROBE/SERIAL#	CAL DUE
E140/1634	8-26-04	360	
APCII/70194	7-14-04	N/A	

REASON FOR SURVEY

- ☐ ROUTINE
- ☐ RWP
- ☑ OTHER — Pre Chipping & Post Cleaning Survey

AirSample Control #: N/A Total DAC Fraction: N/A

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

βMDA= 48.3 α MDA= 14.1

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
1	73.1	<MDA	11	244.2	<MDA
2	227.5		12	184.8	
3	118.2		13	142.0	
4	132.6		14	70.7	
5	130.1		15	427.1	
6	156.3		16	182.4	
7	172.9		17	172.9	
8	80.2		18	187.1	
9	144.4		19	123.0	
10	106.4		20	85.0	

Smear Continuation Sheet Used. ☐ YES ☐ NO

NOA= No Detectable Activity

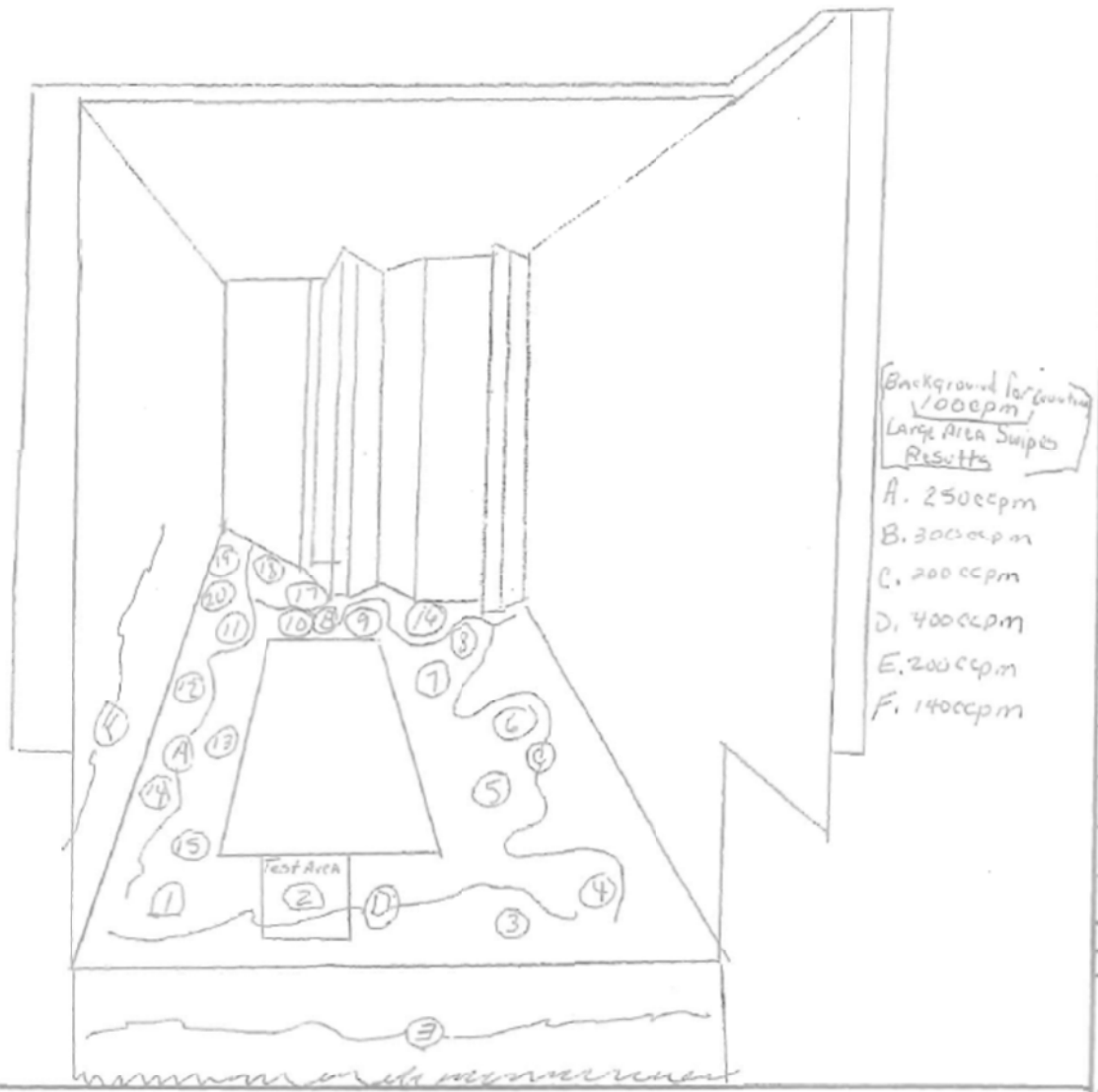
Legend:

Dose rates are gamma and are in mrem/hr unless otherwise noted.
All smears in Dpm/100cm² unless otherwise noted.
All LAS's in dpm/LAS unless otherwise noted.

- Large Area Swipe Location
- AirSample Location
- Smear Location
- Contact Exposure Rate
- General Area Exposure Rate
- Indicates Boundary
- SOP — Step Off Pad
- RPR — Respiratory Protection Required

ARA - Airborne Radioactivity Area
RA - Radiation Area
CA - Contaminated Area
HRA - High Radiation Area
LHRA - Locked High Radiation Area
RM - Radioactive Material(s)
HCA - High Contamination Area
HPA - Hot Particle Area
RCA - Radiologically Controlled Area

HP MANAGER OR DESIGNEE REVIEW: DATE: 3/25/04



Postings ☐ Other
☒ RCA ☑ RM ☒ CA ☒ RA ☐ LHRA
☐ Outside The RCA ☐ HCA ☐ HRA ☐ Spec 2

☐ Contact HP Prior to Entering
☐ Airborne Radioactivity Area
☐ Respirator Protection Required

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
MATT Gibson	MK Gibson	PAB Metering Pump Area

Date: 3-24-04 | Time: 1430 | Log #: 04-2296
Area #: 2214 | Map #: NA | Rev. # NA

INSTRUMENTS USED

MODEL/SERIAL#	CAL DUE	PROBE/SERIAL#	CAL DUE
RO20/2491	6-16-04	N/A	
E520/5016	6-24-04	360	
APC II 70194	7-14-04	N/A	
N/A	N/A		

REASON FOR SURVEY

- ☐ ROUTINE
- ☐ RWP
- ☑ OTHER — Post Chipping Survey

AirSample Control #: 032320 | Total DAC Fraction: 0.10

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

βγ MDA = 48.3 | α MDA = 14.1

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
1	244.2	< MDA	11	75.5	< MDA
2	56.5		12	146.8	
3	146.8		13	104.0	
4	158.6		14	< MDA	
5	144.4		15	115.9	
6	80.2		16	< MDA	
7	146.8		17	< MDA	
8	151.5		18	87.4	
9	66.0		19	68.3	
10	104.0		20	< MDA	

Smear Continuation Sheet Used. ☑ YES ☐ NO

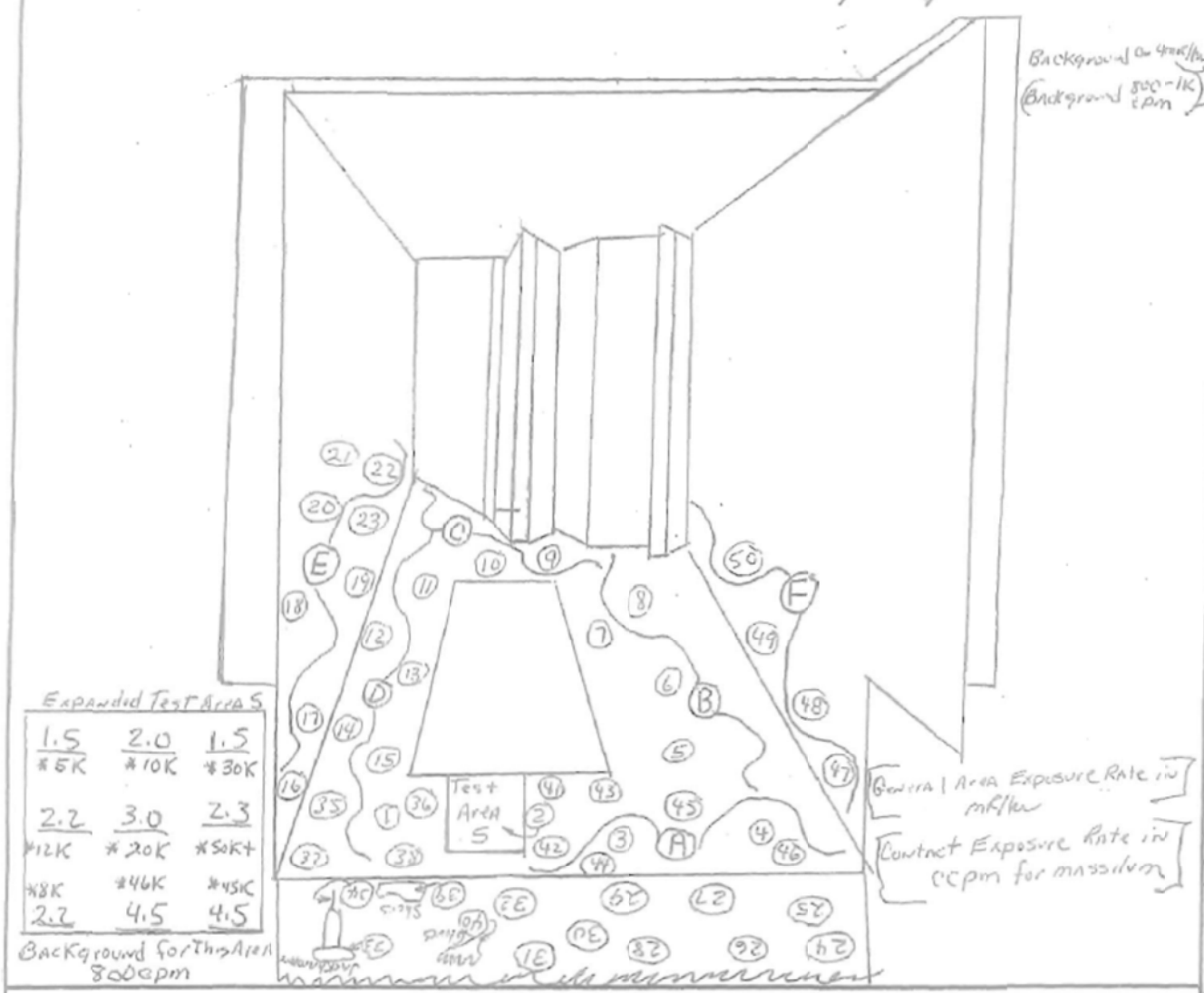
NDA = No Detectable Activity

Legend:

Dose rates are gamma and are in mr/hr/hr unless otherwise noted.
All smears in Dpm/100cm² unless other wise noted.
All LAS's in dpm/LAS unless other wise noted.

