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NMS82

BD
Helping all people live healthy lives

May 19, 2008

LAT
USNRC Region I
475 Allendale Road
King of Prussia, PA 19406

To Whom It May Concern,

03020875

Becton Dickinson Caribe, Ltd. has ended the use of byproduct radioactive material at the Cayey, Puerto Rico facility and has performed decommissioning actions to terminate the NRC issued byproduct license 52-21502-01.

Included in this submission is the Radiological Final Status Survey Report that has been prepared by Mr. Gregory D. Smith, CHP of RSO, Incorporated.

If a site visit is requested, please contact the Radiation Safety Officer, Ms. Carmen Gonzalez at (787) 738-4242 extension 244.

If you have any questions concerning this submission, I can be contacted at (410) 773-6009.

Sincerely,

Michael J. Spinazzola

Michael J. Spinazzola
Supervisor, Safety & Environment, RSO Becton Dickinson Baltimore

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NMSS/RGN1 MATERIALS-002

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RADIOLOGICAL
FINAL STATUS SURVEY REPORT

Becton Dickinson Caribe, Ltd.
Vicks Drive
Cayey, Puerto Rico

May 2008

Prepared for:
Becton Dickinson

Report Prepared by: [signature]
Gregory D. Smith, CHP

RSO, Inc.
Laurel, MD

142422

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1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

Becton Dickinson Caribe Ltd, (BD Cayey) has ended the use of byproduct radioactive material at the Cayey Puerto Rico facility and has performed decommissioning actions to terminate the NRC issued byproduct materials license 52-21502-01. The facility was licensed and commissioned for the possession and use of carbon-14 in the manufacture of in vitro diagnostic products. It is noted that there are several BACTEC products produced at the BD Cayey facility with only a few that employed 14C to make "radiometric" BACTEC. This report will refer to radiometric BACTEC as r-BACTEC.

BD stopped manufacturing r-BACTEC at the Cayey facility in 2005. Since that time all radiometric BACTEC products have been shipped off site and all radioactive waste has been disposed of through release to the sanitary sewer or shipped/transferred for off-site disposal.

BD facility personnel conducted radioactive contamination surveys of the equipment used to manufacture r-BACTEC. Most of this equipment has been surveyed and released. BD personnel have also conducted contamination surveys of the surfaces in the areas where 14C was used or stored, where r-BACTEC was manufactured and where r-BACTEC product was stored.

A Radiological Final Status Survey (FSS) was conducted in 2 phases. No residual contamination above the NRC Screening values for surface contamination was likely, however, actions were taken to reduce residual contamination to "as low as reasonably achievable". The 1st phase included surveys of areas with the greatest potential for residual contamination. The 2nd phase included survey of other impacted areas and surveys of areas where additional remedial action was performed.

BD provided a description of the use of 14C to develop a Historical Site Assessment (HSA). The HSA has been used to determine the areas to be surveyed.

RSO, Inc. (RSO) supplied selected calibrated radiation survey equipment, analysis of wipe tests and provided an analysis of the sensitivity of the survey techniques for the selected potential contaminate radionuclides. RSO supplied trained and experienced personnel to perform the surveys, collect wipe tests and prepare a Final Survey Report.

1.2 Purpose and Scope

BD contracted with RSO, Inc. to conduct a Radiological Final Status Survey (FSS) and prepare a report to support the request for termination of the BD Cayey NRC issued byproduct materials license.

2.0 BACKGROUND

2.1 BACTEC

Following is a brief description of the purpose of the radiometric BACTEC that were produced at the BD Cayey facility.

*The **BACTEC** Radiometric Technique has been widely used for the rapid recovery of bacteria from sputum and other clinical specimens. All types of clinical specimens, pulmonary as well as extra-pulmonary, can be processed for **BACTEC** procedures. Details are provided in the CDC Manual, Procedure for the Isolation and Identification of Mycobacteria.*

*The sample to be tested is inoculated into one or more of the BACTEC vials, with a syringe through the rubber septum, and incubated. The culture vial is periodically placed into the **BACTEC** 460TB System instrument for testing, which consists of aspiration of the head space gas and assay of its radioactive content. A positive reading indicates the presence of viable microorganisms in the vial.*

2.2 Use of Licensed Material At the BD Cayey Facility

BD Cayey applied for a NRC issued byproduct materials license and began producing radiometric BACTEC in 1984. The use of 14C was limited to the production of r-BACTEC vials. No other use or radionuclides was conducted at this facility. Production of r-BACTEC ended in 2005.

The r-BACTEC product produced at the BD Cayey facility was referred to as 13A. Each vial (bottle) contained 5 uCi of 14C in 30 mL of media.

2.3 Radiometric BACTEC Production

The manufacture of r-BACTEC can be summarized in the following steps:

1. Carbon-14 was acquired from suppliers in the form of palmitic acid, in hexane, with an activity of 10 millicuries per sealed ampoule.
2. The palmitic acid, through a drying process, removed the hexane and converted the 14C to a solid powder. This operation (sometimes referred to as "dry-down") was performed in a ductless fume hood.
3. This powder was weighed and then dissolved into compounds referred to as "substrates".
4. The 14C substrates were then added to the BACTEC media, in the formulation tanks, during the media formulation process.
5. The media containing 14C was piped to the r-BACTEC filling station where the vials were filled, capped and placed in stainless steel racks for autoclaving.
6. From the autoclave the racks of r-BACTEC were moved to a "cool down" area equipped with overhead ventilation hoods.
7. Then the r-BACTEC vials were moved to an automated line for labeling.
8. r-BACTEC bottles were placed in closed top cardboard trays of 100 vials each.
9. A label was applied to each tray and the trays moved to the warehouse area until shipped.
10. Rejected or unusable r-BACTEC vials were disposed of in a "Bottle Break" (aka Bottle Crush) room (also used for disposal of non-radiometric BACTEC).

2.4 Site Information

Facility: Becton Dickinson Caribe, Ltd.
Parque Industrial Ricon
Vicks Drive, Lot 6
Cayey, Puerto Rico

The building used for r-BACTEC production is referred to Building 1. The production and warehouse areas are a single level with 2 levels housing the administrative and engineering areas. The roof has a flat membrane roof. Floor plans of the facility and survey areas are included in the survey results.

All areas of the facility were still in use during this survey. A dedicated bottling line was used for r-BACTEC, however, media was prepared in common mixing and formulation tanks, autoclaves and labeling lines were used for both radiometric and non-radiometric BACTEC.

QC Laboratory and Palmitic Acid Storage

Quality Control tests are performed in the QC Laboratory. A BACTEC 460 test machine was used for some of this testing. Palmitic acid (14C labeled) was stored in the QC Laboratory until needed for production in a "Temperature Control Unit" (walk-in style cabinet). No opening of the sealed vials containing the relatively high activity low volume palmitic acid was performed in the QC Lab or the Temperature Control Unit.

Palmitic Acid "Dry-down" Labs

Radiometric media was prepared using the previously described "dry-down" process, inside a dedicated "ductless hood". During the years of r-BACTEC production 2 different rooms were used. The most recent room used was near the BACTEC Fill Area (near the formulation tanks). The area is now used as BACTEC Sensor Laboratory. Previous to this use another small room near the BACTEC Fill Area was used. It is now a storeroom for boxed paper records. The hood for this operation, had previous to this survey, been dismantled, parts decontaminated and released or parts disposed of as radioactive waste.

Fill Area Platform and Fill Lines

In the Fill Area are the Platform with Formulation and Mixing Tanks used for preparation of media, and the Fill Lines (bottling lines). Each line has automated cleaning, filling, and capping.

Autoclave

BACTEC vials from the Fill Lines are placed in racks and the racks placed in an autoclave. There are 8 autoclaves and each has a canopy style hood over the door with dedicated ducting and roof mounted exhaust blower.

Trench Drains for Fill Lines

The former bottling line (now removed) used for r-BACTEC production was served by floor drain trenches, with a nominal size of 12" width and 12" depth and typically 4' to 8' in length.

Air Handling Fill Area

The air handling system for the Fill Area was served by the current roof mounted air handling unit. Return air and "make-up" air is combined in the air handling unit then sent to supply ducts above the formulation tanks and other areas of the bottling area. Air is returned to the system through 11 ceiling mounted air return grills and associated ducting. A separate system serves the labeling area.

There are 3 local ventilation ducts and roof mounted fans above the formulation tanks, a duct and roof mounted fan for each of the 8 large autoclave units and 4 ducts and 4 roof mounted fans for the rack "cool down" area.

Air Handling Unit for Fill Area

The air handling unit (AHU#7) pulls air from the air returns and outdoor "make-up" air through a set of rough and pleated filters then a set of cooling coils using a large electric blower. The conditioned air is supplied primarily to the center of the Fill Area.

Roof Above Fill Area

AHU#7, autoclave exhaust blowers and local exhaust blowers are on the roof above the Fill Area. The roof above the Fill Area is a flat roof with a sealed membrane surface.

Vial Labeling Area

BACTEC product after filling, capping and autoclaving are placed onto automated lines for application of the product labels.

Bottle Crush Room

All usable BACTEC products (e.g.: "off spec" production) are disposed by crushing, washing and releasing the liquid to the sanitary sewer. A small room near the BACTEC Fill Area was used for this purpose.

Product Storage (warehouse)

Warehouse area used prior to shipment to BD Baltimore for storage of packaged BACTEC vials including r-BACTEC.

Radioactive Waste Storage Area

This area was used for storage of 55-gallon steel drums of dry radioactive waste. This waste consisted of disposable protective clothing (gloves, coveralls, and booties), empty palmitic acid vials and parts that could not be decontaminated.

2.5 Decommissioning Actions

All remaining stock vials and manufactured r-BACTEC have been disposed of.

There was in inventory during Phase 1 of the FSS: 4 each 55-gallon steel drums containing dry waste, 2 PZA test kits that contain 14C, several LSC unquenched standards (3H and 14C) and the Beckman LS1801 liquid scintillation counter (LSC) that contains a small radioactive sealed source (137Cs, 30 uCi, nominal activity).

Following Phase 1:

- The trench drain that served the r-BACTEC bottling line was further steam cleaned to reduce contamination levels.
- Approximately 10' of contaminated trench drain steel grating was removed and disposed of as radioactive waste.
- The electric motor of the bottle crusher was removed and disposed of as radioactive waste.

- The Air Handling Unit #7 (air return side), was cleaned using high pressure washing to reduce contamination levels.

During Phase 2:

The 4 drums of radioactive waste were shipped off-site. A copy of the NRC 541 forms used for the shipment is included in this report as Attachment 2.

The PZA test kits, the LSC unquenched standards, and the Beckman LS1801 LSC have been transferred to Becton Dickinson in Baltimore, MD.

3.0 RADIOLOGICAL FSS - APPROACH

3.1 Survey Design Basis

This Final Status Survey (FSS) was designed in consideration of the NRC guidance in NUREG 1757 for Group 2 facilities (see following excerpt). Group 2 includes facilities that "would not have contaminated work areas at the levels above the decommissioning screening criteria". The BD Cayey facility was considered to fit into this category.

From NUREG 1757 v1 Chapter 7:

> Group 2 facilities may have residual radiological contamination present in building surfaces and soils. However, licensees are able to demonstrate that their facilities meet the provisions of 10 CFR 20.1402 ("Radiological Criteria for Unrestricted Use") by applying the screening approach dose analysis described in Chapter 6.
>
> Additionally, licensees in Group 2 typically possess historical records of material receipt, use, and disposal, such that quantifying past radiological material possession and use may be developed with a high degree of confidence. Furthermore, these licensees have radiological survey records that characterize the residual radiological contamination levels present within the facilities and at their sites. That is, they are able to demonstrate residual radiological contamination levels without more sophisticated survey procedures (greater than those used for operational surveys) or dose modeling. These licensees do not need to use site-specific parameters or establish site-specific DCGLs in order to demonstrate acceptability for release of their sites."

Derived Concentration Guideline Levels (DCGLs) are radionuclide-specific concentration limits used by the licensee during decommissioning to achieve the regulatory dose standard that permits the release of the property and termination of the license. The DCGL applicable to the average concentration over a survey unit is called the $DCGL_W$. The DCGL applicable to limited areas of elevated concentrations within a survey unit is called the $DCGL_{EMC}$.

3.2 Decommissioning Criteria

The Radiological Criteria for Unrestricted Use, is found in 10 CFR Part 20 Subpart E:

> "The site will be considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from background radiation results in a TEDE to an average member of the critical group that does not exceed 25 mrem per year, and that the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA)."

3.3 Screening Values

The NRC has established Screening Value (DCGLs) for common beta-gamma-emitting radionuclides for building surface contamination as published in the Federal Register (63 FR 64132, November 18, 1998) and also shown in Appendix B Table B.1 of NUREG 1757 and is a $DCGL_W$. These are values, which would be derived using the default parameters and the computer code DandD, for the concentration (dpm/100 cm^2) equivalent to 25 mrem/y.

The surface contamination Screening Value for carbon-14 is shown below:

Radionuclide	Surface Contamination (dpm/100 cm^2)
14C	3.7×10^6

3.4 Performance of Radiological Surveys

The radiological surveys were conducted using guidance provided by the NRC in NUREG-1575, EPA 402-R-97-016, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM): Revision 1, August 2000.

3.5 Area Classification

Impacted Areas

- Impacted areas are areas that may have residual radioactivity from the licensed activities.
- Non-impacted areas are areas without residual radioactivity from licensed activities.
- NRC guidance provides that Final Status Survey (FSS) radiation surveys do not need to be conducted in non-impacted areas.

Impacted areas identified by BD by using knowledge of past radiometric BACTED manufacturing processes. The impacted areas were the areas where: 14C was stored in closed ampoules, ampoules were opened and the 14C, r-BACTEC manufacturing areas (formulation of media, filling of bottles), disposal of unusable r-BACTEC (bottle crushing), r-BACTEC storage (warehouse area) and the radioactive waste storage area.

Classes

Impacted areas can be classified into one of the three classes, listed below, based on levels of residual radioactivity.

- Class 1 Areas are impacted areas that, prior to remediation, are expected to have concentrations of residual radioactivity that exceed the $DCGL_W$ ($DCGL_W$ is defined in Section 2.2 of MARSSIM);
- Class 2 Areas are impacted areas that, prior to remediation, are not likely to have concentrations of residual radioactivity that exceed the $DCGL_W$.;
- Class 3 Areas are impacted areas that have a low probability of containing residual radioactivity.

Classification of the Areas at BD Cayey

The DCGL used to design this survey was 3.4×10^6 (dpm/100 cm^2).

Class 3 Areas – Areas where: 14C stored in closed ampoules, r-BACTEC storage (warehouse area) and the radioactive waste storage area.

Class 2 Areas - Areas where: ampoules were opened and the 14C, r-BACTEC manufacturing areas (formulation of media, filling of bottles), disposal of unusable r-BACTEC (bottle crushing).

The rooms or areas, where the relatively high activity palmitic acid was used, were classified as a Class 2 Area. This would be the area where the "ductless" fume hood was used for the "dry-down" procedure and the area around the formulation tanks where the substrates were added to the large volume media being prepared. The activity concentration of the 14C at this point of the process was less than 0.2 uCi per mL of media.

3.6 Survey Approach

The FSS conducted by RSO, Inc. included static measurements and scans of floors and bench surfaces at survey locations selected by RSO, Inc. Wipe test for removable contamination were collected at each survey location.

The HSA identified only carbon-14 as the potential radionuclide contaminate.

3.7 Methods

Survey Locations

Floor plans were provided by BD Cayey and used to show sample locations. The sample locations were selected during the survey at likely bench top and floor locations for contamination and included basins and floor drains.

At each location a wipe test was collected and a static measurement was performed.

Background Radiation Level Determination

Daily background measurements were performed and recorded for each instrument before starting survey work each day.

Background was determined with the detector in the survey area, at about 1 m above the floor, not in contact with room surface, with a protective cover only (when applicable).

Removable Contamination

Each wipe test consisted of using a 2.5 cm^2 dry wipe test paper applying moderate pressure over an area of about 100 cm^2.

Scan Survey

Scans were performed using a hand held detector coupled to an analog/digital rate-meter with an audio output. Surface scanning speeds were 1 detector width per second. To optimize detection of elevated radiation levels (1.5 to 3 times background) during scanning, the survey meter audio was used in addition to observing the fluctuations in the analog meter reading.

Static Measurements

Static radiation measurements for beta/gamma surface contamination were performed at random and biased locations using a 4-detector "pancake" GM array. Measurements were conducted by integrating over a 1-minute count time.

Other Sampling
Laboratory sink basins and chemical fume hoods were surveyed using scans, static measurements and wipe tests.

Laboratory Services
Wipe test were analyzed by RSO, Inc. using a liquid scintillation counter and automatic gamma counter.

Quality Assurance
Survey meters used to perform the Final Status Survey had been calibrated within 6 months of their use using radioactive standards traceable to NIST. Also, performance checks were completed on each survey meter at the beginning of each day of use and periodically throughout the day.

The laboratory instruments used by RSO, Inc. to analyze the wipe tests were maintained under RSO's laboratory Quality Assurance Program which includes a service agreement with the manufacturer, daily QC performance charts of background and standard samples.

The reported data was reviewed for consistency and data reduction method.

3.8 Organization and Responsibilities

Oversight of the survey work was provided by Mr. Michael Spinazzola, the BD Baltimore Radiation Safety Officer and the FSS was performed by the following personnel from RSO, Inc.:

Gregory D. Smith, Certified Health Physicist, RSO, Inc.

- Certification by the American Board of Health Physics (1989)
- M.S. Colorado State University-Health Physics (1986)
- 25 Years of Radiation Safety Program and Services Experience with RSO, Inc. *including facility decommissioning surveys*
- MARSSIM Training 40-Hour ORAU (October 2005)

David E. Wellner, General Manager, RSO, Inc.

- B.S. Environmental Management (1999)
- 25 Years of Radiation Safety Program and Services Experience with RSO, Inc. *including facility decommissioning surveys and radioactive waste disposal*
- DOT and IATA Training Transportation of Radioactive Materials (February 2008)

4.0 SURVEY INSTRUMENTATION

4.1 Description of Instrumentation

The survey instruments that were used to perform the FSS are shown in Table 3:

Table 3. Survey meters used to conduct the Phase 1 and Phase 2 of the FSS.

Survey Meter	Detector Model	Detector Type	Probe Area/Size	Description
Floor Monitor Ludlum Model 2221 Scaler/Ratemeter	Ludlum 43-37	Gas Flow Proportional Detector	582 cm^2	Scans of Floors
Ludlum Model 2221 Scaler/Ratemeter	Ludlum 43-68	Gas Flow Proportional Detector	126 cm^2	Static Measurements and Scans of Surfaces

4.2 Instrument Calibration and Efficiency Data

The calibration and efficiency data for the survey meters that were used during the FSS are summarized in Table 4.

Table 4. Survey meter/instrument calibration data and efficiency data.

Meter w/ Probe	Serial Number	Calibration Date	Detector Model	Radionuclide	Total Efficiency (4π)
Ludlum Model 2241 Scaler/Ratemeter	161591	2/22/08	Ludlum 43-68	14C	20% cpm per dpm
Ludlum Model 2241 Scaler/Ratemeter	147497	2/22/08	Ludlum 43-37	14C	20% cpm per dpm
Ludlum Model 2241 Scaler/Ratemeter	99138	3/28/08	Ludlum 43-68	14C	21% cpm per dpm
Ludlum Model 2241 Scaler/Ratemeter	108858	3/28/08	Ludlum 43-37	14C	20% cpm per dpm
Packard Liquid Scintillation Counter	TriCarb	9/14/07	LS	3H 14C 32P	~50% cpm per dpm ~85% cpm per dpm ~95% cpm per dpm

4.3 Minimum Detectable Concentration for Scanning Technique

Beta Scans:

The minimum detectable concentration for the beta scans was estimated using the suggested method in NUREG -1507 and in Abelquist 2001 (See 9.3.3.2).

Equation 1

$$\text{Scan MDC} = \frac{MDCR}{\sqrt{p} * E_i E_s}$$

Where:

Scan MDC = estimated minimum activity (dpm/100 cm^2) that can be detected during a scan,

MDCR = Minimum detectable count rate, see Table 6.6 MARSSIM

p = surveyor efficiency considered to be 0.25

E_i = 2π efficiency (c/d), and

E_s = surface efficiency,

Note: E_i estimated assuming the 2π efficiency was approximately 2 times the 4π efficiency

Note: E_s assumed to be 0.5

Table 5. MDC for Scanning.

Survey Meter	Detector or Probe	Probe Area/Size	Contam-inate	4π Eff-iciency	MDCR	Estimated scanMDC (dpm/100 cm^2)
Ludlum 16 Ratemeter Scaler/Ratemeter	Ludlum 44-9	15 cm^2	14C	8%	200 cpm	13,000
Ludlum 2221 Ratemeter Scaler/Ratemeter	Ludlum 43-68	126 cm^2	14C	20%	900 cpm	7,000
Ludlum 2221 Ratemeter Scaler/Ratemeter	Ludlum 43-37	582 cm^2	14C	20%	2400 cpm	4,000

4.4 Static Measurement Data Reduction

Determinations of the total surface activity were based on static measurements with the detector in direct contact with the surface. For each analysis gross counts were converted into area activity concentration using the following method of data reduction:

Equation 2

$$A = \frac{\left(\frac{C}{T}\right) - R_B}{E * \left(\frac{a}{100 \text{ cm}^2}\right)}$$

Where:

A = total activity (dpm/100 cm^2),

C = integrated gross counts (counts),

T = count time (min),

R_B = background count rate (cpm),

E = total efficiency (c/d), and

a = detector area (normalized to 100 cm^2).

4.5 Minimum Detectable Concentration for Static Measurements

Using the equation shown below the minimum detectable activity for the static measurements was estimated using the following equation for instances in which the background and sample are counted for the same time intervals:

Equation 3

$$\text{Static MDC} = \frac{3 + 4.65\sqrt{R_B * T_{S+B}(1 + T_{S+B}/T_B)}}{K * \left(\frac{\text{detector area}}{100cm^2}\right) * T_{S+B}}$$

Using the equation shown below the minimum detectable activity for the static measurements was estimated using the following equation for instances in which the background and sample are counted for different time intervals:

Equation 4

$$\text{Static MDC} = \frac{3 + 3.29\sqrt{R_B * T_{S+B}(1 + T_{S+B}/T_B)}}{K * \left(\frac{\text{detector area}}{100cm^2}\right) * T_{S+B}}$$

Where:

Static MDC = activity (dpm/100 cm^2),

C = integrated gross counts (counts),

T_{S+B} = sample count time

T_B = background count time

R_B = background count rate (cpm),

Table 6. MDC for Static Measurements.

Survey Meter	Detector Model	Probe Area/Size	Efficiency (cpm per dpm)	Background Count Rate (cpm)	Background and Sample Count Time	Static MDC (dpm/100 cm^2)
Ludlum 2221 Scaler/ Ratemeter	Ludlum 43-68	126 cm^2	0.2	250	10 minute and 0.5 minute	323

5.0 PHASE 1 and PHASE 2 SURVEY RESULTS

5.1 Results

The results are reported by survey method and survey unit. Attachment 1, 2 and 3 contain the diagrams and a data sheet for each area surveyed.

Data sheets include survey meter data, background response, and the minimum detectable concentration for Static measurement techniques.

5.2 Background Levels

During the survey, background levels in some areas were higher due to natural activity in different building materials. This was evident in the higher background count-rate of bare concrete floors vs. concrete floor covered with tile or floor covering vs. bench top surfaces.

5.4 Beta Scan and Static Measurements

Areas of residual activity were found during the scan and static measurements.

5.5 Wipe Tests for Removable Contamination

The wipe tests indicated only very low levels of removable contamination. These areas were limited to the BACTEC Fill Area ventilation system.

5.6 Results Summary by Survey Area

Following is a summary of the results:

QC Laboratory and Palmitic Acid Storage

Palmitic acid was stored in the QC Laboratory until needed for production. A Temperature Control Unit was used for this storage. No opening of the sealed vials containing the relatively high activity low volume palmitic acid was performed in the storage area. A BACTEC 460 was used to analyze BACTEC vials for QC.

No contamination was found in this area during the Phase 1 Survey.

Palmitic Acid Dry-down Areas

Radiometric substrates were prepared using the above described "drydown" process, inside a dedicated "ductless hood" in rooms near the Fill Area. One lab was being used as the BACTEC Pilot Sensor Lab the other room was being used for document filing. The ductless hood for this operation was decontaminated and released.

No contamination was found in these areas during the Phase 1 Survey.

Fill Area Platform and Fill Lines

There are 3 significant areas in the Fill Area: the Tank Platform and the Fill area and autoclaves. The 14C substrates were added to the media in the Formulation Tanks. Serving each of the 2 tanks is a large industrial mixer. The outside surfaces of the mixers were found to be contaminated.

Description	Surface Contamination Residual Activity (dpm/100 cm²)	
	Phase 1	Post Decon Final Survey
Formulation Tank Mixer (painted Blue in color)	13,000	3,000
Formulation Tank Mixer (painted Blue in color)	4,000	1,000
Light Fire (overhead)	17,000	< 5,000
Light Fire (overhead)	20,000	< 5,000

Finding: The painted surfaces of the mixers were contaminated.

The contamination found on the overhead fluorescent light fixtures indicates that some of horizontal surfaces above the platform have low levels of contamination (however these appear to be low levels of contamination).

Action Taken: The painted surfaces of the motors and sheet metal surfaces of the light fixtures were cleaned.

Result: Cleaning of the surfaces reduced the levels of contamination to less than 5,000 dpm per 100 cm².

BACTEC Fill A m

Except for the Trench Drains and the Formulation Tank mixers, During the Phase 1 Survey no contamination was found on the floor in the BACTEC Fill Area including the area of the former r-BACTEC Fill Line. . The survey was repeated during the Phase 2 survey following the decontamination of the trench drains. No contamination was found.

Trench Drains for Fill Lines

Finding: The Trench Drains, under former location of the r-BACTEC bottling line were contaminated. In particular, the steel grates and the angle iron supports were contaminated. The contamination appeared to be fixed since wipe test showed only low levels of removable contamination.

Levels of contamination on Trench Drain grates. These were removed and disposed of as radioactive waste.

Description	Surface Contamination Residual Activity (dpm/100 cm²)	
	Phase 1	Final Survey
Trench Drain Grate Support	40,000	removed
Trench Drain Grate	45,000	removed
Trench Drain Grate	66,000	removed
Trench Drain Grate	55,000	removed
Trench Drain Grate	77,000	removed

Action Taken: Trench drain steel grates in the area of the former r-BACTEC bottling line were found to have elevated levels of contamination during the Phase 1 survey. BD Cayey personnel attempted to reduce the levels of contamination however elevated levels of contamination remained. Grates with contamination above 10,000 dpm per 100 cm² were removed and disposed of radioactive waste. Also removed were about 10' of steel grate supports.

Result: All remaining steel grates have levels of contamination that are less than 10,000 dpm/100 cm².

Air Handling Unit (AHU #7)

Finding: The air handling unit (AHU-7) for the Fill Area where the r-BACTEC was manufactured had elevated levels of surface contamination on the inside surfaces (return side ahead of the filters).

Description	Surface Contamination Residual Activity (dpm/100 cm²)	
	Phase 1	Final Survey,
Air Supply Grill above Formulation Tanks	3,400	No action
AHU-7 Return Side	15,000 to 30,000	11,000 max 2,300 average
AHU-7 Supply Side	<5,000	<5,000
Grill on Roof mounted Local Exhaust Blowers for Formulation Tanks	9,400 to 26,000	No action

Conclusion: Surfaces inside of the air handling system for the Fill Area became contaminated with 14C from the large volumes of air during the 20 years of r-BACTEC production.

Action Taken: The inside su oft AHU#7 were cleaned using pressure washing. of contamination were e contamination on the roof mounted exhaust blower grills indicates low level of ination are likely present in the local exhaust ductwork.

Results: The cleaning reduced the level) of contamination inside AHU#7.

Air Handling Unit (AHU #7)

Finding: The air supply system for the Fill Area was contaminated with low levels of fixed contamination. The average for 38 measurements inside the ductwork was 7,000 dpm per 100 cm². The average levels of contamination for each of the supply or return ducts is shown in the following table:

Ductwork Inside Grill in Fill Area. Average of accessible surfaces.

Description	Surface Contamination Residual Activity (dpm/100 cm²)
Air Return-1	5775
Air Return-2	3019
Air Return-3	11654
Air Return-4	2867
Air Return-5	1413
Air Supply-1	21985
Air Supply-2	8536

Final Status: Low levels of residual contamination remain on the inside surface of the air supply and return ductwork and the local exhaust system ductwork.

Conclusion: The levels of surface contamination that remain in the ductwork are ALARA. To remove or significantly reduce the contamination would require removal of the ductwork. The total activity in the ductwork was estimated at less than 1 mCi (1,500 m of 18" ductwork with at an average activity of 7.000 dpm per 100 cm^2.

BACTEC Vial Labeling Area

This area remains in use for labeling non-radiometric BACTEC. No contamination was found in this area.

Bottle Crush Room

The bottle crusher was used for the disposal of radiometric and non-radiometric BACTEC. It continues to be used for disposal of non-radiometric BACTEC. The mom that houses the bottle crusher is made of concrete block, with thick paint for ease of cleaning.

