American Radiolabeled
Chemicals, Inc.

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22 September 2010

U.S. Nuclear Regulatory Commission, Region III

2443 Warrenville Road, Suite 210

Lisle, IL 60532-4351

ATTN: Kevin Null

LICENSE No: 24-21362-01

CONTROL No.318694

SUBJECT: Hard Copy of Data Previously sent by e-mail

Gentlemen:

American Radiolabeled Chemicals, Inc (ARC) submits the following information as requested in various telephone conversations on and after Sept 14th. The attached documents are hard copies of data previously sent by e-mail.

Attachment One	copies of all the page changes to the RPP and SOPs
Attachment Two	Daily Walk Thru Check List. This is not specifically a part of any procedure. It is documented and filed. The files are kept five years. It is useful in showing compliance with SOPs 03, 07, 09, and 28
Attachment Three	Attachment to RPP (POC); Meter Calibration Forms; Incoming Package survey form; Liquid waste spread sheet.SOP 18 floor plan and vent plan. The forms are not part of the procedure and are subject to change. Spread sheets and floor plans are considered part of the document.
Attachment Four	SOPs 12, 13, and 14. These procedures were written many years ago and never used. We can put them in service at any time; the filters, cartridges

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and standards are on site . The spread sheets will have to bne re-written, as they did not survive the change of computer operating systems/.

Attachment Five — Floor plans showing the various classifications of areas. ARC reserves the right to reduce or expand the classification based on survey results.

The schedule for completion of the requested changes is as follows:

1.	2009 Air Effluent Data	20 work days from today.
2.	Emergency Procedures	30 work days from today
3.	Audit Program for SOP 29	60 work days from today
4.	Over all inventory program to combine Product inventory, DAW, non-aqueous Liquid waste	90 work days from today

If you have any questions or require clarification on any of the information stated above, you may contact Regis A. Greenwood, CHP at 314-991-4545.

Sincerely

AMERICAN RADIOLABELLED CHEMICALS, INC

Surendra K. Gupta, PhD

President

American Radiolabeled Chemicals, Inc.

cc. NRC Correspondence File

RSC file

Attachment One

standards and procedures.

This review will be, whenever possible, accomplished by the use of a third party auditor. The minimum qualification for the auditor is Certification by the American Board of Health Physics and experience as RSO or RPM of a large license.

The lack of availability or difficulty in obtaining the services of an appropriate auditor does not remove the requirement for a review or audit.

If necessary, the review or audit may be carried out by the RSC or delegate using the format given in attachment A

3.3.3.6 Reviews radiation safety records periodically to assure compliance with the provisions of the Radiation Protection Program

3.3.3.7 Presents summary reports to the President specifying the primary sources of exposure to radiation or radioactive materials with possible recommendations for exposure reduction.

3.3.3.8 Makes safety evaluations of proposed new synthesis methods for presentation to the RSC, including modification of equipment and procedures.

New **uses** of RAM, rather than new methods of synthesis requires a license amendment, as does modification of the facility and/or new authorized users.

3.3.3.9 Gathers information and data needed by the President to determine corrective actions to be taken for reports or responses to the NRC.

3.3.3.10 Reviews and updates Decommissioning Funding Plan on a frequency set by applicable regulations and guides

3.3.4 Supervisory Duties

The RSO:

3.3.4.1 Conducts the Radiation Protection Program to maintain compliance with established standards and procedures.

3.3.4.2 Issues and enforces work restrictions when necessary.

3.3.4.3 Periodically reviews shipping documents to ensure compliance with DOT or IATA regulations.

4.2 A 1 ml aliquot of the urine sample is assayed by liquid scintillation counting using Counting Protocol 3 – Bioassay, see attached).

4.3 A 1 ml water blank is assayed with each group of samples

4.4 The Liquid Scintillation Counter automatically makes corrections for quench, overlap, efficiency and background to obtain results in net dpm/ml and percent permissible body burden for each radionuclide. The print outs are retained for record and review.

4.5 For each occupationally exposed individual, the results are entered in his or her spreadsheet which provides the average weekly mrem, the quarterly mrem and the running yearly mrem for each radionuclide. These spreadsheets, when printed, contain information equivalent to NRC Form 5.

4.6 The annual dose reports are given to each occupationally exposed individual in January of each year.

5.0 Action Levels

5.1 Acute exposures - Short-term, >100 mrem/week

The individual is restricted from further work with radionuclides which could result in an additional uptake. This weekly dose rate is the sum of the dose rates for each radionuclide identified.

5.1.1 The individual shall remain restricted until the dose rate falls below 100 mrem/week, based on two consecutive samples; or below 50 mrem/wk on any sample.

5.1.2. The RSO shall attempt to determine the cause of the uptake and to propose corrective actions to minimize the potential for recurrence. This determination shall be documented, including any corrective actions.

5.1.3 A copy of the documentation shall be given to the individual concerned, and the original placed in the individual's radiation protection file.

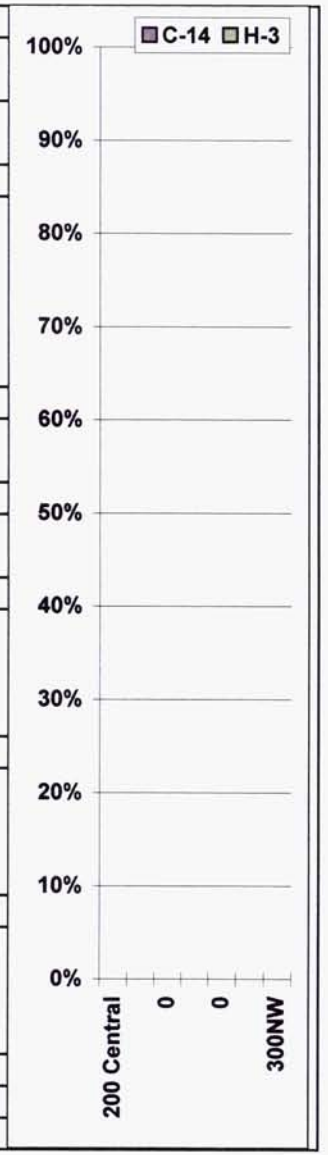
5.2 Chronic exposures - Long-term exceeding 50 mrem/week

The individual is restricted from any area within which air concentrations exist in excess of 50% of permissible.

5.2.1 The individual shall remain restricted until the dose rate falls below 50 mrem/week.

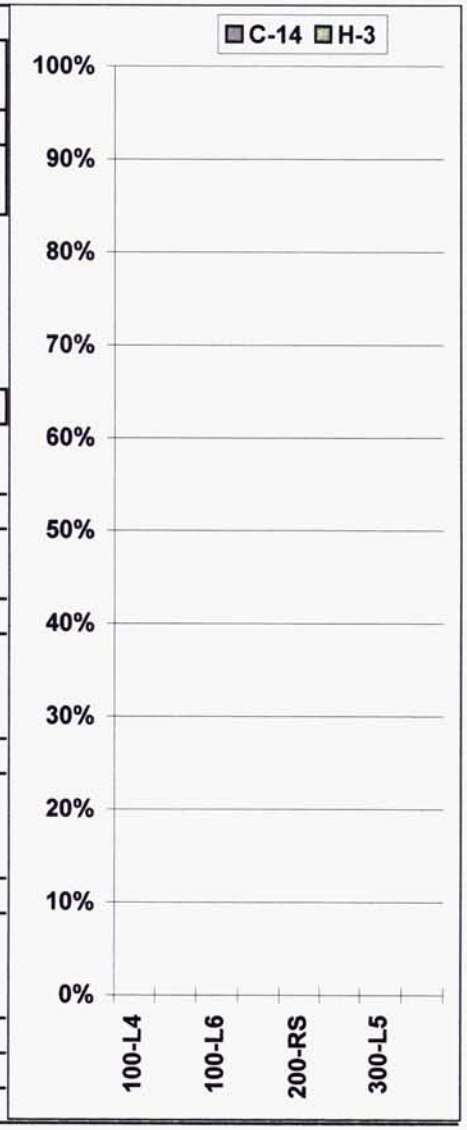
2005 STACK R/A AIR CONCENTRATIONS

Start/end date	1/0/1900	1/0/1900		1/0/1900	1/0/1900	
Start/end time	0:00	0:00		0:00	0:00	
Sample Location	200 Central	300 North			300 SW	300NW
Sample Number	S(200)	S1			S5	S6
Input Data						
Initial ml/min	0	0			0	
Final ml/min	0	0			0	0
1st Bottle NaOH ml	0	0			0	0
2nd Bottle NaOH ml	0	0			0	0
Sample ml	1	1			1	1
Stack flowrate CFM	12000	12000			0	0
C-14 Assay Data						
1st NaOH dpm/ml	0	0			0	0
2nd NaOH dpm/ml	0	0			0	0
H-3 Assay Data						
1st NaOH dpm/ml	0	0			0	0
2nd NaOH dpm/ml	0	0			0	0
Output Data						
Sample mins	0	0			0	0
Average ml/min	0	0			0	0
Air Sample ml	0.0E+00	0.0E+00			0.0E+00	0.0E+00
ml discharged	0.0E+00	0.0E+00			0.0E+00	0.0E+00
C-14 Output Data						
Collection Eff.	NA	NA			NA	NA
Conc. uCi/ml	0.0E+00	0.0E+00			0.0E+00	0.0E+00
% Permissible	0.0%	0.0%			0.0%	0.0%
mCi discharged	0	0			0	0
H-3 Output Data						
Collection Eff.	NA	NA			NA	NA
Conc. uCi/ml	0.0E+00	0.0E+00			0.0E+00	0.0E+00
% Permissible	0.0%	0.0%			0.0%	0.0%
mCi discharged	0	0			0	0
Total % Permissible	%0.0	%0.0			%0.0	%0.0



2005 LABORATORY R/A AIR CONCENTRATIONS

Sample Number	100-L4	100-L5	100-L6	100-L7	200-RS	300-L1	300-L5	300-L6
Sample Location	Enclosure	West Center	Darkroom	Central	Radstore	Center lab	Darkroom	H-3 lab
Input Data								
Start/end date			1/0/1900	1/0/1900		1/0/1900	1/0/1900	
Start/end time			0:00	0:00		0:00	0:00	
Initial ml/min	0	0	0	0	0	0	0	0
Final ml/min	0	0	0	0	0	0	0	0
1st Bottle NaOH ml	0	0	0	0	0	0	0	0
2nd Bottle NaOH ml	0	114	134	0	0	0	0	0
Sample ml	1	1	1	1	1	1	1	1
C-14 Assay Data								
1st NaOH dpm/ml	0	0	0	0	0	0	0	0
2nd NaOH dpm/ml	0	0	0	0	0	0	0	0
H-3 Assay Data								
1st NaOH dpm/ml	0	0	0	0	0	0	0	0
2nd NaOH dpm/ml	0	0	0	0	0	0	0	0
Output Data								
Sample mins	0	0	0	0	0	0	0	0
Average ml/min	0	0	0	0	0	0	0	0
Air Sample ml	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
C-14 Output Data								
Collection Eff.	NA	NA	NA	NA	NA	NA	NA	NA
Conc. uCi/ml	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
% Permissible	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
H-3 Output Data								
Collection Eff.	NA	NA	NA	NA	NA	NA	NA	NA
Conc. uCi/ml	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
% Permissible	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total % Permissible	%0.0	%0.0	%0.0	%0.0	%0.0	%0.0	%0.0	%0.0



