



Science & Technology
Research, Inc.

DUPLICATE
ORIGINAL

7210 Pindell School Road • Fulton, Maryland 20759-9721 • tel 301-598-9313 • fax 301-598-9314

January 6, 2000
ELK/-00-02

U.S. Nuclear Regulatory Commission, Region II
Attn: Ms. Diane Heim, Suite 23T85
61 Forsyth St. SW
Atlanta, Georgia 30303

Dear Ms. Heim:

Please find enclosed Science & Technology Research, Inc.'s (STR's) application for an NRC Radioactive Materials License. A telephone call to Ms. Sandra Kimberly at NRC headquarters indicated that the appropriate license fee for a Possession and Use License Application is \$2,400. A check in this amount is attached to the NRC Form 313.

STR needs this license to perform a Navy contract that is to be awarded to us in April 2000. Your assistance in expediting this request is greatly appreciated.

Should you need additional information, please contact STR's General Manager, Ed Kessler, at (540) 663-9101 or e-mail, ekessler@crosslink.net.

Thank you.

Sincerely,
SCIENCE & TECHNOLOGY RESEARCH, INC.

A handwritten signature in black ink, appearing to read 'G. Yang', is written over the typed name.

George C. Yang
President

List of Enclosures

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Enclosure (2): License Application Summary

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- Item 6. Purpose for Which Licensed Material Will Be Used
- Item 7. Individual(s) Responsible for Radiation Safety --- Their Training and Experience
- Item 8. Training for individuals working within or frequenting the restricted area
- Item 9. Facilities and Equipment
- Item 10. Personnel Monitoring
- Item 11. Waste Management

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- Product Specification, Americium 241

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- 2. Purpose
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Appendix A : Safety Policy for Ship ACADA Cell Assembly

Appendix B: Ship ACADA Radioactive Material Emergency Procedure

(7-96)
10 CFR 30, 32, 33
34, 35, 36, 39 and 40

Estimated burden per response to comply with this information collection request: 7 hours. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. Forward comments regarding burden estimate to the Information and Records Management Branch (T-5 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0120), Office of Management and Budget, Washington, DC 20503. NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

APPLICATION FOR MATERIAL LICENSE

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

DIVISION OF INDUSTRIAL AND MEDICAL NUCLEAR SAFETY
OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:

IF YOU ARE LOCATED IN:

CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLAND,
MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, PENNSYLVANIA,
RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

LICENSING ASSISTANT SECTION
NUCLEAR MATERIALS SAFETY BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO
RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA,
SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION II
101 MARIETTA STREET, NW, SUITE 2900
ATLANTA, GA 30323-0199

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN,
SEND APPLICATIONS TO:

MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION III
801 WARRENVILLE RD.
LISLE, IL 60532-4351

ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS,
LOUISIANA, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA,
OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH,
WASHINGTON, OR WYOMING, SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
811 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TX 76011-8064

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTIONS.

1. THIS IS AN APPLICATION FOR (Check appropriate item)

- A. NEW LICENSE
- B. AMENDMENT TO LICENSE NUMBER _____
- C. RENEWAL OF LICENSE NUMBER _____

2. NAME AND MAILING ADDRESS OF APPLICANT (Include Zip code)

Science & Technology Research
5200 Potomac Drive
King George, Virginia 22485

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED

9008 Will Loop Road
King George, Virginia 22485

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Ed Kessler

TELEPHONE NUMBER

(540) 663-9101

SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL.

a. Element and mass number; b. chemical and/or physical form; and c. maximum amount which will be possessed at any one time. **Enclosure (2) and (3)**

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.

Enclosure (3)

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING EXPERIENCE.

Enclosure (3)

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

Enclosure (3)

9. FACILITIES AND EQUIPMENT.

Enclosure (3)

10. RADIATION SAFETY PROGRAM.

Enclosure (7)

11. WASTE MANAGEMENT.

Enclosure (3)

12. LICENSEE FEES (See 10 CFR 170 and Section 170.31)

FEE CATEGORY **3.b**

AMOUNT ENCLOSED \$ **2,400.00**

13. CERTIFICATION. (Must be completed by applicant) THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

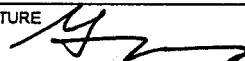
THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, 36, 39 AND 40, AND THAT ALL INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

CERTIFYING OFFICER - TYPED/PRINTED NAME AND TITLE

George C. Yang, Ph.D., President

SIGNATURE



DATE

1/10/2011

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
			\$		
APPROVED BY				DATE	

LICENSE APPLICATION SUMMARY

SCIENCE & TECHNOLOGY RESEARCH, INC.