Levels of contamination found at the bottle crusher.

Description	Surface Contamination Residual Activity (dpm/100 cm²)	
	Post Decon	Final Survey
Bottle Crush Machine inside sheet metal shroud	23,000	7,400
Bottle Crusher electric motor	217,000	removed

Finding: The Bottle Crusher in the Bottle Break room has the highest levels of surface contamination found during the Phase 1 Survey.

Action Taken: This shroud was removed for decontamination. Several decontamination reduced contamination levels. The electric motor for the Bottle Crusher was removed and disposed of as radioactive waste.

Result: Several decontamination reduced contamination levels of remaining surfaces to less than 5,000 dpm per 100 cm^2.

BACTEC Product Storage (Warehouse)

Warehouse area used prior to shipment to BD Baltimore for storage of packaged BACTEC vials including r-BACTEC.

No contamination was found in this area during the Phase 2 Survey.

Radioactive Waste Storage Area

Storage of 55-gallon steel drums was in this area. No contamination found during Phase 1 survey. The drums were opened, inspected and radioactive waste added at the during the Phase 2 survey. The survey of this area was repeated and no contamination was found.

5.7 Results Summary

- Most radioactive material had been removed prior to the survey, a few items will be transferred to another BD location
- The survey techniques had sufficient sensitivity to detect residual contamination at levels much less than the Screening Level DCGL for 14C

  Beta scans detected levels of residual contamination
- Beta Static and Scan measurements showed no levels of residual contamination above the DCGL for 14C
- Removable contamination was low and less than 10% of the total surface contamination
- Cleaning/decontamination of the trench drains and AHU#7 was performed
- Removal and disposal as radioactive waste of specific trench grate, grate supports and the bottle crusher electric motor was performed
- A final radioactive waste shipment has been made

6.0 SUMMARY AND CONCLUSIONS

BD maintains an NRC issued byproduct materials license for the facility at Vicks Drive Lot 6, Cayey PR. BD used relatively large amounts of radioactivity when integrated over the years in the production of radiometric BACTEC products. The production began in 1984 and ended in 2005.

BD Cayey contracted with RSO, Inc. to perform a Final Status Survey and prepare a FSS report.

MARSSIM was used to guide, design plan and implement the Final Status Survey. Historical knowledge and Phase 1 surveys did not indicate any residual contamination above the Screening Level. The impacted areas were categorized as Class 2 and Class 3 survey areas. The release criteria chosen for the FSS were the NRC's Screening Level Derived Concentration Guideline Levels. The Screening Level for 14C is 3.4 x 10^6 dpm/100 cm^2.

The Radiological FSS was conducted in 2 phases. Residual contamination was found during Phase 1 however, no areas were above the Screening Level DCGL. Additional decontamination and removal of contamination was performed so that residual contamination was as low as reasonably achievable.

Included in this survey were static measurements, scanning surveys and wipe tests for removable contamination. The detection limits for static measurements was less than 800 dpm per 100 cm^2 for a 0.5 minute count time and less than 7,000 dpm per 100 cm^2 for scanning floor areas and less than 50 dpm per wipe test (100 cm^2).

The results showed that all survey measurements were well less than the Screening Level DCGL. It is noted that low levels of surface contamination were found and remain in the BACTEC Fill Area air handling system, autoclave ventilation and local exhaust systems, trench drains and the bottle break vial crusher area.

Removal of the highest levels of contaminationwas performed to so that the remaining residual contamination was as low as reasonably achievable,

A final radioactive waste shipment was made during Phase 2 of the survey that contained dry solid radioactive waste from past operations and the items with surface contamination removed following the Phase 1 survey.

The impacted areas of the facilities that were the subject of this survey meet the decommissioning criteria in 10 CFR part 20 subpart E and the BD Cayey facility is a condition suitable for unrestricted release.

7.0 REFERENCES

7.1 Abelquist EW 2001 Decommissioning Health Physics, A Handbook for MARSSIM Users, Institute of Physics Publishing, Philadelphia, PA.

7.2 Federal Register, 63 FR 64132, November 18, 1998

7.3 NUREG-1575, Rev. 1, EPA 402-R-97-016, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), August 2000.

7.4 NUREG-1757, Vol. 1, Rev. 1, Consolidated Decommissioning Guidance, Decommissioning Process for Materials Licensees, Final Report, Division of Waste Management, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC, September 2003.

7.5 NUREG-1507, Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions, U.S. Nuclear Regulatory Commission NRC 1998 Washington, DC. 1998.

7.6 NUREG-5512, Vol. 3, Residual Radioactive Contamination from Decommissioning, Draft Report for Comment, Office of Nuclear Material Research, U.S. Nuclear Regulatory Commission, Washington, DC, October 1999.

7.7 Decontamination and Decommissioning (DandD) software, U.S. NRC, Version 2.1.0

7.8 RadCalc LE, Ludlum Measurements Edition, Version 1.0, ©1999, RSA Publications.

8.0 ATTACHMENTS

Attachment 1	Survey Meter Calibration certificates
Attachment 2	Radioactive Waste Shipping Manifest

APPENDIX A: DETAILED SURVEY RESULTS BY AREA

The survey results for each area include representative photograph(s) of the area, a diagram of the surveyed area annotated with the survey locations, a data sheet for the instruments used and the data reduction sheet or sheets.

Attachment 1

Survey Meter Calibration Certificates

RSO, Inc.
P.O. Box 1450
Laurel, MD 20725
(301) 953-2482

Certificate of Calibration

Job No.

TO: RSO, Inc.
Laurel, ad 7
Greg

INSTRUMENT: LUDLUM
TYPE: SCALER/RATE MET
SN: 108858

PO NO: Becton Dickerson PR

RSO, Inc. certifies that on 03/28/2008 the above described instrument was calibrated using a radioactive source to determine the efficiency for a specific radionuclide(s) and using electronically generated pulse for the linearity. Pulsed using Ludlum 500-2, S/N 159110.

The results are tabulated below. Calibration is traceable to NIST.

Calibration Data

	RANGE	EXPECTED	OBSERVED		C.F.
X	1	100	100	cpm	1.00
		400	400	cpm	1.00
		1000	1000	cpm	1.00
		4000	4000	cpm	1.00
X	100	10000	10000	cpm	1.00
		40000	40000	cpm	1.00
X	1000	100000	100000	cpm	1.00
		400000	400000	cpm	1.00
			C.F. AVERAGE		1.00

Probe type(s) Probe1: PROPORTIONAL Probe2

	MODEL	SER#	WINDOW	GEOMETRY	VOLT	ISOTOPE 1	EFF.(%)	ISOTOPE 2	EFF.(%)	ISOTOPE 3	EFF.(%)	ISOTOPE 4	EFF.(%)
1	43-37	PR124945	FIXED	CONTACT	1800	C14	19	Sr90	27	Tc99	19		
2	43-68	PR120557	FIXED	CONTACT	1800	C14	22	Sr90	28	Tc99	20		

ENVIRONMENTAL

1 mR/hr CHECK: N/A
BATTERY CHECK: NORMAL
CHECK SOURCE 1: N/A READING:
CHECK SOURCE 2: N/A READING:

TEMP: 22°C
PRESS: 755 mmHg
HUMID: 35 %

THE SUGGESTED RECALIBRATION DATE FOR THIS INSTRUMENT IS 03/28/2009

Calibrated By: Dorsey Austin Reviewed By: RO Cal Date: 03/28/2008

Maryland License MD-33-021-01

6335

RSO, Inc.
P.O. Box 1450
Laurel, MD 20725
(301) 953-2482

Certificate of Calibration

¢ Ro:

MODEL: LUDLUM
TYPE:

PO NO: Becton Dickerson PR

RSO, Inc. certifies that on 03/28/2008 the above described instrument was calibrated using a radioactive source to determine the efficiency for a specific radionuclide(s) and using electronically generated pulse for the linearity. Pulsed using Ludlum 500-2, S/N 159110.

The results are tabulated below. Calibration is traceable to NIST.

Calibration Data

	RANGE	EXPECTED	OBSERVED		C.F.
X	1	100	100	cpm	1.00
		400	400	cpm	1.00
X	10	1000	1000	cpm	1.00
		4000	4000	cpm	1.00
X	100	10000	10000	cpm	1.00
		40000	40000	cpm	1.00
X	1000	100000	100000	cpm	1.00
		400000	400000	cpm	1.00
			C.F. AVERAGE		1.00

Probe2: PROPORTIONAL Probe3:

	MODEL	SER#	WINDOW	GEOMETRY	VOLT	ISOTOPE 1	EFF.(%)	ISOTOPE 2	EFF.(%)	ISOTOPE 3	EFF.(%)	ISOTOPE 4	EFF.(%)
3	43-37	PR108858	FIXED	CONTACT	1800	C14	20	Sr90	26		20		
4	43-68	PR120557	FIXED	CONTACT	1800	C14	21	Sr90	29	Tc99	21		

INSTRUMENT CHECKS

1 mR/hr CHECK: N/A
BATTERY CHECK: NORMAL
CHECK SOURCE 1: N/A READING:
CHECK SOURCE 2: N/A READING:

TH RECALIBRATION DATE FOR THIS INSTRUMENT IS ____________

Calibrated By: [signature] Dorsey Austin Reviewed By: [signature]

Maryland License MD-33-021-01

6338

RSO, Inc.
P.O. Box 1450
Laurel, MD 20725
(301) 953-2482

Certificate of Calibration

RSO Job No. 7675

ISSUED TO: RSO, Inc.
5206 Minnick Road
Laurel, MD 20707

CONTACT: Greg Smith
PHONE:

PO NO:

INSTRUMENT: LUDLUM
MODEL: 2221
TYPE: SCALER/RATE MET
SN: 161591

RSO, Inc. certifies that on 02/22/2008 the above described instrument was calibrated using a radioactive source to determine the efficiency for a specific radionuclide(s) and using electronically generated pulse for the linearity. Pulsed using Ludlum 500-2, S/N 159110.

The results are tabulated below. Calibration is traceable to NIST.

Calibration Data

RANGE		EXPECTED	OBSERVED		C.F.
X	1	100	100	cpm	1.00
		400	400	cpm	1.00
X	10	1000	1000	cpm	1.00
		4000	4000	cpm	1.00
X	100	10000	10000	cpm	1.00
		40000	40000	cpm	1.00
X	1000	100000	100000	cpm	1.00
		400000	400000	cpm	1.00
			C.F. AVERAGE		1.00

Probe type(s) Probe1: PROPORTIONAL Probe2: PROPORTIONAL Probe3:

MODEL		WINDOW	GEOMETRY	VOLT	ISOTOPE 1	EFF.(%)	ISOTOPE 2	EFF.(%)	ISOTOPE 3	EFF.(%)	ISOTOPE 4	EFF.(%)
43-37	PR124945	FIXED	CONTACT	1765	C14	20	Sr90	25	Tc99	19		
43-68	PR120557	FIXED	CONTACT	1765	C14	20	Sr90	29	Tc99	20		

INSTRUMENT CHECKS

mR/hr CHECK: N/A
BATTERY CHECK: NORMAL.
CHECK SOURCE 1: N/A READING:
CHECK SOURCE 2: N/A READING:

ENVIRONMENTAL

TEMP: 23°C
PRESS: 760 mmHg
HUMID: 24 %

THE RECALIBRATION DATE FOR THIS INSTRUMENT

Calibrated By: Dorsey Austin Reviewed By:

Cal 02/22/2008

Maryland License MD-33-021-01

RSO, Inc.
P.O. Box 1450
Laurel, MD 20725
(301) 953-2482

RSO Job No. 7675

Certificate of Calibration

ISSUED TO: RSO, Inc.
5206 Minnick Road
Laurel, MD 20707

INSTRUMENT: LUDLUM
MODEL: 2221
TYPE: SCALER/RATE ME
SN: 174947

CONTACT: Greg Smith
PHONE:

PO NO:

RSO, Inc. certifies that on 02/22/2008 the above described instrument was calibrated using a radioactive source to determine the efficiency for a specific radionuclide(s) and using electronically generated pulse for the linearity. Pulsed using Ludlum 500-2, S/N 159110.

The results are tabulated below. Calibration is traceable to NIST.

Calibration Data

	RANGE	EXPECTED	OBSERVED		C.F.
X	1	100	100	cpm	1.00
		400	400	cpm	1.00
X	10	1000	1000	cpm	1.00
		4000	4000	cpm	1.00
X	100	10000	10000	cpm	1.00
		40000	40000	cpm	1.00
X	1000	100000	100000	cpm	1.00
		400000	400000	cpm	1.00
				C.F. AVERAGE	1.00

Probe type(s) Probe1: PROPORTIONAL Probe2: PROPORTIONAL Probe3:

MODEL	SERP	WINDOW	GEOMETRY	VOLT	ISOTOPE 1	EFF.(%)	ISOTOPE 2	EFF.(%)	ISOTOPE 3	EFF.(%)	ISOTOPE 4	EFF.(%)
43-37	PR124945	FIXED	CONTACT	1800	C14	19	Sr90	28	Tc99	20		
43-68	PR120557	FIXED	CONTACT	1800	C14	19	Sr90	27	Tc99	19		

S

N/A

READING:
READING:

ENVIRONMENTAL

TEMP 23°C
PRESS: 760 mmHg
HUMID: 24 %

THE SUGGESTED RECALIBRATION DATE FOR THIS INSTRUMENT IS 02/22/2009

Calibrated By: Dorsey Austin

Reviewed By: GAS

Maryland License MD-[illegible]-021-01

Cal Date: 02/22/2008

6196

Attachment 2

Radioactive Waste Shipment Manifest

CROWLEY LINER SERVICES INC

ARRIVAL NOTICE
NOTIFICACION DE LLEGADA

(2) SHIPPER (Complete Name, Address, & Zip Code) Embarcador — 0206962-67

BECTON DICKINSON & CO
PO BOX 372860
CAYEY, PR 00737

(3) BOOKING NO. Reserva No: CAT273051
(3c) SCAC Code: CAMN
(3b) DATE Fecha: 10 APR 08
(38) BILL OF LADING/INVOICE NO. Conocimiento de Embarque: 6JUN8M028337

VESSEL/VOYAGE: MIAMI V-14N
ETA PENNSAUKEN, NJ: 4/18/08 PM
CARGO AVAILABLE: 4/21/08 6:00 AM
LAST DAY FREE TIME: 4/25/08

(6) CONSIGNEE (Complete Name, Address, & Zip Code) Consignado a: NOT NEGOTIABLE UNLESS CONSIGNED "TO ORDER" — 5371589-01

RSO INC
5204 MINNICK RD
LAUREL, MD 20707

F/X:
E/S:

(7) NOTIFY PARTY (Complete Name, Address, & Zip Code) Dirigir Notificación de Llegada a:

(8) ALSO NOTIFY - ROUTING & INSTRUCTIONS También Notificar - Ruta Doméstica/Instrucciones de Exportación

(9) VESSEL Nave	VOYAGE Viaje	FLAG Bandera	(10) PLACE OF RECEIPT Carga Recibida en	(11) RELAY POINT Punto de Conexión	(12) POINT & COUNTRY OF ORIGIN OF GOODS Lugar y País de Origen
MIAMI	014N	US			

(13) PORT OF LOADING Puerto de Carga	(14) LOADING PIER / TERMINAL Muelle	
SAN JUAN, PR	ISLA GRANDE	HOUSE TO HOUSE

(16) PORT OF DISCHARGE Puerto de Descarga	(17) PLACE OF DELIVERY Lugar de Entrega de la Carga	(18) ORIGINALS TO BE RELEASED AT Originales para Entregarse en
PHILADELPHIA, PA		SAN JUAN, PR ROUTE T

PARTICULARS FURNISHED BY SHIPPER

(19) MARKS & NOS. / CONTAINER NO'S. Marcas y Números	(20) NO. OF TRLS / CONTS / PKGS / No. de Furgones / Bultos	(21) HM	(22) DESCRIPTION OF CARGO Contenido Según Embarcador	(23) WEIGHT Libras/Kilos	(24) MEASUREMENT Medidas
CMCU 2102291 SEAL 1152 2197241	1 20FT	Y	4 PIECES OF RADIOACTIVE MATERIAL EXCEPTED PACKAGE - LIMITED QUANTITY OF MATERIAL 7 , UN 2910	28900 13109.04	
	BILL	TO:	0206962-59 BECTON DICKINSON & CO C/O CASS INFO PO BOX 6541 CHELMSFORD, MA 01824		
D/R EQUIP CMCU	ID 2102291	SEAL# 1152	2197241	WEIGHT 28900L	C W B

(25) HAZARDOUS DECLARATION - THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY PACKED, LOADED, CLASSIFIED, DESCRIBED, MARKED, LABELED/PLACARDED, DESIGNATED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO ALL APPLICABLE REGULATIONS AS SPECIFIED IN CLAUSE 26. PROVIDE SHIPPER'S EMERGENCY RESPONSE CONTACT'S NAME AND TELEPHONE NUMBER INCLUDING AREA CODE IN THE SPACE PROVIDED.

CONTACT: CHEMTREC — TEL NO. 800-424-9300

FREIGHT CHARGES Flete	RATED AS Flete Básico	PER	RATE Tarifa	TO BE PREPAID IN US DOLLARS Prepagado en Dolares U.S.	TO BE COLLECTED IN US DOLLARS A Cobrar en Dolares U.S.	FOREIGN CURRENCY Moneda Local
					E. [signature] 4-28-08	
			TOTALS			

LIABILITY INCREASED DECLARED ALL SECTION

DECLARED VALUE ______ PAGE
APPLICABLE ONLY WHEN USED A THROUGH TRANSPORTATION BILL OF LADING
INDICATE WHETHER ANY OF THE CARGO IS HAZARDOUS MATERIAL UNDER DOT, IMCO, OR OTHER REGULATIONS AND INDICATE THE CORRECT COMMODITY NUMBER IN DESCRIPTION OF CARGO ABOVE.

IMO DANGEROUS GOODS DECLARATION

This form meets the requirement of SOLAS 74 chapter VII, regulation 5; MARPOL 73/78 ANNEX III, regulation 4 and the IMDG CODE, General Introduction section 9

1 Shipper
BECTON DICKINSON CARIBE LTD.
VICKS DRIVE LOT #6 ROAD 735
CAYEY, PUERTO RICO 00736

2 Reference number(s) PR-24
Page 1 of 1
Shipper's Reference Number

3 Consignee
RSO INC
5204 MINNICK RD
LAUREL, MD 20707

4 Carrier:
CROWLEY LINER SERVICES
236 SD DELAWARE RIVER
PENNSAUKEN, NJ 08110

Container packing certificate/vehicle declaration

DECLARATION

It is declared that the packing of the container/vehicle has been carried out in accordance with the General Introduction, IMDG Code, paragraph 5.4.2

TO BE COMPLETED FOR SHIPMENTS IN CONTAINERS OR VEHICLES

5 Name/status, company/organization of signatory
David Wellner Manager RSO Inc.
Place and date
Cayey PR 4/03/08
Signature on behalf of packer
David E Weller

6 Ship's name and voyage No.: EL CONQUISTADOR 13
Port of loading: SAN JUAN, PR
8 Port of discharge: PENNSAUKEN, NJ

7 Instructions or other matter

9

Marks Nos. If applicable, identification or registration number(s) of the Unit	Number and kind of packages, proper shipping name *, IMO hazard class/division, UN number, packaging group (where assigned) **, flashpoint (in °C.c.c.) **, control and emergency temperatures **, identification of the good as MARINE POLLUTANT* *, EmS No. and MFAG Table No.***	Gross mass (kg,), net quantity/mass**
CONTAINER NO. CMCU210229-1 SEAL NO. 1152 / C0043175 BOOKING NO. CAT273051	4 EACH, RADIOACTIVE MATERIAL EXCEPTED PACKAGE - LIMITED QUANTITY OF MATERIAL,7, UN2910	293.0207 kgs 0.8496 m3 or 30.0 cu/ft

Goods delivered as:
- [ ] Breakbulk cargo
- [X] Unitized cargo
- [ ] Bulk packages

Type of unit (container, trailer, tank vehicle, etc.)
- [ ] Open
- [X] Closed

Insert "X" in appropriate box

(This column may be left empty apart from the heading, in which case insert appropriate description)

* Synonyms should not be used. Proprietary/trade names alone are not sufficient. If applicable:(1) the word "WASTE" should precede the nam
(2) "EMPTY UNCLEANED" or "RESIDUE-LAST CONTAINED" should be added
(3) "LIMITED QUANTITY" should be added.

** When required in paragraph 9.3 of the General Introduction to the IMDG code; *** When required.
The IMDG Code page number should not appear on this form.

10 ADDITIONAL INFORMATION
(In certain circumstances special information/certificates are required, see IMDG code, General Introduction, paragraphs 9.7.1/9.7.2/9.9.1 and 9.10.

DECLARATION

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name(s), and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

11 Name/status, company/organization of signatory
CARMEN G Gonzalez RSO
Place and Date
Cayey, PR 4/03/08
Signature on behalf of shipper
Carmen G Gonzalez

FORM 540

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

SHIPPING PAPER

1. EMERGENCY TELEPHONE NUMBER (Include Area Code)
1-800-424-9300

ORGANIZATION
ChemTrec

2. IS THIS AN "EXCLUSIVE USE" SHIPMENT?
☐ YES
☑ NO

3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST ====> 4

4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT? ☐ YES ☑ NO
If "Yes," provide Manifest Number =====>

EPA MANIFEST NUMBER

5. SHIPPER – NAME AND FACILITY
Becton Dickinson Caribe LTD
Vicks Drive Lot #1
Cayey, PR 00737

SHIPMENT NUMBER
NA

CONTACT
Rosa Morales

SHIPPER I.D. NUMBER
NA

☐ COLLECTOR
☐ PROCESSOR
☑ GENERATOR TYPE
(Specify) O

TELEPHONE NUMBER (Include Area Code)
787-738-7272

6. CARRIER – Name and Address
Crowley Liner Services
36 SD Delaware River
Pennsauken, NJ 08110
Truck #:
Trailer #:

CONTACT
Michael Lesser

SIGNATURE – Authorized carrier acknowledging waste receipt

EPA I.D. NUMBER
FLD 982173346

SHIPPING DATE
04/02/2008

TELEPHONE (Include Area Code)
904-727-2230

DATE

7. FORM 540 AND 540A — PAGE 1 OF 1 PAGE(S)
FORM 541 AND 541A — 1 PAGE(S)
FORM 542 AND 542A — None PAGE(S)
ADDITIONAL INFORMATION — None PAGE(S)

8. MANIFEST NUMBER
(Use this number on all continuation pages)
40208

9. CONSIGNEE - Name and Facility
RSO, Inc.
5204 Minnick Road
Laurel, MD 20707

CONTACT
David Wellner

TELEPHONE (Include Area Code)
(301)953-2482

SIGNATURE – Authorized consignee acknowledging waste receipt

DATE
4/30/08

10. CERTIFICATION

This is to certify that the herein named materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. This also certifies that the materials are classified, packaged, marked, and labeled and are in proper condition for transportation and disposal as described in accordance with the requirements of 10 CFR Parts 20 and 61, or equivalent state regulations.

AUTHORIZED SIGNATURE | TITLE: RSC/GSC | DATE: 4/2/08

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number, and any additional information)	12. DOT LABEL "RADIOACTIVE"	13. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM	15. INDIVIDUAL RADIONUCLIDES	16. TOTAL PACKAGE ACTIVITY MBq	mCi	17. LSA CLASS	18. TOTAL WEIGHT OR VOLUME (use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Radioactive material, excepted package-limited quantity of material, 7, UN 2910	NA	NA	Solid Glass Paper Plastic Metal	C-14	3.7000E+00	1.0000E-01	NA	175 LBS; 7.5 FT3	56599
Radioactive material, excepted package-limited quantity of material, 7, UN 2910	NA	NA	Solid Glass Paper Plastic Metal	C-14	3.7000E+00	1.0000E-01	NA	194 LBS; 7.5 FT3	56600
Radioactive material, excepted package-limited quantity of material, 7, UN 2910	NA	NA	Solid Glass Paper Plastic Metal	C-14	3.7000E+00	1.0000E-01	NA	155 LBS; 7.5 FT3	56601
Radioactive material, excepted package-limited quantity of material, 7, UN 2910	NA	NA	Solid Glass Paper Plastic Metal	C-14	3.7000E+00	1.0000E-01	NA	122 LBS; 7.5 FT3	56602

FOR CONSIGNEE USE ONLY

20

FORM 541

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

CONTAINER AND WASTE DESCRIPTION

Additional Nuclear Regulatory Commission (NRC) Requirements for Control, Transfer and Disposal of Radioactive Waste

1. MANIFEST TOTALS

NUMBER OF PACKAGES/ DISPOSAL CONTAINERS	NET WASTE VOLUME		NET WASTE WEIGHT		SPECIAL NUCLEAR MATERIAL (grams) U-233	U-235	Pu	Total
4	m3	0.8496	kg	293.0297	NP	NP	NP	NP
	ft3	30.0000	lb	646.0000				

ACTIVITY

	ALL NUCLIDES	TRITIUM	C-14	Tc-99	I-129	SOURCE (kg)	
MBq	1.4800E+01	NP	1.4800E+01	NP	NP	(kg)	NA
mCi	4.0000E-01	NP	4.0000E-01	NP	NP	(lbs)	NA

2. MANIFEST NUMBER 40208

3. PAGE 1 OF 1 PAGE(S)

4. SHIPPER NAME Becton Dickinson Caribe LTD

SHIPMENT ID NUMBER NA

DISPOSAL CONTAINER DESCRIPTION / WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER

5. CONTAINER IDENTIFICATION NUMBER/ GENERATOR ID NUMBER	6. CONTAINER DESCRIPTION (See Note 1) PROCESS REQUESTED (See Note 1A) BURIAL/DISPOSITION (See Note 2A)	7. VOLUME (m3) / (ft3)	8. WASTE AND CONTAINER WEIGHT (kg) / (lb)	9. SURFACE RADIATION LEVEL (mSv/hr) / (mrem/hr)	10. SURFACE CONTAMINATION (MBq/100 cm2) / (cpm/100cm2) ALPHA	BETA-GAMMA	11. WASTE DESCRIPTOR (See Note 2)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) / (FT3)	13. SOLIDIFICATION OR STABILIZATION MEDIA (See Note 3)	14. CHEMICAL DESCRIPTION: CHEMICAL FORM/ CHELATING AGENT	WEIGHT % CHELATING AGENT IF > 0.1%	15. RADIOLOGICAL DESCRIPTION: INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT — RADIONUCLIDES	MBq	mCi	16. WASTE CLASSIFICATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
56599/BDPR	4	0.2124	79.3767	2.0000E-04	<1.6700E-06	<1.6700E-06	39	0.2124	NA	Glass Paper Plastic Metal/NP	NP	C-14 Subtotal Total	3.7000E+00 3.7000E+00 3.7000E+00	1.0000E-01 1.0000E-01 1.0000E-01	AU
		7.5000	175.0000	2.0000E-02	<1.0000E+02	<1.0000E+02		7.5000							
56600/BDPR	4	0.2124	87.9969	2.0000E-04	<1.6700E-06	<1.6700E-06	39	0.2124	NA	Glass Paper Plastic Metal/NP	NP	C-14 Subtotal Total	3.7000E+00 3.7000E+00 3.7000E+00	1.0000E-01 1.0000E-01 1.0000E-01	AU
		7.5000	194.0000	2.0000E-02	<1.0000E+07	<1.0000E+02		[illegible]							
56601/BDPR	4	0.2124	70.3060	2.0000E-04	<1.6700E-06	<1.6700E-06	39	0.2124	NA	Glass Paper Plastic Metal/NP	NP	C-14 Subtotal Total	3.7000E+00 3.7000E+00 3.7000E+00	1.0000E-01 1.0000E-01 1.0000E-01	AU
		7.5000	155.0000	2.0000E-02	<1.0000E+02	<1.0000E+07		7.5000							
56602/BDPR	4	0.2124	55.3383	2.0000E-04	<1.6700E-06	<1.6700E-06	39	0.2124	NA	Glass Paper Plastic Metal/NP	NP	C-14 Subtotal Total	3.7000E+00 3.7000E+00 3.7000E+00	1.0000E-01 1.0000E-01 1.0000E-01	AU
		7.5000	122.0000	2.0000E-02	<1.0000E+02	<1.0000E+02		7.5000							
Shipment Totals		0.8496	293.0207										1.4800E+01	4.0000E-01	
		30.0000	646.0000												

Note 1: Container Description Codes. For containers/ waste requiring disposal in approved structural over-packs the numerical code must be followed by "-OP."

1. Wooden Box or Crate
2. Metal Box
3. Plastic Drum or Pail
4. Metal Drum or Pail
5. Metal Tank or Liner
6. Concrete Tank or Liner
7. Polyethylene Tank or Liner
8. Fiberglass Tank or Liner
9. Demineralizer
10. Gas Cylinder
11. Bulk Unpackaged Waste
12. Unpackaged Components
13. High Integrity Container
19. Other. Describe in Item 6 or additional page

Note 1A: Process Requested

- SC Supercompaction
- B. Bulk
- I Inventory
- BS Bulk Sort
- DE. Decon
- DS. Direct Survey
- O. Other (See Attached)

NOTE 2: Waste Descriptor Codes (Choose up to three which predominate by volume.)