- Large Area Swipe Location
- AirSample Location
- Smear Location
- Contact Exposure Rate
- General Area Exposure Rate
- Indistinct Boundary
- Step Off Pad
- Respirator Protection Required
- ARA • Airborne Radioactivity Area
- RA • Radiation Area
- CA • Contaminated Area
- HRA • High Radiation Area
- LHRA • Locked High Radiation Area
- Rad • Radioactive Material(s)
- HCA • High Contamination Area
- HPA • Hot Particle Area
- RCA • Radiologically Controlled Area

HP MANAGER OR DESIGNEE REVIEW: [signature] DATE: 3/30/04



Postings ☐ Other _____
☑ RCA ☑ RM ☑ CA ☑ RA ☐ LHRA
☐ Outside The RCA ☐ HCA ☐ HRA ☐ Spec 2

☐ Contact HP Prior to Entering
☐ Airborne Radioactivity Area
☐ Respirator Protection Required

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

04-2296

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
Matt Gibson	MR Gibson	PAB Metering Pump Area

Survey Date: 3-24-04 | Survey Time: 1430
Area #: 2214 | Map #: NA | Rev.#: NA
Page 2 of 2

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
21	<MDA	<MDA	41	94.5	<MDA
22	<MDA		42	87.4	
23	87.4		43	113.5	
24	89.7		44	284.6	
25	<MDA		45	137.5	
26	56.5		46	77.9	
27	94.5		47	35.1	
28	49.3		48	77.9	
29	73.1		49	260.8	
30	54.1		50	186.0	↓
31	<MDA				
32	61.2				
33	<MDA				
34	96.9				
35	<MDA				
36	82.6				
37	<MDA				
38	73.1				
39	51.7				
41	96.9	↓			

INSTRUMENTS USED

MODEL#	SERIAL#	PROBE TYPE	CAL DUE
RO 20	2491	NA	6-16-04
E520	5016	360	6-24-04
ARC II	70194	NA	7-14-04

CONTAMINATION RESULTS (LAS)

	RESULTS	RESULTS
A	330 ccpm	
B	330	
C	280	
D	430	
E	130	
F	280	

Note: All header information (ie. Name, Signature, Survey Area# etc.) Should match that of the original survey for which this Smear Continuation Sheet is being used.

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Page 1 of 2

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
MAH Gibson	MR Gibson	PAB Metering Pump Area

Date: 3 25 04 | Time: 10 30 | Log #: 04-2297
Area #: 2214 | Map #: NA | Rev. #: NA

INSTRUMENTS USED

MODEL/SERIAL#	CAL DUE	PROBE/SERIAL#	CAL DUE
RO20/1192	9-17-04	NA	
E520/5016	6-24-04	360	N/A
ApCII/70194	7-14-04	NA	
	NA		

REASON FOR SURVEY

- ☐ ROUTINE
- ☐ RWP
- ☑ OTHER — PAB Area 2214 Survey after Clearing of Concrete and fines.

Air Sample Control #: NA | Total DAC Fraction: NA

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

βγ MDA = 48.3 | α MDA = 14.1

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
1	< MDA	< MDA	11	99.2	< MDA
2	104.0		12	61.2	
3	87.4		13	87.4	
4	99.2		14	73.1	
5	118.2		15	54.1	
6	111.1		16	80.2	
7	125.4		17	182.4	
8	70.7		18	94.5	
9	111.1		19	127.7	
10	< MDA	↓	20	< MDA	↓

Smear Continuation Sheet Used. ☑ YES ☐ NO

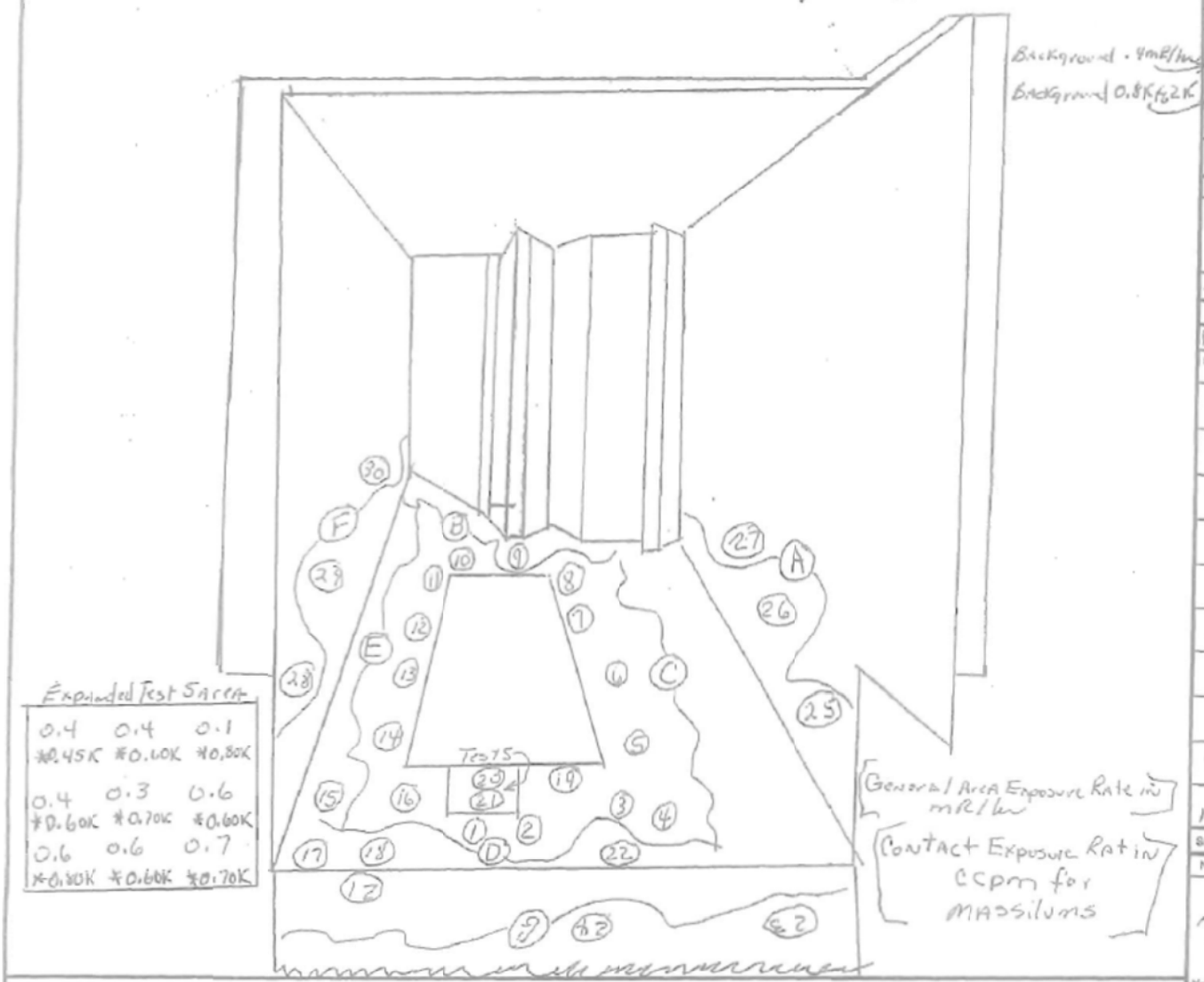
NDA = No Detectable Activity

Legend:

Dose rates are gamma and are in mrem/hr unless otherwise noted.
All smears in Dpm/100cm² unless other wise noted.
All LAS's in cpm/LAS unless other wise noted.