Science & Technology Research, Inc. (STR) is applying for a specific NRC radioactive materials Possession and Use License to permit production of Ship Automatic Chemical Agent Detection and Alarm (Ship ACADA) detectors for the U.S. Navy. This detector is operated only when it is suspected that the ship may have been exposed to chemical warfare agents. Ship ACADA is a portable air sampling detector that employs two ion mobilization spectroscopy cells, each using one 100 microcurie ²⁴¹ Americium source for a total of 200 microcuries per detector.

The source is enclosed in the cell module by end caps. Once enclosed there is no physical contact possible with the source and no line-of-sight access to the source. Further, the cells are enclosed in the Drift Tube Assembly housing which is protected by tamper-proof screws. The Drift Tube Assembly remains fixed and enclosed in the detector's metal, air-tight case (housing) during storage and all operations. The operator never has access to the cell module. Moreover, no maintenance is performed on the cell or the detector by shipboard personnel. Malfunctioning and failed detectors are returned to the Navy Depot (Naval Surface Warfare Center, Crane, IN) where trained personnel perform all necessary corrective maintenance in approved radiation work areas.

The Naval Surface Warfare Center, Dahlgren, VA procurement is for 235 detectors over the next two years; this requirement dictates an average production rate of 16 detectors a month. STR plans to procure the sources from Amersham International, Inc. in quantities to support a 2 month production, i.e. 6.4 millicuries. Since new sources received will overlap with the 2 month supply of detectors to be delivered to the Navy, STR is requesting a maximum of 12.8 millicuries to be in possession at one time.

The Navy possesses Naval Radioactive Material Permit (NRMP) Number 13-00164. STR intends to transfer the licensed source material from its license to the aforementioned NRMP upon delivery of the fully-operational detectors to the Navy.

STR's preparation for NRC licensing includes (1) establishing a safety program / policy for possession and use of radioactive materials; (2) designation of a Radiation Safety Officer (RSO) and an Assistant RSO; (3) engaging the services of an outside firm to provide health physics services, training, and consulting; (4) identifying a suitable manufacturing facility with a restricted area for handling the source material, and; (5) selection of equipment for monitoring the source material.

Enclosure (3)
Application Items 5 through 11 of NRC Form 313

Item 5. Radioactive Material

Element and Mass Number	Chemical / Physical Form	Maximum Amount to be Possessed at any one time
Am ²⁴¹	Sealed Source, Amersham AMMK 5731 (NRC registration number AMM)	12.8 millicuries

STC Drawing and vendor information pertaining to the radioactive source is provided in Enclosure (4).

Item 6. Purpose for Which Licensed Material Will Be Used.

General Usage Description:

For use in gas detection equipment to be assembled and tested prior to delivery to US Naval Surface Weapons Center (NSWC) Crane, Indiana

Note: a more detailed description of source usage is provided in the License Application Summary.

Item 7. Individual(s) Responsible for Radiation Safety --- Their Training and Experience.

Radiation Safety Officer (RSO)

Name	Education / Training	Experience
Rodney Dodd - Engineering Technician	Ionizing and Non-Ionizing Radiation Systems -1992 NSWCDD (40 hours). Annual Refresher Radiation Safety Training. A.A.S. (Electronics) -1989 DeVry Institute of Technology. Bachelor of Business Adm. And Computer Information Systems- 1987 Campbell University.	Over nine years experience with handling of Am ²⁴¹ sources pertaining to IMS cells, including safety monitoring and installation of sources in cells. RSO at another company (NRC#45-25341-01) for one year. Technical support of facilities for RF and microwave radiation testing at Patuxent River Naval Air Station. Operated various high powered transmitters.

Application Items 5 through 11 of NRC Form 313

RSO Assistant

Name	Education / Training	Experience
Ed Kessler General Manager	BS General Engineering - U.S. Naval Academy, 1958. Radiation Safety & Use of Radiac Instruments - 1973. Nuclear Warhead Safety - Various U.S. Navy Schools, 1960 - 1971.	Over six years experience as Nuclear Safety Officer on nuclear submarines. Developed curriculum, performed as senior instructor for Nuclear Safety Officer course for Pacific-based submarine force. For the Chief of Naval Operations (3 years), (1) managed inspection and certification programs for Navy nuclear weapon capable ships and shore activities, (2) Action Officer for Navy worldwide nuclear accident / incident program, (3) managed Navy's nuclear weapon stockpile storage, maintenance and logistics, (4) managed nuclear weapon reliability testing, and (5) managed the Navy's Nuclear Weapon Safety program.