- 20 Charcoal
- 21. Incinerator Ash
- 22 Soil
- 23. Gas
- 24. Oil
- 25 Aqueous Liquid
- 26. Filter Media
- 27 Mechanical Filter
- 28 EPA or State Hazardous
- 29 Demolition Rubble
- 30 Cation Ion-exchange Media
- 31 Anion Ion-exchange Media
- 32. Mixed Bed Ion-exchange Media
- 33 Contaminated Equipment
- 34 Organic Liquid (except oil)
- 35 Glassware or Labware
- 36. Sealed Source/Device
- 37 Paint or Plating
- 38 Evaporator Bottoms/Sludges/ Concentrates
- 39 Compactible Trash
- 40 Noncompactible Trash
- 41 Animal Carcass
- 42 Biological Material (except animal carcass)
- 43 Activated Material
- 99. Other. Describe in Item 11 or additional page

NOTE 2A: End Disposition

- RG Return to Generator
- S Storage
- R Recycle
- REL Release
- O Other (See Attached)
- EOU Envirocare UT
- WCS Waste Control Specialists TX
- BAR Barnwell SC
- BAR Richland, WA

Note3: Solidification and Stabilization Media Codes. (Choose up to three which predominate by volume. For media meeting disposal site structural stability requirements, the numerical code must be followed by "-S." and the media vendor and brand name must also be identified in Item 13. Code 100=NONE REQUIRED

Solidification

- 90 Cement
- 91. Concrete (encapsulation)
- 92 Bitumen
- 93 Vinyl Chloride
- 94 Vinyl Ester Styrene
- 99. Other. Describe in Item 13 or additional page
- 100 None Required

FORM 541 (10-98)

BD Cayey Radiological Final Status Survey

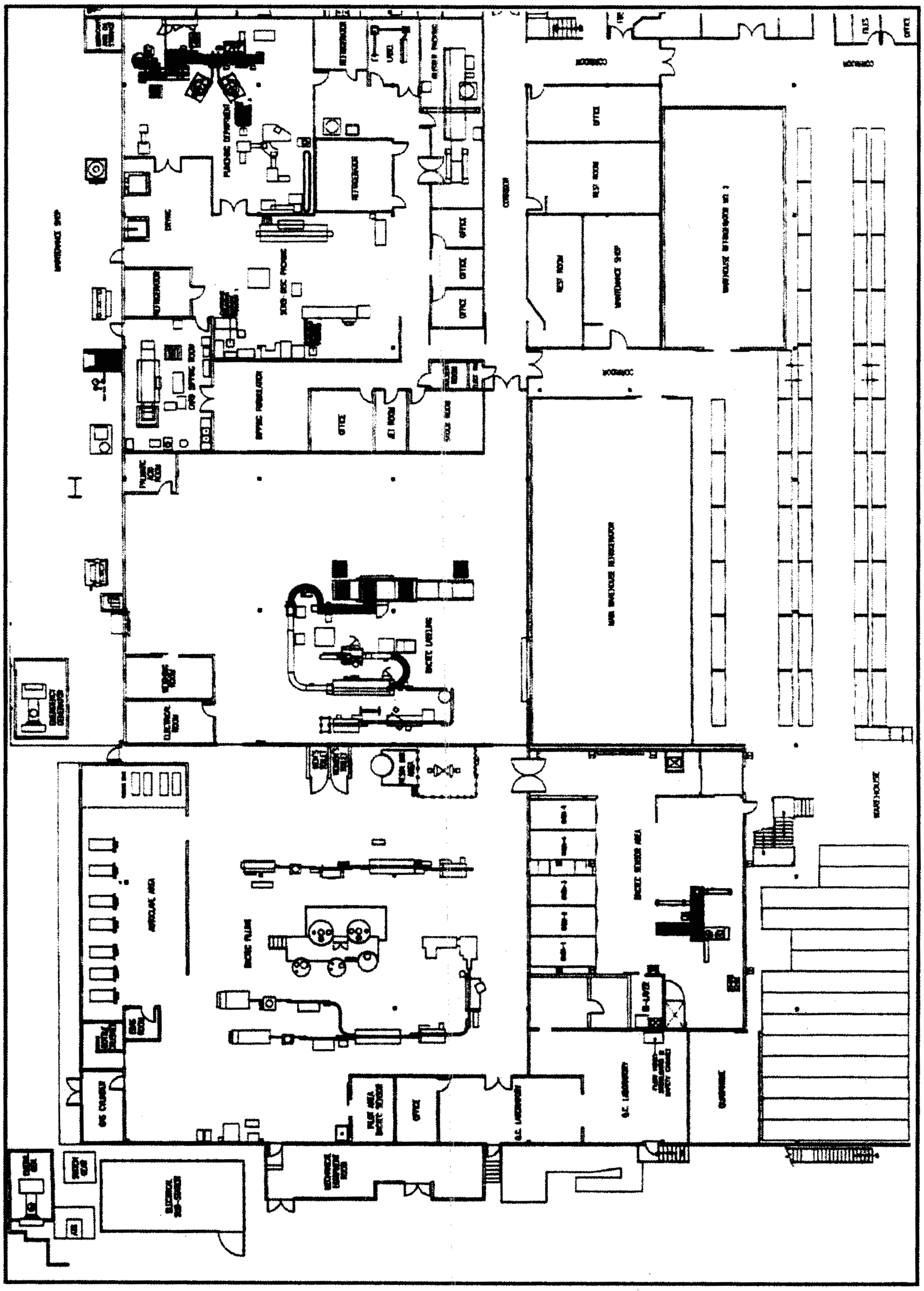
APPENDIX A: SURVEY DATA BY AREA

TABLE OF CONTENTS

APPENDIX A: SURVEY DATA BY AREA

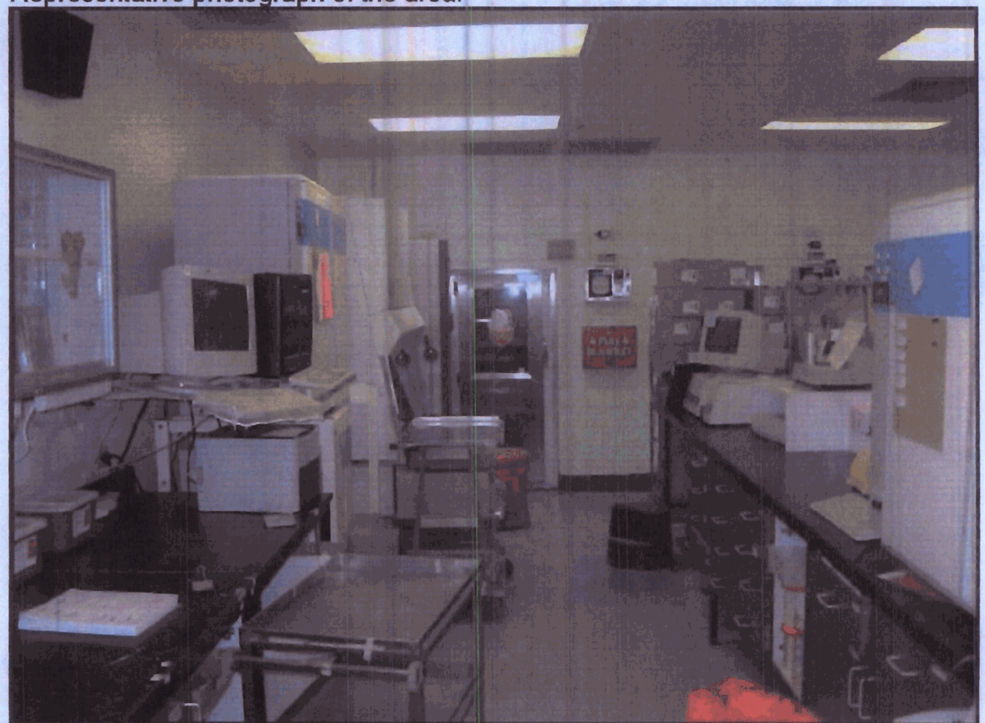
The survey results for each area include representative photograph(s) of the area, a diagram of the surveyed area annotated with the survey locations, a data sheet for the instruments used and the data reduction sheet or sheets.

The floor plan for the facility follows on the next page:

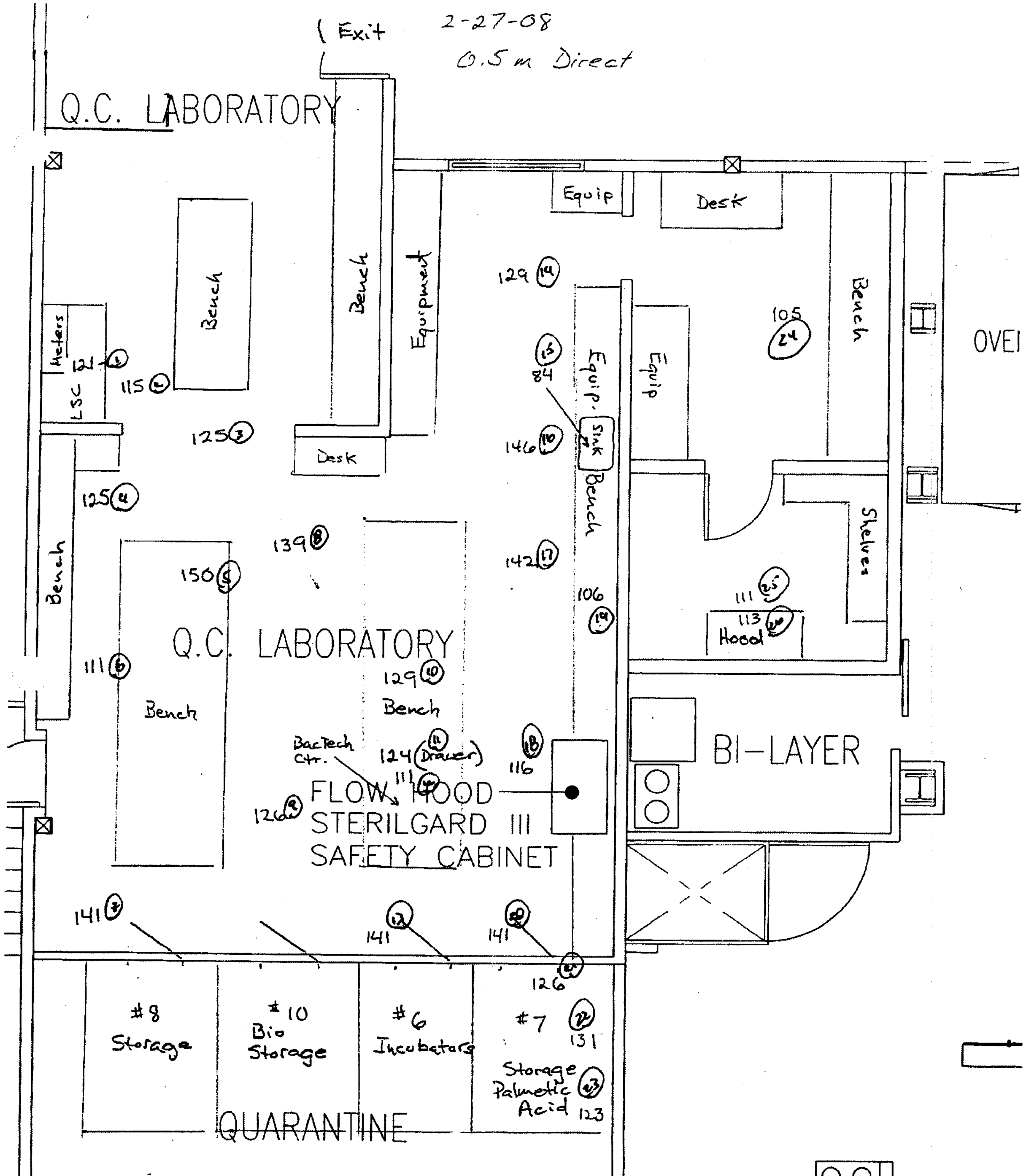


A.1 QC Laboratory and Palmitic Acid Storage

Representative photograph of the area:



2-27-08
0.5 m Direct



Rad Inventory

Note: Bactec Ct 3-Sets Standards
LSC 1800 3-Sets ^{14}C ^{3}H
1- ^{14}C Check Source Metal
500-600 CPM

Survey Meter Information

Site: BD Cayey Building: Building 1 **Lab/Room:** QC Lab and **Palmitic** Stg

	Meter 1		Meter 2		Meter 3		Meter 4		Meter 5	
Date:	2/27/2008		2/27/2008			Not In Service		Not In Service		Not In Service
Make:	Ludlum		Ludlum							
Model:	2221		2221							
SN:	161591		147497							
Probe Make:	Ludlum		Ludlum							
Probe Model:	43-68		43-37							
Probe SN:	120557		124945							
Probe Area (cm^2):	126		584							
Next Cal. Date:	2/22/2009		2/22/2009							
Background Surface Materia	Concrete		Concrete							
Background(c) - Time(Min)):	2521	10	9010	10						µRem/hr
Sample Count Time (min)				1		1				
CS Isotope - Activity(µCi):	C-14	0.149	C-14	0.149						
CS Source(cpm)	50270		51024							
L_c, L_d (Counts)	37	77	70	143					NA	NA
Direct MDC, Scan MDC (dpm/100cm^2)	305	1905	87	5402		571			NA	NA
MDCR , MDC Count Rate	422		321		120				NA	NA
Instrumen 4π Eff, Isotope:			21.0%	Tc-99	21.0%					
E_s Surface Efficiency:			50.0%	Concrete	50.0%					
E, Total Efficiency:	20.0%	C-14	21.0%		21.0%					

Lc= Critical Detection **Leve**
Ld= a **priori** Detection **limi**
MDC= Minimum **Detectable Concentration**
MDCR= Minimum Detectable **Count Rate**

Direct MDC= $\frac{3+3.29*SQRT(B/T(1+T_{S+B}/T_B)}{K * T_{S+B}}$

Beta
Scan MDC= $\frac{MDCR}{SQRT(p)*E*E_s*K}$

MDCR= s_i * (60/i)

B = Background Counts
T_B = BKG Counting Time In Minuter
T_{S+B} = Sample-Bkg Counting time In Minute:
E = Total Detector Efficiency in **Counts/Disintegratio**
A = Physical Probe Area in cm^2
K = Other Constants and Factors **When** Needed
p = Surveyor **Efficiency**
E_s = Surface Efficiency s_i = **1.38*SQRT(B_i)**
i = Counting **Interva**

Site: BD Cayey | Building: Building 1 | **Lab/Room:** QC Lab and **Palmitic** Stg

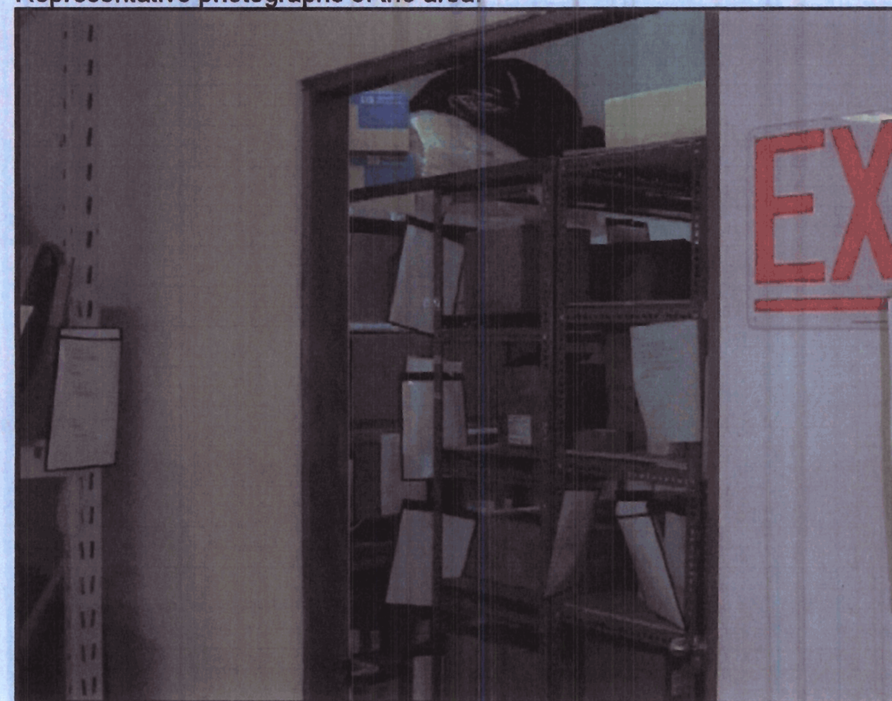
Start Date: 02/27/08

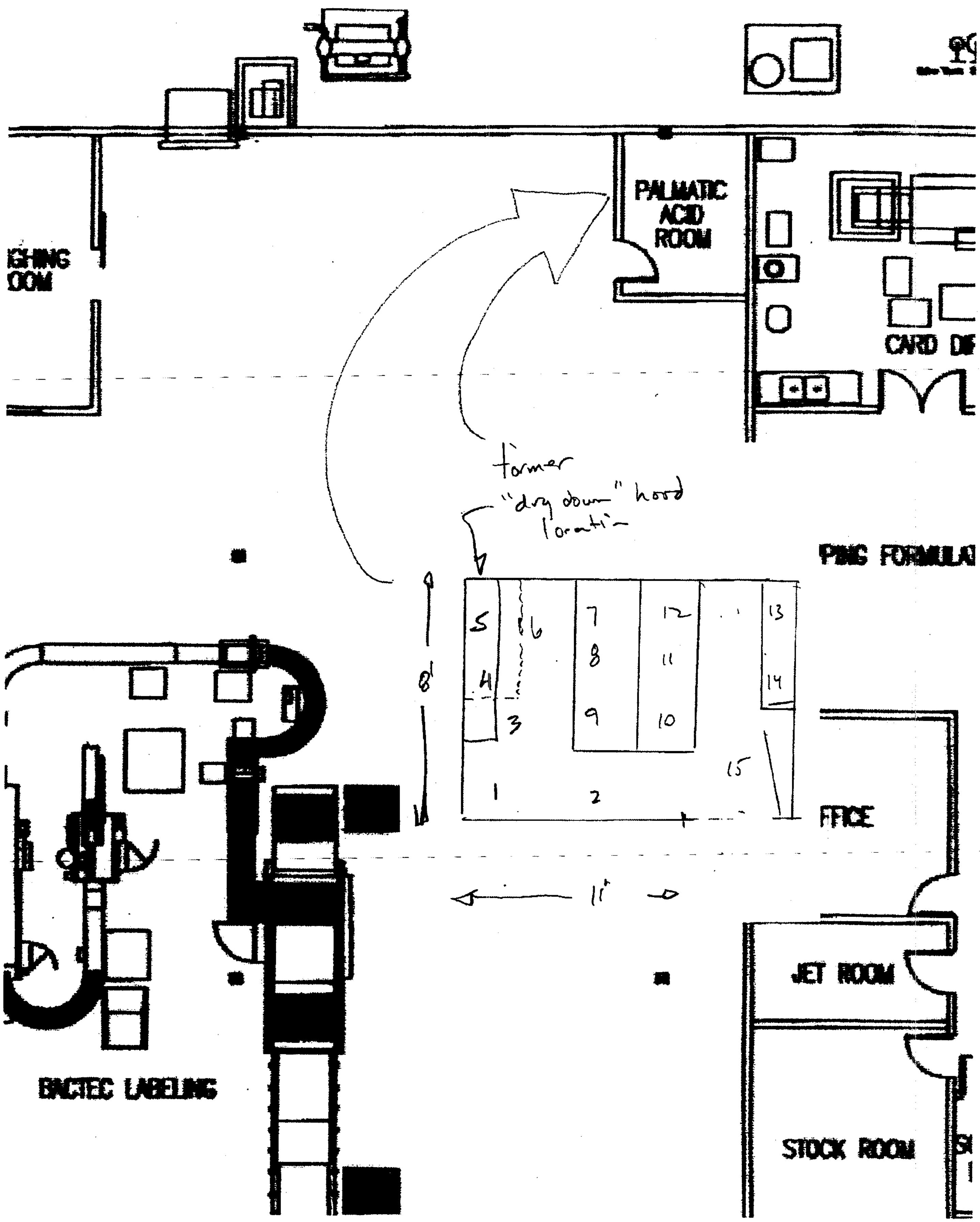
Surveyor: Greg Smith | Surveyor: Gregory D. Smith David Wellner

Area Suwey Results			Wipe Test Results			β Direct Measurements			a Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Activity dpm/100 cm² (beta)	Meter#	(cpm)	Activity dpm/100 cm²	Survey Meter#	Grass High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm² (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm²
1	Lsc	Metal Sample Area	LSC		<200	1	242	-40					2	1000	750	-129
2	Floor	Floor Cover/Concrete	LSC		<200	1	230	-88					2	1000	750	-129
3	Floor	Floor Cover/Concrete	LSC		<200	1	250	-8					2	1000	750	-129
4	Floor	Floor Cover/Concrete	LSC		<200	1	250	-8					2	1000	750	-129
5	Bench	Syn Composite	LSC		<200	1	300	190					2	1000	750	-129
6	Floor	Floor Cover/Concrete	LSC		<200	1	222	-119					2	1000	750	-129
7	Temp Unit	Stainless Steel	LSC		<200	1	282	119					2	1000	750	-129
8	Floor	Floor Cover/Concrete	LSC		<200	1	278	103					2	1000	750	-129
9	Floor	Floor Cover/Concrete	LSC		<200	1	252	0					2	1000	750	-129
10	Bench	Syn Composite	LSC		<200	1	258	23					2	1000	750	-129
11	Bench	Syn Composite	LSC		<200	1	248	-16					2	1000	750	-129
12	Bench	Syn Composite	LSC		<200	1	222	-119					2	1000	750	-129
13	Temp Unit	Stainless Steel	LSC		<200	1	282	119					2	1000	750	-129
14	Floor	Floor Cover/Concrete	LSC		<200	1	258	23					2	1000	750	-129
15	Sink Basin	Syn Composite	LSC		<200	1	168	-334					2	1000	750	-129
16	Floor	Floor Cover/Concrete	LSC		<200	1	292	158					2	1000	750	-129
17	Floor	Floor Cover/Concrete	LSC		<200	1	284	127					2	1000	750	-129
18	Floor	Floor Cover/Concrete	LSC		<200	1	232	-80					2	1000	750	-129
19	Bench	Syn Composite	LSC		<200	1	212	-159					2	1000	750	-129
20	Temp Unit	Stainless Steel	LSC		<200	1	282	119					2	1000	750	-129
21	Temp Unit	Stainless Steel	LSC		<200	1	252	0					2	1000	750	-129
22	Temp Unit	Stainless Steel	LSC		<200	1	262	39					2	1000	750	-129
23	Temp Unit	Stainless Steel	LSC		<200	1	246	-24					2	1000	750	-129
24	Sink	Floor Cover/Concrete	LSC		<200	1	210	-167					2	1000	750	-129
25	Floor	Floor Cover/Concrete	LSC		<200	1	222	-119					2	1000	750	-129
26	Hood	Syn Composite	LSC		<200	1	226	-104					2	1000	750	-129

A.2 Former Palmitic Acid Dry-down Areas

Representative photographs of the area:




PALMATIC ACID ROOM
IGHING
OOM
CARD DI
former "dry down" hood location
PING FORMULA
8'
5
6
4
3
7
8
9
12
11
10
13
14
15
1
2
FFICE
11'
JET ROOM
BACTEC LABELING
STOCK ROOM

Site: BD Cayey
Building: Building 1
Lab/Room: Storage Rm frmer Drydown Area
Start Date: 02/26/08
Surveyor: Greg Smith
Surveyor: Gregory D. Smith David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instrument		Activity dpm/100 cm^2 (beta)	Survey Meter#	Gross (cpm)	Activity dpm/100 cm^2	Survey Meter#	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm^2 (alpha)	Survey Meter#	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm^2
1	Floor	Painted Concrete	LSC		<200	1	284	203					2	1300	1000	165
2	Floor	Painted Concrete	LSC		<200	1	270	148					2	1300	1000	165
3	Floor	Painted Concrete	LSC		<200	1	442	830					2	1300	1000	165
4	Floor	Painted Concrete	LSC		<200	1	332	394					2	1300	1000	165
5	Floor	Painted Concrete	LSC		<200	1	292	235					2	1300	1000	165
6	Floor	Painted Concrete	LSC		<200	1	268	140					2	1300	1000	165
7	Floor	Painted Concrete	LSC		<200	1	590	1417					2	1300	1000	165
8	Floor	Painted Concrete	LSC		<200	1	400	663					2	1300	1000	165
9	Floor	Painted Concrete	LSC		<200	1	456	886					2	1300	1000	165
10	Floor	Painted Concrete	LSC		<200	1	282	195					2	1300	1000	165
11	Floor	Painted Concrete	LSC		<200	1	308	298					2	1300	1000	165
12	Floor	Painted Concrete	LSC		<200	1	342	433					2	1300	1000	165
13	Floor	Painted Concrete	LSC		<200	1	278	179					2	1300	1000	165
14	Floor	Painted Concrete	LSC		<200	1	282	195					2	1300	1000	165
15	Floor	Painted Concrete	LSC		<200	1	350	465					2	1300	1000	165

Survey Meter Information

Site: BD Cayey   Building: Building 1   Lab/Room: Storage Rm frmer Drydow

	Meter 1		Meter 2		Meter 3	Meter 4	Meter 5
Date:	2/26/2008		2/26/2008		Not In Service	Not In Service	Not In Service
Make:	Ludlum		Ludlum				
Model:	2221		2221				
SN:	161591		147497				
Probe Make:	Ludlum		Ludlum				
Probe Model:	43-68		43-37				
Probe SN:	120557		124945				
Probe Area (cm^2):	126		584				
Next Cal. Date:	2/22/2009		2/22/2009				
Background Surface Materia	Concrete		Concrete				
Background(c) - Time(Min)):	2328	10	8073	10			µRem/hr
Sample Count Time (min)				1	1		
CS Isotope - Activity(µCi):	C-14	0.149	C-14	0.149			
CS Source(cpm)	50270		51024				
L_c, L_d (Counts)	36	74	66	135			NA NA
Direct MDC, Scan MDC (dpm/100cm^2)	293	1831	82	5113	571		NA NA
MDCR , MDC Count Rate	396		304		120		NA NA
Instrumen 4π Eff, Isotope:			21.0%	Tc-99	21.0%		
E_s Surface Efficiency:			50.0%	Concrete	50.0%		
E, Total Efficiency:	20.0%	C-14	21.0%		21.0%		

Please See MARSSIM Chapter 6 for a more detailed explanation of equations.

