



Bristol-Myers Squibb Company

Worldwide Medicines Group

One Squibb Drive P.O. Box 191 New Brunswick, NJ 08903-0191

732-519-2000

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March 15, 2001

Mr. Duncan White
US Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406

RE: AMENDMENT REQUEST - LICENSE NO. 29-00139-02

Dear Mr. White:

E.R. Squibb & Sons, a wholly owned subsidiary of Bristol-Myers Squibb Company, requests to amend its radioactive material license, Number 29-00139-02, to remove all reference from previously filed documents to the Building 81 Interim Waste Storage Facility at the New Brunswick site. The Building 81 Interim Waste Storage Facility was discussed in Items 9 and 11 of the February 18, 1997 license renewal application. This facility, with the exception of the EPA permitted mixed waste storage area and approximately 500 square feet of warehouse space, has been decommissioned in accordance with MARSSIM guidelines.

Since 1993, when Building 81 was renovated for licensed activities, it has been used for decay-in-storage waste, consolidation for shipment, and waste compaction as described in the renewal application. All of the radioactive waste in the facility was shipped for disposal or relocated to a different waste consolidation area onsite prior to conducting the final release survey. A copy of the release survey, conducted by CoPhysics Corporation, is attached.

The EPA permitted mixed waste storage area and approximately 500 square feet of space in Building 81 will continue to be utilized for decay-in-storage, waste consolidation prior to shipment, and waste that may need to be held for interim storage. Design features of this area will continue to include:

- Perimeter containment curbing
- Dedicated once-through exhaust system
- Card key access
- Non-porous epoxy coated concrete floor
- Fire detection and protection system consisting of heat/smoke detectors with fire water sprinkler coverage
- Pallet storage racks

The modified floor plan is attached, the area to be utilized for licensed activities is highlighted. The remainder of the facility will not be used for licensed activities.

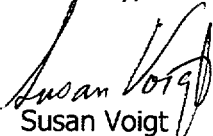
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NMSS/RGN MATERIALS-002

Mr. Duncan White
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If you require any additional information, please contact Michael Vala at (732) 519-2987. We hope to begin renovation of the facility in April. Your prompt consideration of this request is appreciated.

Sincerely,

A handwritten signature in black ink, appearing to read "Susan Voigt", with a stylized flourish at the end.

Susan Voigt
Chair, Radiation Safety Committee
Senior Director, Worldwide Medicines Group EHS

SV:bl

Attachments (2)

cc: M. Vala
Decommissioning File

Report on the Final Status Survey of

**Building 81 - Radioactive Waste Warehouse
Bristol-Myers Squibb Company
New Brunswick, NJ**

March, 2001

Contacts:

Michael Vala, CHP, Manager Radiation Safety
732-519-2987

Theodore Rahon, Ph.D., CHP, CoPhysics Corporation
845-783-4402

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1.0 BACKGROUND

1.1 Reason for Decommissioning

Building 81 of Bristol-Myers Squibb Co. (BMS) in New Brunswick, NJ is a warehouse that had been used for storage of radioactive waste generated from radiosynthesis and general research operations. After decommissioning, the warehouse will be used for non-radioactive material storage.

1.2 Technical / Management Approach

CoPhysics Corporation performed a final status survey in Building 81 using wipe tests and gas proportional counting. The survey was performed in accordance with a general survey methodology following guidance in MARRSIM ("Multi-Agency Radiation Survey and Site Investigation Manual", 1997) and CoPhysics Corporation Standard Operating Procedures.

This report summarizes operations performed and discusses the results of survey measurements with respect to applicable guidelines.

1.3 Site Description

1.3.1 Type and Location of Facility

Building 81 of the BMS New Brunswick facility is a standard steel warehouse building. It is constructed of steel columns and girders, a steel roof, wallboard or plywood walls, and a concrete floor (with about 12,000 square feet of area).

1.3.2 Areas

For purposes of this survey, the building was divided into 4 areas (also see diagrams in Appendix A):

- ♦ radwaste storage, including the dry waste area and the freezer (biological waste storage)
- ♦ compactor area including adjoining conveyor and ancillary rooms
- ♦ non-radioactive storage bay
- ♦ entry, office, locker rooms and loading dock

There is also a mixed waste storage room which is to remain in operation as a radiological control area and thus was not surveyed as part of this project.

1.4 Site Conditions At Time Of Final Survey

Radioactive waste had been removed from the facility before the survey began. The shelves in the waste storage area were bare. Several pallets of non-radioactive materials were staged in the non-radioactive storage bay and loading dock.

1.5 Identity of Contaminants and Release Guidelines

The main contaminants of interest were carbon-14 and tritium as surface contamination. Other radionuclides such as ^{125}I , ^{33}P , ^{32}P , and ^{35}S were also present in the waste stored in the facility. However, little residual contamination from these radionuclides would be expected at the time of survey due to their short half-lives.

Decontamination guidelines for floors, walls and other fixtures for non-controlled use were those given by USNRC Reg Guide 1.86 and Policy / Guidance Directive FC 83-23 as well as BMS internal guidance:

Removable beta-gamma contamination:

1000 dpm/100 sq.cm

Total (fixed+removable) beta-gamma contamination:

5000 dpm/100 sq.cm average over any 1 square meter area

15000 dpm/100 sq.cm maximum on any 100 sq. cm area

2.0 REMEDIATION ACTIVITIES

No significant remediation was performed as part of decommissioning.

BMS personnel had removed the pre-filters from the compactor ventilation system after CoPhysics Corporation's analysis showed a beta radioactivity concentration of about 1800 dpm/g of filter media. The filters were disposed of as radioactive waste.

The only area in the facility that showed radioactivity levels greater than background was the compactor and associated ductwork. However, these levels were within release limits. Thus, no remediation was conducted.

3.0 SURVEY METHODOLOGY

3.1 Objectives

The purpose of the final status survey is to demonstrate that the areas contain no residual radioactivity levels in excess of applicable guidelines so that the space can be released from radiation safety restrictions for future use. Specifically:

1. all removable surface contamination levels must be less than applicable limits;

2. residual contamination is as low as is reasonably achievable; and
3. the dose from residual radioactivity above background does not exceed 25 mrem to the average member of a critical group to occupy the area.

The objective of the survey was to demonstrate at a 95% minimum level of confidence, that the above conditions have been met.

3.2 Results of Previous Surveys

Results of prior routine surveys showed no contamination in excess of guidelines.

3.3 Survey Organization and Responsibilities

The final status survey was performed under direction of Theodore E. Rahon, Ph.D., CHP as Project Manager. The Project Manager was responsible for ensuring:

- ♦ that the survey was conducted according to proper procedures.
- ♦ that all technicians were adequately trained in performing the measurements required by the plan
- ♦ that measurement data was statistically sufficient to be used for testing against release guidelines per MARSSIM.

Analyses of wipes samples were performed by CoPhysics personnel in accordance with procedures outlined in CoPhysics Operating Procedures Manual (New York State License No. 2691-3949 as issued 7/95) "Laboratory Analyses of Samples".

3.4 Instrumentation

3.4.1 Liquid Scintillation Counter

Analyses of wipe tests and other samples were performed in a Wallac Model 1415 Liquid Scintillation Counter (LSC) CoPhysics Corporation's Middletown, NY laboratory. This instrument was used with a 1-minute counting time which provided a minimum detectable activity (MDA) of < 10% of the guideline of 1000 dpm/100 cm² for H-3 and C-14 wipes covering 100 cm².