2005 LABORATORY AND STACK DATA ENTRY

BUILDINGS 100 & 200

	Start	End					
Date							
Stations	L4	L5	L6	L7	LRS	S(200)	
Initial ml/m							
Final ml/m							
Ist bottle ml							
2nd bottle ml							
Sample ml	1	1	1	1	1	1	
	Enclosure	West Centra	Darkroom	Central	Radstore	200 stack	

Sample number			Net H-3	Net C-14		Total dpm	uCi/ml	Flag
2	Enclosure	L41				0	0.000	
3		L42				0	0.000	
4	West Central	L51			Tritium	0	0.000	
5		L52			7/27/2005	0	0.000	
6	Darkroom	L61			181000	0	0.000	
7		L62				0	0.000	
8	Central	L71			Carbon-14	0	0.000	
9		L72			3/10/1998	0	0.000	
10	Radstore	LRS1			121000	0	0.000	
11		LRS2				0	0.000	
12	200 stack	S1(200)				0	0.000	
13		S2(200)				0	0.000	
14		H-3 std						
15		C-14 std						
		Bkdg cpm						

BUILDING 300

	Start	End					
Date							
Time							
Stations	L1	L5	L6	S1			S5
Initial ml/m							
Final ml/m							
Ist bottle ml							
2nd bottle ml							
Sample ml	1	1	1	1	1	1	1
	Center lab	Darkroom	H-3 lab	North stack			

			Net H-3	Net C-14		Total dpm	uCi/ml	Flag
2	L11	Center Lab				0	0.000	
3	L12					0	0.000	
4	L51	Darkroom				0	0.000	
5	L52				Tritium	0	0.000	
6	L61	H-3 lab			7/27/2005	0	0.000	
7	L62				133998	0	0.000	
8	S11	North stack				0	0.000	
9	S12				Carbon-14	0	0.000	
10					3/10/1998	0	0.000	
11					122900	0	0.000	
12						0	0.000	
13						0	0.000	
16								
17								
18								
19								
		H-3 std						
		C-14 std						
		Bkdg cpm						

SUBJECT: ^{14}C and ^{3}H AIR MONITORING PROGRAM

OBJECTIVE: This program provides a means to assure that airborne concentrations of radioactive materials are maintained within regulatory limits

RESPONSIBILITY: Radiation Safety Officer

REFERENCES: Regulatory Guide 8.25

PROGRAM

1.0 Equipment

1.1 An air sampling "bubbler train" consists of a rotometer followed by 1 or 2 gas-washing bottles containing 1.0 molar sodium hydroxide, an entrainment eliminator, a second rotometer, and a limiting orifice all connected in series to a vacuum source.

1.2 Air sampling may be performed at any of the following points of interest in restricted and unrestricted areas. For example:

- In close proximity to radioactive fume hoods;
- In close proximity to waste compactors;
- At the point of discharge from a stack to the atmosphere;
- At other locations selected by the radiation safety officer.

2.0 Requirement

Air sampling is required in areas within which air concentrations normally exist in concentrations in excess of 10% of permissible limits.
Air sampling stations are checked daily and the results documented

3.0 Sampling frequency

3.1 Air sampling is performed at frequencies sufficient to provide reliable estimates of the air concentrations

3.2 Continuous air samples typically are run 24 hours per day except for sample changing and servicing of the system.

3.3 Intermittent samples may be collected at intervals ranging from a few hours to approximately one week depending upon the area being measured and the DAC limits.

SUBJECT: LIQUID WASTE DISPOSAL PROGRAM

OBJECTIVE: The liquid waste disposal program provides a means to measure the pH and radioactivity of wastewater before discharge to the sanitary sewer

RESPONSIBILITY: Radiation Safety Officer

REFERENCES: RPP Section 9
SOPs 8, 16, 20, 21, 33, 35, and 38

1.0 Radioactive liquid waste retention system

Radioactive liquid waste is collected in containers such as tanks, beakers, or flasks. In the following procedure, these collectively shall be referred to as waste containers.

Radioactive liquid waste may be generated from the following operations:

- Dishwashers
- Washing machines
- Scintillation vials
- Floor scrubbers
- Normal Chemical Operation

2.0 Requirement

Wastewater must be assayed and the pH must be determined before discharge to the sanitary sewer.

3.0 Sampling frequency

Radioactive liquid waste is sampled when the tank or container is full.

4.0 Procedure

NOTE: Maintenance personnel may sample washing machine water only. Maintenance personnel will perform only items 4.1 and 4.2 below.

4.1 Measure the wastewater volume in gallons or liters.

4.2 Stir the wastewater thoroughly , collect a 1 ml aliquot, and measure the pH.

4.9.3 The sum total monthly percent permissible for tritium plus ^{14}C.

4.10 Waste water will be discharged by or under supervision of the Radiation Protection Staff.

5. 0 Discharge Criteria

Note: The normal discharge pathways are as follows:

Gravity drain from the hold up tank in Bldg 300 – waste from the sink in 300; dishwasher; washing machine.

Janitor sink in 300 Lab – Floor washing and rinse water; Aqueous HPLC waste.

Pump to drain from hold up tanks in Bldg 100 - waste from front and rear sinks in 100.

Pump to drain from Decon sinks in Bldg 100/200 – waste water from steam cleaner, pressure washer etc. (this path is not yet in service 2/22/08)

ANY OTHER PATHWAY MUST BE APPROVED AND DIRECTLY SUPERVISED BY THE RSO (OR DESIGNEE) IN PERSON AND PHYSICALLY PRESENT.

5.1 If at any time during the month the sum total monthly percent permissible would exceed the 100% monthly limit, all or part of the radioactive liquid waste must be stored for future disposition.

5.2 If at any time during the month the sum total monthly percent permissible would not exceed the 100% monthly limit, all of the radioactive liquid waste may be discharged to the sanitary sewer.

5.3 If at the end of the year the running yearly percent permissible would exceed the 100% yearly limits, all or part of the radioactive liquid waste must be stored for future disposition.

5.4 If at the end of the year the running yearly percent permissible would not exceed the 100% yearly limits and the sum total monthly percent permissible would not exceed the 100% monthly limit, all of the radioactive liquid waste may be discharged to the sanitary sewer.

Tritium MPC		1.0E-2	uCi/ml	Carbon-14 MPC		3.0E-4	uCi/ml	1/1/2010	########	4.5
Date	pH	Origin	H-3	C-14	Sample	Volume	Volume	Projected %		Total
Discharged	S.U.	Bldg.	uCi/l	uCi/l	ml	gallons	liters	H3/yr	C14/yr	%/month
Max	5.5-11.5	nmbr.	######	1095.7	1.0	55.0	208.2	100.0%	100.0%	100 .0%

al/min * 1440 min/day * 3785 ml/gal * 31 day/month = 7.6E+8 ml/mo								FIRST DAY	LAST DAY		
Tritium Output			Actual	Carbon-14 Output			Actual	1/1/2010	12/31/2010		
mCi	mCi/mo	%/mo	Ci/year	mCi	mCi/mo	%/mo	Ci/year				
	7603.3	100.0%	5.000		228.1	100.0%	1.000	12/31/2009	12/31/2010	365	day of year

1.3.2 Contamination Areas

1.3.2.1 Areas inside the laboratories not listed as High contamination areas.

1.3.2.2 Any area, no matter where located, where the following limits are exceeded:

Total- 5000 dpm/100 cm^2 average, not to exceed 15,000 for a single point

Removable – 1000 dpm/ 100 cm^2

1.3.3 Non-contaminated Restricted areas

Areas such as, but not limited to, change areas, the shipping area, the building 300 garage or other areas designated by the RSO.

2 Action level

At this level, areas and equipment are decontaminated by maintenance personnel under supervision of the Radiation protection staff at the next practical (usually immediately, but in all cases within 24 hours time if contamination is above the following levels.)

2.1 Contaminated Restricted Areas

Tritium – 50,000 dpm/100 cm^2
Carbon-14 – 10,000 dpm/100 cm^2
Other β–γ - 10,000 dpm/100 cm^2

2.2 Non-contaminated Restricted Areas

Total- 5000 dpm/100 cm^2 average, not to exceed 15,000 for a single point

Removable – 1000 dpm/ 100 cm^2

2.3 Controlled Areas

Total- 5000 dpm/100 cm^2 average, not to exceed 15,000 for a single point

Removable – 1000 dpm/ 100 cm^2

2.4 Unrestricted Areas

The **goal** for these areas is 100 total dpm above background for wipe samples and 100 cpm above background for direct survey. The action level is:

Total- 5000 dpm/100 cm^2 average, not to exceed 15,000 for a single point

Removable – 1000 dpm/ 100 cm^2

2.5 Routine surveys should include areas most likely to be contaminated such as the floors and doorknobs on the "clean" side of the laboratory exits.

2.6 Any area exceeding the action level shall be restricted

2.6.1 Affected personnel shall be informed of the elevated levels;

2.6.2 Affected personnel shall be advised of interim actions and/or restrictions to be followed.

3.0 Investigation Level

At this level, areas and equipment are decontaminated immediately by maintenance personnel under supervision of the Radiation protection staff upon discovery if contamination is above the following levels.

3.1 If initial contamination levels exceed 10 times the action levels, attempt to determine the source and cause.

3.2 Document the results of the investigation and file the report in the Off-normal Occurrence File.

3.3 Decontaminate the area or equipment immediately.

4.0 Stop Work Level

This is the upper limit for contamination in ARC facilities. If any Investigation Level listed above is exceeded by a factor of 200, (NOTE: This is 2000 times the Action Level) all work in that lab building or exterior location will stop until

4.1 the extent and cause of the contamination has been determined

4.2 All individuals have been shown to be non –contaminated

4.3 The contamination levels have been reduced to below the investigative level,

4.4 and the RSO has given permission to resume work

5.0 Survey frequency

5.1 The routine frequency for removable contamination surveys of each type (direct frisk and wipe) is twice weekly. Materials or equipment removed from restricted areas are surveyed prior to removal.

5.2 Surveys are performed to determine the "worst case" conditions in both restricted and unrestricted areas.

5.3 Direct frisk surveys, those made with a survey meter, are taken in Controlled areas, non-contaminated restricted areas and unrestricted areas to determine total activity, these surveys are taken weekly.

5.4 Wipe surveys are taken in Controlled areas, non-contaminated restricted areas, and unrestricted areas to assure that activity has been contained within restricted areas.

5.5 Contamination is not to be expected in unrestricted areas and indicates that containment has been breached

5.6 High Contamination Areas

These areas are inside hoods and inside working tray on bench tops, not routinely surveyed.

5.7 Contamination Areas

5.7.1 End of Week prior to cleaning – Last workday of the week, usually Friday

5.7.2 Start of Week, after cleaning – Usually Monday morning.

5.8 Controlled and Non-contaminated Restricted Areas

5.8.1 Same frequency as above, with

5.8.2 Daily surveys performed as conditions and manpower permit.

5.9 Unrestricted Areas

5.9.1 Areas within Building 400 - Weekly

5.9.2 Other areas (Private vehicles, driveways, sidewalks, street shoes, street clothing and other similar areas/objects) -- Monthly, time and manpower permitting.

6.0 Procedure

6.1 Use dry wipes and number them consecutively.

6.2 Wipe approximately 100 cm^2 of the surface being surveyed. A 16 square inch area is approximately 100 cm^2 (i.e. 4 x 4, 2 x 8, etc.). If the surface being surveyed is less than 100 cm^2, wipe the entire surface.

6.3 Enter the number of the wipe on a diagram of the area being surveyed.

6.4 Assay the wipes in a liquid scintillation counter (LSC) that automatically converts the count rate to net dpm/100 cm^2.