Lc= Critical Detection Leve
Ld= a priori Detection limi
MDC= Minimum Detectable Concentration
MDCR= Minimum Detectable Count Rate

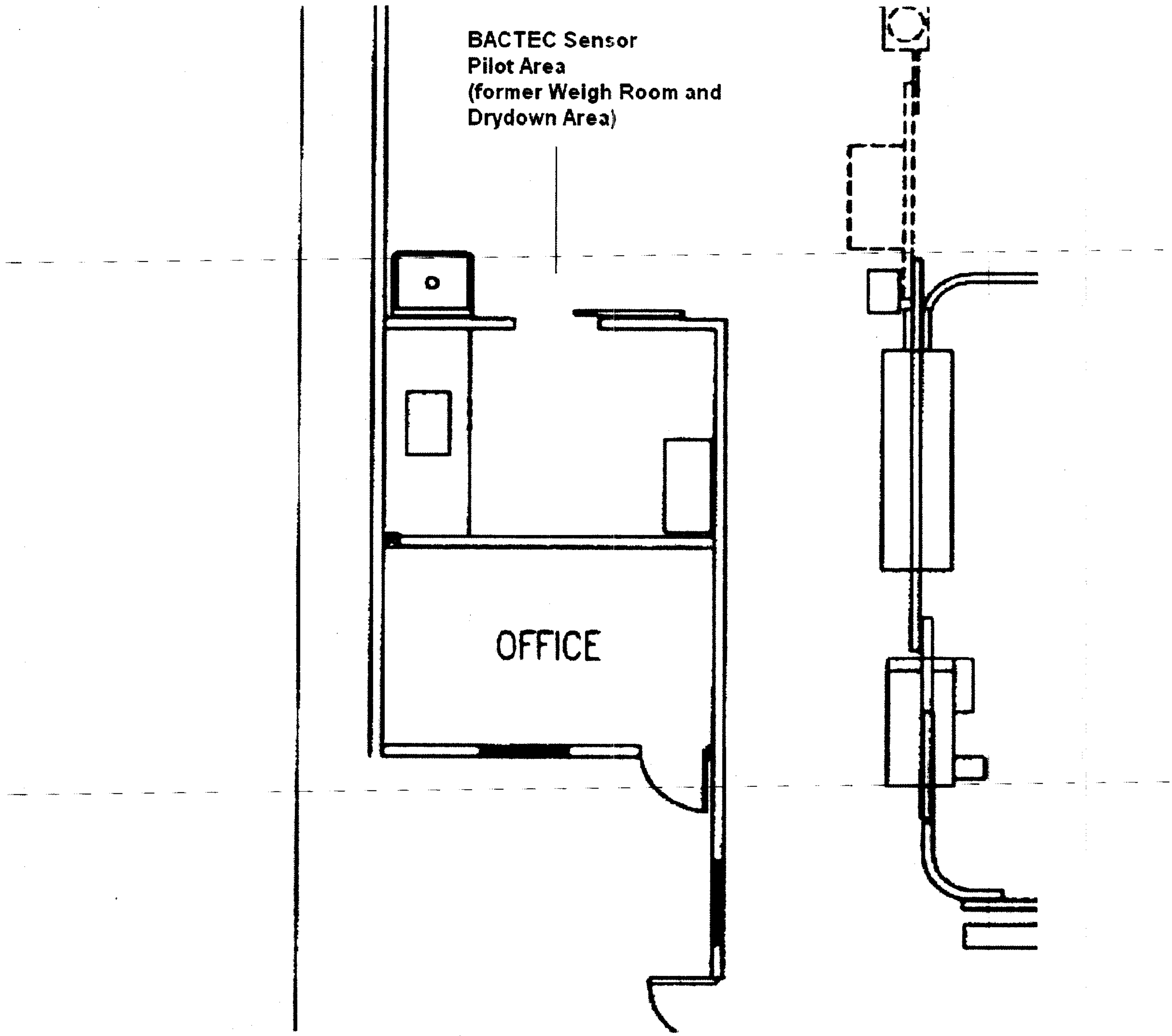
$$\text{Direct MDC} = \frac{3+3.29 \cdot SQRT(B/T(1+T_{S+B}/T_B))}{K \cdot T_{S+B}}$$

Beta

$$\text{Scan MDC} = \frac{MDCR}{SQRT(p) \cdot E \cdot E_s \cdot K}$$

$$MDCR = s_i \cdot (60/i)$$

B = Background Counts
T_B = BKG Counting Time in Minutes
T_{S+B} = Sample-Bkg Counting Time in Minute
E = Total Detector Efficiency in Counts/Disintegratio
A = Physical Probe Area in cm^2
K = Other Constants and Factors When Needed
p = Surveyor Efficiency
E_s = Surface Efficiency $s_i = 1.38 \cdot SQRT(B_i)$
i = Counting Interva


BACTEC Sensor
Pilot Area
(former Weigh Room and
Drydown Area)
OFFICE

Site: BD Cayey Building: Building 1 Lab/Room: Sensor Lab frmer Drydown Area

Start Date: 02/27/08

Surveyor: Greg Smith Surveyor: Gregory D. Smith David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Actvity dpm/100 cm^2 (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm^2	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm^2 (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm^2
1	Ceiling	Gypsum Wall Board	LSC		<200	1	420	666					2	1000	800	-86
2	Air Supply Grill #1	Painted Metal	LSC		<200	1	418	658					2	1000	800	-86
3	Air Supply Grill #2	Painted Metal	LSC		<200	1	450	785					2	1000	800	-86
4	Bench	Syn Composite	LSC		<200	1	224	-112					2	1000	800	-86
5	Bench	Syn Composite	LSC		<200	1	242	-40					2	1000	800	-86
6	Floor	Painted Concrete	LSC		<200	1	356	412					2	1000	800	-86
7	Floor	Painted Concrete	LSC		<200	1	316	254					2	1000	800	-86
8	Floor	Painted Concrete	LSC		<200	1	302	198					2	1000	800	-86
9	Floor	Painted Concrete	LSC		<200	1	542	1150					2	1000	800	-86
10	Floor	Painted Concrete	LSC		<200	1	296	174					2	1000	800	-86
11	Floor	Painted Concrete	LSC		<200	1	340	349					2	1000	800	-86
12	Floor	Painted Concrete	LSC		<200	1	310	230					2	1000	800	-86
13	Floor	Painted Concrete	LSC		<200	1	272	79					2	1000	800	-86
14	Floor	Painted Concrete	LSC		<200	1	360	428					2	1000	800	-86
15	Floor	Painted Concrete	LSC		<200	1	350	388					2	1000	800	-86

Survey Meter Information

Site: BD Cayey   Building: Building 1   Lab/Room: Sensor Lab frmer Drydowr

	Meter 1		Meter 2		- Meter 3		Meter 4		Meter 5	
Date:	2/27/2008		2/27/2008			Not In Service		Not In Service		Not In Service
Make:	Ludlum		Ludlum							
Model:	2221		2221							
SN:	161591		147497							
Probe Make:	Ludlum		Ludlum							
Probe Model:	43-68		43-37							
Probe SN:	120557		124945							
Probe Area (cm^2):	126		584							
Next Cal. Date:	2/22/2009		2/22/2009							
Background Surface Materia	Concrete		Concrete							
Background(c) - Time(Min)):	2521	10	9010	10						µRem/hr
Sample Count Time (min)				1		1				
CS Isotope - Activity(µCi):	C-14	0.149	C-14	0.149						
CS Source(cpm)	50270		51024							
L_c, L_d (Counts)	37	77	70	143					NA	NA
Direct MDC. Scan MDC (dpm/100cm²)	305	1905	87	5402		571			NA	NA
MDCR , MDC Count Rate	422		321		120				NA	NA
Instrumen 4π Eff, Isotope:			21.0%	Tc-99	21.0%					
E_s Surface Effciency:			50.0%	Concrete	50.0%					
E Total Effciency:	20.0%	C-14	21.0%		21.0%					

Please See MARSSIM Chapter 6 for a more detaikd explanation of equations.

Lc= Critical Detection Leve
Ld= a priori Detection limi
MDC= Minimum Detectable Concentration
MDCR= Minimum Detectable Count Rate

Direct MDC= $\frac{3+3.29*SQRT(B/T(1+T_{S+B}/T_B)}{K * T_{S+B}}$

Beta

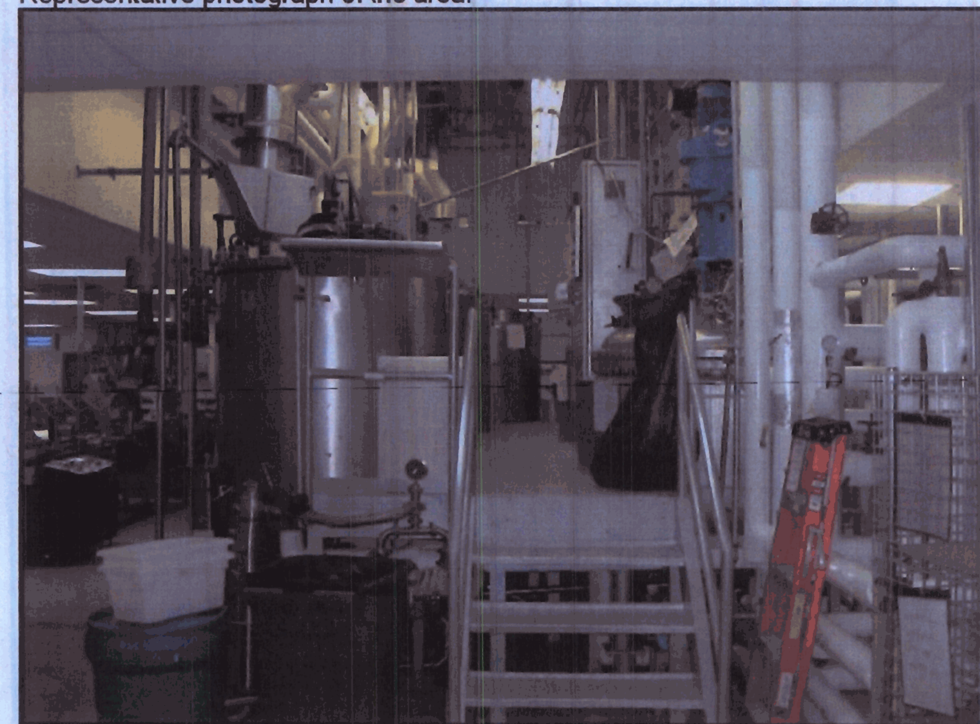
Scan MDC= $\frac{MDCR}{SQRT(p)*E*E_s*K}$

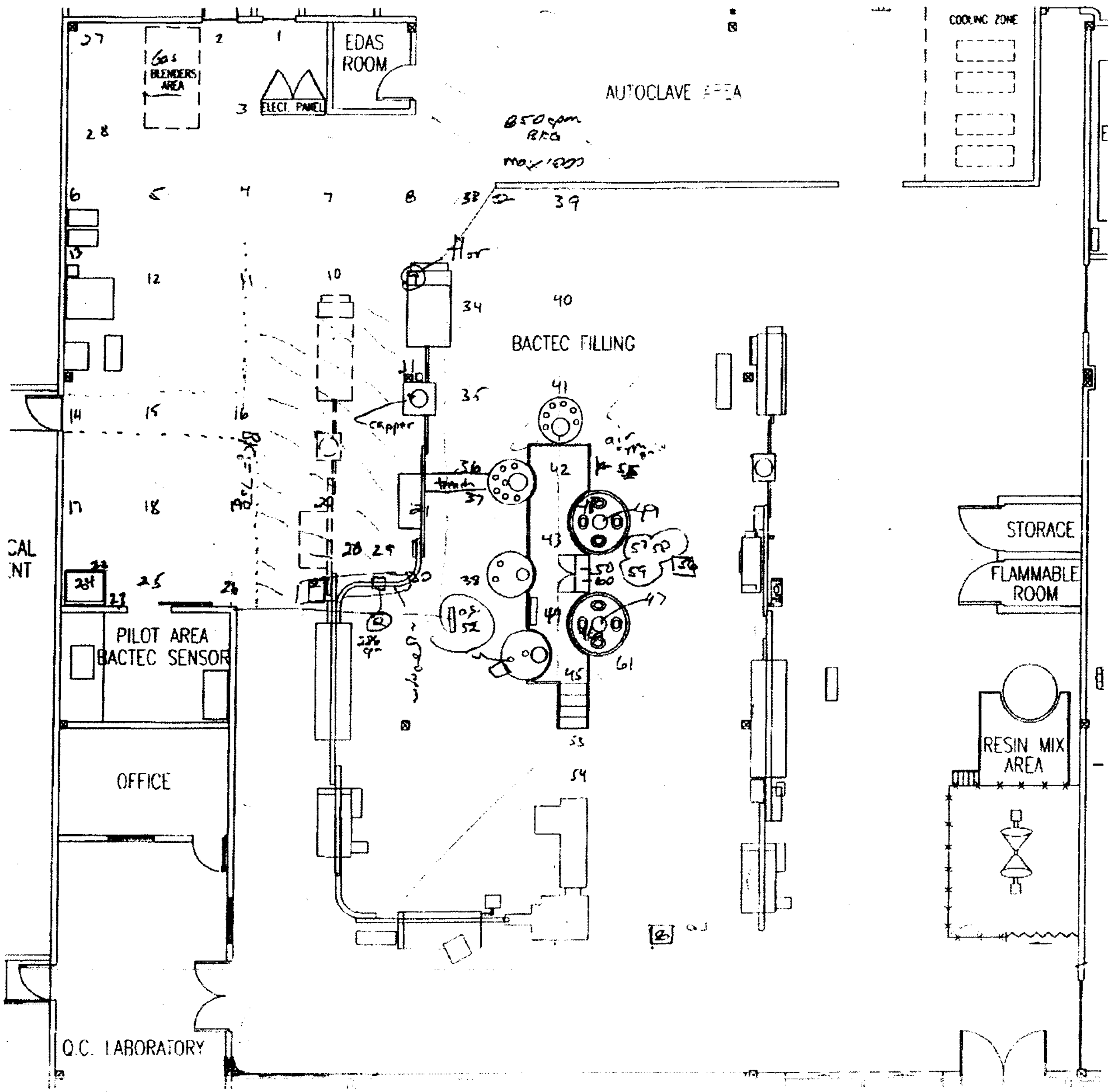
MDCR= s_i * (60/i)

B = Background Counts
T_B = BKG Counting Time In Minutes
T_{S+B} = Sample-Bkg Counting Time In Minute!
E = Total Detector Efficiency in Counts/Disintegratio
A = Physical Robe Area in ad
K = Other Constants and Factors When Needed
p = Surveyor Efficiency
E_s = Surface Efficiency s_i = 1.38*SQRT(B_i)
i = Counting Interva

A3 Formulation and Mixing Tank Platform and Fill Area

Representative photograph of the area:




EDAS ROOM
Gas BLENDERS AREA
ELECT. PANEL
AUTOCLAVE AREA
COOLING ZONE
BACTEC FILLING
STORAGE
FLAMMABLE ROOM
RESIN MIX AREA
PILOT AREA BACTEC SENSOR
OFFICE
Q.C. LABORATORY
CAL
NT

Site: BD Cayey　　Building: Building 1　　Lab/Room: BACTEC Filling

Start Date: 02/25/08

Surveyor: Greg Smith　　Surveyor: Gregory D. Smith　　David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Activity dpm/100 cm^2 (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm^2	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm^2 (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm^2
1	Floor	Painted Concrete	LSC		<200	1	236	-64					2	1200	850	-44
2	Floor	Painted Concrete	LSC		<200	1	196	-223					2	1200	850	-44
3	Floor	Painted Concrete	LSC		<200	1	282	119					2	1200	850	-44
4	Floor	Painted Concrete	LSC		<200	1	258	23					2	1200	850	-44
5	Floor	Painted Concrete	LSC		<200	1	222	-119					2	1200	850	-44
6	Floor	Painted Concrete	LSC		<200	1	212	-159					2	1200	850	-44
7	Floor	Painted Concrete	LSC		<200	1	230	-88					2	1200	850	-44
8	Floor	Painted Concrete	LSC		<200	1	218	-135					2	1200	850	-44
9	Floor	Painted Concrete	LSC		<200	1	214	-151					2	1200	850	-44
10	Floor	Painted Concrete	LSC		<200	1	254	8					2	1200	850	-44
11	Floor	Painted Concrete	LSC		<200	1	254	8					2	1200	850	-44
12	Floor	Painted Concrete	LSC		<200	1	228	-96					2	1200	850	-44
13	Floor	Painted Concrete	LSC		<200	1	212	-159					2	1200	850	-44
14	Floor	Painted Concrete	LSC		<200	1	242	-40					2	1200	850	-44
15	Floor	Painted Concrete	LSC		<200	1	272	79					2	1200	850	-44
16	Floor	Painted Concrete	LSC		<200	1	278	103					2	1200	850	-44
17	Floor	Painted Concrete	LSC		<200	1	256	15					2	1200	850	-44
18	Floor	Painted Concrete	LSC		<200	1	276	95					2	1200	850	-44
19	Floor	Painted Concrete	LSC		<200	1	230	-88					2	1200	850	-44
20	Floor	Painted Concrete	LSC		<200	1	270	71					2	1200	850	-44
21	Floor	Painted Concrete	LSC		<200	1	246	-24					2	1200	850	-44
22	Floor	Painted Concrete	LSC		<200	1	222	-119					2	1200	850	-44
23	Floor	Painted Concrete	LSC		<200	1	228	-96					2	1200	850	-44
24	Sink	Stainless Steel	LSC		<200	1	236	-64								
25	Floor	Painted Concrete	LSC		<200	1	232	-80					2	1200	850	-44
26	Floor	Painted Concrete	LSC		<200	1	212	-159					2	1200	850	-44
27	Floor	Painted Concrete	LSC		<200	1	266	55					2	1200	850	-44
28	Floor	Painted Concrete	LSC		<200	1	284	127					2	1200	850	-44
29	Floor	Painted Concrete	LSC		<200	1	224	-112					2	1200	850	-44
30	Floor	Painted Concrete	LSC		<200	1	316	254					2	1200	850	-44

Site: BD Cavey

Start Date: 02/25/08

Surveyor: Greg Smith

Building: Building 1

Lab/Room: BACTEC Filling

Surveyor: Gregory D. Smith David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Activity dpm/100 cm^2 (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm^2	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm^2 (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm^2
31	Floor	Painted Concrete	LSC		<200	1	240	-48					2	1200	850	-44
32	Vertical Post	Painted Steel	LSC		<200	1	184	-270					2			
33	Floor	Painted Concrete	LSC		<200	1	248	-16					2	1200	850	-44
34	Floor	Painted Concrete	LSC		<200	1	268	63					2	1200	850	-44
35	Floor	Painted Concrete	LSC		<200	1	274	87					2	1200	850	-44
36	Floor	Painted Concrete	LSC		<200	1	246	-24					2	1200	850	-44
37	Floor	Painted Concrete	LSC		<200	1	256	15					2	1200	850	-44
38	Floor	Painted Concrete	LSC		<200	1	268	63					2	1200	850	-44
39	Floor	Painted Concrete	LSC		<200	1	226	-104					2	1200	850	-44
40	Floor	Painted Concrete	LSC		<200	1	230	-88					2	1200	850	-44
41	Floor	Painted Concrete	LSC		<200	1	248	-16					2	1200	850	-44
42	Raised Platform	Stainless Steel	LSC		<200	1	284	127								
43	Raised Platform	Stainless Steel	LSC		<200	1	298	182								
44	Raised Platform	Stainless Steel	LSC		<200	1	238	-56								
45	Raised Platform	Stainless Steel	LSC		<200	1	262	39								
46	Mixing Tank	Stainless Steel	LSC		<200	1	268	63								
47	Mixer	Stainless Steel	LSC		<200	1	3444	12666								
48	Mixing Tank	Stainless Steel	LSC		<200	1	262	39								
49	Mixer	Painted Steel	LSC		<200	1	1352	4365								
50	Equip Cabinet	Painted Steel	LSC		<200	1	502	992								
51	Local Exhaust	Metal	LSC		<200	1	222	-119								
52	Supply Air	Grill	LSC		<200	1	402	595								
53	Floor	Painted Concrete	LSC		<200	1	228	-96								
54	Floor	Painted Concrete	LSC		<200	1	274	87								
55	Supply Air	Grill	LSC		<200	1	1114	3420								
56	Supply Air	Grill	LSC		<200	1	274	87								
57	Equipment	Metal	LSC		<200	1	228	-96								
58	Equipment	Metal	LSC		<200	1	454	801								
59	Equipment	Metal	LSC		<200	1	302	198								
60	Floor	Painted Concrete	LSC		<200	1	290	150					2	1200	850	-44

Site: BD Cayey | Building: Building 1 | Lab/Room: BACTEC Filling

Start Date: 02/25/08

Surveyor: Greg Smith | Surveyor: Gregory D. Smith David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			a Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Actvity dpm/100 cm² (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm²	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm² (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm²
61	Floor	Painted Concrete	LSC		<200	1	286	135					2	1200	850	-44
62	Overhead Light	Metal Light Fixture	LSC		<200	1	4616	17317								
63	Overhead Light	Metal Light Fixture	LSC		<200	1	5260	19873								
64	Overhead Pipe	Metal Light Fixture	LSC		<200	1	262	39								

Survey Meter Information

Site: BD Cayey Building: Building 1 Lab/Room: BACTEC Filling

	Meter 1		Meter 2		Meter 3		Meter 4		Meter 5	
Date:	2/25/2008		2/25/2008			Not In Service		Not In Service		Not In Service
Make:	Ludlum		Ludlum							
Model:	2221		2221							
SN:	161591		147497							
Probe Make:	Ludlum		Ludlum							
Probe Model:	43-68		43-37							
Probe SN:	120557		124945							
Probe Area (cm^2):	126		584							
Next Cal. Date:	2/22/2009		2/22/2009							
Background Surface Materia	Concrete		Concrete							
Background(c) - Time(Min)):	2521	10	9010	10						µRem/hr
Sample Count Time (min)				1		1				
CS Isotope - Activity(µCi):	C-14	0.149	C-14	0.149						
CS Source(cpm)	50270		51024							
L_c, L_d (Counts)	37	77	70	143					NA	NA
Direct MDC, Scan MDC (dpm/100cm^2)	305	1905	87	5402		571			NA	NA
MDCR , MDC Count Rate	422		321		120				NA	NA
Instrumen 4π Eff, Isotope:			21.0%	Tc-99	21.0%					
E_s Surface Efficiency:			50.0%	Concrete	50.0%					
E, Total Efficiency:	20.0%	C-14	21.0%		21.0%					

Please See MARSSIM Chapter 6 for a more detailed explanation of equations.

Lc= Critical Detection Leve
Ld= a priori Detection limi
MDC= Minimum Detectable Concentration
MDCR= Minimum Detectable Count Rate

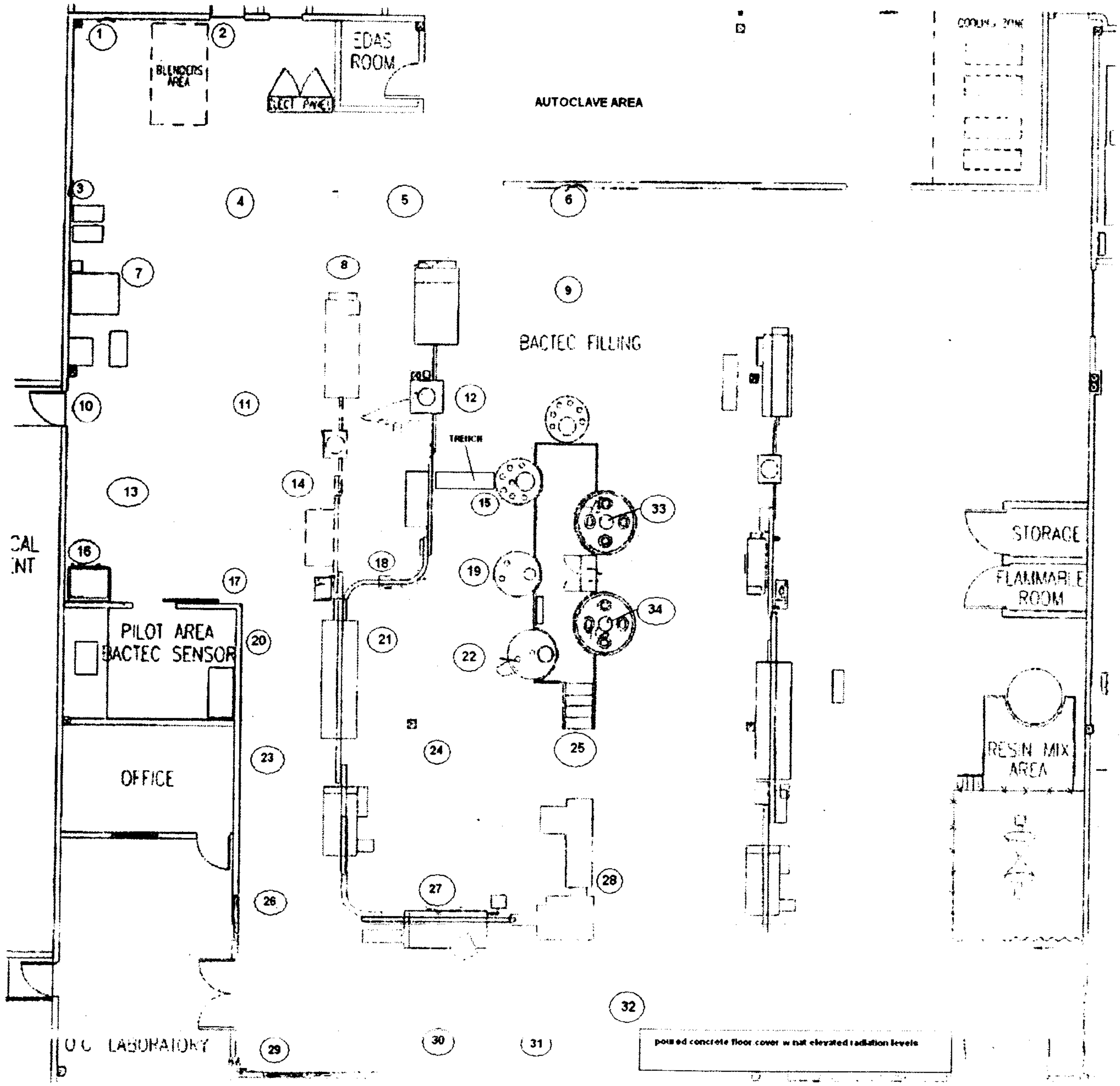
$$\text{Direct MDC} = \frac{3+3.29 \cdot SQRT(B/T(1+T_{S+B}/T_B))}{K \cdot T_{S+B}}$$

$$\text{Beta Scan MDC} = \frac{MDCR}{SQRT(p) \cdot E \cdot E_s \cdot K}$$

$$MDCR = s_i \cdot (60/i)$$

B = Background Counts
T_B = BKG Counting Time In Minute
T_{S+B} = Sample-Bkg Counting Time In Minute
E = Total Detector Efficiency in Counts/Disintegratio
A = Physical Probe Area in cm^2
K = Other Constants and Factors When Needed
p = Surveyor Efficiency
E_s = Surface Efficiency $s_i = 1.38 \cdot SQRT(B_i)$
i = Counting Interva

Survey Date: 4-1-08



Site: BD Cayey
Start Date: 04/01/08
Surveyor: Greg Smith

Building: Building 1

Lab/Room: BACTEC Fill Area

Surveyor: Gregory D. Smith David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instrument		Activity dpm/100 cm^2 (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm^2	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm^2 (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm^2
1	Floor	Painted Concrete	LSC		<200	1	254	15					2	1200	800	43
2	Floor	Painted Concrete	LSC		<200	1	288	144					2	1200	800	43
3	Floor	Painted Concrete	LSC		<200	1	252	8					2	1200	800	43
4	Floor	Painted Concrete	LSC		<200	1	286	136					2	1200	800	43
5	Floor	Painted Concrete	LSC		<200	1	256	23					2	1200	800	43
6	Floor	Painted Concrete	LSC		<200	1	336	325					2	1200	800	43
7	Floor	Painted Concrete	LSC		<200	1	284	128					2	1200	800	43
8	Floor	Painted Concrete	LSC		<200	1	286	136					2	1200	800	43
9	Floor	Painted Concrete	LSC		<200	1	296	174					2	1200	800	43
10	Floor	Painted Concrete	LSC		<200	1	272	83					2	1200	800	43
11	Floor	Painted Concrete	LSC		<200	1	326	287					2	1200	800	43
12	Floor	Painted Concrete	LSC		<200	1	258	30					2	1200	800	43
13	Floor	Painted Concrete	LSC		<200	1	232	-68					2	1200	800	43
14	Floor	Painted Concrete	LSC		<200	1	252	8					2	1200	800	43
15	Floor	Painted Concrete	LSC		<200	1	278	106					2	1200	800	43
16	Floor	Painted Concrete	LSC		<200	1	284	128					2	1200	800	43
17	Floor	Painted Concrete	LSC		<200	1	256	23					2	1200	800	43
18	Floor	Painted Concrete	LSC		<200	1	266	60					2	1200	800	43
19	Floor	Painted Concrete	LSC		<200	1	246	-15					2	1200	800	43
20	Floor	Painted Concrete	LSC		<200	1	786	2026					2	1200	800	43
21	Floor	Painted Concrete	LSC		<200	1	258	30					2	1200	800	43
22	Floor	Painted Concrete	LSC		<200	1	284	128					2	1200	800	43
23	Floor	Painted Concrete	LSC		<200	1	262	45					2	1200	800	43
24	Floor	Painted Concrete	LSC		<200	1	258	30					2	1200	800	43
25	Floor	Painted Concrete	LSC		<200	1	286	136					2	1200	800	43
26	Floor	Painted Concrete	LSC		<200	1	288	144					2	1200	800	43
27	Floor	Painted Concrete	LSC		<200	1	248	-8					2	1200	800	43
28	Floor	Painted Concrete	LSC		<200	1	256	23					2	1200	800	43
29	Floor	Painted Concrete	LSC		<200	1	292	159					2	1200	800	43
30	Floor	Painted Concrete	LSC		<200	1	278	106					2	1200	800	43

Site: BD Cayey | Building: Building 1 | Lab/Room: BACTEC Fill Area

Start Date: 04/01/08

Surveyor: Greg Smith | Surveyor: Gregory D. Smith | David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Actvity dpm/100 cm^2 (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm^2	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm^2 (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm^2
31	Floor	Painted Concrete	*LSC*		<200	*1*	484	884					2	1200	800	43
32	Floor	Painted Concrete	*LSC*		<200	*1*	280	113					2	1200	800	43
33	Tank Mixer	Painted Metal											*1*	2000	1000	2834
34	Tank Mixer	Painted Metal											*1*	1000	500	945

Survey Meter Information

Site: BD Cayey   Building: Building 1   Lab/Room: BACTEC Fill Area

	Meter 1		Meter 2		Meter 3	Meter 4	Meter 5	
Date:	4/1/2008		4/1/2008		Not In Service	Not In Service		Not In Service
Make:	Ludlum		Ludlum					
Model:	2221		2221					
SN:	99138		108858					
Probe Make:	Ludlum		Ludlum					
Probe Model:	43-38		43-37					
Probe SN:	120557		124945					
Probe Area (cm^2):	126		582					
Next Cal. Date:	3/28/2009		3/28/2009					
Background Surface Materia	Concrete		Concrete					
Background(c) - Time(Min)):	2500	10	40	10				µRem/hr
Sample Count Time (min)				1				
CS Isotope - Activity(µCi):	C-14	0.149	C-14	0.149				
CS Source(cpm)	50268		49624					
L_c, L_d (Counts)	37	77	5	12			NA	NA
Direct MDC, Scan MDC (dpm/100cm^2)	289	1807	9	378			NA	NA
MDCR , MDC Count Rate	419		21				NA	NA
Instrumen 4π Eff, Isotope:	0.21		0.20	Tc-99				
E_s Surface Efficiency:	50.0%		50.0%	Concrete				
E, Total Efficiency:	21.0%	C-14	20.0%					

Please See MARSSIM Chapter 6 for a more detailed explanation of equations.