In addition Dr. Lee Anthony, certified health physicist and Proprietor of Physics Associates, NRC# 45-17344-01, will provide consultation on safety procedures, radiation monitoring, and other health physics related issues as appropriate. In addition to inservice training (see below), STR plans to have Dr. Anthony perform audits of the facility and safety program on a periodic basis to ensure worker safety and NRC compliance. A letter stating Physic Associates qualifications and commitment to provided services for providing health physics services to STR is included in Enclosure (5).

Item 8. Training for individuals working with or frequenting restricted areas.

Every employee who handles radioactive material or frequents the restricted area will be provided 8 hours of basic radiation safety on a yearly basis. Employees will be trained prior to performing cell assembly or handling of the radioactive materials. Radiation training will be provided by Physics Associates at the STR facility. The inservice training will provide basic radiation protection guidelines and specifics related to the manufacture of the Ship ACADA systems. Topics will include the following:

- Characterization of types of radiation and hazards of each.
- Safety practices, STR safety policy, source handling procedures.
- Operation of survey meters for monitoring work areas.
- Emergency procedures.

Handling of source material will be restricted to senior level assemblers which will be trained as described above. Actual handling of the sources is planned to occur once a day when sources required for that day's cell production will be removed from storage and inserted in the cell housings awaiting further cell assembly and test. Maintenance requiring source removal from the cell is considered very rare. In the unlikely event such maintenance should be required, it will be performed by the same cell assemblers.

Item 9. Facilities and Equipment

Facilities

The STR manufacturing facility is to be located at:

STR
9008 Will Loop Road
King George, Virginia 22485

The facility layout is shown in Enclosure (6). Page 1 shows the entire facility layout and the location of the restricted access radioactive work area within the facility. Page 2 shows the details of the radioactive material work area. The radioactive material work area has been located in a corner of the facility to prevent any unnecessary traffic flow. Access to the cell assembly area will be limited to only those persons involved in the cell assembly process. Work within the radioactive material work area is limited to storage of the sources and assembly of the sources into cell modules. Therefore, all activity that involves physical contact with the source will be performed in this area. Assembled cell modules will be surveyed to ensure they are free of radioactive material prior to release from this area and subsequent assembly. It is anticipated that no more than four assemblers will be assigned to work in the cell assembly area. Radioactive waste generated as a result of the assembly process (see item 11) will be stored in this area awaiting disposal. Waste generated is expected to be minimal.

All further assembly and testing operations will be performed in the Assembly area adjacent to the radioactive material work area.

Equipment

STR will purchase two Ludlum survey meters (Model 3), equipped with a pancake G-M detector (Model 44-9) for performing routine monitoring of work surfaces/areas following any handling of the sources for the presence of ^{241}Am . The counter has a sensitivity range of 0-200 mR/hr. Both counters will be stored in the work area and will be available for use by all assembly personnel. The instruments will be calibrated on six month intervals by:

Physics Associates
5346 Peters Creek Road
Roanoke, VA 24019

Physics Associates operates under NRC license No. 45-17344-01. Calibration schedules will be staggered to ensure that at least one instrument is in the house at all times.

STR will maintain an inventory of disposable gloves, lab coats, rad wipes, etc. to be used by all employees when handling radioactive sources.

Item 10. Personnel Monitoring

Personnel Monitoring Equipment

Since the ^{241}Am 100 microcurie source has relatively low energy photon emissions, STR proposes not to implement the use of film or ring badges for personnel for the following reasons:

1) Film and ring badge data have been recorded by the Navy during the period of 1991 through 1994 on workers who were involved in handling the 100 microcurie sources during installation and maintenance of the Improved Point Detection System which employs the same cell technology and design. During the three year period, no readings were recorded that measured above the control badges.

2) Since STR plans to continue the same cell assembly approach, no worker should be exposed to more than one source at a time. Exposure to 1 millicurie of ^{241}Am at 10 centimeters is approximately 1 mR/hr. The STR source is a factor of 10 less than 1 mR/hr., and working distances to the body are expected to be approximately 30 centimeters. The cell assembly is anticipated to expose a worker to a maximum (likely considerably less) of 12 hours / week. The potential exposure to body and hands is expected to be considerably less than 10% of the dose specified in paragraph 20.1201 of 10 CFR Part 20.

Moreover, routine monitoring of work surfaces for removable contamination will be conducted following each period in which sources were handled using the survey meter (see item 9). In addition, wipe tests of sources and work areas will be conducted on six month intervals.

Radiation Safety Policy

STR has established a radiation safety policy which details all aspects for control of radioactive materials and safe operating procedures during cell assembly. The Policy is included as Enclosure (7), Appendix A.