6.5 Decontaminate and rewipe any surface areas above the action levels defined in 2.0 above.

6.6 Repeat the above step as necessary.

SUBJECT: TRANSPORTATION OF RAM USING PRIVATE VEHICLES

OBJECTIVE: This procedure provides a means for ARC to transport packages of radioactive materials using either a Company vehicle or a private owned vehicle (POV)

RESPONSIBILITY: Radiation Safety Officer

PROCEDURE: **A written test will be given o0n the SOP content**

Refresher training will be conducted annually

1.0 ARC driver duties

1.1 Placarding

Placarding of the vehicle is required only if transporting one or more packages labeled with a Yellow III label.

Note: Radioactive Yellow III will not be transported by ARC personnel

1.2 Blocking and bracing

Packages should be placed in the trunk or rear seat of the vehicle and prevented from shifting during transport. Note: Seatbelts may be used for blocking and bracing. Small packages may be placed inside a larger consolidation box (the box should not have a top so the package labels may be viewed). It isn't necessary to label the consolidation box.

1.3 Separation distances

Feet (minimum)	TI (maximum)	Label
1	0.1 to 1.0	Yellow II
2	1.1 to 5.0	Yellow III

1.4 Shipping papers

Verify that the number of packages and the package labels agree with the shipping papers. The shipping papers must be within reach of the driver's seat.

SUBJECT: AIR SAMPLING LINE CONTINUITY

OBJECTIVE: To assure air sampling line continuity from a particular stack or laboratory location to a particular air sampling station.

RESPONSIBILITY: Radiation Safety Officer

PROGRAM

1.0 Continuity check requirement

A continuity check is required whenever the radiation safety officer suspects that continuity has been compromised.

The daily checks for sampler bubbles and flow meter indication is sufficient evidence that the line is intact.

2.0 Effluent air sampling lines

- Use 1/4 inch stainless steel (SS) tubing and fittings wherever exposed to ultra-violet light from sunlight.
- Polyethylene (PE) tubing may be used out-of-doors in place of SS tubing if shielded from Ultra violet (UV) light within electrical conduit.
- Air sampling lines should enter at right angles to a stack or duct at least 5 stack diameters away from elbows or other sources of turbulence and make a ninety-degree turn at the center of the stack or duct to face into the air stream.
- PE lines are connected to SS lines after a roof penetration. Run the PE line to where the gas-washing bottles are located inside the building.
- PE lines should be continuous from beginning to end.
- Air sampling lines should be permanently and clearly identified on each end of the tubing
- If practical, use different colored PE tubing for each effluent air system.

3.0 Continuity check – stacks

3.1 Attach a flowmeter to the input end of a sampling line on the roof. This may require breaking a connection or removing a line from a stack or duct.

Segregation of Dry Active Waste - SOP 32

OBJECTIVE: To survey Dry Active Waste (DAW) and segregate, as necessary, "hot" objects from "cold".
Including "cold" items in with DAW is an added expense to the Company.
Including "hot" items in regular trash is a violation of the license and of Federal Regulations.

RESPONSIBILITY: All Laboratory Personnel. It is forbidden to place hot trash in a cold trash receptacle. It is forbidden to place cold trash in a hot trash receptacle.

REFERENCES: SOPs 16, 21, 33, 35, and 38

PROGRAM

1.0 Description

1.1 Dry Active Waste is made up of non-liquid "trash" from the production laboratories.

DAW will include disposable protective clothing, paper towels, lab bench paper, packing material, pipettes and other small glass ware.

UNDER NO CIRCUMSTANCES SHOULD ANY LIQUID OF ANY TYPE BE PERMITTED IN WASTE CLASSED AS "DRY ACTIVE WASTE" (DAW).

1.2 Surveys will be performed by an individual designated by the RSO, either a Lab Technician or by the Health Physics staff..

1.3 Survey activities will be periodically "spot checked" by the RSO

2.0 Survey of "Cold Trash"

2.1 Wear all normal protective clothing while sorting trash

2.2 Remove any disposable gloves, disposable shoe covers, and lab bench paper from the cold trash place these items in a "Hot" trash container.

SUBJECT: TRAINING AND DOSE ESTIMATES FOR LABORATORY PERSONNEL

OBJECTIVE: This procedure is designed to provide ARC laboratory personnel, including maintenance personnel who work in the laboratories, with radiation safety training specific to the work functions they will perform in contaminated areas, and to provide training commensurate with the hazard(s) present.

RESPONSIBILITY: Radiation Safety Officer

PROCEDURE:

1.0 Occupational Exposure

As any dose equivalent received will be as a direct consequence of the individual's work/occupation, the individuals are considered to be Occupationally Exposed.

2.0 Radiation Safety Training

2.1 Requirement

Training is required for individuals who perform a majority of their work inside the lab. This includes chemists, lab technicians, and any health physics staff.

2.2 Providing Training and Qualifications.

2.2.1 RSO Regis Greenwood

2.2.1.1 CHP FHPS, Masters Degree in Health Physics from University of Pittsburgh and forty-seven years of experience.

2.2.2 Health Physicist Kyle Gerard

2.2.2.1 Bachelor of Science from Purdue University with a major in Radiological Health Sciences.

2.2.3 Health Physics Technician April Jeffries

2.2.3.1 Associate Degree in Health Physics

Attachment Two

Record of Daily Radiation Protection Walk Through

Building 100					
Waste Holding Tank (FRONT)	1/4	1/2	3/4	Full	
Waste Holding Tank (REAR)	1/4	1/2	1/2	Full	
Dilution Flow	_____ gpm				
Hood flows all Inward	Yes		No	(Note Exceptions Below)	
Air Samples all Bubbling	Yes		No	(Note Exceptions Below)	
Air Samples, Meters on scale	Yes		No	(Note Exceptions Below	

Building 300					
Waste Holding Tank	1/4	1/2	3/4	Full	
Dilution Flow	_____ gpm				
Hood flows all Inward	Yes		No	(Note Exceptions Below)	
Air Samples all Bubbling	Yes		No	(Note Exceptions Below)	
Air Samples, Meters on scale	Yes		No	(Note Exceptions Below	
HPLC Waste containers	1/4	1/2	3/4	Full	

Building 200		
Air Samplers all Bubbling	Yes	No
Air Sample Meters on Scale	Yes	No

Builoding 400		
Air Samplers all Bubbling	Yes	No
Air Sample Meters on Scale	Yes	No

Comments

Performed By:_____ Date_____

Time_____

Attachment Three

RPP Attachment A

RADIATION PROTECTION PERFORMANCE OBJECTIVES AND CRITERIA (POC)

A. ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Facility organization and administration should ensure effective implementation and control of radiological protection activities.

CRITERIA

1. Organizational responsibilities for radiological protection are well defined and understood.

2. Staffing and resources are sufficient to accomplish assigned tasks.

3. Appropriate responsibilities are assigned to management level personnel for such matters as:

   -- Maintaining personnel radiation exposure ALARA

   -- Minimizing the contamination of areas, equipment, and personnel; and

   -- Reducing solid radioactive waste volumes.

4. Responsibilities and authorities of the radiation protection staff are clearly defined and sufficient to control work activities to protect employees.

5. Management, supervisors and technicians clearly understand their authority, responsibilities, and accountabilities.

6. Radiation protection requirements are actively administered by management and supervision and adhered to by personnel.

7. The Radiation Safety Officer has direct access to the Corporate President and has sufficient authority to perform his duties effectively.

8. Auditable reports of inspections, audits, and resulting corrective actions taken, are maintained.

9. Procedures approved by facility management are in place to implement the radiation protection program and reviewed periodically and updated as needed.

10. Radiation protection problems are evaluated and documented. Actions are taken to correct the causes

11. Radiation protection personnel are actively encouraged to develop improved methods of meeting radiation protection objectives and goals.

B. SELF ASSESSMENTS

PERFORMANCE OBJECTIVE: The self assessment program for both routine operations and unusual occurrences should provide adequate evaluation of performance.

CRITERIA

SELF ASSESSMENTS

1.. All radiation protection program elements are assessed (i.e., procedures, records, routine survey program, internal and external dosimetry, instrumentation, calibration, etc.).

2. Management is aware of findings and recommendations from self assessments and assures appropriate follow-up action.

ACCIDENTS/INCIDENTS

1. Procedures for investigation and documentation of accidents and incidents are in existence, and are followed.

2. A review is performed to determine and correct the cause of even minor incidents.

3. Upper management shows support of efforts to eliminate even "minor" incidents.

4. Accidents are investigated thoroughly and documented and publicized appropriately. Close-out procedures are in place.

5. Adequate pre-job planning is performed to reduce or minimize the potential for an accident.

C. RADIATION PROTECTION PROCEDURES AND POSTING

PERFORMANCE OBJECTIVE: Radiation protection procedures for the control and use of radioactive materials should provide for safe operations and for clearly identified areas of potential consequences.

CRITERIA

PROCEDURES

1. The facility has a written policy on radiation protection (including ALARA).

2. Radiation protection standards, procedures, and controls have recognizable or formal technical bases for limits, methods, and personnel protection standards.

3. Radiation protection procedures are adequately documented and updated periodically.

4. Procedures, standards and controls programs have a documented approval system. Those who generate and those who use the program both concur in the procedures.

5. The procedures, standards and controls program elements are maintained in a centralized historical file. There is a designated period of time that such files must be maintained.

POSTING

1. The technical criteria, and levels, for defining very high contamination, high contamination, contamination, airborne radioactivity areas and buffer zones are established, documented, and consistently applied.

2. Required regulatory agency forms are posted appropriately.

3. Entrance to areas where radioactive materials are used or stored is restricted based upon established criteria.

4. Only trained, authorized personnel handle radioactive materials.

7. Areas where radioactive materials are handled or stored are clearly and accurately posted.

SOURCE CONTROL

1. Inventories of stored radioactive materials specify locations, quantities, and characteristics, and are current and periodically audited.

2. Procedures are in place to adequately control, label, handle, ship, and receive radioactive material.

D EXTERNAL RADIATION EXPOSURE CONTROL PROGRAM

Not Applicable

E EXTERNAL RADIATION DOSIMETRY

Not Applicable

F. INTERNAL RADIATION EXPOSURE CONTROL PROGRAM

PERFORMANCE OBJECTIVE: Internal radiation exposure controls should minimize internal dose.

CRITERIA

1. Engineered controls are used to prevent the intake of radioactive material, when feasible:

2. Accurate and timely airborne radioactivity survey information is available

3. Accurate and timely contamination survey information is available

4. The number of areas where respiratory equipment is required is minimized.

5. Procedures and resources are available to perform dose calculations when significant internal exposures occur.

G. INTERNAL RADIATION DOSIMETRY

PERFORMANCE OBJECTIVE: The internal radiation dosimetry program should ensure that personnel doses are accurately determined and recorded.

CRITERIA

1. A quality control program, including the use of internal audit samples, is employed.

2. The frequency and timeliness of in vitro and/or in vivo bioassay and notification of field personnel of results is appropriate for the radionuclides present and the nature of the operations.

3. Procedures to identify workers for whom bioassay is required and the frequency is technically based.

4. The types of routine monitoring of workers (in vivo and/or in vitro) are appropriate for the radionuclides present.

5. The minimum detection level for in vitro and/or in vivo bioassay procedures are documented.

6. In vivo counting equipment is calibrated and maintained on an established frequency.

H. FIXED AND PORTABLE INSTRUMENTATION

PERFORMANCE CRITERIA: Personnel dosimetry and radiological protection instrumentation used to obtain measurements of radioactivity should be calibrated, used, and maintained so that results are accurately determined.

CRITERIA

1. Instrumentation (normal and emergency) and instrumentation calibration are consistent with ANSI N42.17, ANSI N323, ANSI N320, ANSI N317, ANSI N43.1, and ANSI N42.18, as appropriate.