Lc= Critical Detection Leve
Ld= a priori Detection limi
MDC= Minimum Detectable Concentration
MDCR= Minimum Detectable Count Rate

$$\text{Direct MDC} = \frac{3+3.29\cdot SQRT(B/T(1+T_{S+B}/T_B))}{K \cdot T_{S+B}}$$

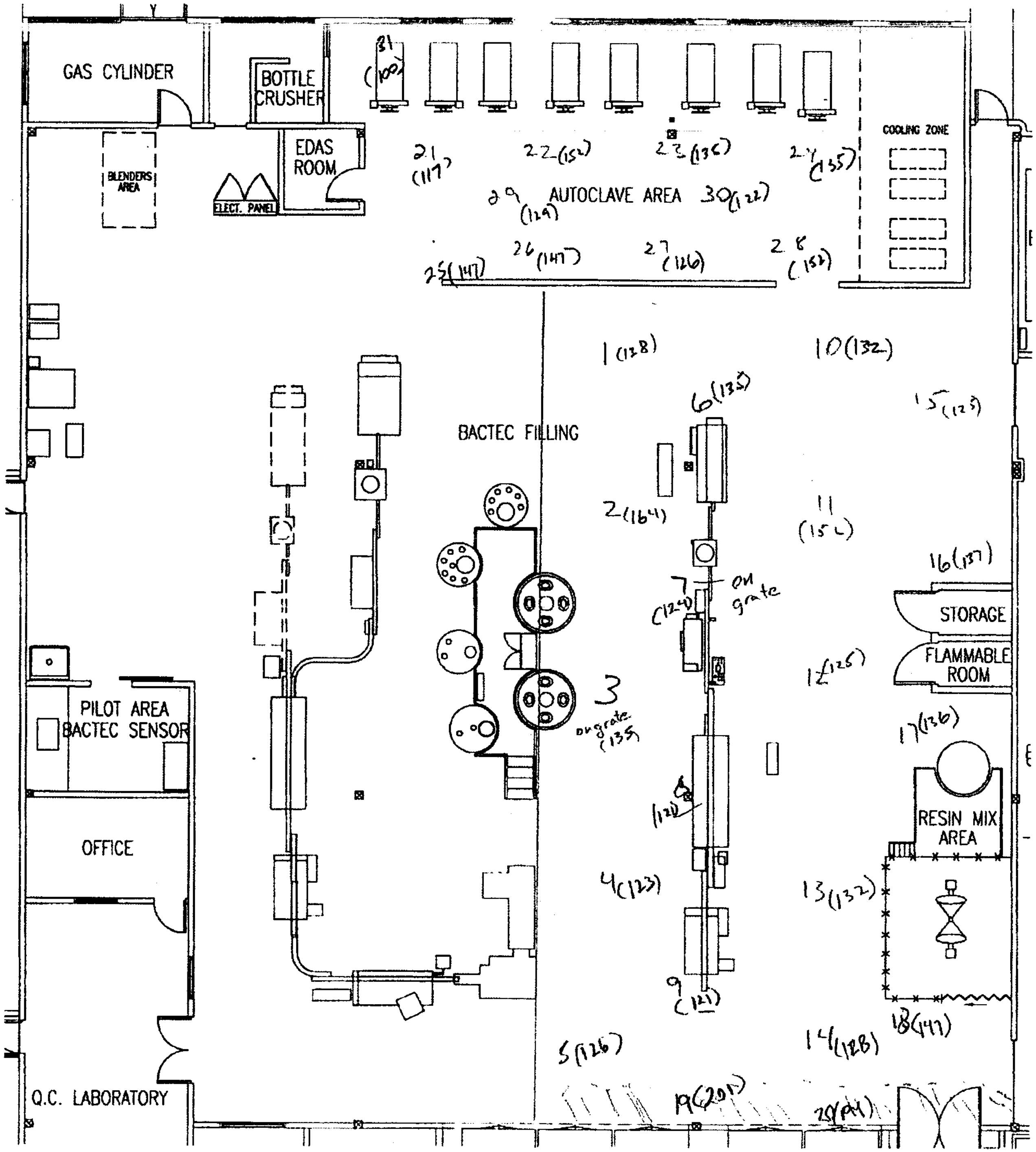
$$\text{Beta Scan MDC} = \frac{MDCR}{SQRT(p)\cdot E \cdot E_s \cdot K}$$

$$MDCR = s_i \cdot (60/i)$$

B = Background Counts
T_B = BKG Counting Time In Minutes
T_{S+B} = Sample-Bkg Counting Time In Minute:
E = Total Detector Efficiency in Counts/Disintegratio
A = Physical Probe Area in cm^2
K = Other Constants and Factors When Needed
p = Surveyor Efficiency
E_s = Surface Efficiency $s_i = 1.38\cdot SQRT(B_i)$
i = Counting Interva

A.4 BACTEC Fill Area and Autoclave

Representative photograph of the area:


GAS CYLINDER
BOTTLE CRUSHER
EDAS ROOM
BLENDERS AREA
ELECT. PANEL
AUTOCLAVE AREA
COOLING ZONE
BACTEC FILLING
STORAGE
FLAMMABLE ROOM
PILOT AREA BACTEC SENSOR
OFFICE
RESIN MIX AREA
Q.C. LABORATORY
31 (100)
21 (117)
22 (152)
23 (136)
24 (135)
29 (129)
30 (122)
25 (147)
26 (147)
27 (126)
28 (152)
1 (128)
10 (132)
6 (135)
15 (125)
2 (164)
11 (156)
16 (137)
7 (124) on grate
3 on grate (135)
12 (125)
17 (136)
4 (123)
13 (132)
9 (121)
18 (147)
5 (126)
14 (128)
19 (201)

Site: BD Cayey | Building: Building 1 | Lab/Room: BACTEC Fill Area Part 2 and Autoclave

Start Date: 04/01/08

Surveyor: Greg Smith | Surveyor: Gregory D. Smith David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Activity dpm/100 cm² (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm²	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm² (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm²
1	Floor	Painted Concrete	LSC		<200	1	276	98					2	1200	800	43
2	Floor	Painted Concrete	LSC		<200	1	328	295					2	1200	800	43
3	Trench Drain Grate	Metal	LSC		<200	1	270	76					2	1200	800	43
4	Floor	Painted Concrete	LSC		<200	1	246	-15					2	1200	800	43
5	Floor	Painted Concrete	LSC		<200	1	252	8					2	1200	800	43
6	Floor	Painted Concrete	LSC		<200	1	270	76					2	1200	800	43
7	Trench Drain Grate	Metal	LSC		<200	1	248	-8					2	1200	800	43
8	Floor	Painted Concrete	LSC		<200	1	242	-30					2	1200	800	43
9	Floor	Painted Concrete	LSC		<200	1	240	-38					2	1200	800	43
10	Floor	Painted Concrete	LSC		<200	1	264	53					2	1200	800	43
11	Floor	Painted Concrete	LSC		<200	1	304	204					2	1200	800	43
12	Floor	Painted Concrete	LSC		<200	1	250	0					2	1200	800	43
13	Floor	Painted Concrete	LSC		<200	1	264	53					2	1200	800	43
14	Floor	Painted Concrete	LSC		<200	1	256	23					2	1200	800	43
15	Floor	Painted Concrete	LSC		<200	1	250	0					2	1200	800	43
16	Floor	Painted Concrete	LSC		<200	1	274	91					2	1200	800	43
17	Floor	Painted Concrete	LSC		<200	1	272	83					2	1200	800	43
18	Floor	Painted Concrete	LSC		<200	1	294	166					2	1200	800	43
19	Floor	"Granite" Floor Cover	LSC		#NAME?	1	402	574					2	1200	800	43
20	Floor	"Granite" Floor Cover	LSC		<200	1	388	522					2	1200	800	43
21	Floor	Painted Concrete	LSC		<200	1	234	-60					2	1200	800	43
22	Floor	Painted Concrete	LSC		<200	1	304	204					2	1200	800	43
23	Floor	Painted Concrete	LSC		<200	1	272	83					2	1200	800	43
24	Floor	Painted Concrete	LSC		<200	1	270	76					2	1200	800	43
25	Floor	Painted Concrete	LSC		<200	1	294	166					2	1200	800	43
26	Floor	Painted Concrete	LSC		<200	1	294	166					2	1200	800	43
27	Floor	Painted Concrete	LSC		<200	1	252	8					2	1200	800	43
28	Floor	Painted Concrete	LSC		<200	1	304	204					2	1200	800	43
29	Floor	Painted Concrete	LSC		<200	1	258	30					2	1200	800	43
30	Floor	Painted Concrete	LSC		<200	1	244	-23					2	1200	800	43

Site: BD Cayey
Start Date: 04/01/08
Surveyor: Greg Smith

Building: Building 1

Lab/Room: BACTEC Fill Area Part 2 and Autoclave

Surveyor: Gregory D. Smith David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Actvity dpm/100 cm^2 (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm^2	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm^2 (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm^2
31	Autoclave 1	Stainless Steel	LSC		<200	1	200	-189								

Survey Meter Information

Site: BD Cayey   Building: Building 1   Lab/Room: BACTEC Fill Area Part 2 a

	Meter 1		Meter 2		Meter 3	Meter 4	Meter 5	
Date:	4/1/2008		4/1/2008		Not In Service	Not In Service		Not In Service
Make:	Ludlum		Ludlum					
Model:	2221		2221					
SN:	99138		108858					
Probe Make:	Ludlum		Ludlum					
Probe Model:	43-38		43-37					
Probe SN:	120557		124945					
Probe Area (cm^2):	126		582					
Next Cal. Date:	3/28/2009		3/28/2009					
Background Surface Materia	Concrete		Concrete					
Background(c) - Time(Min)):	2500	10	7500	10				µRem/hr
Sample Count Time (min)				1				
CS Isotope - Activity(µCi):	C-14	0.149	C-14	0.149				
CS Source(cpm)	50268		49624					
L_c, L_d (Counts)	37	77	64	130			NA	NA
Direct MDC, Scan MDC (dpm/100cm^2)	289	1807	84	2070			NA	NA
MDCR , MDC Count Rate	419		293				NA	NA
Instrumen 4π Eff, Isotope:	0.21		0.20					
E_s Surface Efficiency:	50.0%		50.0%					
E, Total Efficiency:	21.0%	C-14	20.0%					

Please See MARSSIM Chapter 6 for a more detailed explanation of equations.

Lc= Critical Detection Leve
Ld= a priori Detection limi
MDC= Minimum Detectable Concentration
MDCR= Minimum Detectable Count Rate

Direct MDC= $\frac{3+3.29*SQRT(B/T(1+T_{S+B}/T_B)}{K * T_{S+B}}$

Beta

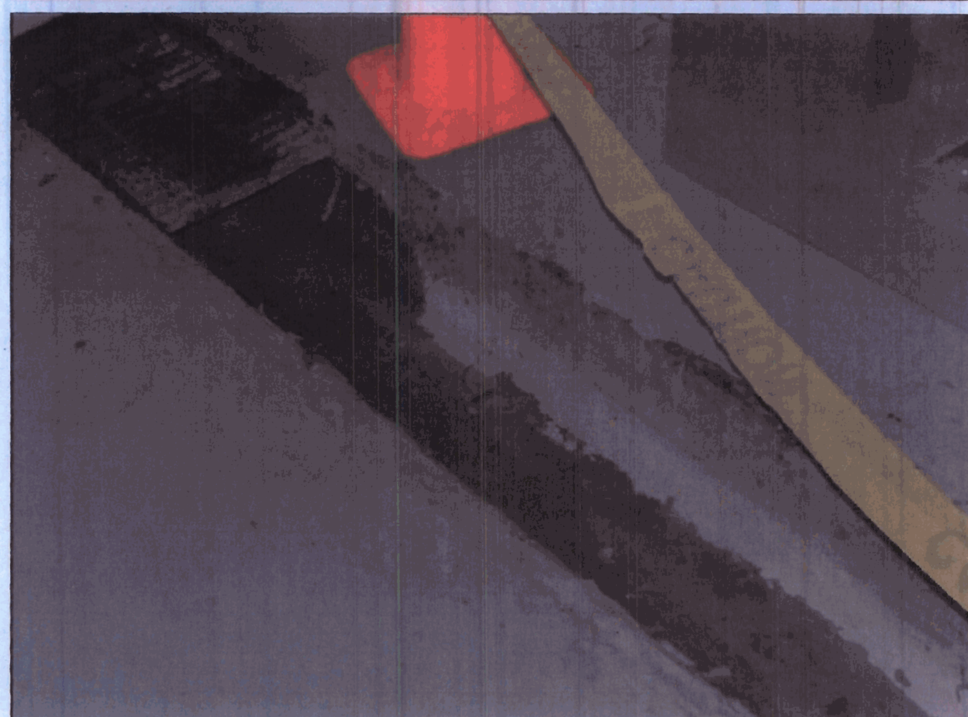
Scan MDC= $\frac{MDCR}{SQRT(p)*E*E_s*K}$

MDCR= s_i * (60/i)

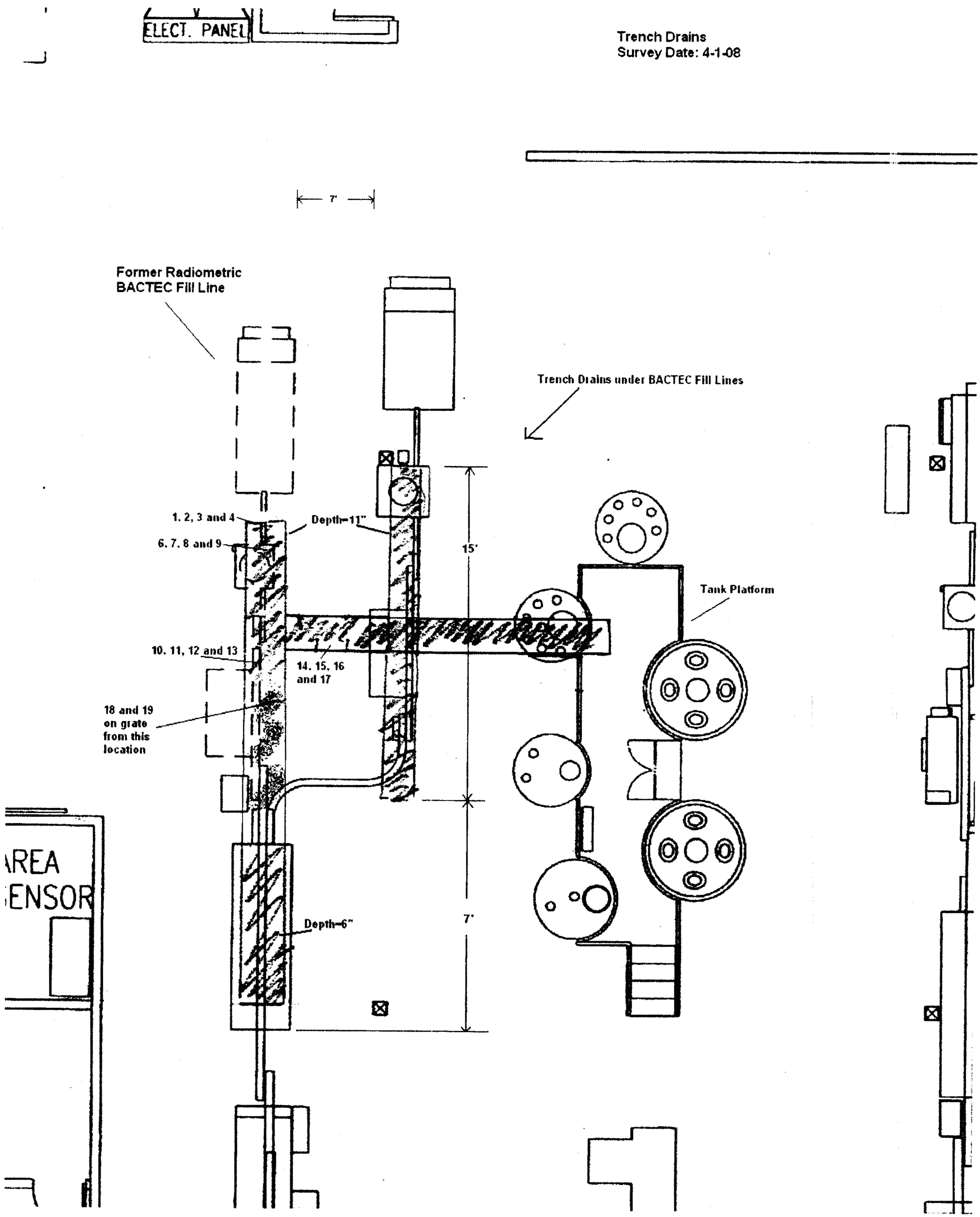
B = Background Counts
T_B = BKG Counting Time In Minutes
T_{S+B} = Sample-Bkg Counting Time In Minute:
E = Total Detector Efficiency in Counts/Disintegratio
A = Physical Probe Area in cm^2
K = Other Constants and Factors When Needed
p = Surveyor Efficiency
E_s = Surface Efficiency s_i = 1.38*SQRT(B_i)
i = Counting Interva

A.5 BACTEC Fill Trench Drain for Former r-BACTEC Bottling Line

Representative photograph of the area:



Trench Drains
Survey Date: 4-1-08



Site: BD Cayey Building: Building 1 Lab/Room: B. Fill Trench Drains

Start Date: 04/01/08

Surveyor: Gregory D. Smith Surveyor: David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Activity dpm/100 cm^2 (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm^2	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm^2 (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm^2
1	Floor	Painted Concrete				1	260	38								
2	Trench End	Painted Concrete				1	444	733								
3	Trench Inside	Painted Concrete				1	378	484								
4	Trench Cover Top	Metal				1	244	-23								
5	Trench Cover Bot	Metal				1	284	128								
6	Floor	Painted Concrete				1	264	53								
7	Trench Inside	Painted Concrete				1	356	401								
8	Trench Cover Top	Metal				1	1932	6357								
9	Trench Cover	Metal				1	158	-348								
10	Floor	Painted Concrete				1	326	287								
11	Trench Inside	Painted Concrete				1	898	2449								
12	Trench Grate Top	Steel				1	12118	44853								
13	Trench Grate Bot	Steel				1	17762	66183								
14	Floor	Painted Concrete				1	340	340								
15	Trench Grate Top	Steel				1	472	839								
16	Trench Grate Bot	Steel				1	592	1293								
17	Trench Inside Bot	Painted Concrete				1	508	975								
18	Xtra T Grate Top	Steel				1	14860	55215								
19	Xtra T Grate Bot	Steel				1	20740	77438								
20	Floor	Painted Concrete				1	316	249								
21	Trench Grate Top	Steel				1	1036	2971								
22	Trench Grate Bot	Steel				1	1542	4883								
23	Trench Inside	Painted Concrete				1	1996	6599								
24	Bottling Line End	Stainless Steel				1	1776	5767								

Survey Meter Information

Site: BD Cayey   Building: Building 1   Lab/Room: B. Fill Trench Drains

	Meter 1		Meter 2		Meter 3	Meter 4	Meter 5	
Date:	4/1/2008		4/1/2008		Not In Service	Not In Service		Not In Service
Make:	Ludlum		Ludlum					
Model:	2221		2221					
SN:	99138		108858					
Probe Make:	Ludlum		Ludlum					
Probe Model:	43-38		43-37					
Probe SN:	120557		124945					
Probe Area (cm^2):	126		582					
Next Cal. Date:	3/28/2008	Not Cal	3/28/2008	Not Cal				
Background Surface Materia	Concrete		Concrete					
Background(c) - Time(Min)):	2500	10	7500	10				µRem/hr
Sample Count Time (min				1				
CS Isotope - Activity(µCi):	C-14	0.149	C-14	0.149				
CS Source(cpm)	50268		49624					
L_c, L_d (Counts)	37	77	64	130			NA	NA
Direct MDC, Scan MDC (dpm/100cm^2)	289	1807	84	5175			NA	NA
MDCR , MDC Count Rate	419		293				NA	NA
Instrumen 4π Eff, Isotope:	0.21		0.20					
E_s Surface Efficiency:	50.0%		50.0%	Concrete				
E, Total Efficiency:	21.0%	C-14	20.0%					

Please See MARSSIM Chapter 6 for a more detailed explanation of equations.

Lc= Critical Detection Leve
Ld= a priori Detection limi
MDC= Minimum Detectable Concentration
MDCR= Minimum Detectable Count Rate

$$\text{Direct MDC} = \frac{3+3.29 \cdot SQRT(B/T(1+T_{S+B}/T_B))}{K \cdot T_{S+B}}$$

Beta

$$\text{Scan MDC} = \frac{MDCR}{SQRT(p) \cdot E \cdot E_s \cdot K}$$

$$MDCR = s_i \cdot (60/i)$$

B = Background Counts
T_B = BKG Counting Time In Minutes
T_{S+B} = Sample-Bkg Counting Time In Minute:
E = Total Detector Efficiency in Counts/Disintegratio
A = Physical Probe Area in cm^2
K = Other Constants and Factors When Needed
p = Surveyor Efficiency
E_s = Surface Efficiency $s_i = 1.38 \cdot SQRT(B_i)$
i = Counting Interva

Radiological Survey	BD Cayey Vicks Drive, Cayey, PR	RSO, Inc. Building: Building 1	Room: B. Fill Trench Drains	L:› Type

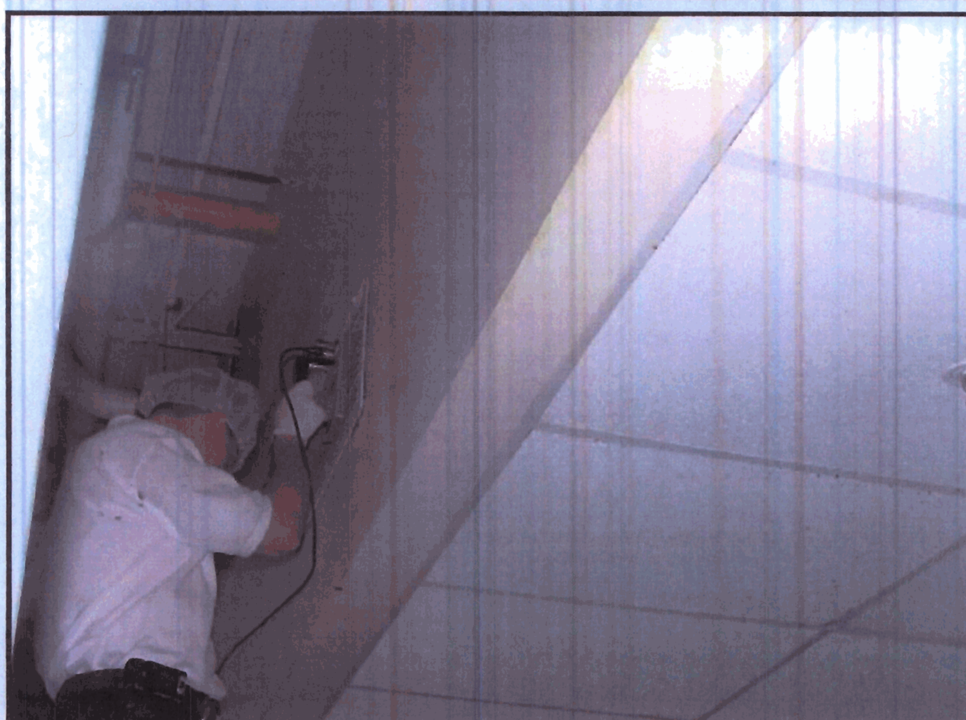
Surveyors	Name: Gregory D. Smith	Name: David Wellner	Date: 4/1/2008
Contact	Name: Michael Spinazolla	Phone No: 410-773-6009	

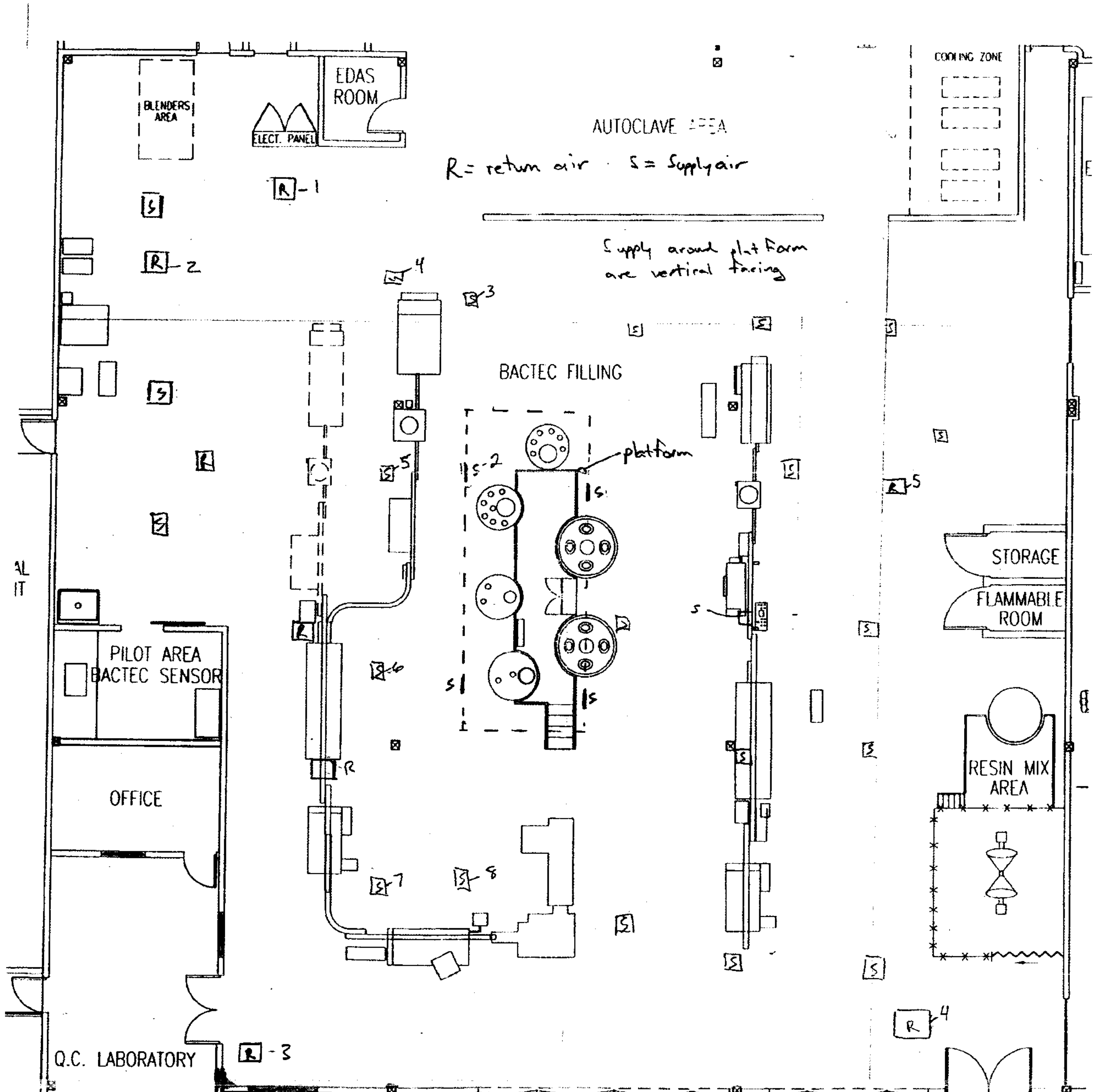
1 Steel Grates with highest contamination were removed and disposed of as radioactive waste.