The Wallac 1410 LSC has automatic quench correction using an external Eu-152 standard. The LSC was calibrated with a set of quenched tritium and C-14 standards. The standards were created using identical vials, cocktail and filter paper that were used during the survey along with liquid tritium and carbon-14 standards traceable to the National Institute of Standards and Technology and varying amounts of carbon tetrachloride as a quenching agent. The set of standards was used to create an efficiency versus spectral quality parameter quench curve within the LSC computer program. During actual sample analysis, the LSC program determined each

sample's counting efficiency from its spectral quench parameter, and then calculated tritium and carbon-14 activity in disintegrations per minute (dpm).

3.4.2 Field Instruments

The following instruments were used to assess fixed (total) beta emissions from surfaces.

Meter	Serial #	Probe	Serial #	Calibration Date
Ludlum Model 2350	105641	43-37 Floor Monitor	148949	12/21/00
Ludlum Model 2200	54114	43-68 Gas Prop. (GPC)	127616	4/2/00
Ludlum Model 3	83924	44-9 GM	077858	12/21/00

Results of efficiency and background checks were entered into the field data log sheets.

3.4.3 Minimum Detectable Activity

The MDA's of count instrumentation, such as the LSC and GPC, were calculated by the following formula adapted from NUREG-5849:

$$MDA = [2.71 + 4.65(R_b * t)^{1/2}] / (t * E * A)$$

where: MDA = minimum detectable activity in dpm/100 sq.cm

R_b = background count rate in cpm

t = counting time (minutes)

E = counting efficiency (cpm/dpm)

A = area of wipe in 100's of sq.cm

The MDA's of an instrument in count rate mode, such as the GPC or GM detectors, were calculated by the following formula adapted from NUREG-5849:

$$MDA = [4.65(R_b/2t)^{1/2}] / (E * A/100)$$

where: MDA = minimum detectable activity in dpm/100 sq.cm

R_b = background count rate in cpm

t = meter time constant (minutes)(normally 0.0667 min)

E = counting efficiency (cpm/dpm)

A = area of probe in 100's of sq.cm

The MDA's for the on-site measurements performed follow:

Type of Measurement	Typical BKG (cpm)	Typical Efficiency	Counting Time (min)	MDA (dpm)	Guideline
100 sq.cm Wipe Test Analysis - H-3	2	0.23	1	40.00	1000 dpm/100 sq.cm
100 sq.cm Wipe Test Analysis - C-14	1	0.93	1	8	1000 dpm/100 sq.cm
Direct Beta Count via GPC for C-14	460	0.07	0.5	2100	5000 dpm/100 sq.cm
Direct Beta Count via GPC for gr. beta	460	0.20	0.5	730	5000 dpm/100 sq.cm
Direct Beta Scan via GPC for C-14	460	0.07	rate	3900	5000 dpm/100 sq.cm
Direct Beta Scan via GPC for gr. beta	460	0.20	rate	1370	5000 dpm/100 sq.cm

3.4.4 Instrument QA/QC

The GPC was source checked each day by counting a C-14 source. A daily background was also obtained by counting a non-contaminated surface.

These daily QC results were reviewed by the Project Manager. No deviation from normal was observed.

3.5 Area Classification

Four survey areas were delineated and given MARSSIM classifications based on BMS descriptions of prior use:

- ♦ radwaste storage, including the dry waste area and the freezer - Class 1
- ♦ compactor area including adjoining conveyor and ancillary rooms - Class 1
- ♦ non-radioactive storage bay - Class 2
- ♦ entry, office, locker rooms, loading dock - non-impacted

3.6 Reference Grid and Measurement Frequency

Grids were established for the purpose of referencing locations of samples and measurements, relative to the floor plan of the area. All remaining equipment, furnishings and fixtures were also identified with a unique numbering sequence. Grid designations were 1,2,3... in the "X" direction and A,B,C... in the "Y" direction. Wall and fixture measurement locations were designated by the nearest floor grid point, for example B3W is the wall reading nearest grid point B3. Biasd measurements in non-impacted areas without a grid system were identified using the sequential LSC printout ID number.

Floor plans of the areas surveyed are shown in the Appendix.

The frequencies and the number of measurements necessary to meet the required 95% confidence intervals were derived from MARSSIM based on expected standard deviation of measurement results and detector sensitivities (see Appendix for a summary of MARSSIM techniques). A summary of the minimum required measurement frequencies and scan coverage follow:

Measurement Frequencies and Coverage

Type of Measurement	Minimum-number per Class 1 or 2 survey unit	Coverage		
		Class 1 -Floors & Bench tops	Class 1 - Walls Class 2 - All	Any class - Fixtures & Overhead
Wipe tests	13	random grid	random grid	biased
Direct Reading	12	random grid	random grid	biased
Meter Scan	-	100%	25-50%	biased

Because of the size of the survey areas and the potential presence of tritium (not scannable), a greater number of samples were used than those specified above by using 12' x 12' (rectangular) sampling grid for the radwaste and non-rad storage areas, and an 8' x 8' (rectangular) grid for the compactor area. Several biased samples were collected in non-impacted areas.

3.7 Background Level Determinations

Because natural tritium and C-14 background levels on surfaces are much less than the MDA of the LSC, any test result over the instrument's MDA is considered to be "above background". Thus, the MARSSIM "sign test" is to be used (contaminant not present in background).

Background for the gas proportional counter is dependent on the amount of natural radioactivity in the surfaces measured. For concrete block, plasterboard, plywood and poured concrete, the GPC background ranged from 400 to 500 cpm. Background measurements were performed in a non-radiological area (Loading Dock and entryway) that had a similar construction as the remainder of the warehouse. A GM pancake probe was used for measurement of the ventilation system components because of physical accessibility limitations associated with the GPC. The GM pancake probe background was estimated to be approximately 100 cpm.

3.8 Sample Collection Procedure

The amount of removable radioactive material per 100 cm² of surface area was determined by wiping that area with Whatman #1 filter or cotton swabs, applying moderate pressure, and assessing the amount of radioactive material on the wipe with the LSC. When removable contamination on objects of less surface area was determined, the pertinent levels were reduced proportionately and the entire surface wiped.

The wipes were either cotton swabs for use in probing cracks and interfaces between surfaces, or filter papers such as Whatman filters. Wipes were placed in numbered scintillation vials or paper envelopes. The sample numbers corresponded to a grid location, recognizable piece of equipment or other facility item.

3.9 Sample Analysis

Wipe and liquid samples (1 ml aliquots) were placed into 7 ml plastic scintillation vials, cocktail was added, and the samples analyzed in the liquid scintillation counter as discussed previously in this section.

3.10 Data Recording Procedures

All wipe test results on the LSC printout sheets were labeled with the sample number so that they corresponded to a sample location or grid. The sample numbers were recorded on data sheets along with descriptions of the items surveyed. These results were entered into a spreadsheet program for inclusion into this report.

GPC measurement readings were also recorded on the data sheets along with grid designations and descriptions of the items surveyed. The readings then were entered into the spreadsheet program and were converted from cpm/100 cm² to dpm/100 cm² for comparison to the surface activity guidelines. This was done by subtracting background and then dividing by the efficiency obtained during calibration.

3.11 Techniques For Reducing/Evaluating Data

Data conversions and evaluations were performed, following the guidance in MARSSIM.