2. Instrument calibrations are traceable to a recognized standard (NIST).

3. Instruments are properly tested and calibrated periodically, and adequate records of servicing and calibration are maintained by the facility.

4. The complement (number and types) of instruments are adequate to meet the needs of both the routine and non-routine radiation protection surveillance program and are appropriate for the activities and radiation sources present.

5. Instruments have current calibration stickers with appropriate correction factors, and an adequate system for instrument recall has been established.

6. The calibration facility (onsite or vendor) has well-characterized dose rate profiles of the full range and type of sources needed to calibrate instruments for the situations encountered in the facility or on the site, and is periodically quality-control checked.

7. The instrument repair facility has adequately trained personnel and facilities to service the instruments in use in a prompt and safe manner.

8. Adequate check sources are available and used for both emergency and routine instruments to ensure they operate properly prior to use.

I AIR MONITORING

PERFORMANCE OBJECTIVE: Air monitoring systems through selection, location, calibration, and maintenance should ensure reliable estimates of air activity for radiation protection purposes.

CRITERIA

1. Action levels used are based on appropriate technical criteria to evaluate air sampling and monitoring results and determine necessary control procedures.

2. The minimum detection limits for the specific radionuclides of interest are provided.

3. Routine air monitor calibrations include minimum detectable activity; energy dependence; efficiency; precision; response time; stability, alarm threshold accuracy and stability; air flow accuracy and stability; air in-leakage; and effects of temperature, humidity, and ambient pressure.

4. Air sampling and monitoring equipment is used and is appropriate for the nature of the operation and sources.

5. The nominal flow rates and sampling intervals used for grab sampling, continuous sampling, personal sampling and emergency sampling are based on appropriate technical criteria.

6. Adequate counting equipment is available. The equipment is properly calibrated and maintained. Counting procedures are available and followed by technicians. Adequate records are maintained to permit verification of sample results

J. RADIATION MONITORING/CONTAMINATION CONTROL

PERFORMANCE OBJECTIVE: The radiation monitoring and contamination control program should ensure worker protection from radiation exposures.

CRITERIA

RADIATION MONITORING

Not Applicable

CONTAMINATION CONTROL

1. Unrestricted radiological contamination release levels for personnel, equipment and materials, and facility surfaces are defined and comply with appropriate standards.

3. Contaminated areas are clearly identified and have the contamination levels and the protective measures required clearly posted .

4. Contaminated or potentially contaminated areas are adequately surveyed, documented, and posted at specific frequencies, based upon the contamination levels, traffic patterns, and occupancy levels.

5. Routine contamination surveys are conducted in areas that are not normally contaminated. Frequency of those surveys is commensurate with the potential for contamination and with the significance of finding contamination in a particular area.

7. Operations with a high potential for release of contamination are performed in accordance with job-specific procedures that minimize the potential for release.

8. Facilities for decontamination are available.

K ALARA PROGRAM

PERFORMANCE OBJECTIVE: A formally structured program should be in place with established milestones to ensure that individual doses are maintained as low as reasonably achievable (ALARA).

CRITERIA

1. A documented ALARA program is established and audited on a specified frequency.

2. The ALARA program and its results reflect management commitment to ALARA. The radiation workers are convinced of management's commitment to ALARA. The radiation workers themselves are committed to ALARA.

L. RECORDS

PERFORMANCE OBJECTIVE: Records related to occupational radiation exposure should be maintained in a manner that permits retrievability, allows trend analysis, and aids in the control of individual dose..

CRITERIA

1. Comprehensive records related to occupational radiation exposure are systematically generated and maintained consistent with ANSI N13.6.

2. Records related to occupational radiation exposure are adequate to demonstrate compliance with regulatory requirements.

3. Visitors are provided information with respect to their exposure in accordance with regulatory requirements.

4. Records are maintained in a centralized location, protected from loss, such that the level of effort required to retrieve all the records relevant to a given incident (including field monitoring records, air sampling data, bioassay analysis, in vivo measurement, dose assessments, etc.) would be minimal.

M. TRAINING

GENERAL EMPLOYEES

PERFORMANCE OBJECTIVE: General employee training programs should ensure that facility personnel, contractors and visitors have an understanding of their responsibilities and expected safe work practices, and have the knowledge and practical abilities necessary to effectively implement radiation protection practices associated with their work.

CRITERIA

1. Programs are established and implemented for initial and continuing training.

2. Continuing training maintains and improves job-related knowledge and skills and includes areas such as the following:

   -- Pertinent changes to procedures; and
   -- Emphasis on identified performance problems of workers and on infrequently used information.

3. Initial training develops job-related knowledge and skills in the areas listed. above. Radiological protection training emphasizes those actions individuals can take to reduce their exposures to radiation and radioactive materials during routine operations and emergencies.

4. In both initial and continuing training, emphasis is placed on presenting facility-specific problems that require individual awareness.

5. Verification that knowledge and practical abilities are maintained current is performed at least once every 2 years.

6. Training and examinations/demonstrations are completed prior to assigning personnel to tasks which require special knowledge and skills.

7. Personnel who do not complete continuing training and examination requirements satisfactorily within required time frames are not allowed to continue to work in restricted areas.

RADIOLOGICAL PROTECTION PERSONNEL

PERFORMANCE OBJECTIVE: The radiological protection personnel training and qualification program should develop and improve the knowledge and skills necessary to perform assigned job functions.

CRITERIA

1. Programs are established and implemented for initial and continuing training.

2. Initial training includes classroom and on the job training, develops job-related knowledge and skills, unless selection criteria ensure that individuals already possess these knowledge and skills through previous training or experience;

3. Continuing training maintains and improves job-related knowledge and skills.

N. SOLID WASTES

PERFORMANCE OBJECTIVE: Solid radioactive wastes should be controlled to minimize the volume generated, and handled in a manner that provides safe storage and transportation.

CRITERIA

1. Procedures for the handling, storage, and transportation of solid hazardous wastes exist and are followed.

2. Personnel are trained in solid hazardous waste handling procedures and safety precautions, and in ALARA program objectives.

3. Annual goals are established to reduce the amount of solid radioactive waste generated at the facility.

4. Procedures and training emphasize the importance of keeping the volume of solid hazardous waste to a minimum.

5. Solid hazardous waste is stored in a manner which minimizes exposure, precludes deterioration of containers, and prevents the spread of contamination.

6. Personnel involved in transfer, packaging, and transportation of radioactive and other hazardous wastes are trained in the applicable regulations and procedures and in emergencies that might be encountered.

P. ENVIRONMENTAL MONITORING

PERFORMANCE OBJECTIVE: The impact on the environs from the operation of the facility should be monitored and the results documented

CRITERIA

1. Management has taken all reasonable efforts to minimize quantities of radioactive materials released to the environment from operations.

2. All points of potential release of radioactive material to the environment are monitored sufficiently to provide assurance that the quantities and qualities of the releases are known.

3. Auditable records are kept which show the radioactive material release quantities

Q. PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIALS

PERFORMANCE OBJECTIVE: Performance of the packaging and transportation functions should ensure conformance with existing regulations and standards

CRITERIA

1. Management directives are current, and contain appropriate standards and references

2. Operating procedures are documented and reflect conformance with applicable standards

3. Personnel are properly trained..

4. Accident reporting procedures are complete and documented

R. EMERGENCY ACCESS AND EGRESS

PERFORMANCE OBJECTIVE: Authorized safety support personnel should not be denied access in an emergency. Egress during emergencies should be conducted according to approved preplanning.

CRITERIA

1. Access to the facility is pre-planned and prearranged for emergency personnel and equipment (such as fire department, rescue, and medical) during emergencies.

Meter Calibration Report

American Radiolabeled Chemical Corporation
101 ARC Drive, St. Louis, MO 63146
Radiation Safety Office

Location:	Calibration Date:	
Meter Manufacturer:	Model#:	SN#:
Probe Type:	Model#	SN#
Probe Type:	Model#	SN#
Batteries:	High Voltage:	
Internal Adjustment:	Input Sensitivity:	

AS FOUND COLUMN C: AS LEFT

Meter Reading	Meter Switch Position	Meter Reading Scale in cpm	Pulser Setting cpm x multiplier	C.F.	Pulser Output cpm	Comparison cpm*/cpm
	1		400	1	400	
	10		400	10	4000	
	100		400	100	40000	
	1000		400	1000	400000	
	1000		100	1000	100000	
	100		100	100	10000	
	10		100	10	1000	
	1		100	1	100	

All Ranges Calibrated Electronically wuth Ludlum Model 500 Pulser SN 76571, Calibrated 08/06/02

Comments

Calibrated By:_____ Reviewed By: _____

Date: _____ Date:_____

From ECAL 07/25/03

Meter Efficiency Report

American Radiolabeled Chemical Corporation
101 ARC Drive, St. Louis, MO 63146
Radiation Safety Office

Location: Calibration Date:

Manufacturer: Model: S.N.:

Probe Type: Model: S.N.:
Probe Thpe: Model: S.N.:

Isotope	Current DPM	Gross CPM	(net CPM)/DPM	%Efficiency	NIST or Estimated

Attached operational check source should read (if applicable):

Conversion Factor (if applicable): CPM for mR/hr

Meter are calibrated electronically for COUNT rates, NOT DOSE rate. In a case where the meter scale is solely in dose rates, and equivalent count rate is found. This does NOT mean the counts indicated will give the dose indicated, but that the counts indicated will make the meter READ the indicated dose. For example, if the conversion factor for your miter is 400 CPM per Mr/h and your meter is reading 1.5mR/h, the count rate is 600 CPM. You still must convert from CPM to DPM using the following formula:

$$DPM = \frac{\text{Gross CPM - BK CPM}}{\text{net CPM/DPM}}$$

Typical Background = 40 CPM

Comments:

Eff S35 approx. = eff C14

Check Source

Calibrated By:_____ Reviewed By: _____

Date: _____ Date:_____

Form ECAL 9/99

INCOMING PACKAGE SURVEY

Date of receipt

Time of receipt

(Circle one) Excepted Package White I Yellow II Yellow III

Highest Contact Reading _____ mrem/hour

Location _____

Highest reading at 1 meter _____ mrem/hour

Spreadable Contamination on outer surface _____ dpm/100sq. cm.