Remarks:

A.6 Air Supply and Return Ducts for the BACTEC Fill Ventilation System

Representative photographs of the area:





BLENDERS AREA
ELECT. PANEL
EDAS ROOM
AUTOCLAVE AREA
COOLING ZONE
R= return air S= Supply air
Supply around platform are vertical facing
BACTEC FILLING
platform
PILOT AREA BACTEC SENSOR
OFFICE
Q.C. LABORATORY
STORAGE
FLAMMABLE ROOM
RESIN MIX AREA

Site: BD Cayey
Building: Building 1
Lab/Room: B. Fill Ventilation Ductwork
Start Date: 04/01/08
Surveyor: Gregory D. Smith
Surveyor: David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Activity dpm/100 cm^2 (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm^2	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm^2 (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm^2
1	Air Return-1	Grill	LSC		11	1	346	363								
2	Air Return-1	In Duct Back	LSC		32	1	1390	4308								
3	Air Return-1	In Duct Top	LSC		34	1	1764	5722								
4	Air Return-1	In Duct Bottom-1	LSC		33	1	2026	6712								
5	Air Return-1	In Duct Bottom-2	LSC		33	1	1720	5556								
6	Air Return-1	In Duct Bottom-3	LSC		60	1	1990	6576								
7	Air Return-2	Grill	LSC		7	1	348	370								
8	Air Return-2	In Duct Back	LSC		86	1	860	2305								
9	Air Return-2	In Duct Top	LSC		193	1	954	2661								
10	Air Return-2	In Duct Baffle	LSC		48	1	1546	4898								
11	Air Return-2	In Duct L Side	LSC		24	1	840	2230								
12	Air Return-2	In Duct R Side	LSC		65	1	1044	3001								
13	Air Return-3	Grill	LSC		-6	1	326	287								
14	Air Return-3	In Duct Back	LSC		101	1	4508	16092								
15	Air Return-3	In Duct Top	LSC		247	1	2752	9456								
16	Air Return-3	In Duct Bottom	LSC		35	1	5014	18005								
17	Air Return-3	In Duct L Side	LSC		52	1	2416	8186								
18	Air Return-3	In Duct R Side	LSC		16	1	1978	6531								
19	Air Supply-1	Grill	LSC		0	1	448	748								
20	Air Supply-1	In Duct Bottom	LSC		24	1	2432	8246								
21	Air Supply-1	In Duct L Side	LSC		160	1	7866	28783								
22	Air Supply-1	In Duct R Side	LSC		94	1	7060	25737								
23	Air Supply-1	In Duct L Top	LSC		238	1	12530	46410								
24	Air Return-4	Grill	LSC		2	1	272	83								
25	Air Return-4	In Duct Front	LSC		35	1	706	1723								
26	Air Return-4	In Duct L Back	LSC		33	1	1136	3348								
27	Air Return-4	In Duct L Side	LSC		32	1	1130	3326								
28	Air Return-4	In Duct R Side	LSC		24	1	1062	3069								
29	Air Return-5	Grill	LSC		112	1	372	461								
30	Air Return-5	In Duct Front	LSC		172	1	672	1595								

Site: BD Cayey
Building: Building 1
Lab/Room: B. Fill Ventilation Ductwork
Start Date: 04/01/08
Surveyor: Gregory D. Smith
Surveyor: David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Activity dpm/100 cm^2 (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm^2	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm^2 (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm^2
31	Air Return-5	In Duct L Back	LSC		146	1	638	1466								
32	Air Return-5	In Duct L Side	LSC		88	1	540	1096								
33	Air Return-5	In Duct R Side	LSC		16	1	646	1497								
34	Air Supply-2	Grill	LSC		6	1	474	847								
35	Air Supply-2	In Duct Bottom	LSC		45	1	3016	10454								
36	Air Supply-2	In Duct L Side	LSC		102	1	3050	10582								
37	Air Supply-2	In Duct R Side	LSC		241	1	1828	5964								
38	Air Supply-2	In Duct Top	LSC		260	1	2140	7143								
39	Air Supply-3	Grill				1	450	756								
40	Air Supply-4	Grill				1	454	771								
41	Air Supply-5	Grill				1	484	884								
42	Air Supply-6	Grill				1	558	1164								
43	Air Supply-7	Grill				1	410	605								
44	Air Supply-8	Grill				1	444	733								

Survey Meter Information

Site: BD Cayey Building: Building 1 Lab/Room: B. Fill Ventilation Ductwork

	Meter 1		Meter 2		Meter 3	Meter 4	Meter 5	
Date:	4/3/2008			Not In Service	Not In Service	Not In Service		Not In Service
Make:	Ludlum							
Model:	2221							
SN:	99138							
Probe Make:	Ludlum							
Probe Model:	43-38							
Probe SN:	120557							
Probe Area (cm^2):	126							
Next Cal. Date:	3/28/2009							
Background Surface Materia	Concrete							
Background(c) - Time(Min)):	2500	10						μRem/hr
Sample Count Time (min				1				
CS Isotope - Activity(μCi):	C-14	0.149						
CS Source(cpm)	54693							
L_c, L_d (Counts)	37	77					NA	NA
Direct MDC, Scan MDC (dpm/100cm²)	289	1807					NA	NA
MDCR , MDC Count Rate	419		#VALUE!				NA	NA
Instrumen 4π Eff, Isotope:	0.21							
E_s Surface Efficiency:	50.0%		50.0%	Concrete				
E, Total Efficiency:	21.0%	C-14	#VALUE!					

Please See MARSSIM Chapter 6 for a more detailed explanation of equations.

Lc= Critical Detection Leve
Ld= a priori Detection limi
MDC= Minimum Detectable Concentration
MDCR= Minimum Detectable Count Rate

$$\text{Direct MDC} = \frac{3+3.29 \cdot SQRT(B/T(1+T_{S+B}/T_B))}{K \cdot T_{S+B}}$$

Beta

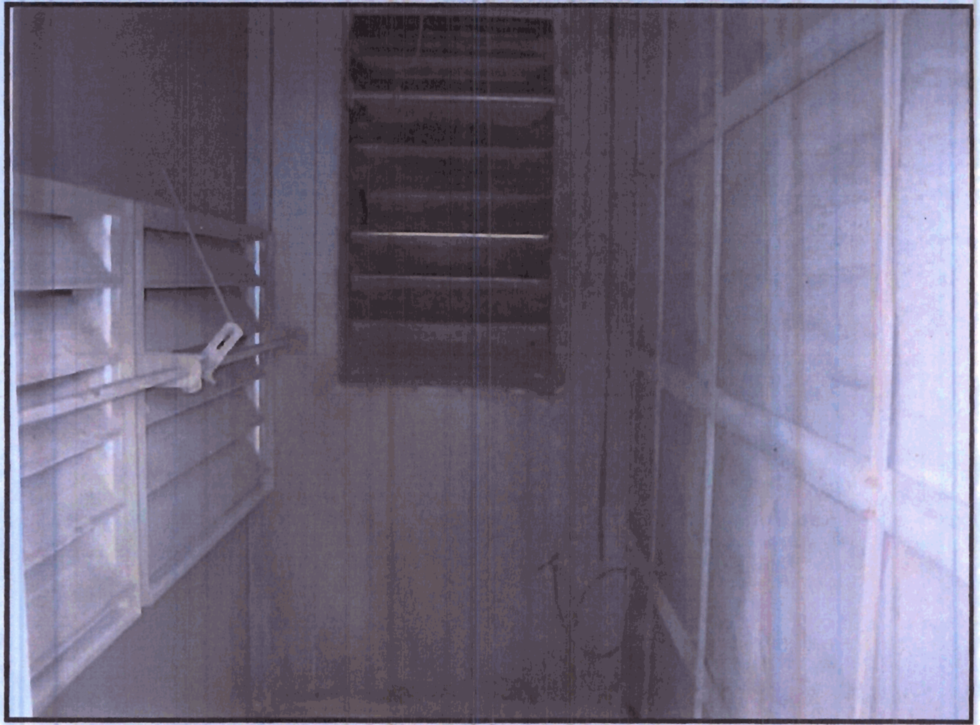
$$\text{Scan MDC} = \frac{MDCR}{SQRT(p) \cdot E \cdot E_s \cdot K}$$

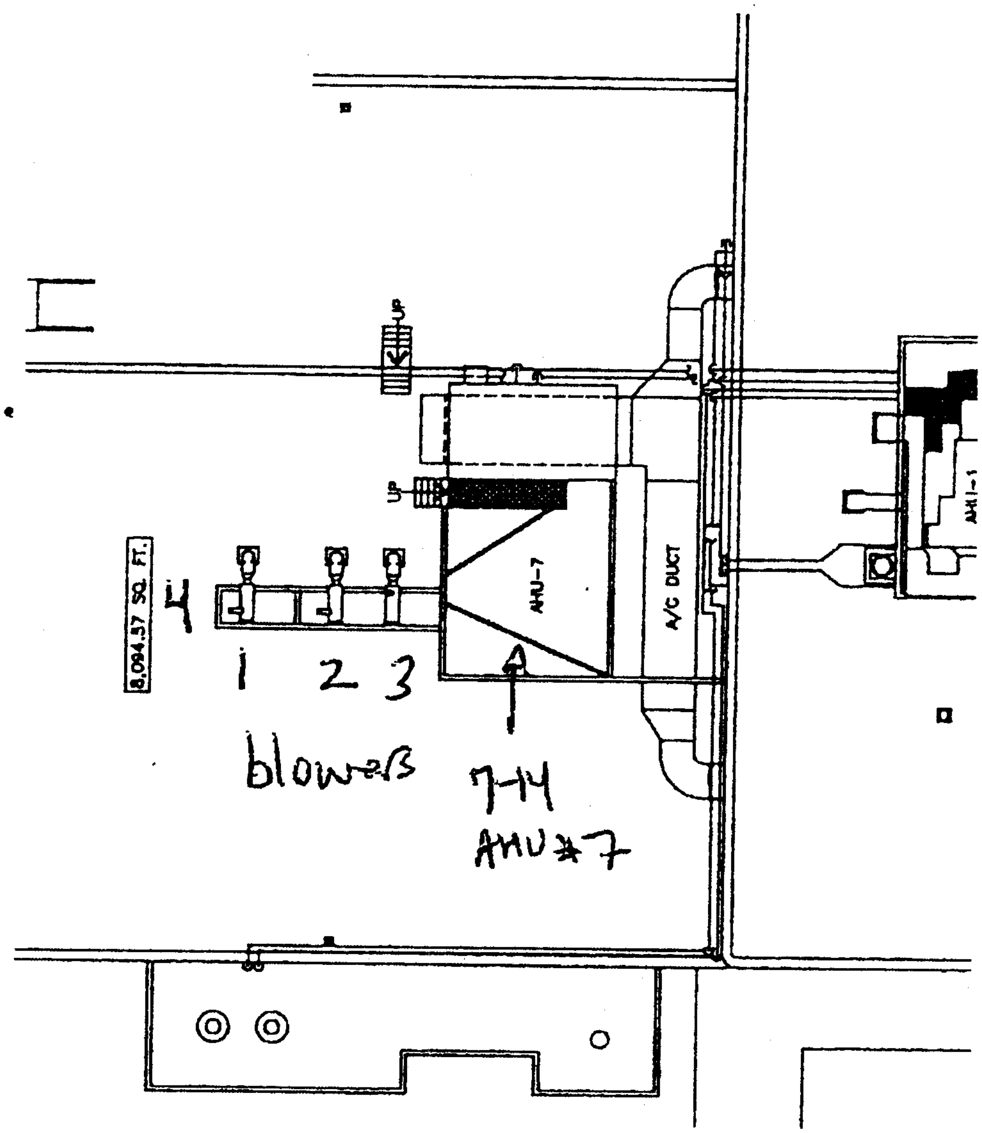
$$MDCR = s_i \cdot (60/i)$$

B = Background Counts
T_B = BKG Counting Time In Minutes
T_{S+B} = Sample-Bkg Counting Time In Minute:
E = Total Detector Efficiency in Counts/Disintegratio
A = Physical Probe Area in cm²
K = Other Constants and Factors When Needed
p = Surveyor Efficiency
E_s = Surface Efficiency $s_i = 1.38 \cdot SQRT(B_i)$
i = Counting Interva

A.7 AHU#7 Air Handling Ventilation System for the BACTEC Fill Area

Representative photographs of the area:





UP
UP
8,094.57 SQ. FT.
AHU-7
A/C DUCT
AHU-1
4
1 2 3
blowers
7-14
AHU #7

Site: BD Cayey
Start Date: 04/01/08
Surveyor: Gregory D. Smith

Building: Building 1

Lab/Room: AHU#7

Surveyor: David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Activity dpm/100 cm^2 (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm^2	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm^2 (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm^2
1	Ahu#7 Return Side	Louvers	LSC		<200	1	958	2676								
2	Ahu#7 Return Side	Louvers	LSC		<200	1	480	869								
3	Ahu#7 Return Side	Louvers	LSC		<200	1	602	1330								
4	Ahu#7 Return Side	Louvers	LSC		<200	1	404	582								
5	Ahu#7 Return Side	Below Louvers	LSC		<200	1	398	559								
6	Ahu#7 Return Side	Above Louvers	LSC		<200	1	690	1663								
7	Ahu#7 Return Side	Above Louvers	LSC		<200	1	546	1119								
8	Ahu#7 Return Side	Side Mid Louver	LSC		<200	1	284	128								
9	Ahu#7 Return Side	Below Side Louver	LSC		<200	1	436	703								
10	Ahu#7 Return Side	Wall With Door	LSC		<200	1	1544	4890								
11	Ahu#7 Return Side	Inside Door	LSC		<200	1	1012	2880								
12	Ahu#7 Return Side	Left Filter Frame	LSC		<200	1	488	899								
13	Ahu#7 Return Side	Mid Filter Frame	LSC		<200	1	3200	11149								
14	Ahu#7 Return Side	Bottom Filter Frame	LSC		<200	1	1172	3485								
15	Ahu#7 Return Side	Back Left Floor	LSC		<200	1	766	1950								
16	Ahu#7 Return Side	Back Right Floor	LSC		<200	1	994	2812								
17	Ahu#7 Return Side	Middle Floor	LSC		<200	1	442	726								
18	Ahu#7 Return Side	Front Rt Floor	LSC		<200	1	692	1670								
19	Ahu#7 Return Side	Front Left Floor	LSC		<200	1	570	1209								
20	Ahu#7 Return Side	Ceiling Middle	LSC		<200	1	1350	4157								
21	Ahu#7 Supply Side	Galv Mesh Left Top	LSC		<200	1	212	-144								
22	Ahu#7 Supply Side	Galv Mesh Rt Top	LSC		<200	1	222	-106								
23	Ahu#7 Supply Side	Galv Mesh Left Bottom	LSC		<200	1	234	-60								
24	Ahu#7 Supply Side	Galv Mesh Rt Bottom	LSC		<200	1	178	-272								
25	Ahu#7 Supply Side	Door	LSC		<200	1	386	514								
26	Ahu#7 Supply Side	Back Wall Med Rt	LSC		<200	1	606	1345								
27	Ahu#7 Supply Side	Rt Wall Left Side	LSC		<200	1	664	1565								
28	Ahu#7 Supply Side	Rt Wall Right Side	LSC		<200	1	638	1466								
29	Ahu#7 Supply Side	Rt Side Floor	LSC		<200	1	360	416								
30	Ahu#7 Supply Side	Floor At Door	LSC		<200	1	716	1761								

Site: BD Cayey

Start Date: 04/01/08

Surveyor: Gregory D. Smith

Building: Building 1

Lab/Room: AHU#7

Surveyor: David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Activity dpm/100 cm^2 (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm^2	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm^2 (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm^2
31	Ahu#7 Supply Side	Fan Housing	LSC		<200	1	906	2479								
32	Ahu#7 Supply Side	Fan Blades	LSC		<200	1	308	219								
33	Ahu#7 Supply Side	Fan Angle Iron Mount	LSC		<200	1	758	1920								
34	Ahu#7 Supply Side	Fan Motor	LSC		<200	1	314	242								
35	Ahu#7 Supply Side	Fan Motor Bracket	LSC		<200	1	244	-23								

Survey Meter Information

Site: BD Cayey Building: Building 1 Lab/Room: AHU#7

	Meter 1		Meter 2		Meter 3	Meter 4	Meter 5	
Date:	4/2/2008			Not In Service	Not In Service	Not In Service		Not In Service
Make:	Ludlum							
Model:	2221							
SN:	99138							
Probe Make:	Ludlum							
Probe Model:	43-38							
Probe SN:	120557							
Probe Area (cm^2):	126							
Next Cal. Date:	3/28/2009							
Background Surface Materia	Concrete							
Background(c) - Time(Min)):	2500	10						µRem/hr
Sample Count Time (min)				1				
CS Isotope - Activity(µCi):	C-14	0.149						
CS Source(cpm)	54693							
L_c, L_d (Counts)	37	77					NA	NA
Direct MDC, Scan MDC (dpm/100cm^2)	289	1807					NA	NA
MDCR , MDC Count Rate	419		#VALUE!				NA	NA
Instrumen 4π Eff, Isotope:	0.21							
E_s Surface Efficiency:	50.0%		50.0%	Concrete				
E, Total Efficiency:	21.0%	C-14	#VALUE!					

Please See MARSSIM Chapter 6 for a more detailed explanation of equations.

Lc= Critical Detection Leve
Ld= a priori Detection limi
MDC= Minimum Detectable Concentration
MDCR= Minimum Detectable Count Rate

Direct MDC= $\dfrac{3+3.29*SQRT(B/T(1+T_{S+B}/T_B))}{K * T_{S+B}}$

Beta

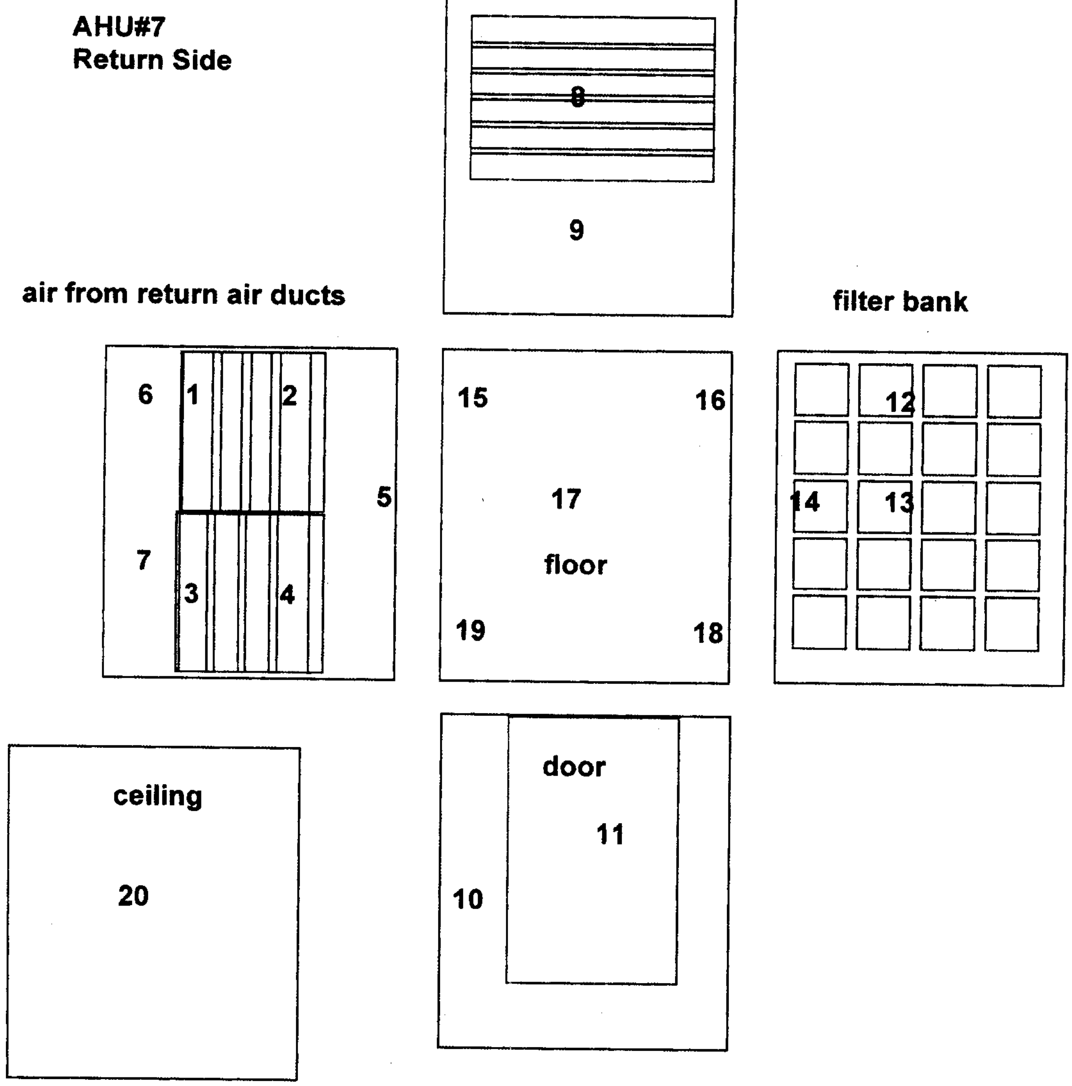
Scan MDC= $\dfrac{MDCR}{SQRT(p)*E*E_s*K}$

MDCR= s_i * (60/i)

B = Background Counts
T_B = BKG Counting Time In Minutes
T_{S+B} = Sample-Bkg Counting Time In Minute:
E = Total Detector Efficiency in Counts/Disintegratio
A = Physical Probe Area in cm^2
K = Other Constants and Factors When Needed
p = Surveyor Efficiency
E_s = Surface Efficiency s_i = 1.38*SQRT(B_i)
i = Counting Interva

Radiological Survey	BD Cayey Vicks Drive, Cayey, PR	RSO,Inc. Building: Building 1 Room: AHU#7 Lab Type:
Surveyors	Name: Gregory D. Smith Name: David Wellner	Date: 4/1/2008
Contact	Name: Michael Spinazolla Phone No: 410-773-6009	

AHU#7
Return Side

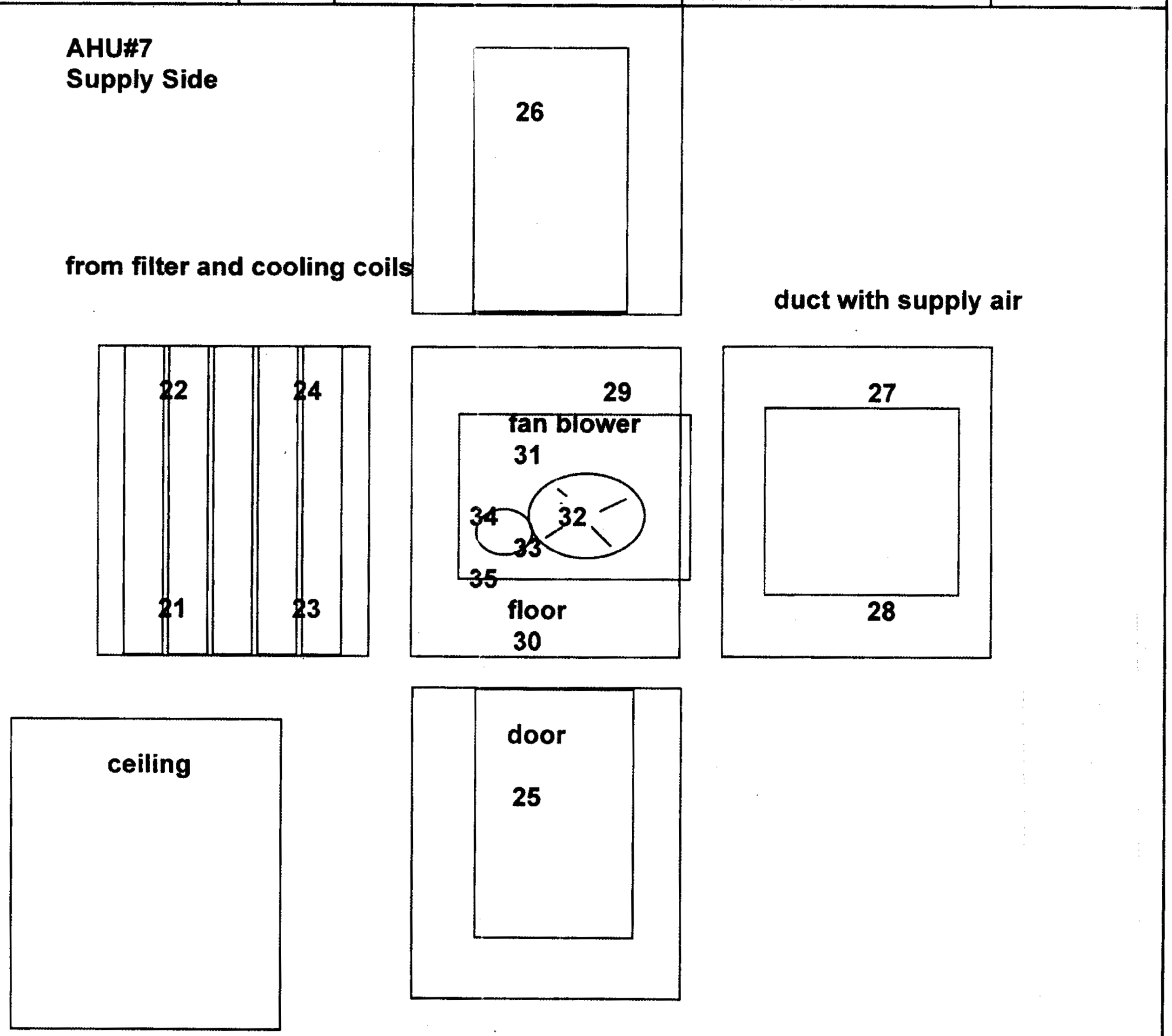


Remarks:

Survey following cleaning.

Radiological Survey	BD Cayey Vicks Drive, Cayey, PR	RSO,Inc. Building: Building 1 / Room: AHU#7 / Lab Type:

Surveyors	Name: Gregory D. Smith	Name: David Wellner	Date: 4/1/2008
Contact	Name: Michael Spinazolla	Phone No: 410-773-6009	

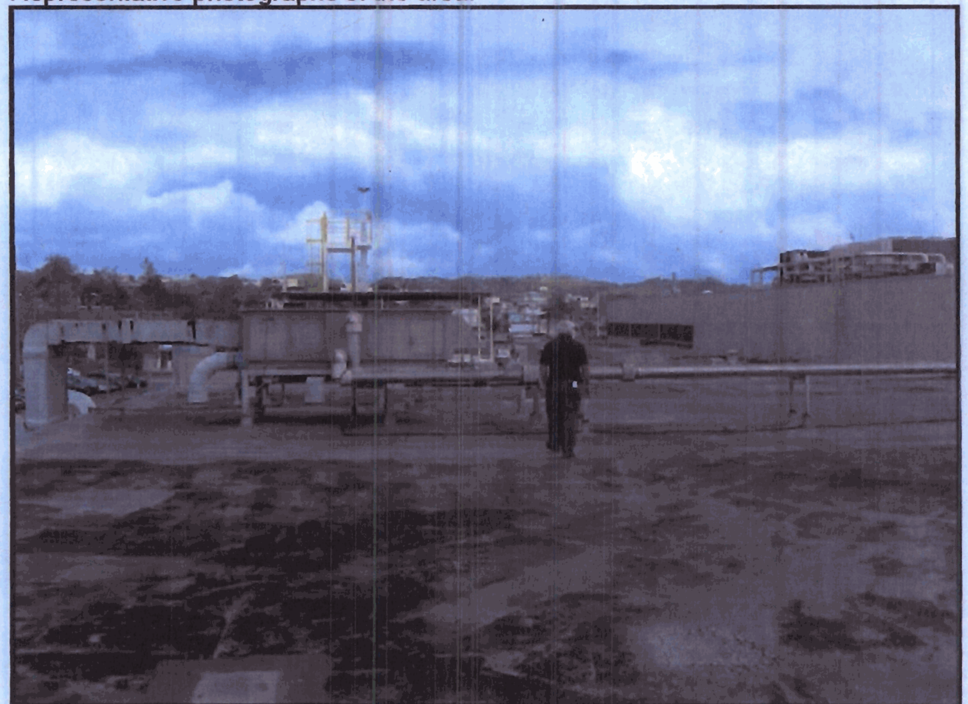


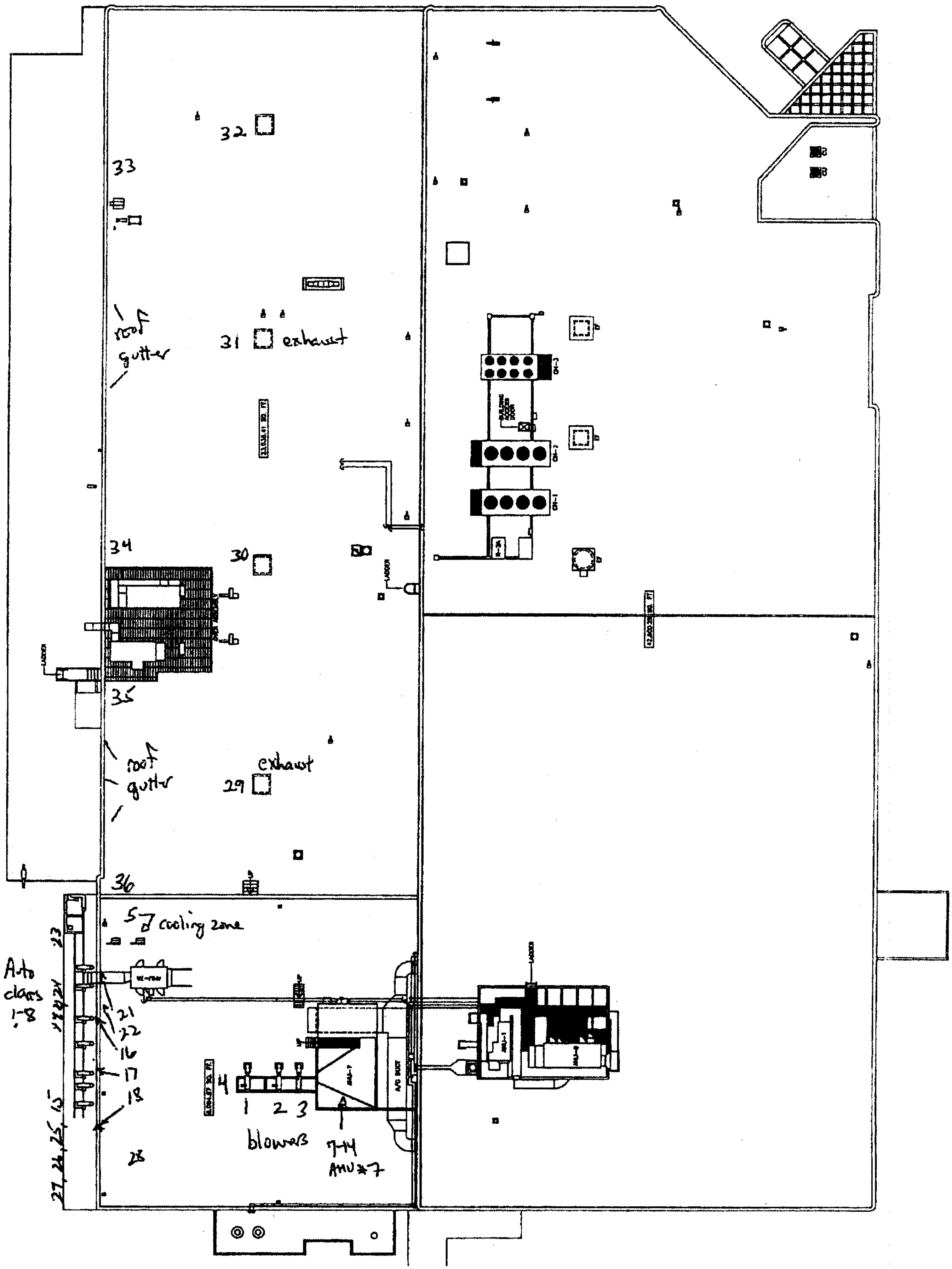
Remarks:

Survey following cleaning.