3.11.1 Net Activity Calculation

After the survey, the wipe test analysis results and meter readings were entered into a spreadsheet program and converted from cpm/100 cm² to dpm/100 cm² for comparison to guidelines and for dose assessment, if necessary. This was done by subtracting background, dividing by the area factor, and then dividing by the efficiency obtained during calibration of the specific instrument used.

3.11.2 Uncertainty Calculation

The uncertainties of the LSC sample analysis results or gas proportional counts were calculated as 1-sigma standard deviations using the following formula:

$$SD = [(R_g + R_b)/t]^{1/2} / (E * A)$$

where: SD = standard deviation in dpm/100 sq.cm
R_g = gross sample count rate in cpm
R_b = background count rate in cpm
t = counting time (minutes)
E = counting efficiency (cpm/dpm)
A = area of wipe or probe in 100's of sq.cm

The SD's of the GPC and GM detectors used in count rate mode were calculated using the following formula:

$$SD = [(R_g + R_b)/t]^{1/2} / (E * A)$$

where: SD = standard deviation in dpm/100 sq.cm
R_g = gross sample count rate in cpm
R_b = background count rate in cpm
t = meter time constant (minutes)
E = counting efficiency (cpm/dpm)
A = area of probe in 100's of sq.cm

(In this survey, the meter time constants were 4 seconds, or 0.0667 minutes.)

4.0 SURVEY FINDINGS

4.1 Results

The results of field measurements and laboratory analysis for final release measurements of the areas are shown in the Appendix. The results are summarized in the tables below along with calculated statistical parameters per guidance in MARSSIM:

DAW Storage & Freezer (Class 1)

	Removable ³ H	Removable ¹⁴ C	Removable Gr.Beta	Direct Beta Reading
	net dpm/100 sq.cm			
Mean	-1	0	3	27
Median	-3	0	1	0
S.D.	6	0	6	268
Min.	-3	0	-5	-400
Max.	30	0	36	800
N	114	114	114	91
DCGL	1000	1000	1000	5000
Rel.Shift	89	53000	81	9.3
N _{required}	13	13	13	12

Clean Storage Bay (Class 2)

	Removable ³ H	Removable ¹⁴ C	Removable Gr.Beta	Direct Beta Reading
	net dpm/100 sq.cm			
Mean	-2	0	4	41
Median	-3	0	3	100
S.D.	4	0	5	237
Min.	-3	0	-4	-400
Max.	14	0	19	800
N	32	32	32	32
DCGL	1000	1000	1000	5000
Rel.Shift	128	28000	98	10.6
N _{required}	13	13	13	12

Compactor Area (Class 1)

	Removable ³ H	Removable ¹⁴ C	Removable Gr.Beta	Direct Beta Reading
	net dpm/100 sq.cm			
Mean	24	54	89	405
Median	-3	0	4	200
S.D.	67	144	211	809
Min.	-3	0	0	-200
Max.	260	722	921	4000
N	43	43	43	43
DCGL	1000	1000	1000	5000
Rel.Shift	7	3	2	3.1
N _{required}	13	13	13	12

Other non-impacted or Class 3 areas such as the office and locker rooms showed no detectable residual contamination via biased location measurements and scans.

Notes:

DCGL: Derived Concentration Guideline Level (MARSSIM):

DCGL_W: DCGL as analyzed for average areas of contamination using the Wilcoxon Rank Sum Test (MARSSIM)

DCGL_{EMC}: DCGL as analyzed for small areas of elevated activity (Elevated Measurement Comparison)

Note: Values for DCGL in the tables above were chosen to be the limits from applicable USNRC or agreement state regulations for residual contamination and twice bkg for Gamma Exposure Rate if applicable.

Rel Shift: "Relative Shift" (from MARSSIM) which is designated to be 1/2 of the guideline DCGL divided by the standard deviation of the measurement results.

4.2 *Comparison of Findings with Guideline Values and Conditions*

The results of measurements performed are compared to the survey objectives below:


- a. All measurement results were found to be in compliance with the contamination limit criteria (i.e., the "Maximum" readings for each of the measurements listed in Section 4.1 above were less than the DCGL's.)
- b. ALARA considerations: Average residual radioactivity levels were less than 10% of the applicable guidelines and the vast majority of samples were indistinguishable from background; all maximum levels were less than applicable guidelines. No further ALARA consideration is warranted.
- c. Confidence level objectives (number of samples, background values) as described in MARSSIM were met.
- d. Because average residual radioactivity levels were less than 10% of the DCGL's and were not statistically different than background levels, there was no need to perform a prospective dose assessment. Prospective doses will not measurably exceed background levels and thus will comply with the 25 mrem dose limitation.

5.0 *SUMMARY*

As part of radiological decommissioning, the radioactive waste warehouse (Building 81) at the Bristol-Myers Squibb facility in New Brunswick, NJ was surveyed in accordance with generally-accepted procedures. In the opinion of the Licensee, as supported by work described herein by CoPhysics Corporation, the following are concluded:

- no residual radioactivity exists in excess of guidelines and
- prospective doses to future occupants and workers will be well within guideline values and will be indistinguishable from natural background levels.

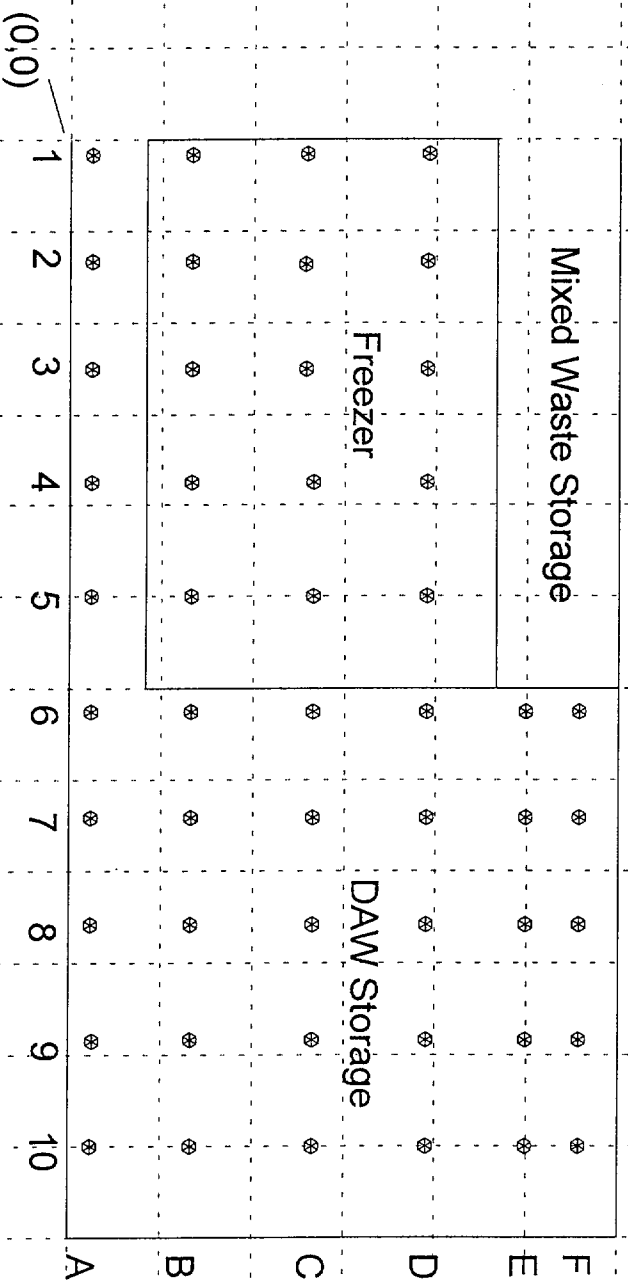
A small area of the warehouse (mixed waste room) will remain as a radiological control area and thus was not considered part of this project.