Curie Content _____

Describe contents

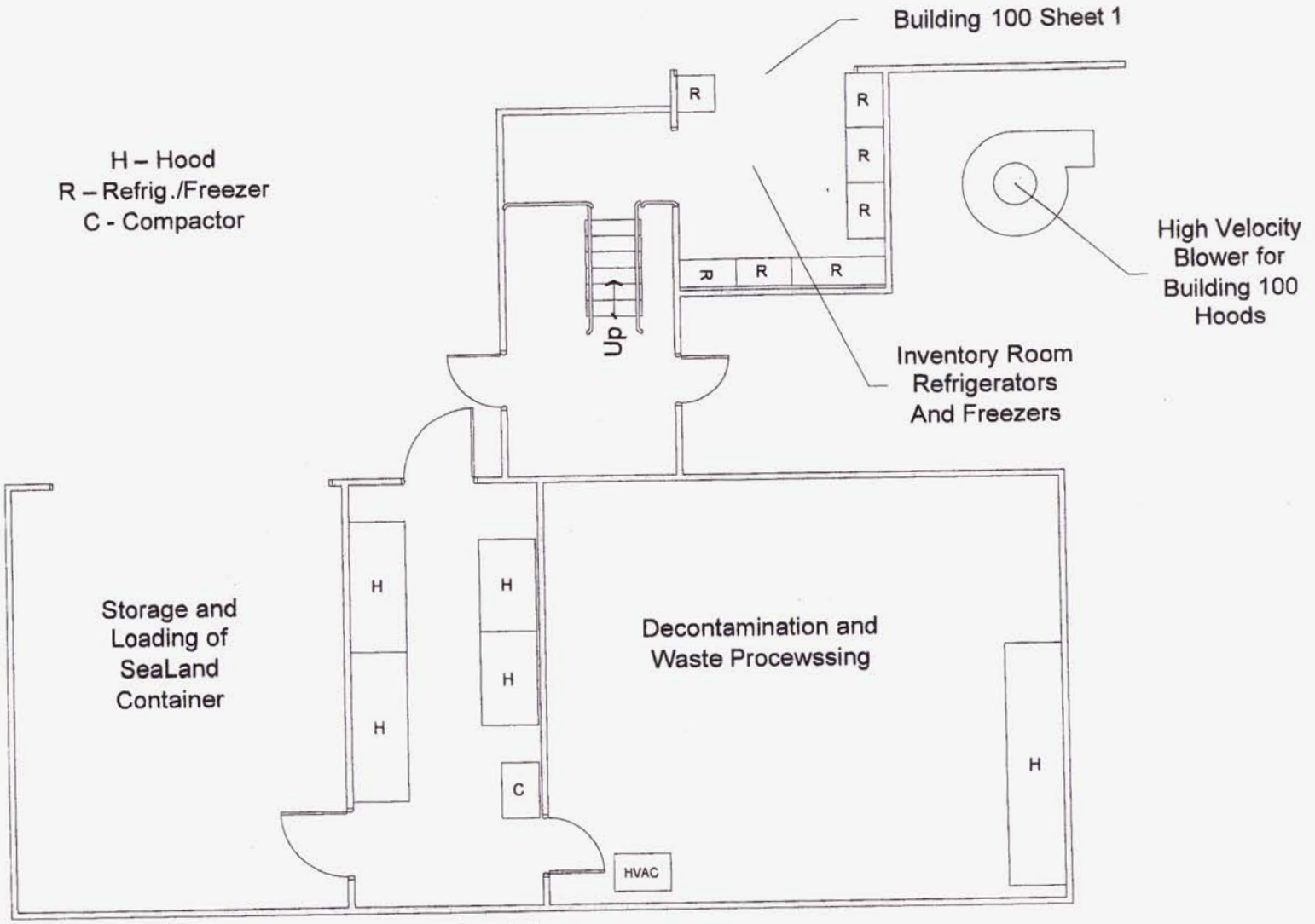
Survey Taken By: _____ Date and Time _____

Tritium MPC		1.0E-2	uCi/ml	Carbon-14 MPC		3.0E-4	uCi/ml	1/1/2010	########	4.5
Date	pH	Origin	H-3	C-14	Sample	Volume	Volume	Projected %		Total
Discharged	S.U.	Bldg.	uCi/l	uCi/l	ml	gallons	liters	H3/yr	C14/yr	%/month
Max	5.5-11.5	nmbr.	######	1095.7	1.0	55.0	208.2	100.0%	100.0%	100 .0%

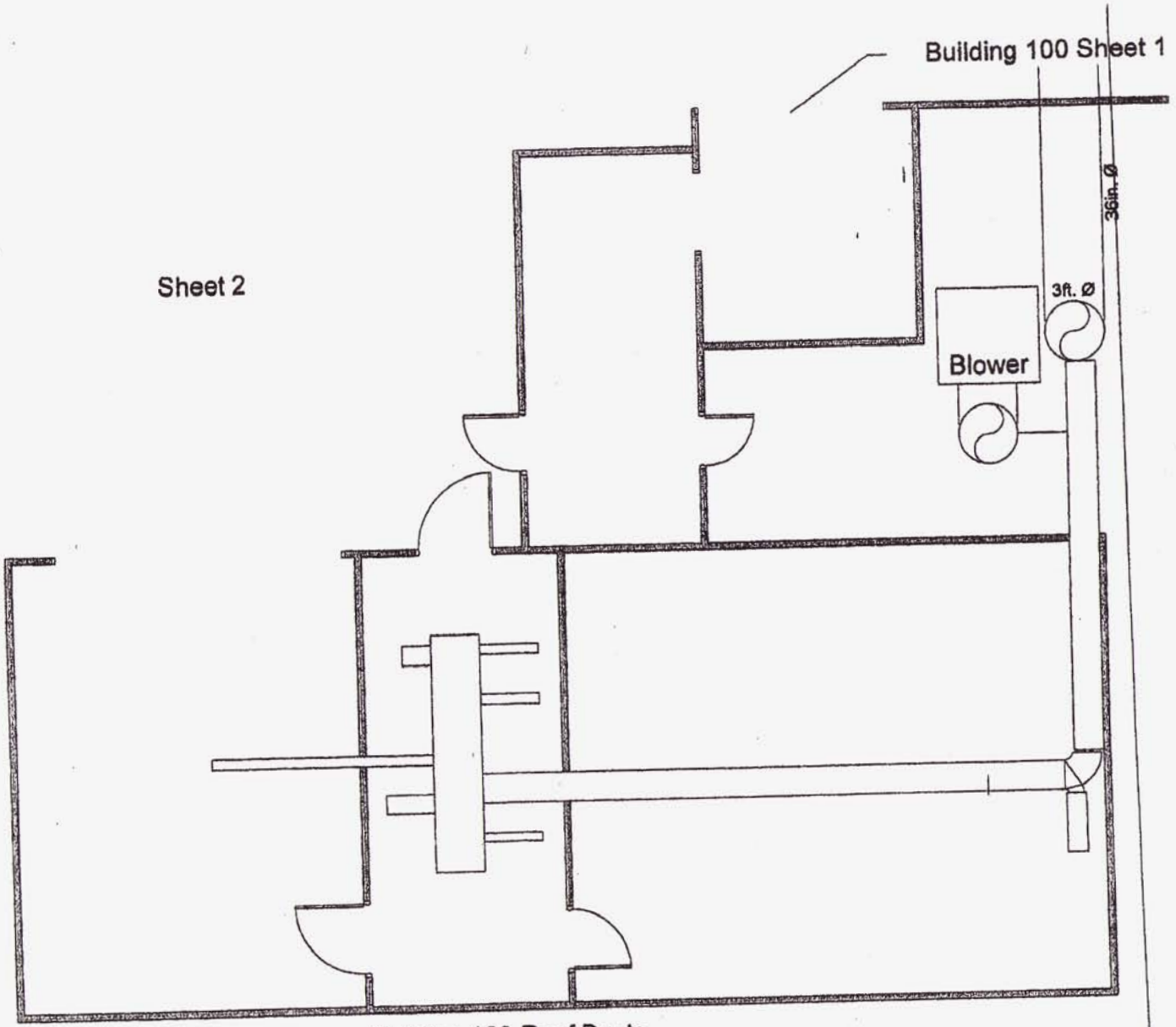
gal/min • 1440 min/day * 3785 ml/gal * 31 day/month = 7.6E+8 ml/mo

Tritium Output			Actual	Carbon-14 Output			Actual
mCi	mCi/mo	%/mo	Ci/year	mCi	mCi/mo	%/mo	Ci/year
	7603.3	100.0%	5.000		228.1	100.0%	1.000

FIRST DAY	LAST DAY		
1/1/2010	12/31/2010		
12/31/2009	12/31/2010	365	day of year



Do Not Scale
Approx. 1/8 in to 1 foot



Building 100 Roof Ducts
Schematic Only

Do Not Scale
Approx. 1/8 in to 1 foot

Attachment Four

Supersedes: 9/7/94 Pag
Approved by RSC: 4/22/99

SUBJECT: INVIVO BIOASSAY PROGRAM

OBJECTIVE: The invivo bioassay program provides a means to estimate the committed dose equivalent to the thyroid received by ARC employees

RESPONSIBILITY: Radiation Safety Officer

PROGRAM

1.0 Maximum permissible burdens

The maximum permissible average yearly thyroid burden of an individual may be based upon a chronic uptake model as follows:

Radionuclide	Critical Organ	Microcuries
Iodine-125	Thyroid	4

2.0 Sampling frequency

The frequency for recorded thyroid burden measurements is weekly. Additional measurements may be required at the direction of the Radiation Safety Officer.

3.0 Requirement

Thyroid burden measurements are required for those individuals who are likely to receive an annual TODE of 5 Rem. This includes all individuals who work in restricted areas and who have processed or handled ^{125}I in unfinished forms.

4.0 Procedure

4.1 ARC employees shall have a thyroid burden measurement performed on Monday or soon after the weekend.

4.2 Corrections for efficiency and background are made to obtain results in net uCi and % permissible thyroid burden for ^{125}I. The worksheets are retained for record and review.

4.3 The results from 4.2 are entered in a separate spreadsheet for each individual which provides the average weekly mRem, the quarterly mRem and the running

5.0 Action Levels

5.1 Acute exposures - Short-term (abrupt increase in thyroid burden)

1. >1000 mRem/week to the thyroid - the individual is restricted from work with ^{125}I which could result in an additional thyroid uptake.

2. The individual shall remain restricted until the doserate falls below 500 mRem/week.

3. The RSO shall attempt to determine the cause of the uptake and to propose corrective actions to minimize a recurrence.

5.2 Chronic exposures - Long-term (steady exposure or gradual increase)

1. >500 mRem/week to the thyroid - the individual is restricted from any area within which air concentrations exist in excess 50% of permissible for ^{125}I.

2. The individual shall remain restricted until the doserate falls below 500 mRem/week.

3. The RSO shall attempt to determine the cause of the uptake and to propose corrective actions to minimize a recurrence.

5.3 Quarterly exposures - Long or short-term (quarterly average mRem)

1. >3000 mRem/quarter - the RSC reviews reports summarizing the thyroid exposures of each individual and identifies the primary sources of exposure in order to take possible corrective action to reduce exposures.

6.0 Calibration

Calibration is performed through the use of available ^{125}I and/or ^{129}I reference standards loaded in a thyroid phantom in a reproducible geometry.

yearly mRem for each radionuclide. The quarterly TODE is posted to form NRC-5 which is retained in the individual's radiation history file.

7.0 Quality assurance.

Quality assurance is performed by counting available ^{125}I and/or ^{129}I reference standards. Results must be +-10% of the standard value.

AMERICAN RADIOLABELED CHEMICALS, INC.
STANDARD OPERATING PROCEDURE - SOP-13

Supersedes: 7/30/93
Approved by RSC: 9/7/94

SUBJECT: ^{125}I AIR MONITORING PROGRAM

OBJECTIVE: This program provides a means to assure that airborne concentrations of radioactive materials are maintained within regulatory limits

RESPONSIBILITY: Radiation Safety Officer

REFERENCES: Regulatory Guide 8.25
NUREG 1400

PROGRAM

1.0 Air sampling system

An air sampling station consists of a charcoal cartridge followed by a rotometer and a limiting orifice all connected in series to a vacuum source.

Air sampling may be performed at any of the following points of interest in restricted and unrestricted areas.

- λ In close proximity to radioactive fume hoods
- λ In close proximity to waste compactors
- λ At the north, south, east and west roof edges.
- λ At the corners of the property.

- λ At other locations selected by the radiation safety officer in restricted areas.
- λ A portable station mounted on a cart provides for additional information.

2.0 Requirement

Air sampling is required in restricted and unrestricted areas within which air concentrations normally exist in concentrations in excess of 10% of permissible limits.

3.0 Sampling frequency

Air sampling is performed at frequencies sufficient to provide reliable estimates of the air concentrations. This may vary from weekly to monthly in restricted or unrestricted areas.