A.8 Building 1 Roof Area

Representative photographs of the area:





32
33
roof gutter
31 exhaust
34
30
35
roof gutter
exhaust
29
36
5-7 cooling zone
23
Auto doors 1-8
21
22
16
17
18
4
1 2 3
blowers
7-14
AMU#7
28

Site: BD Cayey　　Building: Building 1　　Lab/Room: Roof

Start Date: 02/26/08

Surveyor: Greg Smith　　Surveyor: Gregory D. Smith　　David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Activity dpm/100 cm^2 (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm^2	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm^2 (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm^2
1	Form. Tak Blwer	Exhaust Grill	LSC		<200	1	6736	25730								
2	Form. Tak Blwer	Exhaust Grill	LSC		<200	1	2618	9388								
3	Mix Tank Blower	Exhaust Grill	LSC		<200	1	394	563								
4	Roof Surface	Synthetic Material	LSC		<200	1	316	254								
5	Cooling Zn Blower	Exhaust Grill	LSC		<200	1	238	-56								
6	Roof Surface	Synthetic Material	LSC		<200	1	298	182								
7	Ahu#7 Supply Side	Fan Blade	LSC		<200	1	282	119								
8	Ahu#7 Rtn Side	Rough Filter Material	LSC		<200	1	416	650								
9	Ahu#7 Rtn Side	Floor	LSC		<200	1	400	587								
10	Ahu#7 Rtn Side	Floor	LSC		<200	1	1096	3349								
11	Ahu#7 Rtn Side	Make Up Air Louvers	LSC		<200	1	4022	14960								
12	Ahu#7 Rtn Side	Make Up Air Louvers	LSC		<200	1	4590	17214								
13	Ahu#7 Rtn Side	Steel Wall	LSC		<200	1	1832	6269								
14	Ahu#7 Rtn Side	Make Up Air Louvers	LSC		<200	1	164	-350								
15	Autoclave #7	Blower Vent	LSC		<200	1	854	2388								
16	Lower Roof	Synthetic Material	LSC		<200	1	200	-207								
17	Lower Roof	Synthetic Material	LSC		<200	1	248	-16								
18	Lower Roof	Synthetic Material	LSC		<200	1	258	23								
19	Autoclave #6	Blower Vent	LSC		<200	1	792	2142								
20	Autoclave #5	Blower Vent	LSC		<200	1	324	285								
21	Lower Roof	Synthetic Material	LSC		<200	1	292	158								
22	Lower Roof	Synthetic Material	LSC		<200	1	294	166								
23	Autoclave #1	Metal	LSC		<200	1	1598	5341								
24	Autoclave #2	Blower Vent	LSC		<200	1	606	1404								
25	Autoclave #3	Blower Vent	LSC		<200	1	424	682								
26	Autoclave #4	Blower Vent	LSC		<200	1	756	2000								
27	Autoclave #8	Blower Vent	LSC		<200	1	200	-207								
28	Lower Roof	Synthetic Material	LSC		<200	1	246	-24								
29	Roof Surface	Synthetic Material	LSC		<200	1	278	103								
30	Roof Surface	Synthetic Material	LSC		<200	1	292	158								

Site: BD Cayey
Start Date: 02/26/08
Surveyor: Greg Smith

Building: Building 1

Lab/Room: Roof

Surveyor: Gregory D. Smith David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Activity dpm/100 cm² (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm²	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm² (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm²
31	Roof Surface	Synthetic Material	LSC		<200	1	328	301								
32	Roof Surface	Synthetic Material	LSC		<200	1	304	206								
33	Roof Surface	Gutter	LSC		<200	1	258	23								
34	Roof Surface	Gutter	LSC		<200	1	298	182								
35	Roof Surface	Gutter	LSC		<200	1	218	-135								
36	Roof Surface	Gutter	LSC		<200	1	332	317								
37																
38																
39																

Survey Meter Information

Site: BD Cayey Building: Building 1 Lab/Room: Roof

	Meter 1		Meter 2		Meter 3		Meter 4		Meter 5	
Date:	2/26/2008		2/26/2008			Not In Service		Not In Service		Not In Service
Make:	Ludlum		Ludlum							
Model:	2221		2221							
SN:	161591		147497							
Probe Make:	Ludlum		Ludlum							
Probe Model:	43-68		43-37							
Probe SN:	120557		124945							
Probe Area (cm^2):	126		575							
Next Cal. Date:	2/22/2008	Not Cal	2/22/2008	Not Cal						
Background Surface Materia	Concrete		Concrete							
Background(c) - Time(Min)):	2521	10	8073	10						µRem/hr
Sample Count Time (min)				1		1				
CS Isotope - Activity(µCi):	C-14	0.149	C-14	0.149						
CS Source(cpm)	50270		51024							
L_c, L_d (Counts)	37	77	66	135					NA	NA
Direct MDC, Scan MDC (dpm/100cm²)	305	1905	84	5113		571			NA	NA
MDCR , MDC Count Rate	422		304		120				NA	NA
Instrumen 4π Eff, Isotope:			21.0%	Tc-99	21.0%					
E_s Surface Efficiency:			50.0%	Concrete	50.0%					
E, Total Efficiency:	20.0%	C-14	21.0%		21.0%					

Please See MARSSIM Chapter 6 for a more detailed explanation of equations.

Lc= Critical Detection Leve
Ld= a priori Detection limi
MDC= Minimum Detectable Concentration
MDCR= Minimum Detectable Count Rate

$$\text{Direct MDC} = \frac{3+3.29 \cdot \text{SQRT}(B/T(1+T_{S+B}/T_B))}{K \cdot T_{S+B}}$$

Beta

$$\text{Scan MDC} = \frac{\text{MDCR}}{\text{SQRT}(p) \cdot E \cdot E_s \cdot K}$$

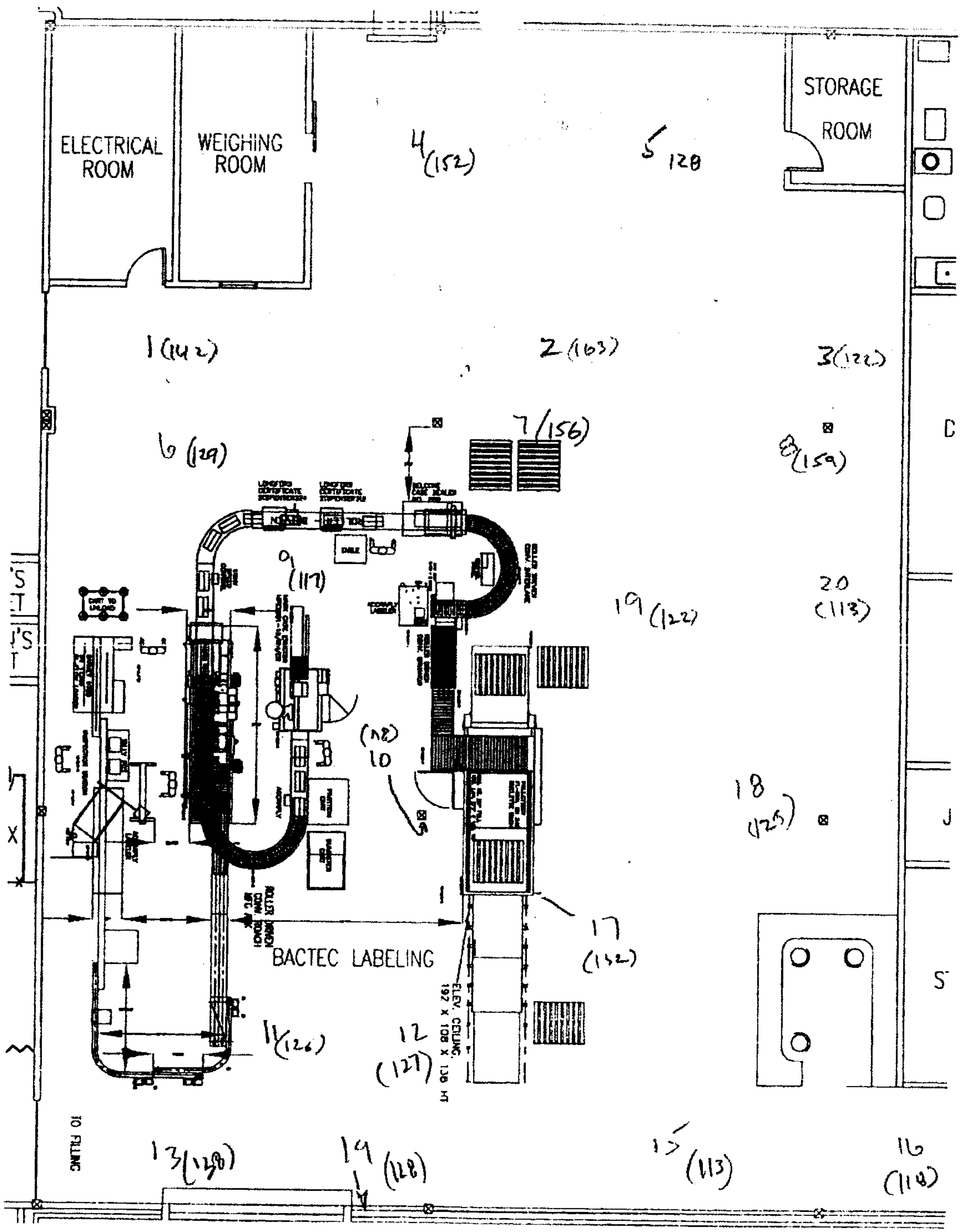
$$\text{MDCR} = s_i \cdot (60/i)$$

B = Background Counts
T_B = BKG Counting Time in Minutes
T_{S+B} = Sample-Bkg Counting Time in Minute:
E = Total Detector Efficiency in Counts/Disintegratio
A = Physical Probe Area in cm^2
K = Other Constants and Factors When Needed
p = Surveyor Efficiency
E_s = Surface Efficiency $s_i = 1.38 \cdot \text{SQRT}(B_i)$
i = Counting Interva

A.9 BACTEC Labeling Area

Representative photograph of the area:

Survy Date:
4/2/08



Site: BD Cayey
Start Date: 04/02/08
Surveyor: Gregory D. Smith

Building: Building 1

Lab/Room: BACTEC Labeling

Surveyor: David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Actvity dpm/100 cm^2 (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm^2	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm^2 (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm^2
1	Floor	Painted Concrete	LSC		<200	1	284	128					2	1000	700	-43
2	Floor	Painted Concrete	LSC		<200	1	326	287					2	1000	700	-43
3	Floor	Painted Concrete	LSC		<200	1	244	-23					2	1000	700	-43
4	Floor	Painted Concrete	LSC		<200	1	304	204					2	1000	700	-43
5	Floor	Painted Concrete	LSC		<200	1	256	23					2	1000	700	-43
6	Floor	Painted Concrete	LSC		<200	1	258	30					2	1000	700	-43
7	Floor	Painted Concrete	LSC		<200	1	312	234					2	1000	700	-43
8	Floor	Painted Concrete	LSC		<200	1	318	257					2	1000	700	-43
9	Floor	Painted Concrete	LSC		<200	1	234	-60					2	1000	700	-43
10	Floor	Painted Concrete	LSC		<200	1	236	-53					2	1000	700	-43
11	Floor	Painted Concrete	LSC		<200	1	252	8					2	1000	700	-43
12	Floor	Painted Concrete	LSC		<200	1	254	15					2	1000	700	-43
13	Floor	Painted Concrete	LSC		<200	1	276	98					2	1000	700	-43
14	Floor	Painted Concrete	LSC		<200	1	256	23					2	1000	700	-43
15	Floor	Painted Concrete	LSC		<200	1	226	-91					2	1000	700	-43
16	Floor	Painted Concrete	LSC		<200	1	236	-53					2	1000	700	-43
17	Floor	Painted Concrete	LSC		<200	1	264	53					2	1000	700	-43
18	Floor	Painted Concrete	LSC		<200	1	250	0					2	1000	700	-43
19	Floor	Painted Concrete	LSC		<200	1	244	-23					2	1000	700	-43
20	Floor	Painted Concrete	LSC		<200	1	226	-91					2	1000	700	-43

Survey Meter Information

Site: BD Cayey Building: Building 1 Lab/Room: BACTEC Labeling

	Meter 1		Meter 2		Meter 3	Meter 4	Meter 5	
Date:	4/2/2008		4/2/2008		Not In Service	Not In Service		Not In Service
Make:	Ludlum		Ludlum					
Model:	2221		2221					
SN:	99138		108858					
Probe Make:	Ludlum		Ludlum					
Probe Model:	43-38		43-37					
Probe SN:	120557		124945					
Probe Area (cm^2):	126		582					
Next Cal. Date:	3/28/2009		3/28/2009					
Background Surface Materia	Concrete		Concrete					
Background(c) - Time(Min)):	2500	10	7500	10				µRem/hr
Sample Count Time (min)				1				
CS Isotope - Activity(µCi):	C-14	0.149	C-14	0.149				
CS Source(cpm)	54693		48115					
L_c, L_d (Counts)	37	77	64	130			NA	NA
Direct MDC, Scan MDC (dpm/100cm²)	289	1807	84	5175			NA	NA
MDCR , MDC Count Rate	419		293				NA	NA
Instrumen 4π Eff, Isotope:	0.21		0.20					
E_s Surface Efficiency:	50.0%	Concrete	50.0%	Concrete				
E, Total Efficiency:	21.0%	C-14	20.0%					

Please See MARSSIM Chapter 6 for a more detailed explanation of equations.

Lc= Critical Detection Leve
Ld= a priori Detection limi
MDC= Minimum Detectable Concentration
MDCR= Minimum Detectable Count Rate

$$\text{Direct MDC} = \frac{3+3.29 \cdot SQRT(B/T(1+T_{S+B}/T_B))}{K \cdot T_{S+B}}$$

Beta

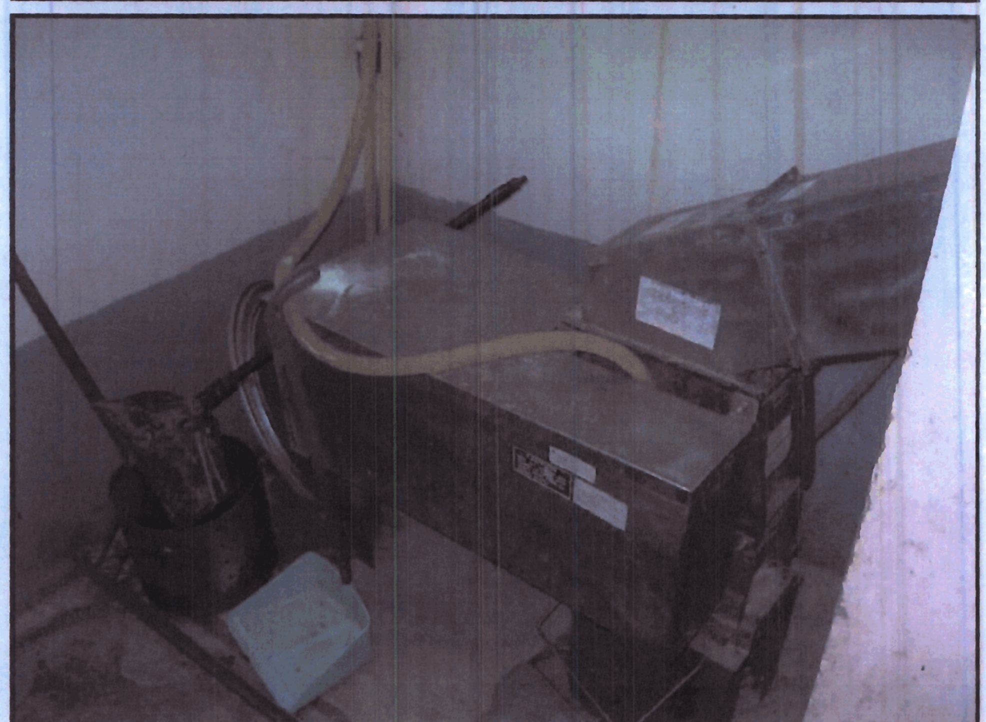
$$\text{Scan MDC} = \frac{MDCR}{SQRT(p) \cdot E \cdot E_s \cdot K}$$

$$MDCR = s_i \cdot (60/i)$$

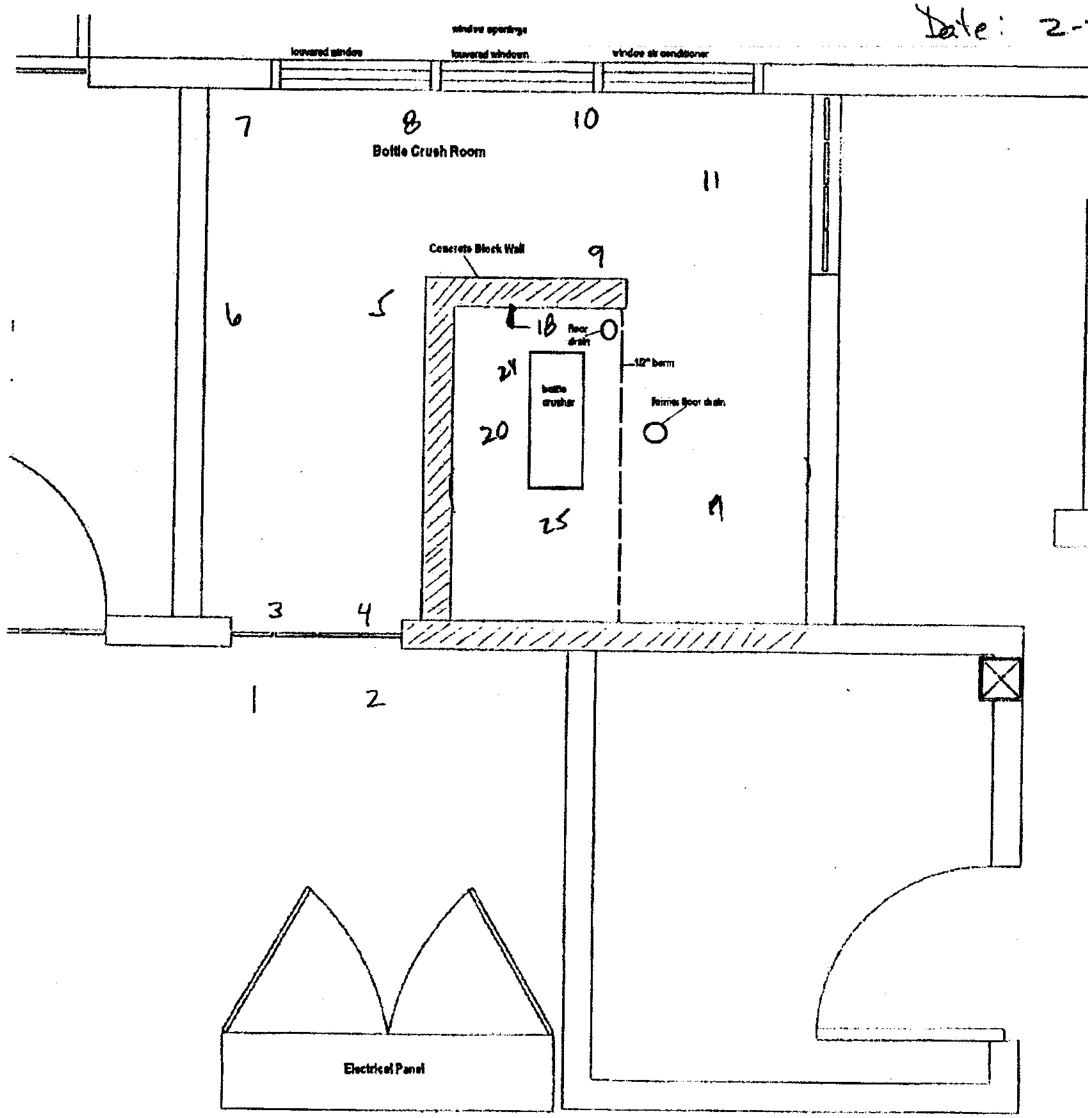
B = Background Counts
T_B = BKG Counting Time In Minutes
T_{S+B} = Sample-Bkg Counting Time In Minute:
E = Total Detector Efficiency in Counts/Disintegratio
A = Physical Probe Area in cm²
K = Other Constants and Factors When Needed
p = Surveyor Efficiency
E_s = Surface Efficiency $s_i = 1.38 \cdot SQRT(B_i)$
i = Counting Interva

A.10 Bottle Crush Room

Representative photographs of the area:



Date: 2-26-2008



Notes:

Locati~

14-17

overhead

bottle crsh area

19-23

bottle crsh unit

Site: BD Cayey Building: Building 1 Lab/Room: Bottle Crush Room

Start Date: 02/26/08

Surveyor: Greg Smith Surveyor: Gregory D. Smith David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Activity dpm/100 cm^2 (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm^2	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm^2 (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm^2
1	Floor	Painted Concrete	LSC		<200	1	246	-24					2	1200	800	-6
2	Floor	Painted Concrete	LSC		<200	1	230	-88					2	1200	800	-6
3	Floor	Painted Concrete	LSC		<200	1	272	79					2	1200	800	-6
4	Floor	Painted Concrete	LSC		<200	1	292	158					2	1200	850	37
5	Floor	Painted Concrete	LSC		<200	1	302	198					2	1200	850	37
6	Floor	Painted Concrete	LSC		<200	1	248	-16					2	1200	850	37
7	Floor	Painted Concrete	LSC		<200	1	190	-246					2	1200	850	37
8	Floor	Painted Concrete	LSC		<200	1	312	238					2	1200	850	37
9	Floor	Painted Concrete	LSC		<200	1	284	127					2	1200	850	37
10	Floor	Painted Concrete	LSC		<200	1	248	-16					2	1200	850	37
11	Floor	Painted Concrete	LSC		<200	1	218	-135					2	1200	850	37
12	Lighting In Ceiling Above	Painted Metal	LSC		<200	1	782	2103					1	800	600	1381
13	Lighting In Ceiling Above	Gypsum Wall Board	LSC		<200	1	688	1730					1	800	600	1381
14	Ceiling	Back Side Gwb	LSC		<200	1	355	408					1	800	600	1381
15	Wall	Painted Concrete	LSC		<200	1	730	1896					1	800	600	1381
16	Top Wall	Painted Concrete	LSC		<200	1	510	1023					1	800	600	1381
17	Ceiling	Gypsum Wall Board	LSC		<200	1	310	230								
18	Conduit	Painted Metal	LSC		<200	1	514	1039								
19	Floor B.C. Room	Painted Concrete	LSC		<200	1	342	357								
20	Floor B.C. Room	Painted Concrete	LSC		<200	1	748	1968								
21	B.C. Bottom	Stainless Steel	LSC		<200	1	1612	5396								
22	B.C. Inside Panel	Stainless Steel	LSC		<200	1	6180	23523								
23	B.C. Motor	Metal	LSC		<200	1	34000	133920								
24	Floor B.C. Room	Rough Concrete	LSC		<200	1	380	508								
25	Floor B.C. Room	Rough Concrete	LSC		<200	1	420	666								
26	Ceiling Tile	New Ceiling Tile	LSC		<200	1	408	619								
27	In Cooling Zone Hood#1	Stainless Steel	LSC		<200	1	812	2222								
28	In Cooling Zone Hood#2	Stainless Steel	LSC		<200	1	964	2825								
29	In Cooling Zone Hood#3	Stainless Steel	LSC		<200	1	440	746								
30	In Cooling Zone Hood#4	Stainless Steel	LSC		<200	1	1120	3444								

Survey Meter Information

Site: BD Cayey Building: Building 1 Lab/Room: Bottle Crush Room

	Meter 1	Meter 2	Meter 3	Meter 4	Meter 5
Date:	2/26/2008	2/26/2008	Not In Service	Not In Service	Not In Service
Make:	Ludlum	Ludlum			
Model:	2221	2221			
SN:	161591	147497			
Probe Make:	Ludlum	Ludlum			
Probe Model:	43-68	43-37			
Probe SN:	120557	124945			
Probe Area (cm^2):	126	575			
Next Cal. Date:	2/22/2008 Not Cal	2/22/2008 Not Cal			
Background Surface Materia	Concrete	Concrete			
Background(c) - Time(Min)):	2521 10	8073 10			µRem/hr
Sample Count Time (min)		1	1		
CS Isotope - Activity(µCi):	C-14 0.149	C-14 0.149			
CS Source(cpm)	50270	51024			
L_c, L_d (Counts)	37 77	66 135			NA NA
Direct MDC, Scan MDC (dpm/100cm^2):	305 1905	84 5113	571		NA NA
MDCR , MDC Count Rate	422	304	120		NA NA
Instrumen 4π Eff, Isotope:		21.0% Tc-99	21.0%		
E_s Surface Efficiency:		50.0% Concrete	50.0%		
E, Total Efficiency:	20.0% C-14	21.0%	21.0%		

Please See MARSSIM Chapter 6 for a more detailed explanation of equations.