Theodore E. Rahon, Ph.D., CHP
President, CoPhysics Corporation

Appendix A - Survey Diagrams

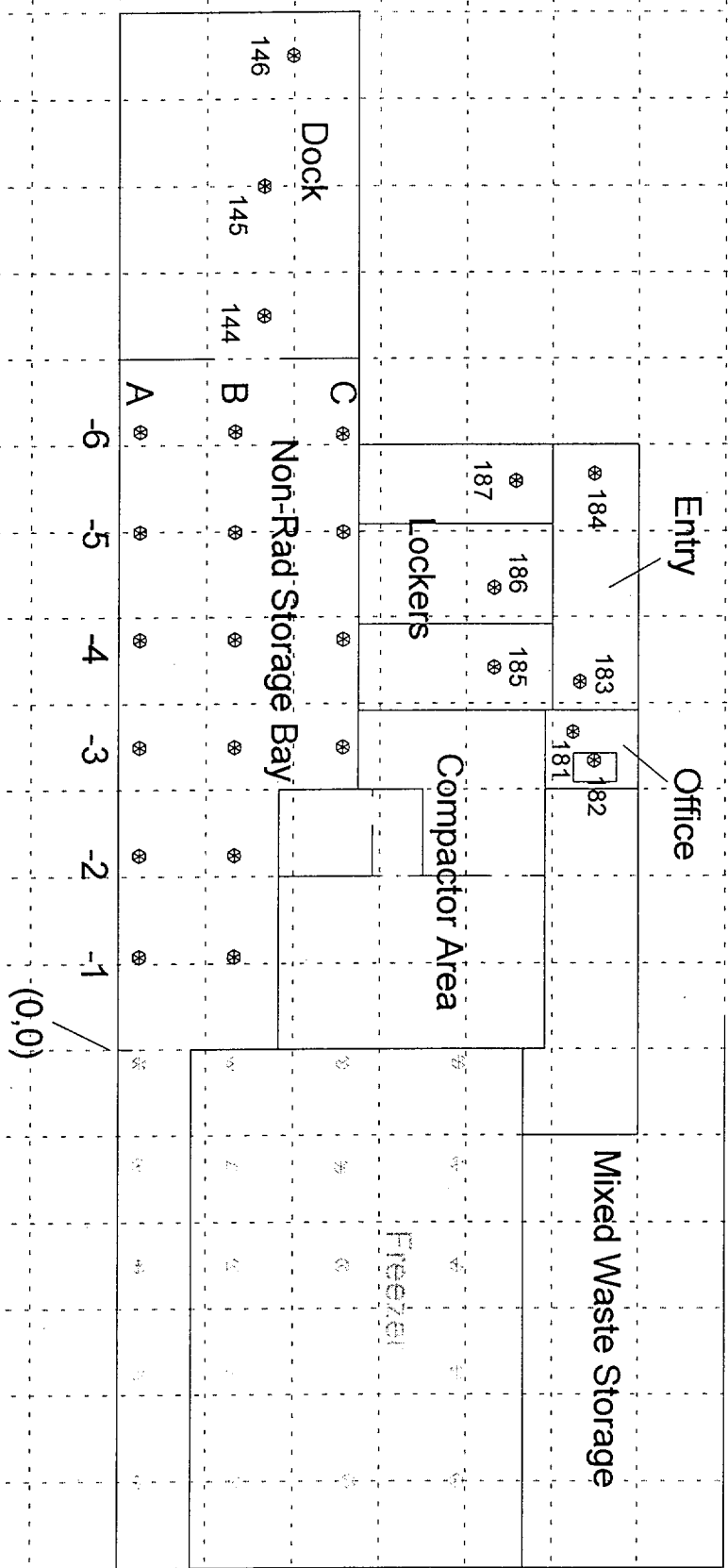
Building 81 - Radioactive Waste Storage & Freezer

Measurement Locations



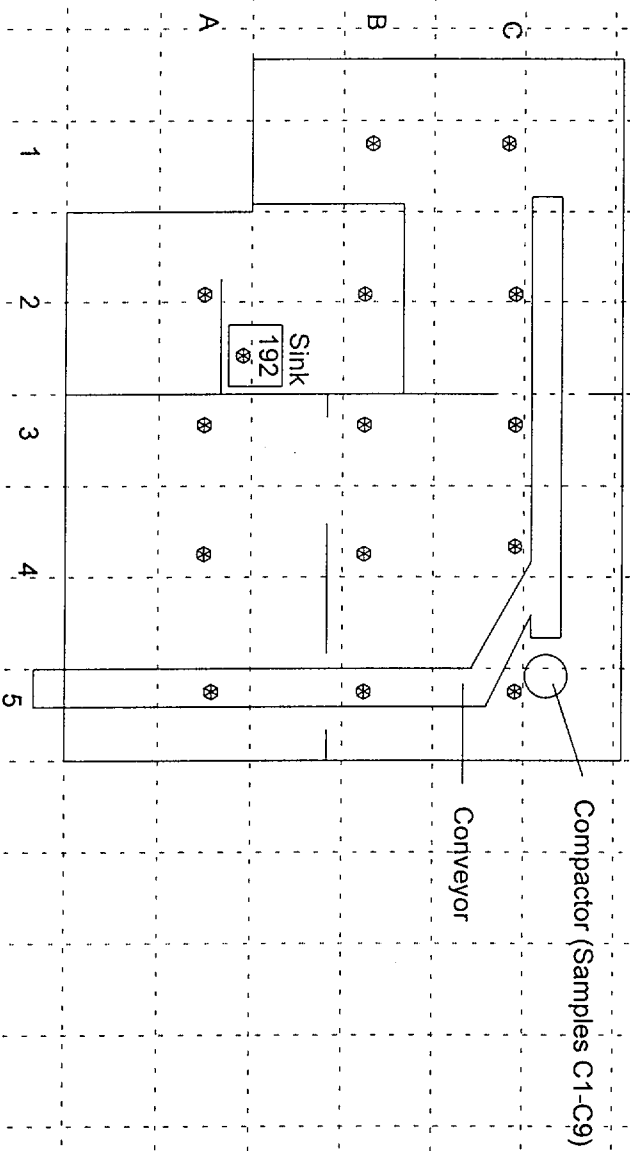
Note: Wall and fixture measurement locations are the nearest wall or fixture to the specified grid point.

Building 81 - Non-Radioactive Materials Storage Bay & Other Measurement Locations



Note: Wall and fixture measurement locations are the nearest wall or fixture to the specified grid point.

Building 81 - Compactor Area Measurement Locations



Note: Wall and fixture measurement locations are the nearest wall or fixture to the specified grid point.