Continuous air samples are run from 8 to 24 hours per day except for sample changing and servicing of the system.
Intermittent samples are collected at intervals ranging from a few hours to approximately one week depending upon the area being measured and the DACs or MPCs.

4.0 Procedure

4.1 Remove the used charcoal cartridges and assay in the gamma counter.

4.2 Install new charcoal cartridges and begin the sampling period.

4.3 The results from 4.1 are entered in a spreadsheet worksheet and converted to concentrations and % permissible for each radionuclide. The worksheets are retained for record and review.

4.4 Input/output data for spreadsheet worksheets

Input data
Date Started
Time Started
Date Finished
Time Finished
Initial ml/min
Final ml/min
I-125 Assay Data
Microcuries
Output data
Sample mins
Average ml/min
Air Sample ml
I-125 Output Data

Conc. uCi/ml
% Permissible

5.0 Calibration

The gamma counter is calibrated against a ^{137}Cs and ^{125}I reference standards.

6.0 Quality assurance.

Quality assurance is performed by counting ^{125}I standards corrected for decay. Results must be +-10% of the standard values.

AMERICAN RADIOLABELED CHEMICALS, INC.
STANDARD OPERATING PROCEDURE - SOP-14

Supersedes: 7/30/93
Approved by RSC: 9/7/94

SUBJECT: ^{32}P AIR MONITORING PROGRAM

OBJECTIVE: This program provides a means to assure that airborne concentrations of radioactive materials are maintained within regulatory limits

RESPONSIBILITY: Radiation Safety Officer

REFERENCES: Regulatory Guide 8.25
NUREG 1400

PROGRAM

1.0 Air sampling system

An air sampling station consists of a particulate filter followed by a rotometer and a limiting orifice all connected in series to a vacuum source.

Air sampling may be performed at any of the following points of interest in restricted and unrestricted areas.

- λ In close proximity to radioactive fume hoods
- λ In close proximity to waste compactors
- λ At the north, south, east and west roof edges.
- λ At the corners of the property.
- λ At other locations selected by the radiation safety officer in restricted areas.

- A portable station mounted on a cart provides for additional information.

2.0 Requirement

Air sampling is required in restricted and unrestricted areas within which air concentrations normally exist in concentrations in excess of 10% of permissible limits.

3.0 Sampling frequency

Air sampling is performed at frequencies sufficient to provide reliable estimates of the air concentrations. This may vary from weekly to monthly in restricted or unrestricted areas.

Continuous air samples are run from 8 to 24 hours per day except for sample changing and servicing of the system.

Intermittent samples are collected at intervals ranging from a few hours to approximately one week depending upon the area being measured and the DACs or MPCs.

4.0 Procedure

4.1 Remove the used particulate filters and assay in the beta counter.

4.2 Install new particulate filters and begin the sampling period.

4.3 The results from 4.1 are entered in a spreadsheet worksheet and converted to concentrations and % permissible. The worksheets are retained for record and review.

4.4 Input/output data for spreadsheet worksheets

Input data
Date Started
Time Started
Date Finished
Time Finished
Initial ml/min
Final ml/min
P-32 Assay Data
Microcuries
Output data
Sample mins
Average ml/min
Air Sample ml
P-32 Output Data
Conc. uCi/ml
% Permissible

5.0 Calibration

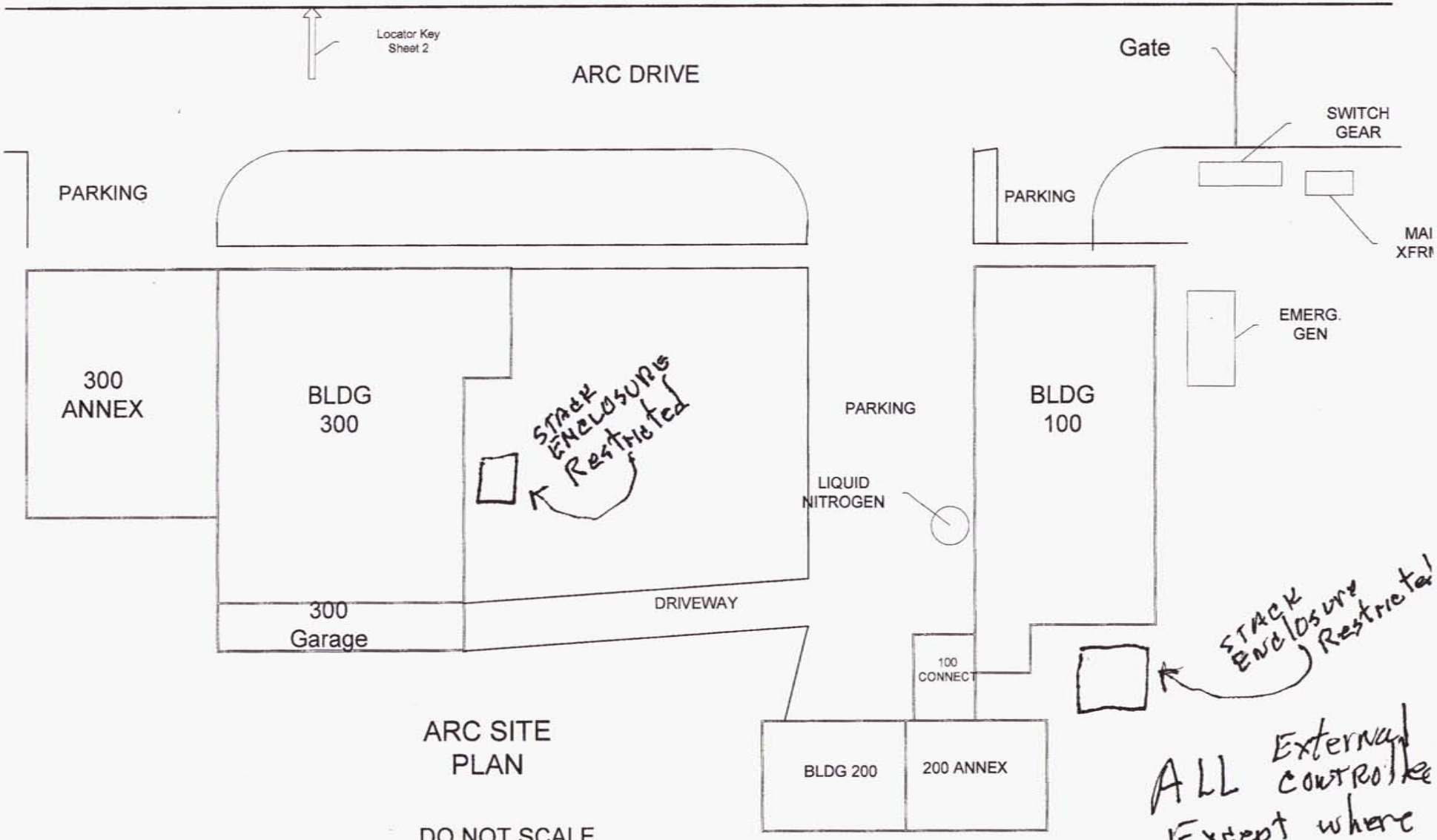
The beta counter is calibrated against a ^{99}Tc and ^{32}P beta reference standards.

6.0 Quality assurance.

Quality assurance is performed by counting a ^{99}Tc beta reference standard. Results must be +-10% of the standard values.

Attachment Five

sheet 1 -- see sheet 2 for Bldg 400



ARC SITE PLAN

DO NOT SCALE

Approx. 1 in = 30 ft.

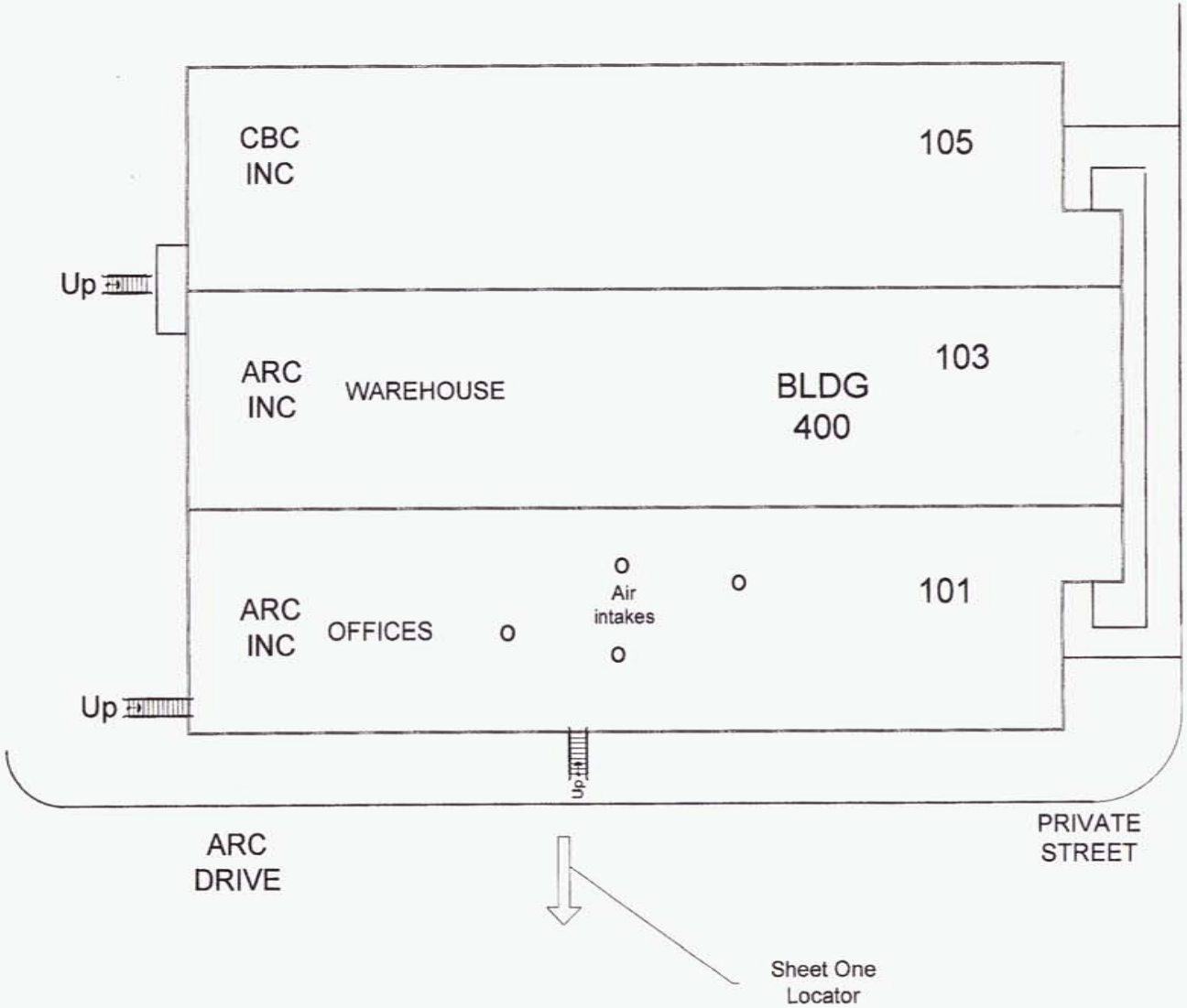
ALL External controlled Except where MARKED