- Large Area Swipe Location
- AirSample Location
- Smear Location
- Contact Exposure Rate
- General Area Exposure Rate
- Indicates Boundary
- SOP — Step Off Pad
- RPA — Respiratory Protection Required
- ARA — Airborne Radioactivity Area
- RA — Radiation Area
- CA — Contaminated Area
- HRA — High Radiation Area
- LHRA — Locked High Radiation Area
- RM — Radioactive Material(s)
- HCA — High Contamination Area
- HPA — Hot Particle Area
- RCA — Radiologically Controlled Area

HP MANAGER OR DESIGNEE REVIEW: MR Gibson DATE: 3/25/04



Postings ☐ Other
☑ RCA ☑ RM ☑ CA ☑ RA ☐ LHRA
☐ Outside The RCA ☐ HCA ☐ HRA ☐ Spec 2

☐ Contact HP Prior to Entering
☐ Airborne Radioactivity Area
☐ Respirator Protection Required

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

04-2297

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:	Survey Date:	Survey Time:
Matt Gibson	MR Gibson	PAB Metering Pump Area	3-25-04	10:30

Area #: 2214 | Map #: NA | Rev. #: NA | Page 2 of 2

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
21	<MDA	<MDA												
22	125.4													
23	80.2													
24	70.7													
25	<MDA													
26	379.6													
27	104.0													
28	<MDA													
29	<MDA													
30	<MDA	↓												

N/A

INSTRUMENTS USED

MODEL#	SERIAL#	PROBE TYPE	CAL DUE
RO20	1192	N/A	9-12-04
ES20	5016	360	6-24-04
APC II	70194	NA	7-14-04

N/A

CONTAMINATION RESULTS (LAS)

	RESULTS	RESULTS
A	120 cpm	
B	220	
C	120	
D	220	
E	170	
F	70	
G	270 ↓	

N/A

N/A

Note: All header information (ie. Name, Signature, Survey Area# etc.) Should match that of the original survey for which this Smear Continuation Sheet is being used.

Connecticut Yankee Atomic Power Co.

Radiochemistry Count Room

Connecticut Yankee Decommissioning Project

Gamma Spectroscopy Sample Analysis Request Form

Sample Taken By: M R Gibson Date / Time: 3-23-04 / 1500

Copy of Results To: D DeGasperi Dept: ____ Ext: ____

Sample Description: Concrete Chips

Location: Pab Metering

Reason for Analysis: Characterization

If from Personnel: Name: ____ EID ____ RWP: 4149-1

Contamination Levels:

<MDA β γ CCPM / DPM <MDA α CCPM / DPM <MDA mR/hr

Sample Weight / Volume: 1298 (cc, ml, grams, etc.)

Sample Container: 1 L pour.

Is this sample for free release? YES or NO (circle one)

Is this sample being shipped offsite? YES or NO (circle one)

Save / Return sample after analysis? YES or NO (circle one)

Other info: ____

If this sample requires special storage requirements, please describe:

____

Responsible Individual for Disposal of Sample

Name: ____ Dept: ____ Ext: ____

Sample delivered to Count Room: Date / Time: ____

COUNT ROOM USE ONLY

Qualitative or Quantitative Analysis? Explain below.

Quantitative

Contains Licensed Material

Sample ID Number: 040323020

Analysis Completed By: J. Matvijw by [illegible] Date: 3-23-04

Sample Storage Location: picked up.

Radiochemistry Supervisor Review: [illegible] Date: 3-23-04

```
*****************************************
          23-MAR-2004 15:55:29.29

              CONNECTICUT YANKEE
              HADDAM NECK STATION
*****************************************

SAMPLE TITLE : - CONCRETE CHIPS:PAB METERING PUMP CUBICLE
SAMPLE ID    : 040323020                * SAMPLE GEOMETRY : 1lmar
SAMPLE TIME  : 23-MAR-2004 15:00        * GEO EFFICIENCY DATE: 30-JUL-2003
SAMPLE TYPE  : LIQUID                   * SAMPLE QUANTITY : 1.29800E+03 ML
*************************************************************************

DETECTOR          : DET 2               * LIBRARY          : CHEM_RELEASE
LAST ENERGY CAL   : 23-MAR-2004 00:58   * ENERGY TOLERANCE: 1.00000
KEV/CHANNEL       : 5.00584E-01         * HALF LIFE RATIO  : 9.00000
START CHANNEL     : 100                 * END CHANNEL      : 4096
ACQ DATE & TIME   : 23-MAR-2004 15:50   * DEADTIME (%)     :  28%
PRESET  LIVE TIME : 0 00:03:20          * SENSITIVITY      : 5.00000
ELAPSED REAL TIME :     277.38 Secs     * GAUSSIAN SEN     : 10.00000
ELAPSED LIVE TIME :     200.00 Secs     * CORRECTION FACTOR: 1.00000E+00
DECAYED TO 0 DAYS  HOURS
FILE IDENT    : CAS$DISK:[NEU.SAMPLE.CHEM.NEW]040323020_ADC2_LIQUID.CNF;1

*************************************************************************
ANALYSES : PEAK V16.8 NID V3.2 MINACT V2.8 WTMEAN V1.8
*************************************************Contains**********
                                                Licensed
                                                Material
Collected by : GIBSON
REVIEWED BY  : _____
COMMENTS     :

*************************************************************************
```

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
2	661.65*	644314	10888	1.82	1322.77	1314	43	0.1	2.30E+02	CS-137
2	670.10	2126	10741	1.73	1339.69	1314	43	9.5		
0	1173.57*	845	1171	2.16	2346.97	2340	16	9.8		CO-60
0	1321.97	1373	866	3.41	2644.04	2635	18	5.9		
0	1332.75*	762	476	2.08	2665.62	2655	19	7.8		CO-60

REPORT NAME : QA_CHECK (V9.1) PAGE 1 OF ___
REPORT DATE : 23-MAR-2004 15:55
REQUESTOR : CAS

CYAPCO
HADDAM NECK STATION

POST NID QA ANALYSIS

TITLE : - CONCRETE CHIPS:PAB METERING PUMP CUBICLE

SAMPLE No. : 040323020 OPERATOR NAME : CAS
SAMPLE TYPE : LIQUID SAMPLE GEOMETRY : 1lmar
COUNT TIME : 23-MAR-2004 15:50:39 SAMPLE QUANTITY : 1.29800E+03
SAMPLE TIME : 23-MAR-2004 15:00:00 DETECTOR : DET 2
LIBRARY : CHEM_RELEASE

ISOTOPE	PEAK ENERGY	ENERGY DIFF (KEV)	DECAY CORR uCi/ML	COMMENTS
CO-60	1332.49	0.27	1.286E-05	QA Results OK
CS-137	661.65	0.00	7.015E-03	QA Results OK
AVG ENERGY DIFF =		0.13	7.028E-03	= TOTAL GAMMA ACTIVITY

UNIDENTIFIED/REJECTED PEAKS

ENERGY	NET AREA	FWHM	GAMMA/SEC	GAMMA/SEC /ML	% ERROR	FLAG	POTENTIAL ID	ACTIVITY
670.10	2126.	1.73	9.566E+02	7.370E-01	9.49	U		
1321.97	1373.	3.41	1.107E+03	8.529E-01	5.85	U		

Contains Licensed Material

Total Unidentified/Rejected Peaks = 2
% Unidentified/Rejected Peaks = 40.00

Flags: U - Unknown Line
R - Rejected During Analysis
P - Positively Identified (line not in analysis library)

Operator Overrode Dead Time Limit

Performed by: _____

Reviewed by: _____

**** End Of Report (1 Page) ****

Control Number: 032320

Attachment A
Air Sample Counting Sheet
Section 1 - Collection Data

Sample Taken By: gibson

Sample Date:	Sample Location and Work Activities Performed:			
23-Mar-04	pab metering- concrete chipping			
RWP / Job Step: 4149/1	Routine: D W M	Sampler Serial Number: 90	Sampler Type: ras	Sampler Cal Due Date: 6/15/2004
Sample Time & Date: On: 03/23/04 14:15 Off: 03/23/04 15:20	Collection Time (min): 65	Flow Rate: 1 cfm	Sample Volume: 65 Cu. Ft.	

Gross Beta-Gamma activity of ≤ 6.0 E-11 = ≤ 0.3 Total Particulate DAC

Co-60 activity of ≤ 6.0 E-11 = ≤ 0.3 Total DAC

Conversion Factors: Liters -- 4.5E-10 liters uCi / ml dpm

Cubic Feet -- 1.6E-11 cubic feet uCi / ml dpm

Section 2 -- Gross Beta-Gamma

Gross β/γ concentration of > 6.0 E -11 uCi/cc requires MGCA Count, If available

1st Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross β/γ Concentration (uCi/cc)
3/23/04 20:15	XLB-1	40045-1	10/08/04	ash	MGCA Count Required: 1.42E-10

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume
117	0.5	234.00	2.58	12.92	231.42	2.5	1.6E-11	65 Cu. Ft.

MDA = 7.96E-12

Section 3 -- Gross Alpha

MGCA results of > 6.0E-11 uCi/cc Co-60 requires alpha count

1st Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross α Concentration (uCi/cc)
N/A	N/A	N/A	N/A	N/A	N/A

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume	SAF
N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.6E-11	65 Cu. Ft.	1.3

MDA =

Initial Gross alpha concentration of ≥ 1.0 E-12 requires a decayed recount

2nd Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross α Concentration (uCi/cc)
N/A	N/A	N/A	N/A	N/A	N/A

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume	SAF
N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.6E-11	65 Cu. Ft.	1.3

MDA =

Section 4 -- Scaled DAC Fractions

(Only for air samples taken in area less than 200 dpm/100 cm² alpha)

Type	uCi/cc	DAC Fraction	Scaling Conversion	Scaled α/β/γ DAC Fraction
Co-60 or Gross β/γ (DAC=1.0E-8)	1.95E-11	1.95E-03	50 X Co-60 OR Gross β/γ DAC Fraction	< 0.098

Co-60 result is less than MDA

Section 5 -- Measured DAC Fractions

Type	Initial uCi/cc	Initial DAC Fraction	Final uCi/cc	Final DAC Fraction
MGCA or Gross β/γ (DAC=1.0E-8)	N/A	N/A	N/A	N/A
Gross Alpha (DAC=3.0E-12)x1.1	N/A	N/A	N/A	N/A
Total Measured DAC Fraction =		N/A		N/A