Appendix B - Survey Results

CoPhysics Corporation

1242 Route 208

Monroe, NY 10950

Tel: 845-783-4402 Fax: 845-783-7191

www.cophysics.com

RADIOANALYTICAL RESULTS

Samp ID#	AREA	DESCRIPTION	GRID	Gross Beta (dpm/100sq.cm±1s)			Tritium (dpm/100sq.cm±1s)			Carbon-14 (dpm/100sq.cm±1s)			Gr. Beta (Fixed) (dpm/100sq.cm±1s)		
1	DAW & Freezer	Floor	1A	2	±	4	-3	±	4	0	±	1	-100	±	200
2	DAW & Freezer	Floor	2A	0	±	3	-3	±	4	0	±	1	0	±	200
3	DAW & Freezer	Floor	3A	1	±	4	-3	±	4	0	±	1	200	±	200
4	DAW & Freezer	Floor	4A	2	±	4	-3	±	4	0	±	1	100	±	200
5	DAW & Freezer	Floor	5A	0	±	3	-3	±	4	0	±	1	200	±	200
6	DAW & Freezer	Floor	6A	-3	±	3	-3	±	4	0	±	1	0	±	200
7	DAW & Freezer	Floor	7A	3	±	4	-3	±	4	0	±	1	100	±	200
8	DAW & Freezer	Floor	8A	5	±	5	-3	±	4	0	±	1	100	±	200
9	DAW & Freezer	Floor	9A	3	±	4	-3	±	4	0	±	1	100	±	200
10	DAW & Freezer	Floor	10A	2	±	4	-3	±	4	0	±	1	100	±	200
11	DAW & Freezer	Floor	10B	1	±	4	-3	±	4	0	±	1	100	±	200
12	DAW & Freezer	Floor	10C	4	±	4	-3	±	4	0	±	1	100	±	200
13	DAW & Freezer	Floor	10D	-1	±	3	-3	±	4	0	±	1	-100	±	200
14	DAW & Freezer	Floor	10D+4,4	4	±	5	-3	±	4	0	±	1	200	±	200
15	DAW & Freezer	Floor	10E	1	±	4	-3	±	5	0	±	1	-100	±	200
16	DAW & Freezer	Floor	10F	1	±	4	-3	±	5	0	±	1	200	±	200
17	DAW & Freezer	Floor	9B	22	±	8	18	±	13	0	±	1	200	±	200
18	DAW & Freezer	Floor	9C	-1	±	3	-3	±	5	0	±	1	0	±	200
19	DAW & Freezer	Floor	9D	1	±	4	-3	±	4	0	±	1	0	±	200
20	DAW & Freezer	Floor	9D+0,7	-4	±	3	-3	±	4	0	±	1	0	±	200
21	DAW & Freezer	Floor	9E	0	±	3	-3	±	4	0	±	1	-100	±	200
22	DAW & Freezer	Floor	9F	0	±	3	-3	±	4	0	±	1	-100	±	200
23	DAW & Freezer	Floor	8B	3	±	4	-3	±	5	0	±	1	0	±	200
24	DAW & Freezer	Floor	8C	1	±	4	-3	±	5	0	±	1	100	±	200
25	DAW & Freezer	Floor	8D	1	±	4	-3	±	5	0	±	1	0	±	200
26	DAW & Freezer	Floor	8E	11	±	5	12	±	11	0	±	1	0	±	200
27	DAW & Freezer	Floor	8F	-2	±	3	-3	±	4	0	±	1	0	±	200
28	DAW & Freezer	Floor	7B	24	±	9	20	±	15	0	±	1	200	±	200

Samp ID#	AREA	DESCRIPTION	GRID	Gross Beta (dpm/100sq.cm±1s)			Tritium (dpm/100sq.cm±1s)			Carbon-14 (dpm/100sq.cm±1s)			Gr. Beta (Fixed) (dpm/100sq.cm±1s)		
29	DAW & Freezer	Floor	7C	0	±	3	-3	±	4	0	±	1	200	±	200
30	DAW & Freezer	Floor	7D	-2	±	3	-3	±	4	0	±	1	-200	±	200
31	DAW & Freezer	Floor	7E	1	±	4	-3	±	4	0	±	1	300	±	300
32	DAW & Freezer	Floor	7F	8	±	5	-3	±	4	0	±	1	100	±	200
33	DAW & Freezer	Floor	6B	0	±	3	-3	±	5	0	±	1	200	±	200
34	DAW & Freezer	Floor	6C	6	±	5	-3	±	5	0	±	1	100	±	200
35	DAW & Freezer	Floor	6D	8	±	6	-3	±	4	0	±	1	100	±	200
36	DAW & Freezer	Floor	6E	-1	±	3	-3	±	4	0	±	1	300	±	200
37	DAW & Freezer	Floor	6F	6	±	5	-3	±	4	0	±	1	-100	±	200
38	DAW & Freezer	Floor	3B	0	±	3	-3	±	4	0	±	1	400	±	300
39	DAW & Freezer	Floor	3C	-4	±	3	-3	±	4	0	±	1	400	±	300
40	DAW & Freezer	Floor	3D	7	±	5	-3	±	4	0	±	1	500	±	300
41	DAW & Freezer	Floor	4B	19	±	7	16	±	12	0	±	1	500	±	300
42	DAW & Freezer	Floor	4C	0	±	3	-3	±	5	0	±	1	500	±	300
43	DAW & Freezer	Floor	4D	14	±	6	13	±	11	0	±	1	600	±	300
44	DAW & Freezer	Floor	5B	1	±	4	-3	±	5	0	±	1	800	±	300
45	DAW & Freezer	Floor	5C	-3	±	3	-3	±	5	0	±	1	500	±	300
46	DAW & Freezer	Floor	5D	-1	±	3	-3	±	4	0	±	1	300	±	300
47	DAW & Freezer	Floor	2B	5	±	5	-3	±	4	0	±	1	300	±	300
48	DAW & Freezer	Floor	2C	-1	±	3	-3	±	5	0	±	1	600	±	300
49	DAW & Freezer	Floor	2D	4	±	4	-3	±	4	0	±	1	200	±	200
50	DAW & Freezer	Floor	1B	5	±	5	-3	±	5	0	±	1	500	±	300
51	DAW & Freezer	Floor	1C	4	±	4	-3	±	4	0	±	1	700	±	300
52	DAW & Freezer	Floor	1D	-1	±	3	-3	±	5	0	±	1	400	±	300
53	DAW & Freezer	Wall	1AW	1	±	4	-3	±	4	0	±	1	-100	±	200
54	DAW & Freezer	Wall	2AW	0	±	3	-3	±	4	0	±	1	-300	±	200
55	DAW & Freezer	Wall	3AW	0	±	3	-3	±	4	0	±	1	-100	±	200
56	DAW & Freezer	Door	5AW	-5	±	3	-3	±	4	0	±	1	-300	±	200
57	DAW & Freezer	Wall	6AW	1	±	4	-3	±	4	0	±	1	-300	±	200
58	DAW & Freezer	Wall	7AW	0	±	3	-3	±	4	0	±	1	-200	±	200
59	DAW & Freezer	Wall	8AW	-2	±	3	-3	±	4	0	±	1	-100	±	200
60	DAW & Freezer	Wall	9AW	3	±	4	-3	±	4	0	±	1	-100	±	200
61	DAW & Freezer	Door	10AW	1	±	4	-3	±	4	0	±	1	-200	±	200
62	DAW & Freezer	Wall	10BW	5	±	5	-3	±	4	0	±	1	-200	±	200
63	DAW & Freezer	Wall	10CW	-1	±	3	-3	±	4	0	±	1	-100	±	200
64	DAW & Freezer	Wall	10DW	5	±	5	-3	±	4	0	±	1	-300	±	200
65	DAW & Freezer	Wall	10EW	2	±	4	-3	±	4	0	±	1	-300	±	200
66	DAW & Freezer	Wall	10FW	14	±	7	-3	±	4	0	±	1	-200	±	200