SITE
PLAN

SHEET
TWO

DO NOT SCALE

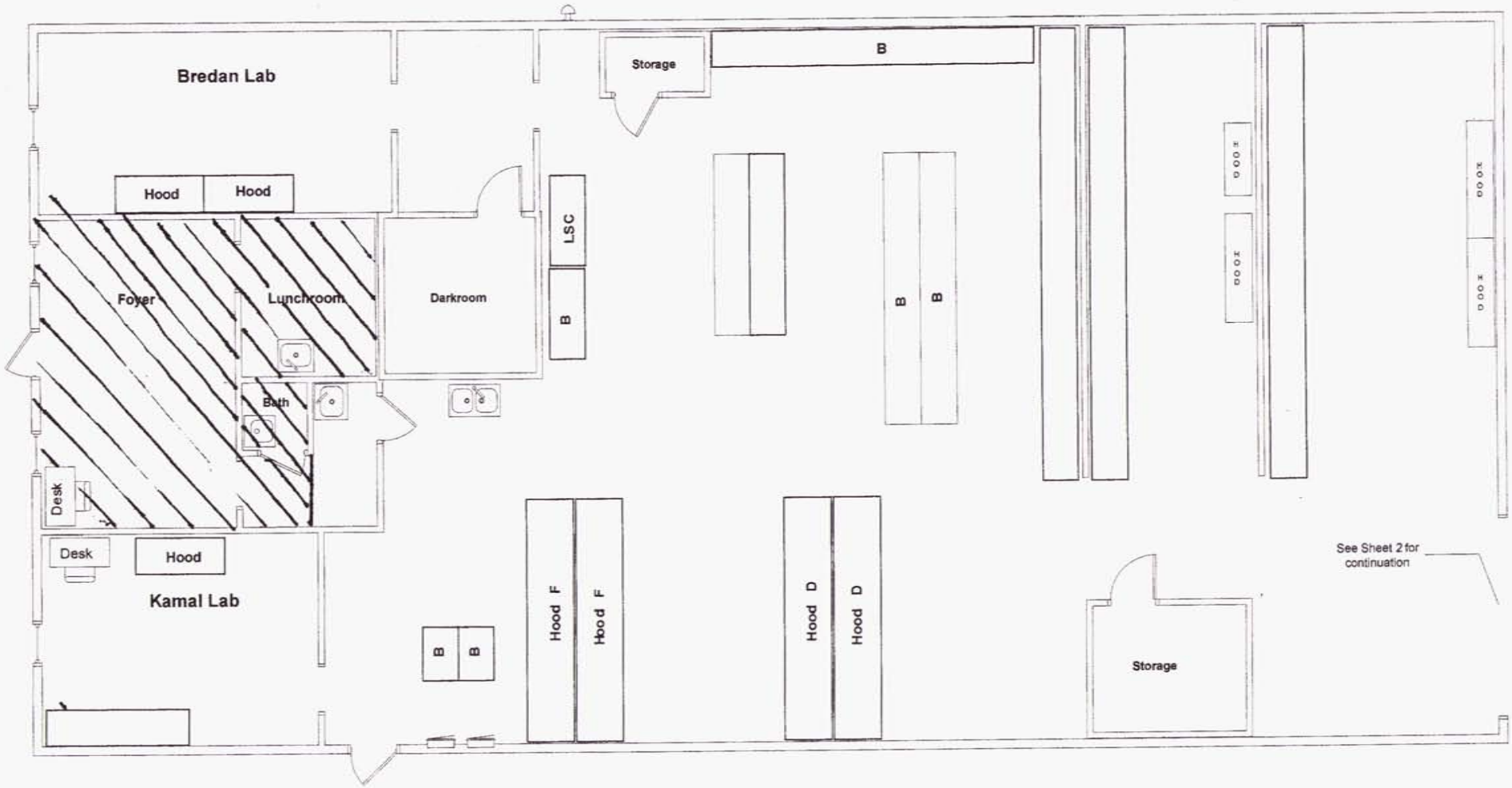
1 in. = approx 30 ft.



ALL UNRESTRICTED
This side of
street

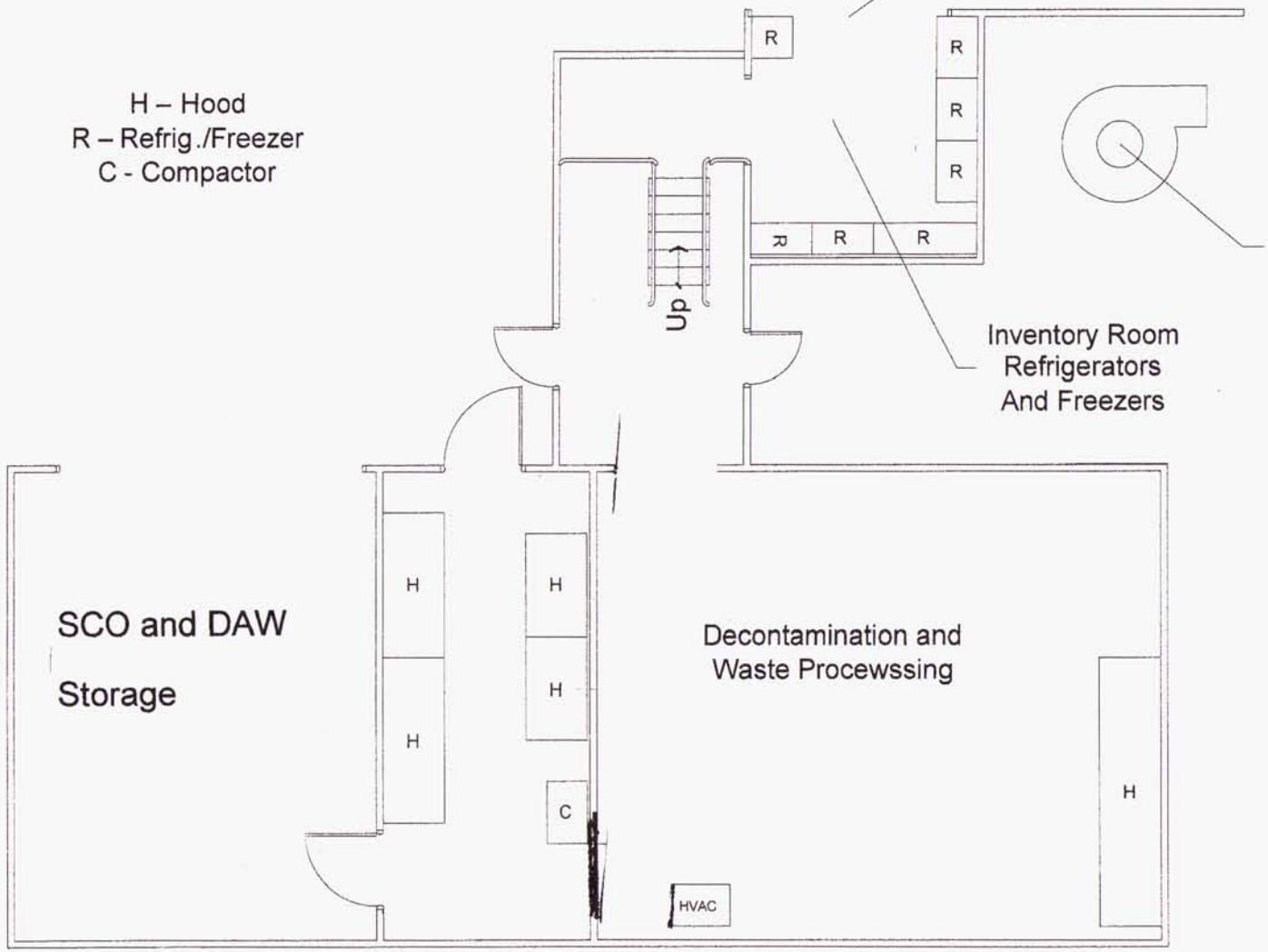
Bldg 100 ALL Restricted Contaminated Except Where Marked