Reviewed By: [signature] Date: 3/24/04

Software Control #0007-02

23-MAR-2004 21:15:49.42

CONNECTICUT YANKEE
HADDAM NECK STATION

SAMPLE TITLE : - PAB METERING PMP RM- CHIP CONCRETE
REASON FOR ANALYSIS: Air Filter count for Beta Limit
RWP NUMBER : 4149/1 * SURVEY ID : 032320
SAMPLE ID : 040323026 * SAMPLE GEOMETRY : 47MLFILTER
GEO EFFICIENCY DATE : 24-JUN-2003

AIR SAMPLER ID# : 90 * CAL DUE DATE : 15-JUN-2004
START TIME : 23-MAR-2004 14:15 * END TIME : 23-MAR-2004 15:20
START FLOW RATE: 1.0000 * END FLOW RATE : 1.0000
SAMPLE TIME : 23-MAR-2004 15:20:00.00
SAMPLE TYPE : AIR PARTICULATE * SAMPLE QUANTITY : 1.84059E+06 CC

DETECTOR : DET 5 * LIBRARY : CHEM_SMEAR
LAST ENERGY CAL : 23-MAR-2004 00:38 * ENERGY TOLERANCE: 1.00000
KEV/CHANNEL : 5.00482E-01 * HALF LIFE RATIO : 9.00000
START CHANNEL : 100 * END CHANNEL : 4096
ACQ DATE & TIME : 23-MAR-2004 21:05 * DEADTIME (%) : 0.0%
PRESET LIVE TIME : 0 00:10:00 * SENSITIVITY : 5.00000
ELAPSED REAL TIME : 600.09 Secs * GAUSSIAN SEN : 10.00000
ELAPSED LIVE TIME : 600.00 Secs * CORRECTION FACTOR : 1.00000E+00
DECAYED TO 0 DAYS HOURS
FILE IDENT : CAS$DISK:[NEU.SAMPLE.RP.NEW]040323026_ADC5_AIR.CNF;1

ANALYSES : PEAK V16.8 NID V3.2 MINACT V2.8 WTMEAN V1.8

COLLECTED BY : GIBSON
REVIEWED BY :
COMMENTS :

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	63.48*	7	0	1.18	126.96	124	7	76.3		
0	234.08	15	5	1.10	467.90	462	10	38.0		
	661.38*	219	0	1.61	1322.10	1318	9	6.8		CS-137

Derived Air Concentration Report Page : 2
Sample ID : 040323026 Acquisition date : 23-MAR-2004 21:05:33

Nuclide Type : FP

Nuclide	Activity (uCi/CC)	1-Sigma % Error	DAC (uCi/CC)		Fractional DAC
CS-137	1.850E-10	7.8	6E-08	(D)	3.083E-03
Totals:	1.850E-10				3.083E-03
Grand Totals:	1.850E-10				3.083E-03

REPORT NAME : DET LIM (V1.1) PAGE 1 OF ___
REPORT DATE : 23-MAR-2004 21:15
REQUESTOR : CAS

CYAPCO
HADDAM NECK STATION

DETECTION LIMIT CONFIRMATION REPORT

Sample ID : 040323026
Sample Title : - PAB METERING PMP RM- CHIP CONCRETE
Sample Time : 23-MAR-2004 15:20
Count Time : 23-MAR-2004 21:05
Sample Qauntity : 1.84059E+06 CC
Nuclide Library : CHEM_SMEAR
Analyzed By : CAS
Sample Media : 47MLFILTER
Sample Shelf : 0
Detector : 5
Required LLD File : CAS_LLD:PGE_HP_PART.DAT - HEALTH PHYSICS AIR PARTICUL

Nuclide	Required LLD (uCi/CC)	Measured VALUE (uCi/CC)	LLD MET
CO-60	6.000E-11	< 1.947E-11	Passed

**** End Of Report (1 Page) ****

REPORT NAME : QA_CHECK (V9.1) PAGE 1 OF ___
REPORT DATE : 23-MAR-2004 21:15
REQUESTOR : CAS

CYAPCO
HADDAM NECK STATION

POST NID QA ANALYSIS

TITLE : - PAB METERING PMP RM- CHIP CONCRETE

SAMPLE No. : 040323026 OPERATOR NAME : CAS
SAMPLE TYPE : AIR PARTICULATE SAMPLE GEOMETRY : 47MLFILTER
COUNT TIME : 23-MAR-2004 21:05:33 SAMPLE QUANTITY : 1.84059E+06
SAMPLE TIME : 23-MAR-2004 15:20:00 DETECTOR : DET 5
LIBRARY : CHEM_SMEAR

ISOTOPE	PEAK ENERGY	ENERGY DIFF (KEV)	DECAY CORR uCi/CC	COMMENTS
CS-137	661.65	-0.27	1.850E-10	QA Results OK
AVG ENERGY DIFF =		-0.27	1.850E-10 = TOTAL GAMMA ACTIVITY	

UNIDENTIFIED/REJECTED PEAKS

ENERGY	NET AREA	FWHM	GAMMA/SEC	GAMMA/SEC /CC	% ERROR	FLAG	POTENTIAL ID	ACTIVITY
63.48	7.	1.18	8.260E-02	4.488E-08	76.3	U	PB_X-RAY	0.000E+00
						R	TH-234	3.141E-11
234.08	15.	1.10	3.017E-01	1.639E-07	38.0	U		

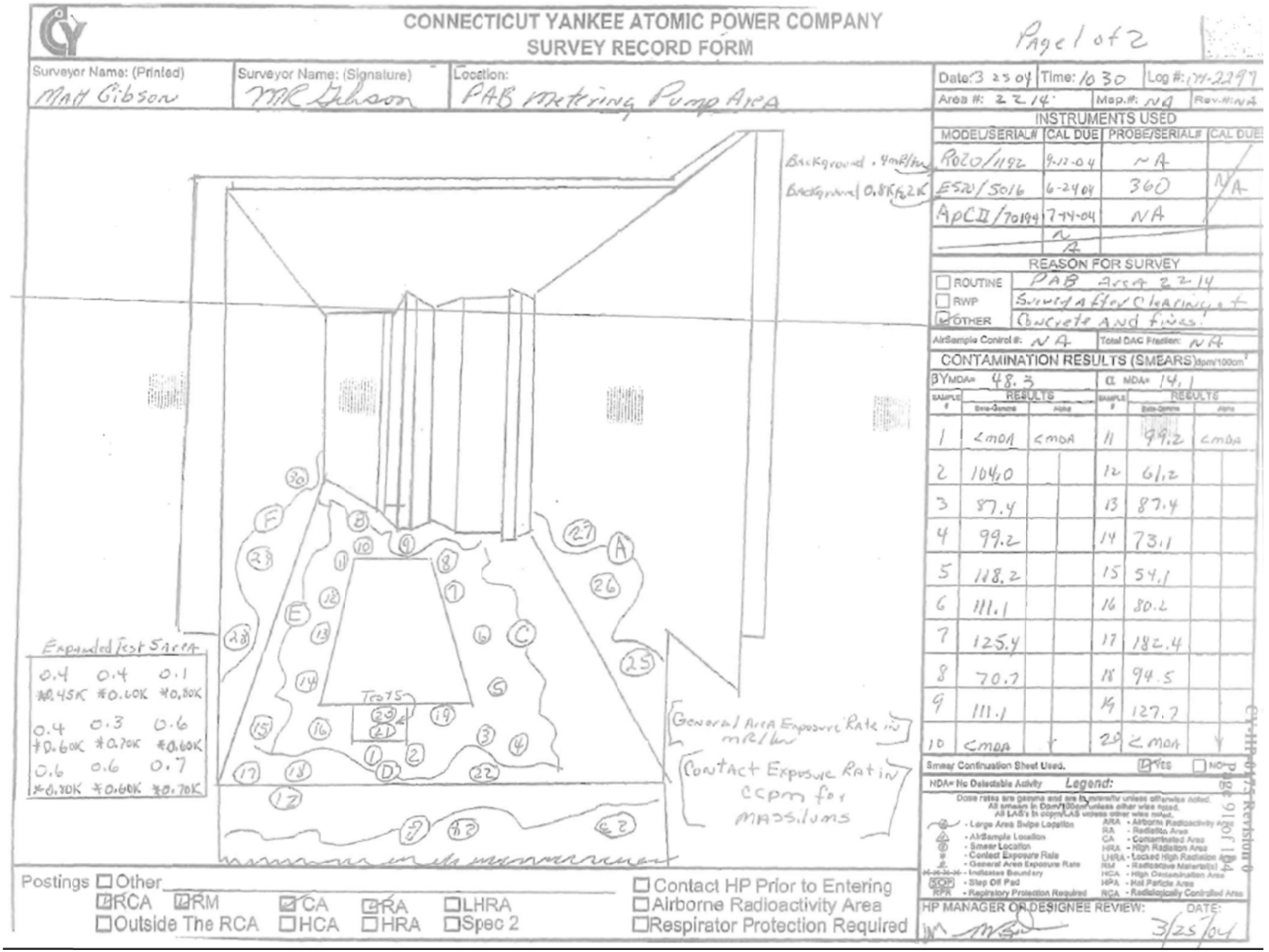
Total Unidentified/Rejected Peaks = 2
% Unidentified/Rejected Peaks = 66.67

Flags: U - Unknown Line
R - Rejected During Analysis
P - Positively Identified (line not in analysis library)

Performed by: _____

Reviewed by: _____

**** End Of Report (1 Page) ****



CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Page 1 of 2

Surveyor Name: (Printed): MAH Gibson
Surveyor Name: (Signature): MR Gibson
Location: PAB Metering Pump Area