Samp ID#	AREA	DESCRIPTION	GRID	Gross Beta (dpm/100sq.cm±1s)			Tritium (dpm/100sq.cm±1s)			Carbon-14 (dpm/100sq.cm±1s)			Gr. Beta (Fixed) (dpm/100sq.cm±1s)		
67	DAW & Freezer	Wall	9FW	-1	±	3	-3	±	4	0	±	1	0	±	200
68	DAW & Freezer	Door	8FW	-1	±	3	-3	±	5	0	±	1	-100	±	200
69	DAW & Freezer	Wall	7FW	22	±	7	15	±	11	0	±	1	-300	±	200
70	DAW & Freezer	Door	6FW	-1	±	3	-3	±	4	0	±	1	-300	±	200
71	DAW & Freezer	Door	6EW	10	±	5	12	±	10	0	±	1	-100	±	200
72	DAW & Freezer	Wall	6DW	-1	±	3	-3	±	4	0	±	1	-300	±	200
73	DAW & Freezer	Wall	6CW	4	±	4	-3	±	4	0	±	1	0	±	200
74	DAW & Freezer	Wall	6BW	11	±	6	8	±	9	0	±	1	-400	±	200
75	DAW & Freezer	Wall	5AW1	2	±	4	-3	±	4	0	±	1	-300	±	200
76	DAW & Freezer	Wall	4AW1	-1	±	3	-3	±	5	0	±	1	-300	±	200
77	DAW & Freezer	Door	3AW1	1	±	4	-3	±	4	0	±	1	-300	±	200
78	DAW & Freezer	Wall	2AW1	36	±	10	30	±	17	0	±	1	-100	±	200
79	DAW & Freezer	Wall	1AW1	2	±	4	-3	±	4	0	±	1	-100	±	200
80	DAW & Freezer	Door	2BW	1	±	4	-3	±	4	0	±	1	-300	±	200
81	DAW & Freezer	Door	3BW	19	±	6	15	±	11	0	±	1	-300	±	200
82	DAW & Freezer	Wall	4BW	2	±	4	-3	±	4	0	±	1	-300	±	200
83	DAW & Freezer	Wall	5BW	0	±	3	-3	±	4	0	±	1	-400	±	200
84	DAW & Freezer	Wall	5CW	3	±	4	-3	±	4	0	±	1	-200	±	200
85	DAW & Freezer	Wall	5DW	-3	±	3	-3	±	4	0	±	1	-200	±	200
86	DAW & Freezer	Wall	4DW	1	±	4	-3	±	4	0	±	1	-100	±	200
87	DAW & Freezer	Wall	3DW	-2	±	3	-3	±	4	0	±	1	-100	±	200
88	DAW & Freezer	Wall	2DW	0	±	3	-3	±	4	0	±	1	-200	±	200
89	DAW & Freezer	Wall	1DW	-1	±	3	-3	±	4	0	±	1	200	±	200
90	DAW & Freezer	Wall	1CW	4	±	4	-3	±	4	0	±	1	100	±	200
91	DAW & Freezer	Wall	1BW	5	±	5	-3	±	4	0	±	1	0	±	200
92	DAW & Freezer	Shelves	1BS	6	±	5	-3	±	4	0	±	1	NA	±	NA
93	DAW & Freezer	Shelves	1DS	5	±	5	-3	±	4	0	±	1	NA	±	NA
94	DAW & Freezer	Shelves	2CS	2	±	4	-3	±	5	0	±	1	NA	±	NA
95	DAW & Freezer	Shelves	3CSL	6	±	5	-3	±	4	0	±	1	NA	±	NA
96	DAW & Freezer	Shelves	3CSR	0	±	3	-3	±	4	0	±	1	NA	±	NA
97	DAW & Freezer	Shelves	4CS	2	±	4	-3	±	5	0	±	1	NA	±	NA
98	DAW & Freezer	Shelves	5BS	3	±	4	-3	±	4	0	±	1	NA	±	NA
99	DAW & Freezer	Shelves	5DS	1	±	4	-3	±	4	0	±	1	NA	±	NA
100	DAW & Freezer	Shelves	6BS	2	±	4	-3	±	5	0	±	1	NA	±	NA
101	DAW & Freezer	Shelves	6DS	4	±	4	-3	±	5	0	±	1	NA	±	NA
102	DAW & Freezer	Shelves	7DS	1	±	4	-3	±	5	0	±	1	NA	±	NA
103	DAW & Freezer	Shelves	7BS	3	±	4	-3	±	5	0	±	1	NA	±	NA
104	DAW & Freezer	Shelves	8BSL	-1	±	3	-3	±	5	0	±	1	NA	±	NA

Samp ID#	AREA	DESCRIPTION	GRID	Gross Beta (dpm/100sq.cm±1s)			Tritium (dpm/100sq.cm±1s)			Carbon-14 (dpm/100sq.cm±1s)			Gr. Beta (Fixed) (dpm/100sq.cm±1s)		
105	DAW & Freezer	Shelves	8DSL	3	±	4	-3	±	5	0	±	1	NA	±	NA
106	DAW & Freezer	Shelves	8DSR	0	±	3	-3	±	5	0	±	1	NA	±	NA
107	DAW & Freezer	Shelves	8BSR	-2	±	3	-3	±	5	0	±	1	NA	±	NA
108	DAW & Freezer	Shelves	9BS	0	±	3	-3	±	4	0	±	1	NA	±	NA
109	DAW & Freezer	Shelves	9DS	0	±	3	-3	±	5	0	±	1	NA	±	NA
110	DAW & Freezer	Shelves	10DS	5	±	5	-3	±	5	0	±	1	NA	±	NA
111	DAW & Freezer	Shelves	10BS	1	±	4	-3	±	4	0	±	1	NA	±	NA
112	DAW & Freezer	Toledo Scale	-	7	±	5	-3	±	5	0	±	1	NA	±	NA
113	DAW & Freezer	Forklift forks	-	4	±	4	-3	±	5	0	±	1	NA	±	NA
114	DAW & Freezer	Forklift wheels	-	5	±	5	-3	±	5	0	±	1	NA	±	NA
115	Storage & Dock	Floor	-1A	-2	±	3	-3	±	4	0	±	1	300	±	300
116	Storage & Dock	Wall	-1AW	-3	±	3	-3	±	4	0	±	1	-200	±	200
117	Storage & Dock	Floor	-2A	8	±	5	-3	±	4	0	±	1	100	±	200
118	Storage & Dock	Wall	-2AW	15	±	6	12	±	10	0	±	1	-100	±	200
119	Storage & Dock	Floor	-3A	1	±	4	-3	±	4	0	±	1	100	±	200
120	Storage & Dock	Wall	-3AW	2	±	4	-3	±	4	0	±	1	-400	±	200
121	Storage & Dock	Floor	-1B	2	±	4	-3	±	4	0	±	1	200	±	200
122	Storage & Dock	Floor-Stair	-1BM	8	±	5	-3	±	4	0	±	1	0	±	200
123	Storage & Dock	Floor	-1A+2,5	1	±	4	-3	±	4	0	±	1	400	±	300
124	Storage & Dock	Floor	-2B	-1	±	3	-3	±	4	0	±	1	200	±	200
125	Storage & Dock	Wall	-2BW	1	±	4	-3	±	4	0	±	1	800	±	300
126	Storage & Dock	Floor	-3B	3	±	4	-3	±	4	0	±	1	100	±	200
127	Storage & Dock	Floor	-3C	3	±	4	-3	±	4	0	±	1	100	±	200
128	Storage & Dock	Door	-3CW	3	±	4	-3	±	4	0	±	1	0	±	200
129	Storage & Dock	Floor	-4C	5	±	5	-3	±	4	0	±	1	100	±	200
130	Storage & Dock	Wall	-4CW	2	±	4	-3	±	4	0	±	1	200	±	200
131	Storage & Dock	Floor	-4B	3	±	4	-3	±	4	0	±	1	100	±	200
132	Storage & Dock	Floor	-4A	6	±	5	-3	±	4	0	±	1	200	±	200
133	Storage & Dock	Wall	-4AW	2	±	4	-3	±	4	0	±	1	-300	±	200
134	Storage & Dock	Floor	-5A	3	±	4	-3	±	4	0	±	1	-100	±	200
135	Storage & Dock	Wall	-5AW	2	±	4	-3	±	4	0	±	1	-300	±	200
136	Storage & Dock	Floor	-5B	19	±	6	14	±	11	0	±	1	0	±	200
137	Storage & Dock	Floor	-5C	3	±	4	-3	±	4	0	±	1	100	±	200
138	Storage & Dock	Wall	-5CW	3	±	4	-3	±	4	0	±	1	-200	±	200
139	Storage & Dock	Floor	-6C	2	±	4	-3	±	4	0	±	1	-100	±	200
140	Storage & Dock	Door	-6CW	11	±	6	-3	±	4	0	±	1	-300	±	200
141	Storage & Dock	Floor	-6B	2	±	4	-3	±	4	0	±	1	0	±	200
142	Storage & Dock	Floor	-6A-3,-1	7	±	5	-3	±	5	0	±	1	200	±	200