= Controlled Area



Building 100 Sheet 1

H – Hood
R – Refrig./Freezer
C - Compactor

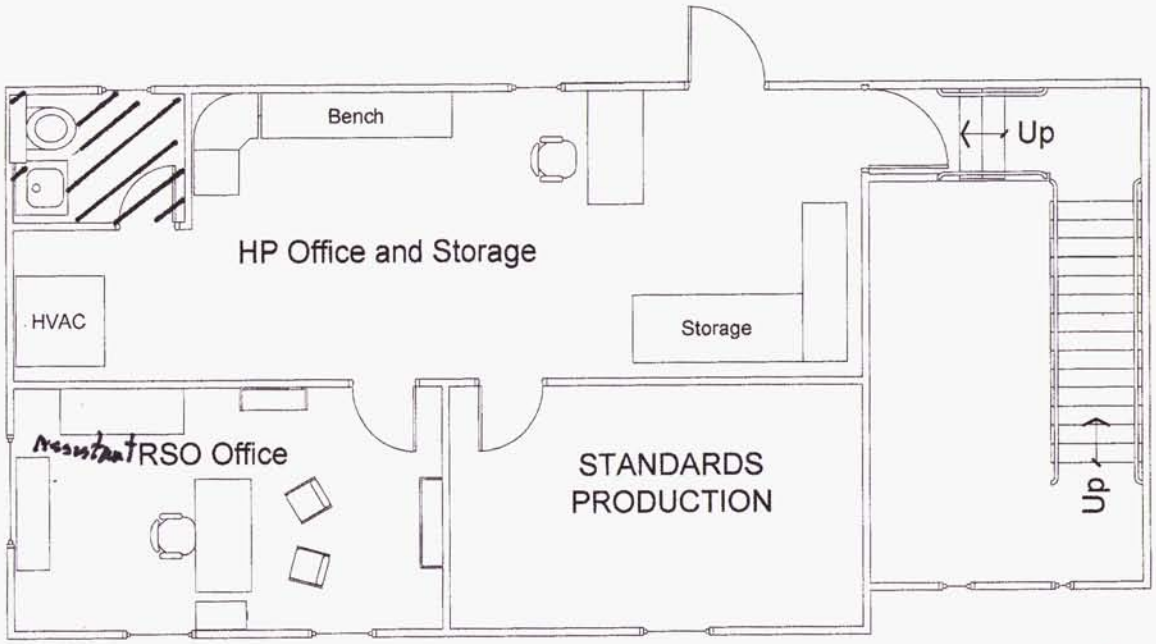


100 Laboratories -
Sheet 2

Do Not Scale
Approx. 1/8 in to 1 foot

ALL Restricted Contaminated

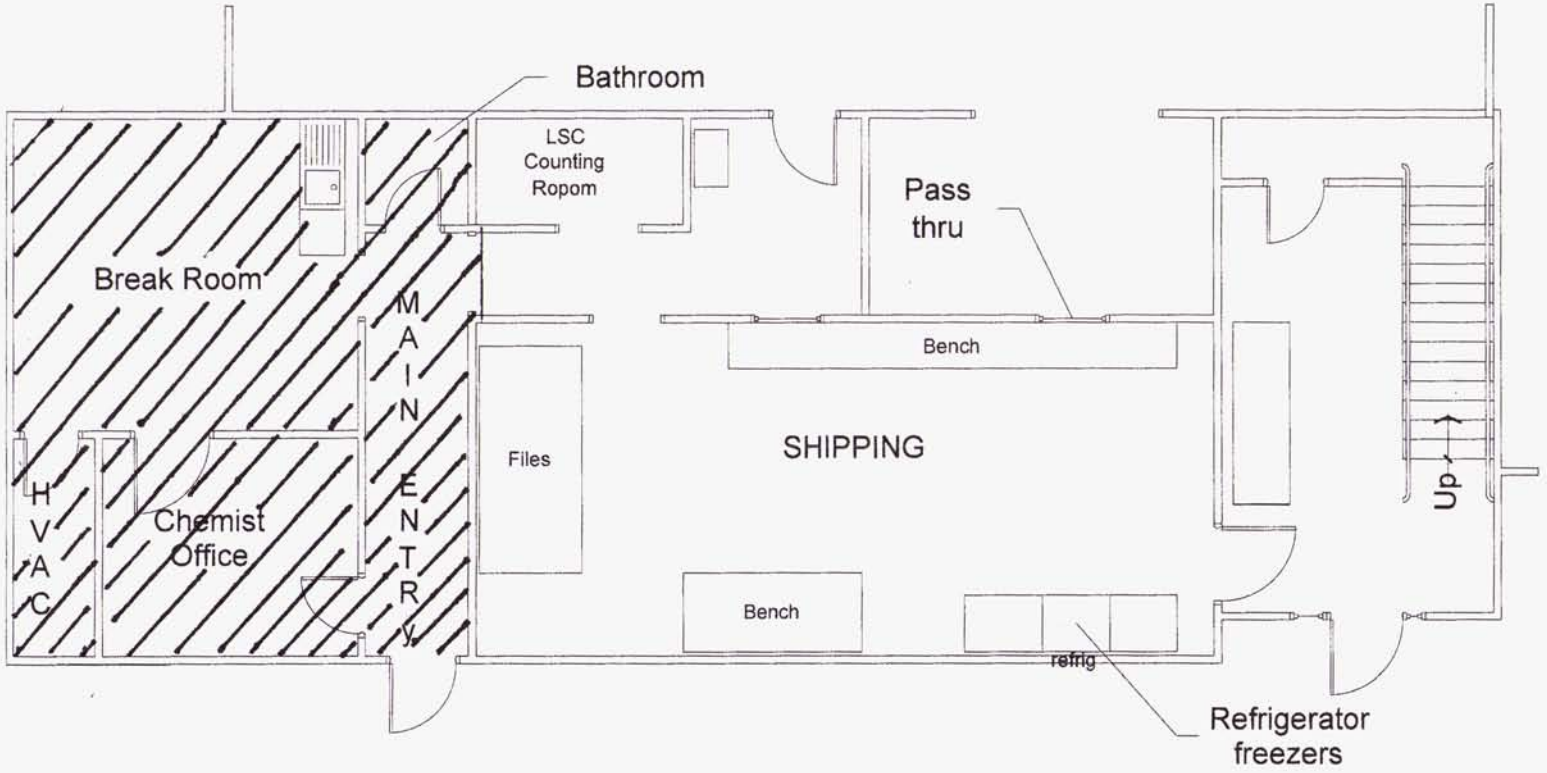
CONTROLLED AREA



Building 300 Upper Level

Do Not Scale
Approx. 1/8 in to 1 foot

ALL Restricted Non-Contaminate Except where MARKED

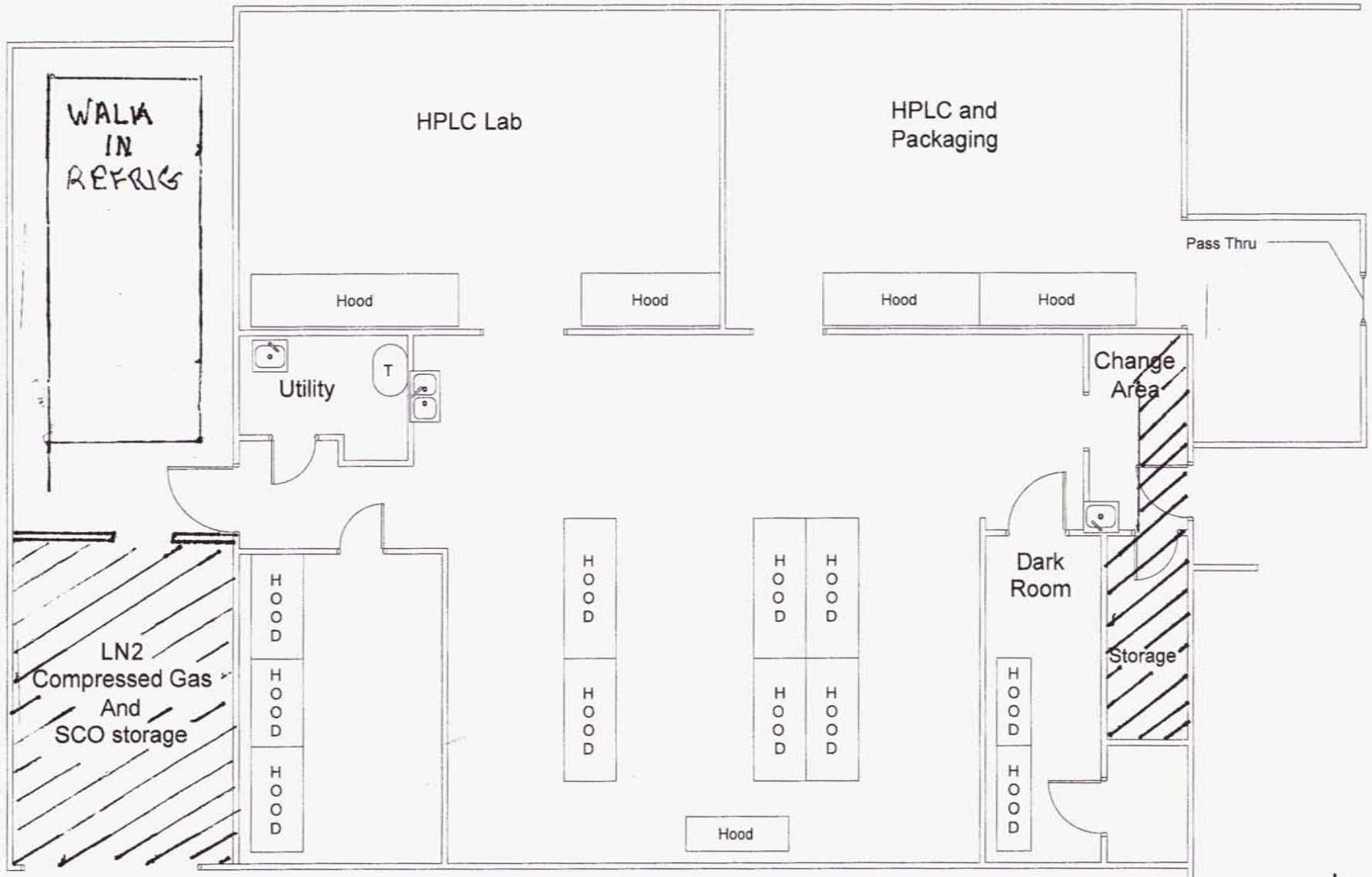


= CONTROLED AREA

Building 300 Controlled areas and Shipping Area

Do Not Scale Approx.
1/8 in to 1 foot

ALL Restricted Non-Contaminate Except where Marked

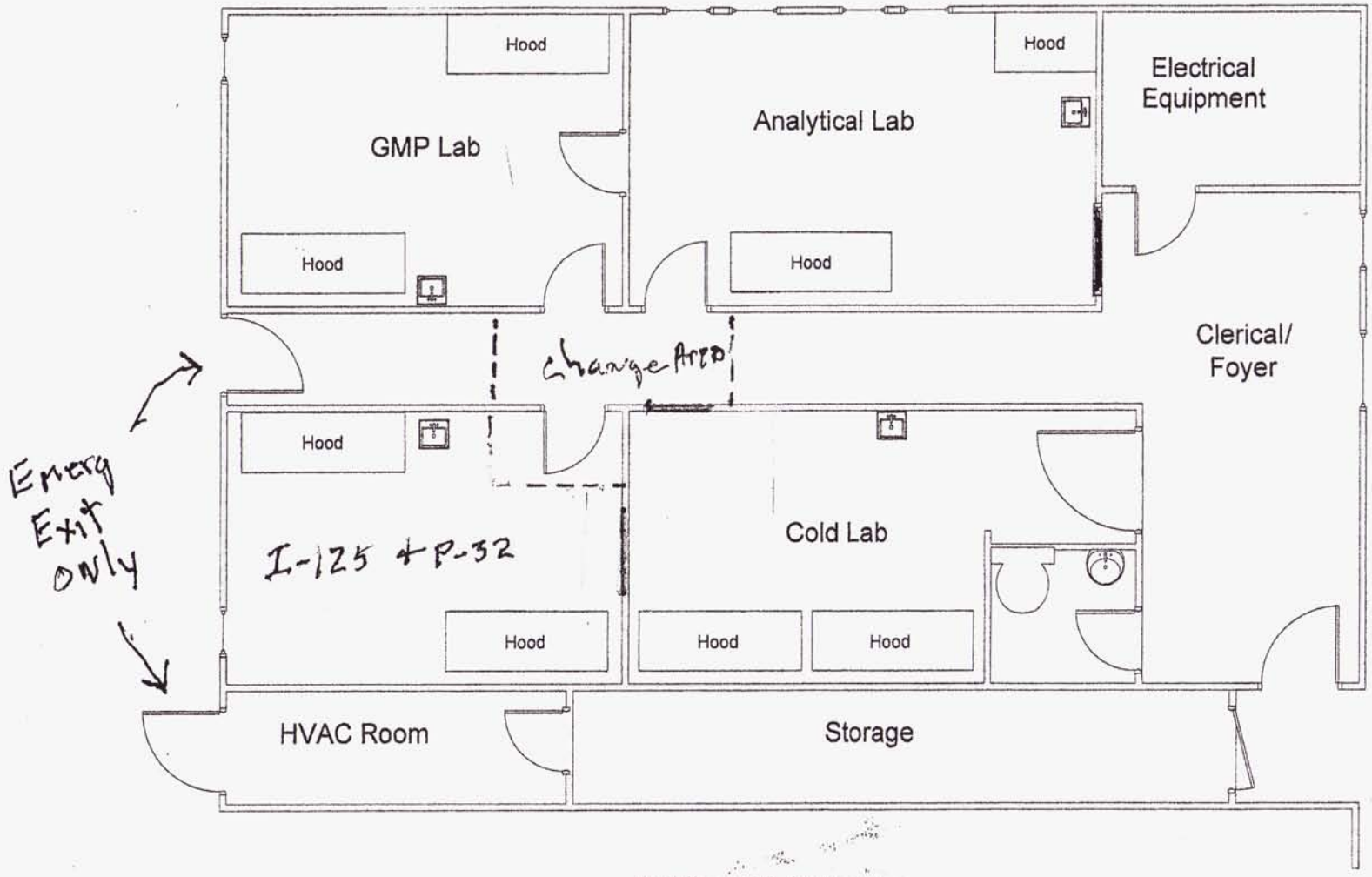


Building 300
Laboratories

Do Not Scale Approx 1/8
in to 1 foot

= Restricted Non Contaminated

ALL Restricted - Contaminated
Except Where Marked



Building 300 Annex

~~Under Construction~~

Not Yet in Svc

Do Not Scale

Approx 1/8 " per foot

ALL AREAS ARE Restricted-Contaminated

Except: Cell Lab, Electric Room, Foyer, Hall, HVAC and Storage.

These are Controlled

SURENDRA GUPTA
AMERICAN RADIOLABELED CHEMICAL
101 ARC DRIVE

ST. LOUIS, MO 63146
UNITED STATES US

ACTWGT: 0.5 LB MAN
CAD: 0747982/CAFE2453

BILL SENDER

°ATTN: KEVIN NUL REGION III
DIVISION OF NUCLEAR MATERIAL SAFETY
U.S. NUCLEAR REGULATORY COMMISSION
2443 WARRENVILLE ROAD, SUITE 210
LISLE IL 605324352

DEPT: LETTER

FedEx Express

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Part # 156148-434 RIT2 07/10

RT 373 1 A
FZ 6975 09.23

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Envelope

Align bottom of **Peel and Stick Airbill** here.