Date: 3 25 04 | Time: 10 30 | Log #: CY-2297
Area #: 2214 | Map #: NA | Rev #: NA

INSTRUMENTS USED

MODEL/SERIAL#	CAL DUE	PROBE/SERIAL#	CAL DUE
RO20/1192	9-12-04	NA	
ESP1/5016	6-24-04	360	N/A
ApCII/70194	7-14-04	NA	
	NA		

REASON FOR SURVEY
☐ ROUTINE — PAB Area 2214
☐ RWP — Survey After Clearing of Concrete and tiles.
☑ OTHER

AirSample Control #: NA | Total DAC Fraction: NA

CONTAMINATION RESULTS (SMEARS) dpm/100cm²
βγ MDA = 48.3 | α MDA = 14.1

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
1	<MDA	<MDA	11	99.2	<MDA
2	104.0		12	61.2	
3	87.4		13	87.4	
4	99.2		14	73.1	
5	118.2		15	54.1	
6	111.1		16	80.2	
7	125.4		17	182.4	
8	70.7		18	94.5	
9	111.1		19	127.7	
10	<MDA		20	<MDA	

Smear Continuation Sheet Used. ☑ YES ☐ NO

NDA = No Detectable Activity

Legend:
- Large Area Swipe Location
- AirSample Location
- Smear Location
- Contact Exposure Rate
- General Area Exposure Rate
- Indicates Boundary
- Step Off Pad
- Respiratory Protection Required
- ARA - Airborne Radioactivity Area
- RA - Radiation Area
- CA - Contaminated Area
- HRA - High Radiation Area
- LHRA - Locked High Radiation Area
- RM - Radioactive Material(s)
- HCA - High Contamination Area
- HPA - Hot Particle Area
- RCA - Radiologically Controlled Area

HP MANAGER OR DESIGNEE REVIEW: DATE: 3/25/04

Expanded Test 5 Area

0.4 #0.45K	0.4 #0.60K	0.1 #0.80K
0.4 #0.60K	0.3 #0.70K	0.6 #0.60K
0.6 #0.80K	0.6 #0.60K	0.7 #0.70K

Tests

Background = 4 mR/hr
Background 0.8K & 2K

General Area Exposure Rate in mR/hr

Contact Exposure Rate in cpm for Masslums

Postings ☐ Other
☑ RCA ☑ RM ☑ CA ☑ RA ☐ LHRA
☐ Outside The RCA ☐ HCA ☐ HRA ☐ Spec 2

☐ Contact HP Prior to Entering
☐ Airborne Radioactivity Area
☐ Respirator Protection Required

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CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

04-2297

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
Matt Gibson	MR Gibson	PAB Metering Pump Area

Survey Date: 3-23-04 | Survey Time: 10:30
Area #: 2214 | Map #: NA | Rev.#: NA
Page 2 of 2

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
21	<MDA	<MDA									
22	125.4										
23	80.2										
24	70.7										
25	<MDA										
26	3796										
27	1040										
28	<MDA										
29	<MDA										
30	<MDA										

N/A

INSTRUMENTS USED

MODEL#	SERIAL#	PROBE TYPE	CAL DUE
RO20	1192	N/A	9-12-04
ES20	5016	360	6-24-04
APC II	70194	NA	7-14-04

N/A

CONTAMINATION RESULTS (LAS)

	RESULTS	RESULTS
A	120 ccpm	
B	220	
C	120	
D	220	
E	170	
F	70	
G	270	

N/A

N/A

Note: All header information (ie. Name, Signature, Survey Area# etc.) Should match that of the original survey for which this Smear Continuation Sheet is being used.

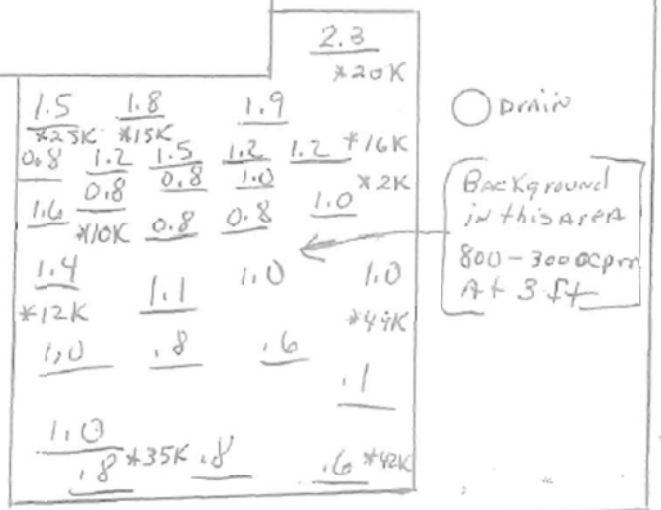
CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
Matt Gibson	MR Gibson	PAB metering Pump Area

Date: 3-25-04 | Time: 1430 | Log #: 04-233C
Area #: 2214 | Map #: NA | Rev. #: NA

Background 0.4mR/hr →
Background 0.8 – 3.0K cpm

Pedistal



General Area Exposure Rates in mR/hr
Contact Exposure Rates in kCpm

INSTRUMENTS USED

MODEL/SERIAL#	CAL DUE	PROBE/SERIAL#	CAL DUE
RO20/1192	9/14/04	NA	
ES20/5016	6/24/04	360	
	N		
	A	NA	

REASON FOR SURVEY

- ☐ ROUTINE
- ☐ RWP
- ☑ OTHER

Layout for next Test.

AirSample Control #: NA | Total DAC Fraction: NA

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

βγ MDA= NA | α MDA= NA

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
	N			A	

Smear Continuation Sheet Used. ☐ YES ☒ NO

NDA= No Detectable Activity

Legend:

Dose rates are gamma and are in mrem/hr unless otherwise noted
All smears in Dpm/100cm² unless other wise noted.
All LAS's in cpm/LAS unless other wise noted.

- Large Area Swipe Location
- AirSample Location
- Smear Location
- Contact Exposure Rate
- General Area Exposure Rate
- Indicates Boundary
- Step Off Pad
- Respiratory Protection Required

ARA - Airborne Radioactivity Area
RA - Radiation Area
CA - Contaminated Area
HRA - High Radiation Area
LHRA - Locked High Radiation Area
RM - Radioactive Material(s)
HCA - High Contamination Area
HPA - Hot Particle Area
RCA - Radiologically Controlled Area

HP MANAGER OR DESIGNEE REVIEW: MR Gibson DATE: 3/30/04

Postings ☐ Other
☑ RCA ☑ RM ☑ CA ☑ RA ☐ LHRA
☐ Outside The RCA ☐ HCA ☐ HRA ☐ Spec 2

☐ Contact HP Prior to Entering
☐ Airborne Radioactivity Area
☐ Respirator Protection Required

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CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Page 1 of 2.

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
MRGibson	MRGibson	PAB Metering Pump Area

Date: 3-29-04 | Time: 1030 | Log #: 04-2426
Area #: R214 | Map #: NA | Rev. # NA

INSTRUMENTS USED

MODEL/SERIAL#	CAL DUE	PROBE/SERIAL#	CAL DUE
RO20/1184	9-27-04	NA	
E520/4403	6-26-04	360	
XLB2/40045-2	2-21-05	NA	
N/A	N/A		

REASON FOR SURVEY

☐ ROUTINE
☐ RWP
☑ OTHER
Post Ship, Debris still in place

AirSample Control #: 032911 | Total DAC Fraction: 0.13

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

βγ MDA = 58.76 | α MDA = 16.33

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
1	<MDA	<MDA	11	125.97	<MDA
2			12	73.46	
3			13	<MDA	
4			14		
5	↓		15		
6	56.13		16	↓	
7	<MDA		17	56.13	
8	64.79		18	<MDA	
9	<MDA		19		
10	73.46		20	↓	