Samp ID#	AREA	DESCRIPTION	GRID	Gross Beta (dpm/100sq.cm±1s)			Tritium (dpm/100sq.cm±1s)			Carbon-14 (dpm/100sq.cm±1s)			Gr. Beta (Fixed) (dpm/100sq.cm±1s)		
143	Storage & Dock	Floor	-6AW	12	±	6	-2	±	4	0	±	1	-200	±	200
144	Storage & Dock	Floor	-85,17	-4	±	3	-3	±	4	0	±	1	0	±	200
145	Storage & Dock	Floor	-100,17	7	±	5	-3	±	4	0	±	1	200	±	200
146	Storage & Dock	Floor	-115,17	5	±	5	-3	±	4	0	±	1	100	±	200
147	Compactor Area	Floor	1B	4	±	4	-3	±	4	0	±	1	300	±	300
148	Compactor Area	Floor	1BW	0	±	3	-3	±	4	0	±	1	100	±	200
149	Compactor Area	Floor	1C	5	±	5	-3	±	4	0	±	1	400	±	300
150	Compactor Area	Wall	1CW	3	±	4	-3	±	4	0	±	1	200	±	200
151	Compactor Area	Floor	2C	6	±	5	-3	±	4	0	±	1	0	±	200
152	Compactor Area	Conveyor	2CM	4	±	4	-3	±	5	0	±	1	0	±	200
153	Compactor Area	Wall	2CW	3	±	4	-3	±	4	0	±	1	1000	±	300
154	Compactor Area	Floor	2B	2	±	4	-3	±	4	0	±	1	200	±	200
155	Compactor Area	Wall	2BW	3	±	4	-3	±	4	0	±	1	100	±	200
156	Compactor Area	Sink	2BS	3	±	4	-3	±	5	0	±	1	300	±	300
157	Compactor Area	Floor	2A	3	±	4	-3	±	4	0	±	1	200	±	200
158	Compactor Area	Door	2AW	7	±	5	-3	±	4	0	±	1	-100	±	200
159	Compactor Area	Floor	3B	3	±	4	-3	±	4	0	±	1	200	±	200
160	Compactor Area	Floor	3BW	1	±	4	-3	±	4	0	±	1	0	±	200
161	Compactor Area	Floor	3C	3	±	4	-3	±	4	0	±	1	200	±	200
162	Compactor Area	Door, fire	3CW	10	±	6	-2	±	4	0	±	1	-100	±	200
163	Compactor Area	Floor	3B+4,4	3	±	4	-3	±	4	0	±	1	400	±	300
164	Compactor Area	Floor	4B	3	±	4	-3	±	4	0	±	1	200	±	200
165	Compactor Area	Wall	4BW	1	±	4	-3	±	4	0	±	1	200	±	200
166	Compactor Area	Floor	4C	1	±	4	-3	±	4	0	±	1	0	±	200
167	Compactor Area	Conveyor	4CM1	31	±	9	11	±	11	0	±	1	1200	±	300
168	Compactor Area	Floor	4CM2	34	±	10	-3	±	5	0	±	1	100	±	200
169	Compactor Area	Floor	4C+0,5	9	±	6	-2	±	5	0	±	1	100	±	200
170	Compactor Area	Floor	5C	1	±	4	-3	±	4	0	±	1	100	±	200
171	Compactor Area	Wall	5CW	6	±	5	-3	±	4	0	±	1	400	±	300
172	Compactor Area	Conveyor	5BM	20	±	8	-3	±	5	22	±	8	200	±	200
173	Compactor Area	Floor	3A	4	±	4	-3	±	4	0	±	1	300	±	300
174	Compactor Area	Wall	3AW	0	±	3	-3	±	4	0	±	1	900	±	300
175	Compactor Area	Floor	4A	6	±	5	-3	±	4	0	±	1	200	±	200
176	Compactor Area	Table	4AM	10	±	6	0	±	6	0	±	1	200	±	200
177	Compactor Area	Conveyor	5AM	2	±	4	-3	±	5	0	±	1	200	±	200
178	Compactor Area	Floor	5A+1,10	4	±	4	-2	±	5	0	±	1	700	±	300
179	Compactor Area	Door, fire	5AW	2	±	4	-2	±	4	0	±	1	-200	±	200
180	Compactor Area	Floor	5A+1,-6	4	±	4	-3	±	4	0	±	1	0	±	200