Lc= Critical Detection Leve
Ld= a priori Detection limi
MDC= Minimum Detectable Concentration
MDCR= Minimum Detectable Count Rate

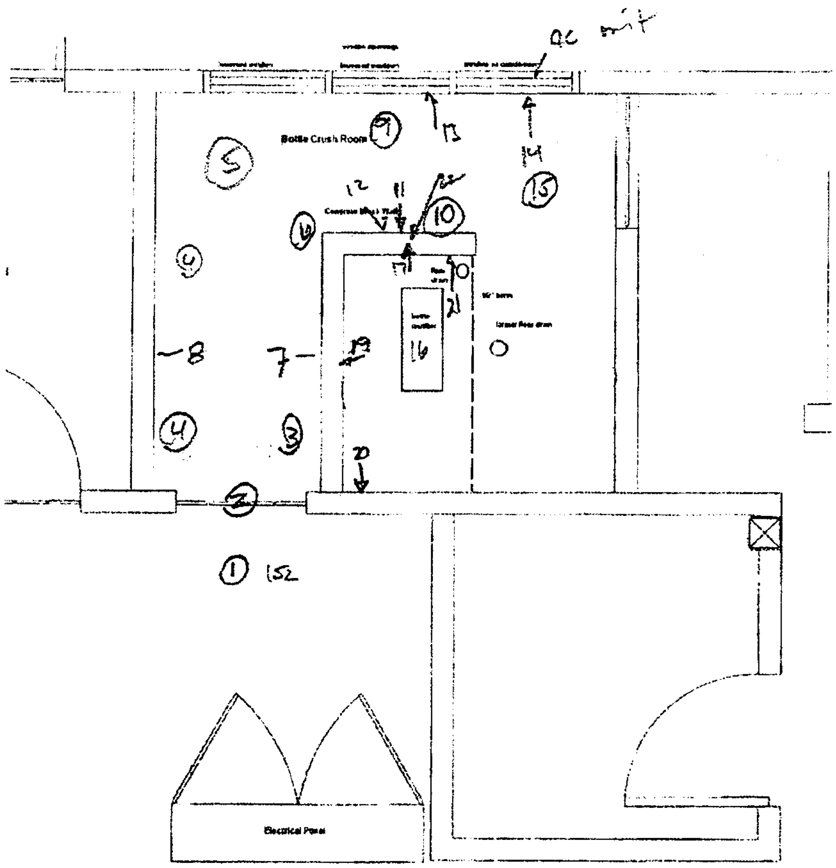
Direct MDC= $\frac{3+3.29*SQRT(B/T(1+T_{S+B}/T_B)}{K * T_{S+B}}$

Beta
Scan MDC= $\frac{MDCR}{SQRT(p)*E*E_s*K}$

MDCR= $s_i * (60/i)$

B = Background Counts
T_B = BKG Counting Time In Minutes
T_{S+B} = Sample-Bkg Counting Time In Minutes
E = Total Detector Efficiency in Counts/Disintegratio
A = Physical Probe Area in cm^2
K = Other Constants and Factors When Needed
p = Surveyor Efficiency
E_s = Surface Efficiency $s_i = 1.38*SQRT(B_i)$
i = Counting Interva

4/1/03



Site: BD Cayey
Start Date: 04/01/08
Surveyor: Gregory D. Smith

Building: Building 1

Lab/Room: Bottle Crush

Surveyor: David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Actvity dpm/100 cm² (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm²	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm² (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm²
1	Floor	Painted Concrete	LSC		<200	1	304	204					2	1100	800	43
2	Floor	Painted Concrete	LSC		<200	1	402	574					2	1100	800	43
3	Floor	Painted Concrete	LSC		<200	1	334	317					2	1100	800	43
4	Floor	Painted Concrete	LSC		<200	1	302	197					2	1100	800	43
5	Floor	Painted Concrete	LSC		<200	1	318	257					2	1100	800	43
6	Floor	Painted Concrete	LSC		<200	1	340	340					2	1100	800	43
7	Wall	Painted Concrete	LSC		<200	1	206	-166								
8	Wall	Painted Concrete	LSC		<200	1	230	-76								
9	Floor	Painted Concrete	LSC		<200	1	238	-45					2	1100	800	43
10	Floor	Painted Concrete	LSC		<200	1	342	348					2	1100	800	43
11	Wall	Painted Concrete	LSC		<200	1	270	76								
12	B.C. Feed	Metal	LSC		<200	1	238	-45								
13	Louver Cvr	Plastic	LSC		<200	1	202	-181								
14	Window A.C.	Metal Grill	LSC		<200	1	228	-83								
15	Floor	Painted Concrete	LSC		<200	1	306	212								
16	B.Crusher Top	Metal	LSC		<200	1	238	-45								
17	Elec. Junction Bx	Metal	LSC		<200	1	322	272								
18	B.Crusher Motor	Metal	LSC		<200	1	15758	58609								
19	Wall	Painted Concrete	LSC		<200	1	334	317								
20	Wall	Painted Concrete	LSC		<200	1	248	-8								
21	Wall	Painted Concrete	LSC		<200	1	234	-60								
22	B.C. Feed	Metal				1	218	-121								
23	B.C. Back	Metal				1	234	-60								
24	B.C. Back	Metal				1	280	113								
25	B.C. Side	Metal				1	425	661								
26	B.C. Side	Metal				1	435	699								
27	B.C. Front	Metal				1	300	189								
28	B.C. Front	Metal				1	300	189								
29	B.C. Front	Metal				1	300	189								
30	B.C. Motor Housing	Metal				1	2200	7370								

Site: BD Cayey Building: Building 1 Lab/Room: Bottle Crush

Start Date: 04/01/08

Surveyor: Gregory D. Smith Surveyor: David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Actvity dpm/100 cm² (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm²	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm² (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm²
31	B.C. Motor Bracket	Metal				1	1300	3968								
32	B.C. Support Leg	Metal				1	300	189								
33	B.C. Support Leg	Metal				1	500	945								

Survey Meter Information

Site: BD Cayey Building: Building 1 Lab/Room: Bottle Crush

	Meter 1		Meter 2		Meter 3	Meter 4	Meter 5	
Date:	4/1/2008		4/1/2008		Not In Service	Not In Service		Not In Service
Make:	Ludlum		Ludlum					
Model:	2221		2221					
SN:	99138		108858					
Probe Make:	Ludlum		Ludlum					
Probe Model:	43-38		43-37					
Probe SN:	120557		124945					
Probe Area (cm^2):	126		582					
Next Cal. Date:	3/28/2009		3/28/2009					
Background Surface Materia	Concrete		Concrete					
Background(c) - Time(Min)):	2500	10	7500	10				µRem/hr
Sample Count Time (min				1				
CS Isotope - Activity(µCi):	C-14	0.149	C-14	0.149				
CS Source(cpm)	54693		49624					
L_c, L_d (Counts)	37	77	64	130			NA	NA
Direct MDC, Scan MDC (dpm/100cm²)	289	1807	84	5175			NA	NA
MDCR , MDC Count Rate	419		293				NA	NA
Instrumen 4π Eff, Isotope:	0.21		0.20					
E_s Surface Efficiency:	50.0%		50.0%	Concrete				
E, Total Efficiency:	21.0%	C-14	20.0%					

Please See MARSSIM Chapter 6 for a more detailed explanation of equations.

Lc= Critical Detection Leve
Ld= a priori Detection limi
MDC= Minimum Detectable Concentration
MDCR= Minimum Detectable Count Rate

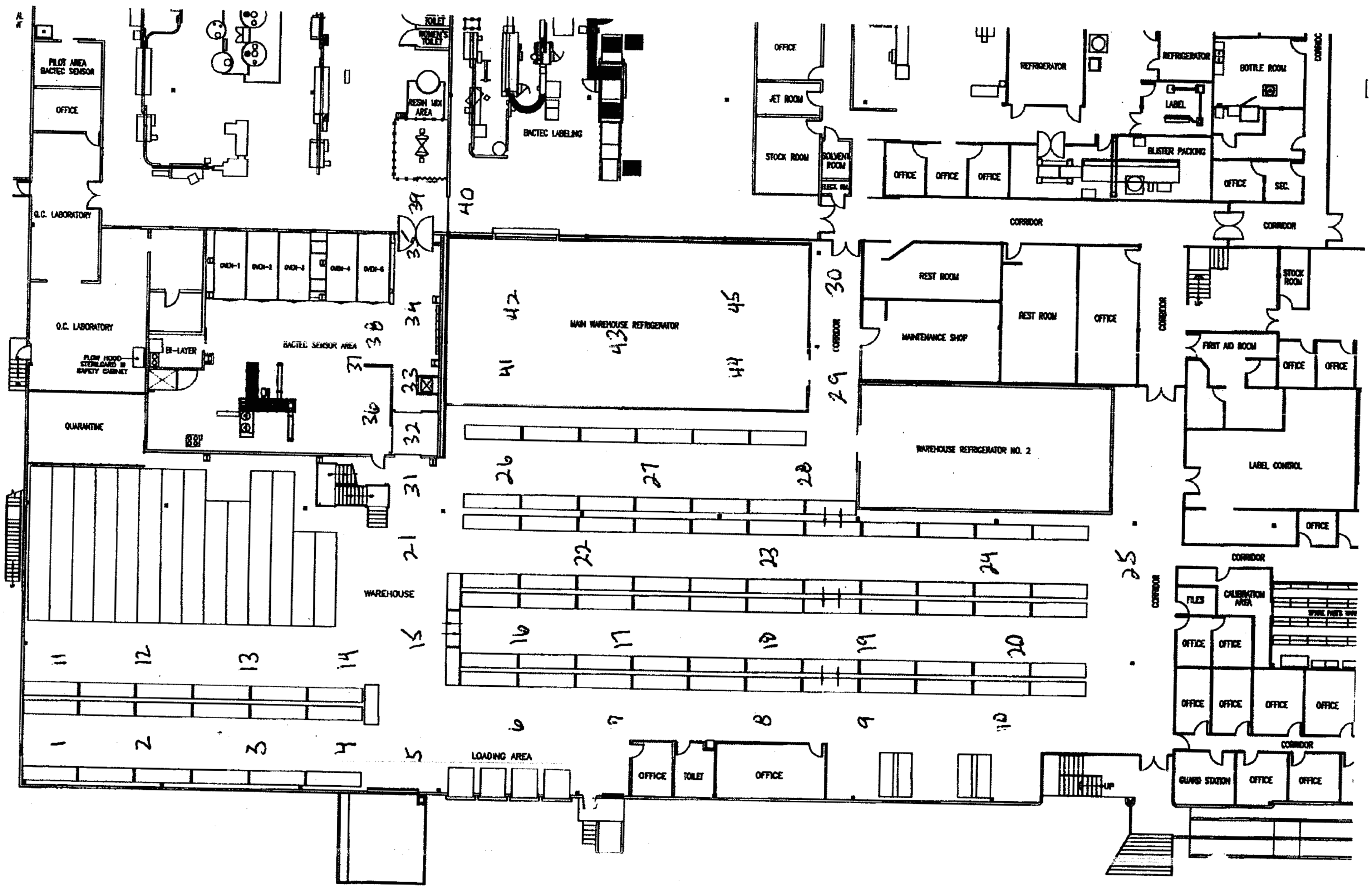
$$\text{Direct MDC} = \frac{3+3.29\cdot SQRT(B/T(1+T_{S+B}/T_B))}{K \cdot T_{S+B}}$$

Beta

$$\text{Scan MDC} = \frac{MDCR}{SQRT(p)\cdot E\cdot E_s\cdot K}$$

$$MDCR = s_i \cdot (60/i)$$

B = Background Counts
T_B = BKG Counting Time In Minutes
T_{S+B} = Sample-Bkg Counting Time In Minute:
E = Total Detector Efficiency in Counts/Disintegratio
A = Physical Probe Area in cm^2
K = Other Constants and Factors When Needed
p = Surveyor Efficiency
E_s = Surface Efficiency $s_i = 1.38\cdot SQRT(B_i)$
i = Counting Interva



PILOT AREA BACTEC SENSOR
OFFICE
Q.C. LABORATORY
Q.C. LABORATORY
FLOW HOOD STERILGARD III SAFETY CABINET
BI-LAYER
BACTEC SENSOR AREA
QUARANTINE
WAREHOUSE
LOADING AREA
TOILET
WOMEN'S TOILET
RESIN MIX AREA
BACTEC LABELING
MAIN WAREHOUSE REFRIGERATOR
OFFICE
JET ROOM
STOCK ROOM
SOLVENT ROOM
ELECT. RM.
OFFICE
OFFICE
OFFICE
REFRIGERATOR
REFRIGERATOR
LABEL
BLISTER PACKING
BOTTLE ROOM
OFFICE
SEC.
CORRIDOR
CORRIDOR
REST ROOM
REST ROOM
OFFICE
MAINTENANCE SHOP
CORRIDOR
CORRIDOR
STOCK ROOM
FIRST AID ROOM
OFFICE
OFFICE
WAREHOUSE REFRIGERATOR NO. 2
LABEL CONTROL
OFFICE
CORRIDOR
CORRIDOR
FILES
CALIBRATION AREA
OFFICE
OFFICE
OFFICE
OFFICE
OFFICE
OFFICE
CORRIDOR
GUARD STATION
OFFICE
OFFICE
OFFICE
TOILET
OFFICE
UP
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45

Site: BD Cayey

Building: Building 1

Lab/Room: Warehouse

Start Date: 04/01/08

Surveyor: Gregory D. Smith

Surveyor: David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Activity dpm/100 cm^2 (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm^2	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm^2 (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm^2
1	Floor	Painted Concrete	LSC		<200	1	310	227					2	1200	800	43
2	Floor	Painted Concrete	LSC		<200	1	390	529					2	1200	800	43
3	Floor	Painted Concrete	LSC		<200	1	320	265					2	1200	800	43
4	Floor	Painted Concrete	LSC		<200	1	372	461					2	1200	800	43
5	Floor	Painted Concrete	LSC		<200	1	344	355					2	1200	800	43
6	Floor	Painted Concrete	LSC		<200	1	322	272					2	1200	800	43
7	Floor	Painted Concrete	LSC		<200	1	342	348					2	1200	800	43
8	Floor	Painted Concrete	LSC		<200	1	344	355					2	1200	800	43
9	Floor	Painted Concrete	LSC		<200	1	332	310					2	1200	800	43
10	Floor	Painted Concrete	LSC		<200	1	330	302					2	1200	800	43
11	Floor	Painted Concrete	LSC		<200	1	352	385					2	1200	800	43
12	Floor	Painted Concrete	LSC		<200	1	346	363					2	1200	800	43
13	Floor	Painted Concrete	LSC		<200	1	344	355					2	1200	800	43
14	Floor	Painted Concrete	LSC		<200	1	282	121					2	1200	800	43
15	Floor	Painted Concrete	LSC		<200	1	378	484					2	1200	800	43
16	Floor	Painted Concrete	LSC		<200	1	362	423					2	1200	800	43
17	Floor	Painted Concrete	LSC		<200	1	316	249					2	1200	800	43
18	Floor	Painted Concrete	LSC		<200	1	290	151					2	1200	800	43
19	Floor	Painted Concrete	LSC		<200	1	308	219					2	1200	800	43
20	Floor	Painted Concrete	LSC		<200	1	278	106					2	1200	800	43
21	Floor	Painted Concrete	LSC		<200	1	310	227					2	1200	800	43
22	Floor	Painted Concrete	LSC		<200	1	298	181					2	1200	800	43
23	Floor	Painted Concrete	LSC		<200	1	342	348					2	1200	800	43
24	Floor	Painted Concrete	LSC		<200	1	322	272					2	1200	800	43
25	Floor	Painted Concrete	LSC		<200	1	298	181					2	1200	800	43
26	Floor	Painted Concrete	LSC		<200	1	318	257					2	1200	800	43
27	Floor	Painted Concrete	LSC		<200	1	330	302					2	1200	800	43
28	Floor	Painted Concrete	LSC		<200	1	338	333					2	1200	800	43
29	Floor	Painted Concrete	LSC		<200	1	406	590					2	1200	800	43
30	Floor	Painted Concrete	LSC		<200	1	386	514					2	1200	800	43

Site: BD Cayey
Start Date: 04/01/08
Surveyor: Gregory D. Smith

Building: Building 1

Lab/Room: Warehouse

Surveyor: David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Activity dpm/100 cm^2 (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm^2	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm^2 (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm^2
31	Floor	Painted Concrete	*LSC*		<200	*1*	272	83					*2*	1200	800	43
32	Floor	Painted Concrete	*LSC*		<200	*1*	352	385					*2*	1200	800	43
33	Floor	Painted Concrete	*LSC*		<200	*1*	340	340					*2*	1200	800	43
34	Floor	Painted Concrete	*LSC*		<200	*1*	334	317					*2*	1200	800	43
35	Floor	Painted Concrete	*LSC*		<200	*1*	242	-30					*2*	1200	800	43
36	Floor	Painted Concrete	*LSC*		<200	*1*	344	355					*2*	1200	800	43
37	Floor	Painted Concrete	*LSC*		<200	*1*	384	506					*2*	1200	800	43
38	Floor	Painted Concrete	*LSC*		<200	*1*	412	612					*2*	1200	800	43
39	Floor	Painted Concrete	*LSC*		<200	*1*	236	-53					*2*	1200	800	43
40	Floor	Painted Concrete	*LSC*		<200	*1*	222	-106					*2*	1200	800	43
41	Floor	Painted Concrete	*LSC*		<200	*1*	342	348					*2*	1200	800	43
42	Floor	Painted Concrete	*LSC*		<200	*1*	380	491					*2*	1200	800	43
43	Floor	Painted Concrete	*LSC*		<200	*1*	300	189					*2*	1200	800	43
44	Floor	Painted Concrete	*LSC*		<200	*1*	342	348					*2*	1200	800	43
45	Floor	Painted Concrete	*LSC*		<200	*1*	326	287					*2*	1200	800	43

Survey Meter Information

Site: BD Cayey   Building: Building 1   Lab/Room: Warehouse

	Meter 1		Meter 2		Meter 3	Meter 4	Meter 5	
Date:	4/1/2008		4/1/2008		Not In Service	Not In Service		Not In Service
Make:	Ludium		Ludium					
Model:	2221		2221					
SN:	99138		108858					
Probe Make:	Ludium		Ludium					
Probe Model:	43-38		43-37					
Probe SN:	120557		124945					
Probe Area (cm^2):	126		582					
Next Cal. Date:	3/28/2008	Not Cal	3/28/2008	Not Cal				
Background Surface Materia	Concrete		Concrete					
Background(c) - Time(Min)):	2500	10	7500	10				μRem/hr
Sample Count Time (min)				1				
CS Isotope - Activity(μCi):	C-14	0.149	C-14	0.149				
CS Source(cpm)	50268		49624					
L_c, L_d (Counts)	37	77	64	130			NA	NA
Direct MDC, Scan MDC (dpm/100cm²)	289	1807	84	5175			NA	NA
MDCR , MDC Count Rate	419		293				NA	NA
Instrumen 4π Eff, Isotope:	0.21		0.20					
E_s Surface Efficiency:	50.0%		50.0%	Concrete				
E, Total Efficiency:	21.0%	C-14	20.0%					

Please See MARSSIM Chapter 6 for a more detailed explanation of equations.

Lc= Critical Detection Leve
Ld= a priori Detection limi
MDC= Minimum Detectable Concentration
MDCR= Minimum Detectable Count Rate

Direct MDC= $\frac{3+3.29*SQRT(B/T(1+T_{S+B}/T_B)}{K * T_{S+B}}$

Beta

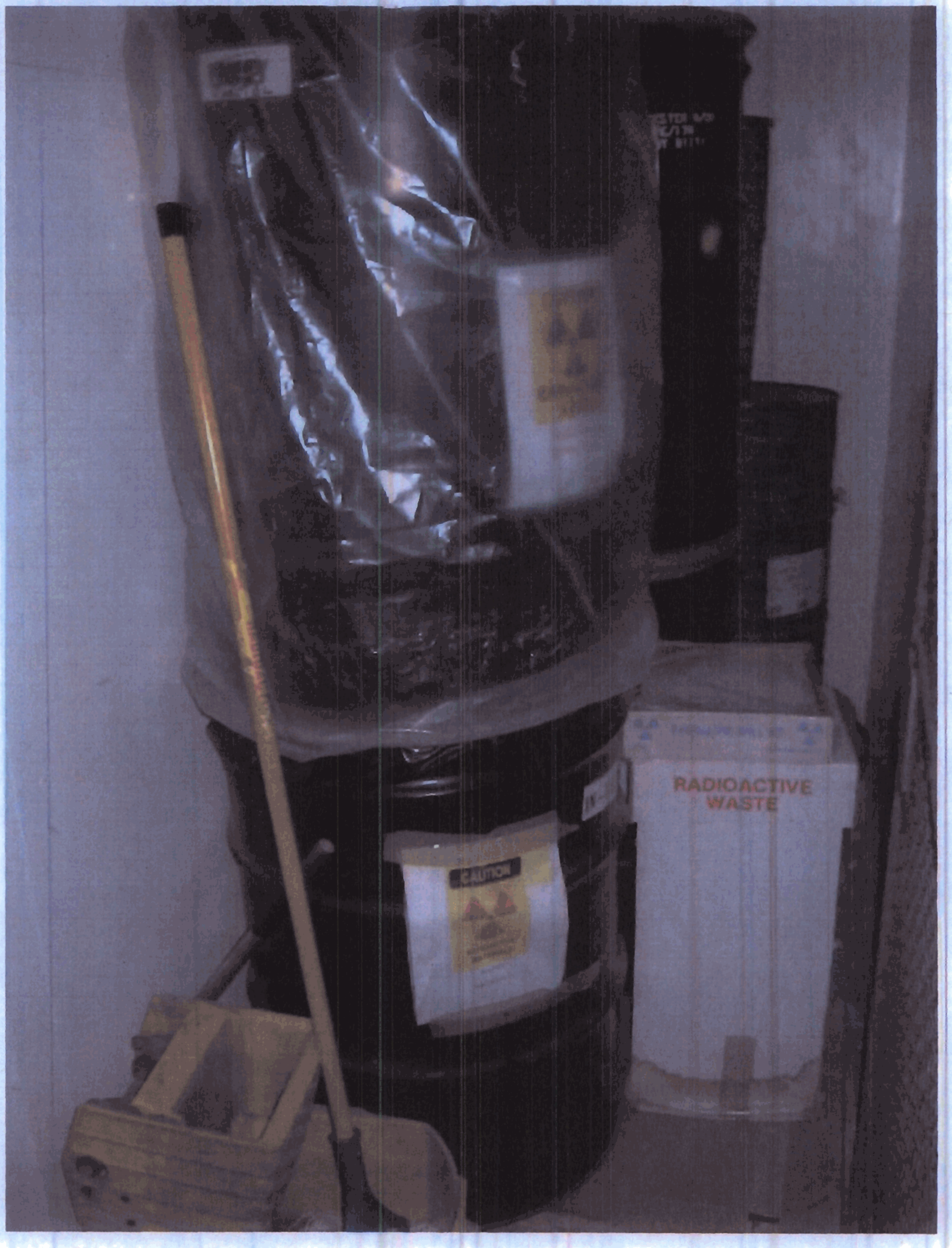
Scan MDC= $\frac{MDCR}{SQRT(p)*E*E_s*K}$

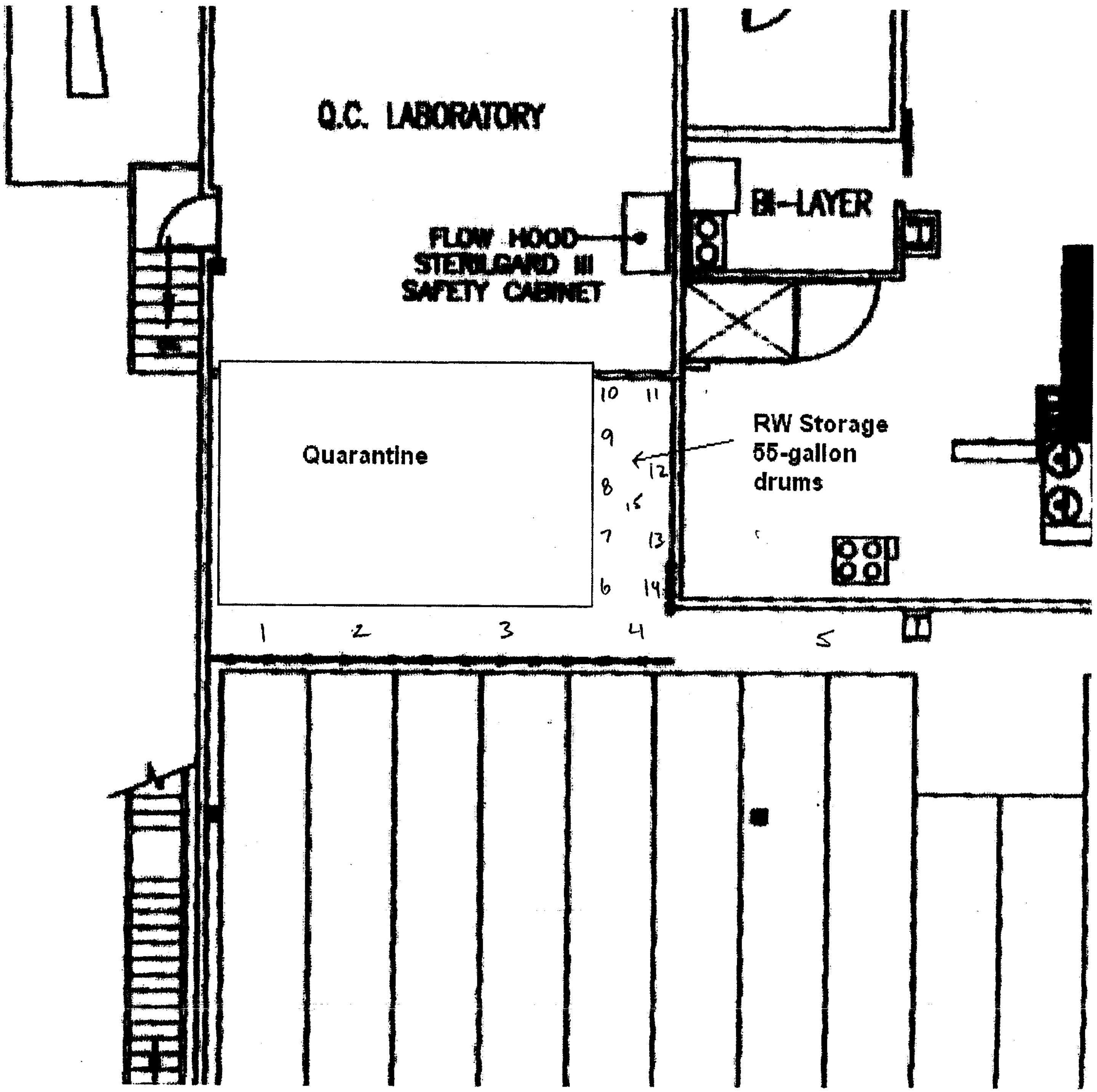
MDCR= s_i * (60/i)

B = Background Counts
T_B = BKG Counting Time In Minute:
T_{S+B} = Sample-Bkg Counting Time In Minute:
E = Total Detector Efficiency in Counts/Disintegratio
A = Physical Probe Area in cm^2
K = Other Constants and Factors When Needed
p = Surveyor Efficiency
E_s = Surface Efficiency s_i = 1.38*SQRT(B_i)
i = Counting Interva

A.12 Radioactive Waste Storage Area

Representative photograph of the area:





Q.C. LABORATORY
BI-LAYER
FLOW HOOD
STERILGARD III
SAFETY CABINET
Quarantine
RW Storage
55-gallon
drums
10
11
9
12
8
15
7
13
6
14
1
2
3
4
5

Site: BD Cayey

Building: Building 1

Lab/Room: Rad Waste Stg

Start Date: 04/02/08

Surveyor: Gregory D. Smith

Surveyor: David Wellner

Area Survey Results			Wipe Test Results			β Direct Measurements			α Scan Measurements				β Scan Measurements			
Sample Number	Description	Surface	Instru-ment		Activity dpm/100 cm^2 (beta)	Survey Meter #	Gross (cpm)	Activity dpm/100 cm^2	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity α dpm/100 cm^2 (alpha)	Survey Meter #	Gross High (cpm)	Gross Average (cpm)	Activity β dpm/100 cm^2
1	Floor	Painted Concrete				1	318	257					2	1200	800	43
2	Floor	Painted Concrete				1	332	310					2	1200	800	43
3	Floor	Painted Concrete				1	328	295					2	1200	800	43
4	Floor	Painted Concrete				1	320	265					2	1200	800	43
5	Floor	Painted Concrete				1	270	76					2	1200	800	43
6	Floor	Painted Concrete				1	362	423					2	1200	800	43
7	Floor	Painted Concrete				1	356	401					2	1200	800	43
8	Floor	Painted Concrete				1	328	295					2	1200	800	43
9	Floor	Painted Concrete				1	318	257					2	1200	800	43
10	Floor	Painted Concrete				1	280	113					2	1200	800	43
11	Floor	Painted Concrete				1	372	461					2	1200	800	43
12	Floor	Painted Concrete				1	324	280					2	1200	800	43
13	Floor	Painted Concrete				1	376	476					2	1200	800	43
14	Floor	Painted Concrete				1	332	310					2	1200	800	43
15	Floor	Painted Concrete				1	270	76					2	1200	800	43

Survey Meter Information

Site: BD Cayey   Building: Building 1   Lab/Room: Rad Waste Stg

	Meter 1		Meter 2		Meter 3	Meter 4	Meter 5	
Date:	4/2/2008		4/2/2008		Not In Service	Not In Service		Not In Service
Make:	Ludlum		Ludlum					
Model:	2221		2221					
SN:	99138		108858					
Probe Make:	Ludlum		Ludlum					
Probe Model:	43-38		43-37					
Probe SN:	120557		124945					
Probe Area (cm^2):	126		582					
Next Cal. Date:	3/28/2008	Not Cal	3/28/2008	Not Cal				
Background Surface Materia	Concrete		Concrete					
Background(c) - Time(Min)):	2500	10	7500	10				µRem/hr
Sample Count Time (min				1				
CS Isotope - Activity(µCi):	C-14	0.149	C-14	0.149				
CS Source(cpm)	54693		48115					
L_c, L_d (Counts)	37	77	64	130			NA	NA
Direct MDC, Scan MDC (dpm/100cm²)	289	1807	84	5175			NA	NA
MDCR , MDC Count Rate	419		293				NA	NA
Instrumen 4π Eff, Isotope:	0.21		0.20					
E_s Surface Effciency:	50.0%		50.0%	Concrete				
E, Total Effciency:	21.0%	C-14	20.0%					

Please See MARSSIM Chapter 6 for a more detailed explanation of equations.

Lc= Critical Detection Leve
Ld= a priori Detection limi
MDC= Minimum Detectable Concentration
MDCR= Minimum Detectable Count Rate

Direct MDC= $\frac{3+3.29*SQRT(B/T(1+T_{S+B}/T_B)}{K * T_{S+B}}$

Beta
Scan MDC= $\frac{MDCR}{SQRT(p)*E*E_s*K}$

MDCR= s_i * (60/i)

B = Background Counts
T_B = BKG Counting Time In Minutes
T_{S+B} = Sample-Bkg Counting Time In Minute
E = Total Detector Efficiency in Counts/Disintegratio
A = Physical Probe Area in cm²
K = Other Constants and Factors When Needed
p = Surveyor Efficiency
E_s = Surface Efficiency s_i = 1.38*SQRT(B_i)
i = Counting Interva

142422

CERTIFIED MAIL

7000 1530 0002 2352 0103

BD Diagnostics
Post Office Box 999
Sparks, Maryland 21152-0999

Hasler

016H26512956

$09.70⁰

05/19/2008

Mailed From 21152

US POSTAGE

LAT
USNRC Region 1
475 Allendale Road
King of Prussia, PA 19406

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

5/19/2008, and to inform you that the initial processing which includes an administrative review has been performed.

☑ Tea Mountain 52-21502-01
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** 142422
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 (RI)
(6-96)

Sincerely,
Licensing Assistance Team Leader