Smear Continuation Sheet Used. ☑ YES ☐ NO

NDA = No Detectable Activity

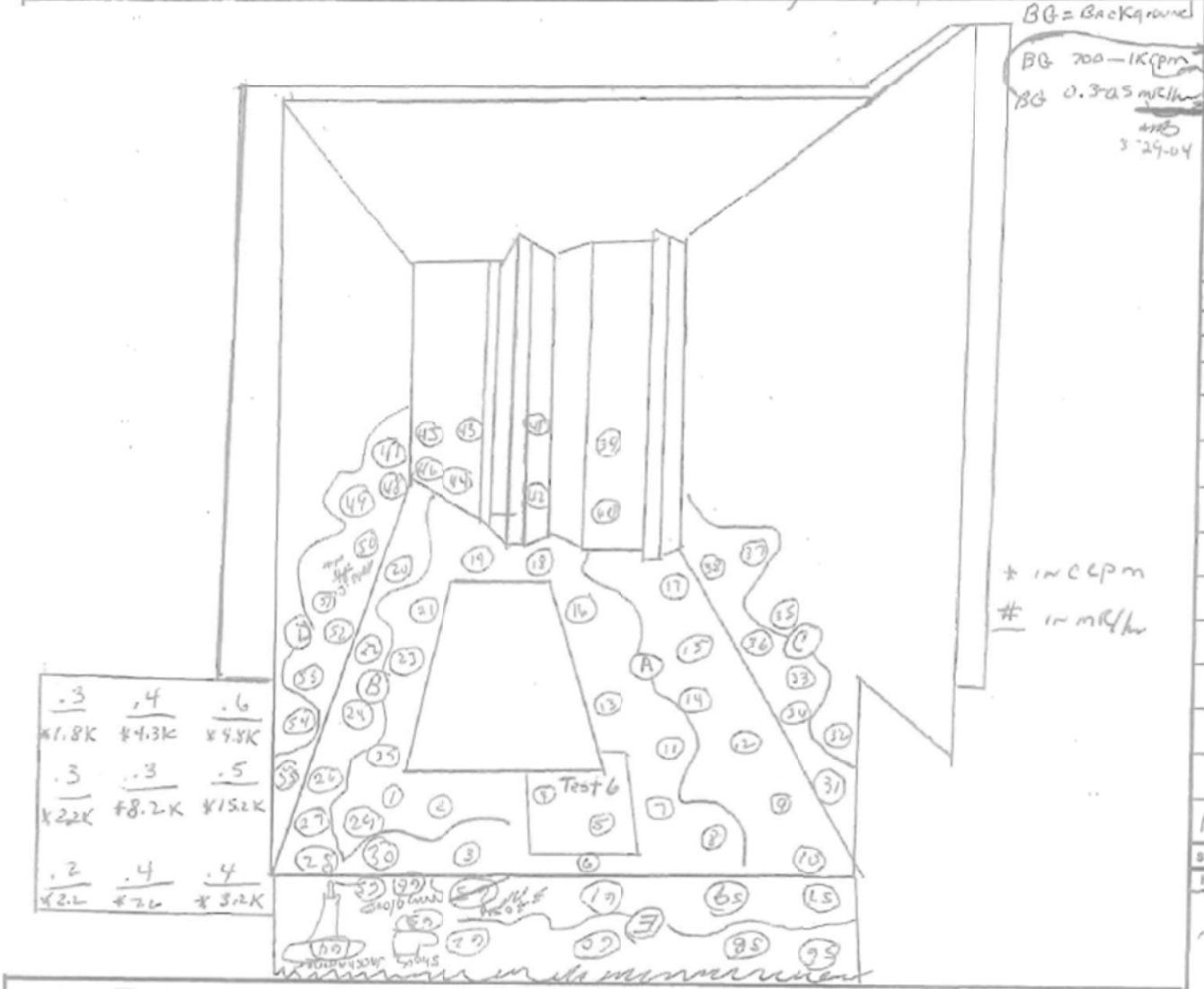
Legend:

Dose rates are gamma and are in mrem/hr unless otherwise noted.
All smears in Dpm/100cm² unless other wise noted.
All LAS's in cpm/LAS unless other wise noted.

- Large Area Swipe Location
- AirSample Location
- Smear Location
- Contact Exposure Rate
- General Area Exposure Rate
- Indicates Boundary
- SOP RPR — Step Off Pad / Respiratory Protection Required

ARA — Airborne Radioactivity Area
RA — Radiation Area
CA — Contaminated Area
HRA — High Radiation Area
LHRA — Locked High Radiation Area
RM — Radioactive Material(s)
HCA — High Contamination Area
HPA — Hot Particle Area
RCA — Radiologically Controlled Area

HP MANAGER OR DESIGNEE REVIEW: MRG | DATE: 3/30/04



Postings ☐ Other
☑ RCA ☑ RM ☑ CA ☑ RA ☐ LHRA
☐ Outside The RCA ☐ HCA ☐ HRA ☐ Spec 2

☐ Contact HP Prior to Entering
☐ Airborne Radioactivity Area
☐ Respirator Protection Required

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CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Page 2 of 12
04-24-26

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
MR Gibson	MR Gibson	PAB Metering Area

Survey Date: | Survey Time:
Area #: | Map #: | Rev #:
Page of

CONTAMINATION RESULTS (SMEARS) dpm/100cm²

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
21	<MDA	<MDA	41	<MDA	<MDA	61	<MDA	<MDA						
22	<MDA		42			62								
23	64.79		43			63								
24	<MDA		44	↓		64								
25	108.13		45	83.13		65								
26	<MDA		46	<MDA		66	↓							
27	64.79		47											
28	<MDA		48											
29			49											
30			50	↓										
31			51	64.79										
32			52	<MDA										
33	↓		53											
34	125.47		54											
35	220.82		55											
36	99.47		56											
37	<MDA		57											
38	212.15		58											
39	<MDA		59											
40	<MDA	↓	60	↓	↓									

INSTRUMENTS USED

MODEL#	SERIAL#	PROBE TYPE	CAL DUE

CONTAMINATION RESULTS (LAS)

	RESULTS	RESULTS
A	260 cpm	
B	240	
C	300	
D	125	
E	280	

Note: All header information (ie. Name, Signature, Survey Area# etc.) Should match that of the original survey for which this Smear Continuation Sheet is being used.

CONNECTICUT YANKEE ATOMIC POWER COMPANY
SURVEY RECORD FORM

Surveyor Name: (Printed)	Surveyor Name: (Signature)	Location:
Matt Gibson	MR Gibson	PAB Metering Pump Area

Date: 3-29-04 | Time: 1420 | Log #: 04-242
Area #: 2214 | Map #: NA | Rev. #: NA

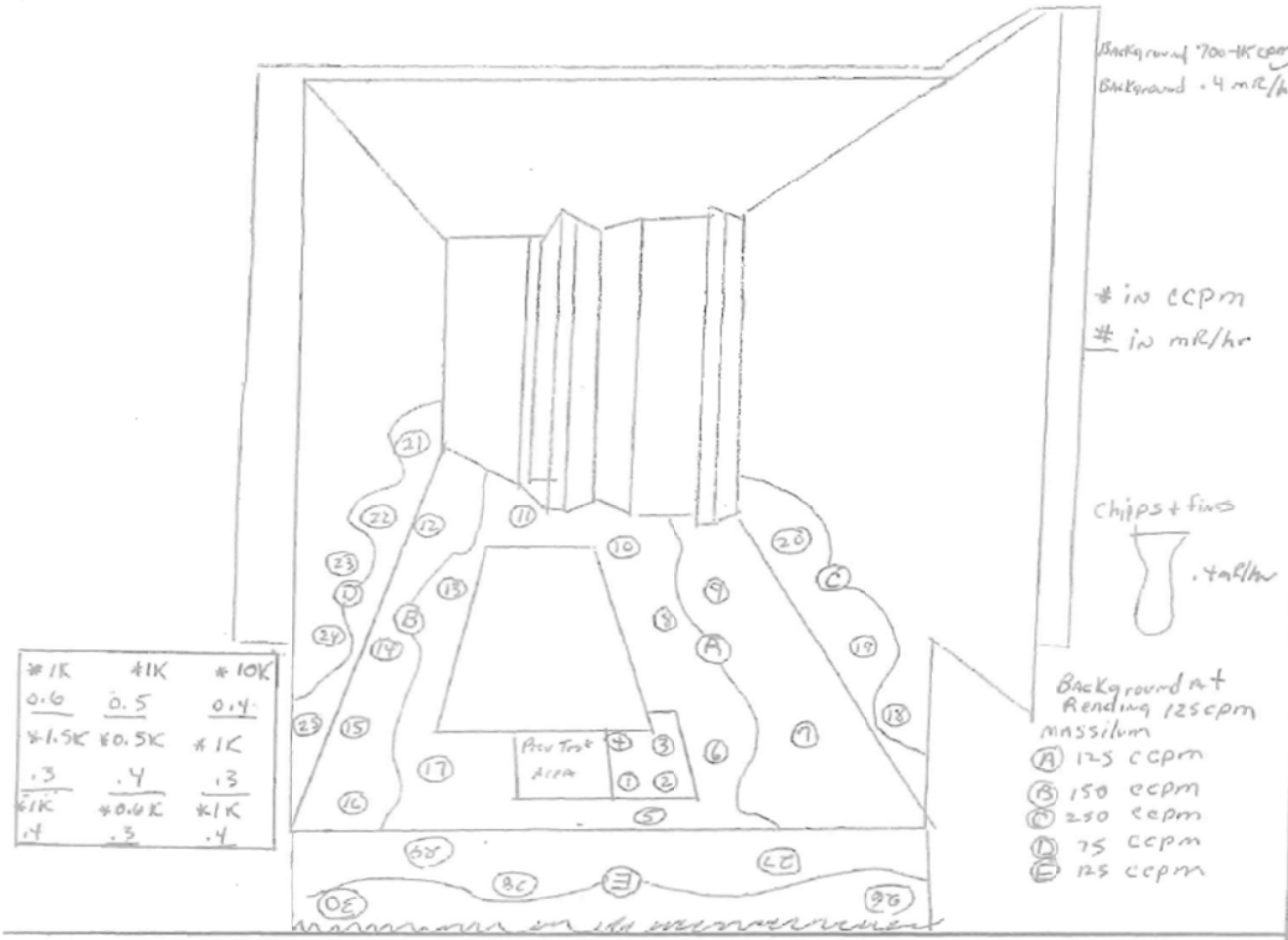
INSTRUMENTS USED

MODEL/SERIAL#	CAL DUE	PROBE/SERIAL#	CAL DUE
E520/~~4035~~ 5016	~~3/22/04~~ 6-24-04	360	
R020/1257 ~~3-22-04~~	5/5/04	N	
XLB-3/40045-2	3/21/05	A	

REASON FOR SURVEY

☐ ROUTINE ☐ RWP ☑ OTHER — Pre Chip Survey, Debris Removed, Area floors massilum + mopped

AirSample Control #: N/A | Total DAC Fraction: N/A



CONTAMINATION RESULTS (SMEARS) dpm/100cm²

βγ MDA = 58.76 | α MDA = 16.33

SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha	SAMPLE #	RESULTS Beta-Gamma	RESULTS Alpha
1	<MDA	<MDA	11	<MDA	<MDA
2	<MDA				
3	<MDA				
4	90.8				
5	<MDA				
6	82.13				
7	<MDA				
8	<MDA				
9	73.46				
10	333.51	↓	30	↓	↓