Samp ID#	AREA	DESCRIPTION	GRID	Gross Beta (dpm/100sq.cm±1s)			Tritium (dpm/100sq.cm±1s)			Carbon-14 (dpm/100sq.cm+1s)			Gr. Beta (Fixed) (dpm/100sq.cm±1s)		
181	Office/Lockers	Floor	-	10	±	5	5	±	8	0	±	1	0	±	200
182	Office/Lockers	Desk	-	4	±	4	-3	±	4	0	±	1	0	±	200
183	Office/Lockers	Floor	-	1	±	4	-3	±	4	0	±	1	200	±	200
184	Office/Lockers	Floor	-	18	±	7	13	±	11	0	±	1	200	±	200
185	Office/Lockers	Floor	-	5	±	5	-3	±	4	0	±	1	-100	±	200
186	Office/Lockers	Floor	-	61	±	15	2	±	6	47	±	12	300	±	300
187	Office/Lockers	Floor	-	21	±	7	14	±	10	0	±	1	-100	±	200
188	Comp.Vent.Sys.	interior housing	-	455	±	76	-3	±	4	211	±	40	0	±	700
189	Gen.Air Vent.Sys.	interior housing	-	7	±	5	-3	±	5	0	±	1	0	±	700
190	Comp.Vent.Sys.	prefilter media***	-	1827	±	1379	298	±	303	177	±	156	5300	±	1000
191	Gen.Air Vent.Sys.	prefilter media***	-	77	±	66	18	±	41	-1	±	4	1300	±	800
192	Compactor Area	Sink Trap***	-	204	±	108	58	±	64	-1	±	4	NA	±	NA
C1	Compactor Area	compactor - door int	-	921	±	193	260	±	104	722	±	159	0	±	700
C2	Compactor Area	compactor - outer pad	-	128	±	32	90	±	46	54	±	17	0	±	700
C3	Compactor Area	compactor - inner floor	-	88	±	24	15	±	14	76	±	21	0	±	700
C4	Compactor Area	compactor - under plate	-	89	±	22	-3	±	5	33	±	11	0	±	700
C5	Compactor Area	compactor - top of plate	-	657	±	142	208	±	73	253	±	62	0	±	700
C6	Compactor Area	compactor - inner walls	-	179	±	35	88	±	34	141	±	31	0	±	700
C7	Compactor Area	inside pipe takeoff	-	645	±	138	244	±	89	439	±	101	4000	±	900
C8	Compactor Area	inside str pipe sec	-	559	±	117	147	±	53	351	±	79	2600	±	900
C9	Compactor Area	inside pipe elbow	-	381	±	87	73	±	34	253	±	62	2600	±	900

*** media & sludge samples - removable activity units are dpm/g

MDA's	14	33	6	1300	(1-187)
				2600	(188-C9)

Method for Wipe Test Analysis: pulse shape, liquid scintillation counting - Instrument: Wallac Model 1415 LSC, Serial #4150043

Method for Fixed Reading: direct gas proportional or GM count - Instruments: see text

Uncertainties are 1-sigma counting and quench correction errors.

MDA - Minimum Detectable Activity

Standards are traceable to the National Institute of Standards and Technology.

Radioactive Materials License: NYS 2691-3949

Appendix C - Summary of MARSSIM Area Classification and Sample Frequency Calculations

Area Classification: For purposes of establishing the sampling and measurement frequency and pattern, MARSSIM discusses non-impacted and impacted areas in which there are 3 sub-classifications:

Impacted Areas - have potential radioactive contamination (based on facility operating history) or known radioactive contamination (based on past or preliminary radiological surveillance). These include areas where radioactive materials were used or stored, or potential for unusual occurrences which could have resulted in contamination. Areas adjacent to locations where radioactive materials were used or stored are normally included in this classification because of the potential for inadvertent spread of contamination. These areas are further classified as:

- ♦ Class 1 Areas: (areas experiencing prior remedial action, spills, waste storage or disposal, relatively large quantities of loose radioactivity)
- ♦ Class 2 Areas: (areas handling low concentrations or small quantities of radioactivity in unsealed forms, upper walls and ceilings in airborne radioactivity areas, perimeters of contamination control areas, etc. where no individual measurement result would be expected to exceed guideline values before remediation)
- ♦ Class 3 Areas: (areas in which residual radioactivity is expected but at a small fraction of guideline values such as buffer areas to contaminated areas, lab offices, hallways, loading docks used for radioactive shipments, etc.)

Non-impacted areas - All areas not classified as affected. These areas are not expected to contain residual radioactivity, based on a knowledge of site history and/or previous survey information.

Sample Frequencies: The frequencies of measurements were derived from MARSSIM based on expected standard deviation of measurement results and the detector efficiencies.

Equation 5.1 from MARSSIM was used to calculate the minimum number of samples/measurements to be collected, based on the WRS test when the contaminant (i.e., gross radioactivity) is present in the background:

$$N = \frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{3(P_r - 0.5)^2}$$

See MARSSIM 5.5.2.2 for descriptions of these parameters. For a 95% confidence level, $Z=1.645$ using 0.05 for each α and β . Because the standard deviation of gross beta GPC measurement results (~80 cpm) is normally much smaller than the "shift" (~1/2 of the DCGL, guideline limit), P_r approaches 1.0. For this type of survey where the radioactivity is easily detectable over background and the detector efficiency is about 0.2 c/d, the required number of measurements, N , is calculated to be 14. Adding about 20% as a contingency, N becomes about

18, consisting of 9 measurements in the reference (background) area and 9 measurements in the survey area. For carbon-14 measurements, with a lower detector efficiency (~ 0.07 c/d), N becomes about 23 (12 in each survey area).

Similarly, when the contaminant is not significantly in the background (i.e., wipe tests), equation 5.2 from MARSSIM was used to calculate the minimum number of samples to be collected, based on the Sign test:

$$N = \frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{3(\text{sign } P - 0.5)^2}$$

For easily detectable radioactivity, "sign P" approaches 1.0, thus N will equal 11. Adding 20% as a contingency, N becomes 13.

The above tests assume uniformity of contamination. However, in most field situations, small areas of elevated activity are likely. Thus, scanning or other techniques must be employed to ensure that these elevated areas are not missed during the survey. The effectiveness of scanning is assessed via a procedure in MARSSIM 5.5.2.4. If scanning sensitivity is good, no additional sampling or fixed counts are necessary, other than special samples such as sink drains, ventilation systems, etc. However, if scanning sensitivity is poor (e.g., uranium in soil) then additional samples must be collected. If scanning is not possible (e.g., tritium), then biased sampling using professional judgment is necessary.

This is to acknowledge the receipt of your letter/application dated

03/15/01, and to inform you that the initial processing which includes an administrative review has been performed.

☒ *Amend* There were no administrative omissions. Your application was assigned to a technical reviewer. Please note that the technical review may identify additional omissions or require additional information.

☐ Please provide to this office within 30 days of your receipt of this card

A copy of your action has been forwarded to our License Fee & Accounts Receivable Branch, who will contact you separately if there is a fee issue involved.

Your action has been assigned Mail Control Number 1 2 9 4 4 6
When calling to inquire about this action, please refer to this control number.
You may call us on (610) 337-5398, or 337-5260.

NRC FORM 532 (R)
(6-98)

Sincerely,
Licensing Assistance Team Leader

BETWEEN:

License Fee Management Branch, ARM
and
Regional Licensing Sections

: (FOR LFMS USE)
: INFORMATION FROM LTS
: -----
:
: Program Code: 03211
: Status Code: 0
: Fee Category: 3A
: Exp. Date: 20080930
: Fee Comments: _____
: Decom Fin Assur Req'd: Y
: ::

LICENSE FEE TRANSMITTAL

A. REGION

1. APPLICATION ATTACHED

Applicant/Licensee: E. R. SQUIBB & SONS, INC.
Received Date: 20010316
Docket No: 3005222
Control No.: 129446
License No.: 29-00139-02
Action Type: Amendment

2. FEE ATTACHED

Amount: _____
Check No.: /

3. COMMENTS

Signed R. J. Brown
Date 03/20/01

B. LICENSE FEE MANAGEMENT BRANCH (Check when milestone 03 is entered /__/))

1. Fee Category and Amount: _____

2. Correct Fee Paid. Application may be processed for:

Amendment _____
Renewal _____
License _____

3. OTHER _____

Signed _____
Date _____