Smear Continuation Sheet Used. ☐ YES ☑ NO

NDA = No Detectable Activity **Legend:**

Dose rates are gamma and are in mrem/hr unless otherwise noted
All smears in Dpm/100cm² unless other wise noted
All LAS's in ccpm/LAS unless other wise noted

- Large Area Swipe Location
- AirSample Location
- Smear Location
- Contact Exposure Rate
- General Area Exposure Rate
- X-X-X-X Indicates Boundary
- SOP Step Off Pad
- RPR Respiratory Protection Required

ARA - Airborne Radioactivity Area
RA - Radiation Area
CA - Contaminated Area
HRA - High Radiation Area
LHRA - Locked High Radiation Area
RM - Radioactive Material(s)
HCA - High Contamination Area
HPA - Hot Particle Area
RCA - Radiologically Controlled Area

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Postings ☐ Other ______
☑ RCA ☑ RM ☑ CA ☐ RA ☐ LHRA
☐ Outside The RCA ☐ HCA ☐ HRA ☐ Spec 2

☐ Contact HP Prior to Entering
☐ Airborne Radioactivity Area
☐ Respirator Protection Required

HP MANAGER OR DESIGNEE REVIEW: [signature] DATE: 3/31/04

Control Number: 032911

Attachment A
Air Sample Counting Sheet
Section 1 - Collection Data

Sample Taken By: Gibson

Sample Date:	Sample Location and Work Activities Performed:				
29-Mar-04	PAB-Metering Pump Cubicle: Concrete				
RWP / Job Step: 4149-1	Routine: D W M	Sampler Serial Number: 90	Sampler Type: ras	Sampler Cal Due Date: 6/15/2004	
Sample Time & Date On: 03/29/04 7:55	Off: 03/29/04 9:55	Collection Time (min): 120	Flow Rate: 1 cfm	Sample Volume: 120 Cu. Ft.	

Gross Beta-Gamma activity of ≤ 6.0 E-11 = ≤ 0.3 Total Particulate DAC

Co-60 activity of ≤ 6.0 E-11 = ≤ 0.3 Total DAC

Conversion Factors: Liters -- 4.5E-10 liters uCi / ml dpm

Cubic Feet -- 1.6E-11 cubic feet uCi / ml dpm

Section 2 -- Gross Beta-Gamma

Gross β/γ concentration of > 6.0 E-11 uCi/cc requires MGCA Count, If available

1st Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross β/γ Concentration (uCi/cc)
3/29/04 16:26	XLB-1	40045-1	10/08/04	Brigham	2.41E-11

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume
39	0.5	78.00	5.67	16.55	72.33	2.5	1.6E-11	120 Cu. Ft.

MDA = 5.52E-12

Section 3 -- Gross Alpha

MGCA results of > 6.0E-11 uCi/cc Co-60 requires alpha count

1st Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross α Concentration (uCi/cc)
N/A	N/A	N/A	N/A	N/A	N/A

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume	SAF
N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.6E-11	120 Cu. Ft.	1.3

MDA =

Initial Gross alpha concentration of ≥ 1.0 E-12 requires a decayed recount

2nd Count Time / Date	Instrument	Serial No.	Cal Due	Sample Counted By:	Gross α Concentration (uCi/cc)
N/A	N/A	N/A	N/A	N/A	N/A

Gross Counts	Count Time (min)	Gross CPM	Bkgd. CPM	MDCR	Net CPM	Eff. Factor	Conv. Factor	Volume	SAF
N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.6E-11	120 Cu. Ft.	1.3

MDA =

Section 4 -- Scaled DAC Fractions

(Only for air samples taken in area less than 200 dpm/100 cm² alpha)

Type	uCi/cc	DAC Fraction	Scaling Conversion	Scaled α/β/γ DAC Fraction
Co-60 or Gross β/γ (DAC=1.0E-8)	2.41E-11	2.41E-03	50 X Co-60 OR Gross β/γ DAC Fraction	0.121

Section 5 -- Measured DAC Fractions

Type	Initial uCi/cc	Initial DAC Fraction	Final uCi/cc	Final DAC Fraction
MGCA or Gross β/γ (DAC=1.0E-8)	N/A	N/A	N/A	N/A
Gross Alpha (DAC=3.0E-12)x1.1	N/A	N/A	N/A	N/A
Total Measured DAC Fraction =		N/A		N/A

Reviewed By: _____ Date: 3/30/04

Software Control #0067-02

Connecticut Yankee Atomic Power Co.
Radiochemistry Count Room
Connecticut Yankee Decommissioning Project

Gamma Spectroscopy Sample Analysis Request Form

Sample Taken By: Matt Gibson Date / Time: 1400 3-29-04
Copy of Results To: DeGaspari Dept:____ Ext:____
Sample Description: Chips & fines
Location: PAB meter Pump Area
Reason for Analysis: unknowns
If from Personnel: Name:____ EID ____ RWP: 4149-1
Contamination Levels:
<MDA β γ CCPM / DPM <MDA α CCPM / DPM <MDA mR/hr
Sample Weight / Volume: 1370 (cc, ml, grams, etc.)
Sample Container: 1 l mar.

Is this sample for free release? YES or NO (circle one)
Is this sample being shipped offsite? YES or NO (circle one)
Save / Return sample after analysis? YES or NO (circle one)
Other info:____
If this sample requires special storage requirements, please describe:

Responsible Individual for Disposal of Sample
Name:____ Dept:____ Ext:____
Sample delivered to Count Room: Date / Time:____

COUNT ROOM USE ONLY

Qualitative or Quantitative Analysis? Explain below.
1L MAR MISC.

Sample ID Number: 040330 ~~020~~ 023 (D3/30)
Analysis Completed By: [signature] Date: 3-30-04
Sample Storage Location: N/A
Radiochemistry Supervisor Review: [signature] Date: 3-31-04

Contains Licensed Material

```
*****************************************
      30-MAR-2004 20:26:40.02

          CONNECTICUT YANKEE
          HADDAM NECK STATION
*****************************************

SAMPLE TITLE : - PAB METERING PMP ROOM- CHIPS/FINES
SAMPLE ID    : 040330023                * SAMPLE GEOMETRY : 1lmar
SAMPLE TIME  : 29-MAR-2004 14:00        * GEO EFFICIENCY DATE: 30-JUL-2003
SAMPLE TYPE  : LIQUID                   * SAMPLE QUANTITY : 1.37000E+03 GM
*******************************************************************************

DETECTOR          : DET 2               * LIBRARY          : CHEM_RELEASE
LAST ENERGY CAL   : 30-MAR-2004 01:49   * ENERGY TOLERANCE: 1.00000
KEV/CHANNEL       : 5.00711E-01         * HALF LIFE RATIO : 9.00000
START CHANNEL     : 100                 * END CHANNEL      : 4096
ACQ DATE & TIME   : 30-MAR-2004 20:06   * DEADTIME (%)     :  17%
PRESET  LIVE TIME : 0 00:16:40          * SENSITIVITY      : 5.00000
ELAPSED REAL TIME :      1205.9 Secs    * GAUSSIAN SEN     : 10.00000
ELAPSED LIVE TIME :      1000.0 Secs    * CORRECTION FACTOR: 1.00000E+00
DECAYED TO 1 DAYS  HOURS
FILE IDENT    : CAS$DISK:[NEU.SAMPLE.CHEM.NEW]040330023_ADC2_LIQUID.CNF;1 *

*******************************************************************************
ANALYSES : PEAK V16.8 NID V3.2 MINACT V2.8 WTMEAN V1.8
*******************************************************************************

Collected by : HP
REVIEWED BY  : _____
COMMENTS     :

*******************************************************************************
```

Contains Licensed Material

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	604.65	2778	21681	1.79	1208.47	1204	10	10.1		CS-134
0	661.51*	1973685	57413	1.66	1322.15	1314	17	0.1		CS-137
0	795.78	1527	8377	1.58	1590.65	1586	10	11.5		CS-134
0	1173.10*	24530	4038	2.05	2345.47	2336	19	0.9		CO-60
6	1318.87	253	977	1.29	2637.21	2634	17	19.3	2.47E+00	
6	1322.23	1841	1492	3.02	2643.93	2634	17	5.3		
0	1332.36*	22496	1526	2.19	2664.20	2654	21	0.8		CO-60

* counted under 1000 sec
misc 1L MAR- Chem

REPORT NAME : QA_CHECK (V9.1)
REPORT DATE : 30-MAR-2004 20:26
REQUESTOR : CAS

PAGE 1 OF ___

CYAPCO
HADDAM NECK STATION

POST NID QA ANALYSIS

TITLE : - PAB METERING PMP ROOM- CHIPS/FINES

SAMPLE No. : 040330023
SAMPLE TYPE : LIQUID
COUNT TIME : 30-MAR-2004 20:06:16
SAMPLE TIME : 29-MAR-2004 14:00:00
LIBRARY : CHEM_RELEASE

OPERATOR NAME : CAS
SAMPLE GEOMETRY : 1lmar
SAMPLE QUANTITY : 1.37000E+03
DETECTOR : DET 2

ISOTOPE	PEAK ENERGY	ENERGY DIFF (KEV)	DECAY CORR uCi/GM	COMMENTS
CO-60	1332.49	-0.13	7.133E-05	QA Results OK
CS-134	604.70	-0.05	4.109E-06	QA Results OK
CS-137	661.65	-0.14	4.072E-03	QA Results OK
AVG ENERGY DIFF =		-0.11	4.148E-03	= TOTAL GAMMA ACTIVITY

Contains Licensed Material

UNIDENTIFIED/REJECTED PEAKS

ENERGY	NET AREA	FWHM	GAMMA/SEC	GAMMA/SEC /GM	% ERROR	FLAG	POTENTIAL ID	ACTIVITY
1318.87	253.	1.29	4.070E+01	2.970E-02	19.3	U		
1322.23	1841.	3.02	2.970E+02	2.168E-01	5.30	U		

Total Unidentified/Rejected Peaks = 2
% Unidentified/Rejected Peaks = 28.57

Flags: U - Unknown Line
R - Rejected During Analysis
P - Positively Identified (line not in analysis library)

Operator Overrode Dead Time Limit

Performed by: _____

Reviewed by: _____

**** End Of Report (1 Page) ****

Connecticut Yankee Atomic Power Co.

Radiochemistry Count Room

Connecticut Yankee Decommissioning Project

Gamma Spectroscopy Sample Analysis Request Form

Sample Taken By: MR Gibson Date / Time: 3-23-04/1500

Copy of Results To: DeGasperi Dept:____ Ext:____

Sample Description: Massilon Post Chipping

Location: PAB metering

Reason for Analysis: Unknowns

If from Personnel: Name:____ EID____ RWP: 4149.1

Contamination Levels:

<mDA β γ CCPM / DPM <mDA α CCPM / DPM <mDA mR/hr

Sample Weight / Volume:____ (cc, ml, grams, etc.)

Sample Container:____

Is this sample for free release? YES or NO (circle one) — NO circled

Is this sample being shipped offsite? YES or NO (circle one) — NO circled

Save / Return sample after analysis? YES or NO (circle one) — NO circled

Other info:____

If this sample requires special storage requirements, please describe:

Responsible Individual for Disposal of Sample

Name:____ Dept:____ Ext:____

Sample delivered to Count Room: Date / Time:____

COUNT ROOM USE ONLY

Qualitative or Quantitative Analysis? Explain below. — Qualitative circled

Not a listed geometry

Sample ID Number: 040323023

Analysis Completed By: [signature] Date: 3-23-04

Sample Storage Location: N/A

Radiochemistry Supervisor Review: [signature] Date: 3-24-04

Contains Licensed Material

Qualitative Analysis Only

23-MAR-2004 19:22:26.28

CONNECTICUT YANKEE
HADDAM NECK STATION

SAMPLE TITLE : - PAB METERING- POST CHIPPING MASSLIN
REASON FOR ANALYSIS: Qualitative Analysis
RWP NUMBER : NA * SURVEY ID : NA
SAMPLE ID : 040323023 * SAMPLE GEOMETRY : 47MLFILTER
SAMPLE TIME : 23-MAR-2004 15:00 * GEO EFFICIENCY DATE: 24-JUN-2003
SAMPLE TYPE : SMEAR * SAMPLE QUANTITY : 1.00000E+00 SMR.

DETECTOR : DET 5 * LIBRARY : CHEM_SMEAR
LAST ENERGY CAL : 23-MAR-2004 00:38 * ENERGY TOLERANCE: 0.70000
KEV/CHANNEL : 5.00482E-01 * HALF LIFE RATIO : 9.00000
START CHANNEL : 100 * END CHANNEL : 4096
ACQ DATE & TIME : 23-MAR-2004 18:22 * DEADTIME (%) : 0.2%
PRESET LIVE TIME : 0 01:00:00 * SENSITIVITY : 5.00000
ELAPSED REAL TIME : 3606.0 Secs * GAUSSIAN SEN : 10.00000
ELAPSED LIVE TIME : 3600.0 Secs * CORRECTION FACTOR: 2.22000E+06
DECAYED TO 0 DAYS HOURS
FILE IDENT : CAS$DISK:[NEU.SAMPLE.RP.NEW]040323023_ADC5_SMEAR.CNF;1

ANALYSES : PEAK V16.8 NID V3.2 MINACT V2.8 WTMEAN V1.8

Collected by : GIBSON
REVIEWED BY :
COMMENTS :

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	59.57	260	1147	1.12	119.14	115	9	24.3		AM-241
0	604.49	90	301	1.18	1208.36	1205	9	36.2	0.00E+00	CS-134
0	661.35*	49330	392	1.46	1322.04	1315	15	0.5		CS-137
0	795.27	128	216	3.65	1589.84	1584	15	26.5		CS-134
0	1172.77*	4727	106	1.80	2344.94	2339	14	1.5		CO-60
0	1331.96*	4242	17	1.91	2663.47	2655	16	1.6		CO-60

Summary of Nuclide Activity Page : 2
Sample ID : 040323023 Acquisition date : 23-MAR-2004 18:22:04

Total number of lines in spectrum 6
Number of unidentified lines 0
Number of lines tentatively identified by NID 6 100.00%

Nuclide Type : AP

Nuclide	Hlife	Decay	Wtd Mean Uncorrected dpm/SMR.	Wtd Mean Decay Corr dpm/SMR.	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
CO-60	5.27Y	1.00	4.016E+03	4.016E+03	0.092E+03	2.29	
CS-134	2.06Y	1.00	5.498E+01	5.499E+01	1.267E+01	23.04	
AM-241	432.20Y	1.00	9.171E+01	9.171E+01	2.274E+01	24.80	
	Total Activity :		4.162E+03	4.163E+03			

Nuclide Type : FP

Nuclide	Hlife	Decay	Wtd Mean Uncorrected dpm/SMR.	Wtd Mean Decay Corr dpm/SMR.	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
CS-137	30.17Y	1.00	2.833E+04	2.833E+04	0.109E+04	3.86	
	Total Activity :		2.833E+04	2.833E+04			

Grand Total Activity : 3.250E+04 3.250E+04

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

REPORT NAME : QA_CHECK (V9.1)
REPORT DATE : 23-MAR-2004 19:22
REQUESTOR : CAS

PAGE 1 OF ___

CYAPCO
HADDAM NECK STATION

POST NID QA ANALYSIS

TITLE : - PAB METERING- POST CHIPPING MASSLIN

SAMPLE No. : 040323023
SAMPLE TYPE : SMEAR
COUNT TIME : 23-MAR-2004 18:22:04
SAMPLE TIME : 23-MAR-2004 15:00:00
LIBRARY : CHEM_SMEAR

OPERATOR NAME : CAS
SAMPLE GEOMETRY : 47MLFILTER
SAMPLE QUANTITY : 1.00000E+00
DETECTOR : DET 5

ISOTOPE	PEAK ENERGY	ENERGY DIFF (KEV)	DECAY CORR dpm/SMR.	COMMENTS
CO-60	1332.49	-0.52	4.016E+03	QA Results OK
CS-134	604.70	-0.20	5.499E+01	QA Results OK
CS-137	661.65	-0.30	2.833E+04	QA Results OK
AM-241	59.54	0.03	9.171E+01	QA Results OK
AVG ENERGY DIFF =		-0.25	3.250E+04	= TOTAL GAMMA ACTIVITY

Qualitative Analysis Only

Contains Licensed Material

UNIDENTIFIED/REJECTED PEAKS

ENERGY	NET AREA	FWHM	GAMMA/SEC	GAMMA/SEC /SMR.	% ERROR	FLAG	POTENTIAL ID	ACTIVITY
No Unidentified/Rejected Peaks								

Performed by: _____

Reviewed by: _____

**** End Of Report (1 Page) ****

MicroShield 8.03
Radiation Safety & Control Services (8.03-0000)

Date	By	Checked

Filename	Run Date	Run Time	Duration
LaCrosse Ope Air Demo.msd	September 26, 2015	8:49:07 AM	00:00:00

Project Info

Case Title	WTB Disk Source
Description	Radius 36 Inches 1/2 Inch Thick 10,045 pCi/g Cs-137
Geometry	8 - Cylinder Volume - End Shields

Source Dimensions

Height	1.27 cm (0.5 in)
Radius	91.44 cm (3 ft)

Dose Points

A	X	Y	Z
#1	0.0 cm (0 in)	2.54 cm (1.0 in)	0.0 cm (0 in)

Shields

Shield N	Dimension	Material	Density
Source	2035.752 in³	Concrete	2.35
Air Gap		Air	0.00122

Source Input: Grouping Method - Actual Photon Energies

Nuclide	Ci	Bq	µCi/cm³	Bq/cm³
Ba-137m	7.7496e-004	2.8674e+007	2.3230e-002	8.5952e+002
Co-60	1.0540e-005	3.8998e+005	3.1595e-004	1.1690e+001
Cs-137	8.1920e-004	3.0310e+007	2.4556e-002	9.0859e+002

Buildup: The material reference is Source
Integration Parameters

Radial	20
Circumferential	10
Y Direction (axial)	10

Results					
Energy (MeV)	**Activity (Photons/sec)**	**Fluence Rate MeV/cm²/sec No Buildup**	**Fluence Rate MeV/cm²/sec With Buildup**	**Exposure Rate mR/hr No Buildup**	**Exposure Rate mR/hr With Buildup**
0.0045	2.977e+05	1.003e-03	1.028e-03	6.875e-04	7.047e-04
0.0318	5.936e+05	1.194e-01	1.441e-01	9.946e-04	1.201e-03
0.0322	1.095e+06	2.294e-01	2.785e-01	1.846e-03	2.241e-03
0.0364	3.986e+05	1.249e-01	1.615e-01	7.098e-04	9.175e-04
0.6616	2.580e+07	6.298e+02	9.331e+02	1.221e+00	1.809e+00
0.6938	6.361e+01	1.643e-03	2.413e-03	3.173e-06	4.660e-06
1.1732	3.900e+05	1.887e+01	2.545e+01	3.372e-02	4.548e-02
1.3325	3.900e+05	2.197e+01	2.908e+01	3.811e-02	5.045e-02
Totals	**2.897e+07**	**6.712e+02**	**9.882e+02**	**1.297e+00**	**1.910e+00**