Item 11. Waste Management

STR anticipates minimal generation of radioactive waste. All disposable items, gloves, table top covers, wipes, etc. will be treated as hazardous waste being collected and stored in a 55 gal. drum within the restricted area. It is anticipated that one drum will serve a major portion if not the entire anticipated life of the Ship ACADA contract. This is due to the scheduled handling of radioactive material only at specific intervals and the limited number of workers who will handle the material (1-2). All waste generated which does not decay on site will be transferred to an appropriately certified disposal facility.


Any source material that is damaged or determined not suited for use in a cell module, or purchased in excess, will be returned to the Amersham International Corporation for disposal/reprocessing.

Enclosure (4):

Description of Source Material

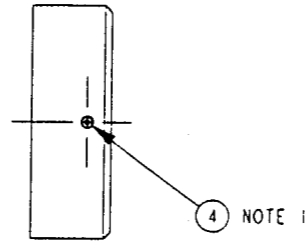
PRELIMINARY

NOTES:

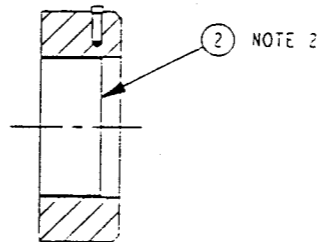
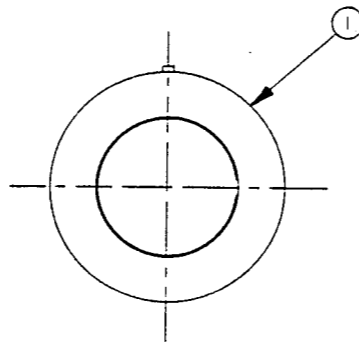
1. INSTALL PIN RECEPTACLE, FIND NO. 4, INTO SOURCE POLE, FIND NO. 1, BEFORE INSTALLING RADIATION SOURCE, FIND NO. 2.
2. BOND INACTIVE SIDE OF RADIATION SOURCE, FIND NO. 2, TO POLE, FIND NO. 1, AS SHOWN USING ADHESIVE, FIND NO. 3. FIND NO. 2 SHALL NOT PROTRUDE BEYOND SURFACE OF FIND NO. 1.
3.  CAUTION: THIS ASSEMBLY CONTAINS RADIOACTIVE MATERIAL - AMERICIUM 241 WITH TOTAL ACTIVITY OF 100 MICROCURIES.
4. SUGGESTED SOURCE OF SUPPLY:
ABLESTIK LABORATORIES
20021 SUSANA RD
RANCHO DOMINGUES, CA 90221
TELEPHONE: 310-764-4600
5. PACKAGE AS A RADIOACTIVE ITEM IAW NAS 853.

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVAL

CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY



4 NOTE 1



2 NOTE 2

FIND NO.	QTY REQD	CAGE CODE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL OR NOTE
4	1	3N087	0552-1-15-01-11-14-10-0	PIN, RECEPTACLE	
3	AR		ECF550-1-005	ADHESIVE, PREFORMED EPOXY	NOTE 4
2	1	51431	AMMK5731	SOURCE, RADIATION	
1	1		7243470	POLE, SOURCE	

PARTS LIST

DISTRIBUTION STATEMENT C. DISTRIBUTION AUTHORIZED TO U.S. GOVERNMENT AGENCIES AND THEIR CONTRACTORS; ADMINISTRATIVE/OPERATIONAL USE; OTHER REQUESTS FOR THIS DOCUMENT SHALL BE REFERRED TO NAVSEA

GENERAL TOLERANCES XX DECIMALS XXX DECIMALS ANGLES ± .005 ± .002 ± .005 UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES REMOVE BURRS AND BREAK SHARP EDGES --- MAX. INSIDE CORNERS R --- MAX. SURFACE FINISH ---		DAHLGREN DIVISION NAVAL SURFACE WARFARE CENTER DAHLGREN, VA 22448-5100		DEPARTMENT OF THE NAVY NAVAL SEA SYSTEMS COMMAND ARLINGTON, VA 22242	
MATERIAL: _____ CHECKED: _____ DRAWN: _____ PCT: 96/03/05 APPROVED FOR NAVSEA: _____ DATE: _____		B53 G52 G524		POLE ASSEMBLY, SOURCE	
DATE OF MODIFICATION 07 MAY 99		7243450 SHIPBOARD CHEMICAL AGENT MONITOR PORTABLE		SIZE/CAGE CODE: GIN DWG NO. REV C 153711 - 7243468 - SCALE: 2/11WEIGHT: -- SHEET 1 OF 1	

DWG NO. 7243468 SH 1 REV -

b50/scamp/7243468 (PROE) (MODEL NAME: 7243468)

PRELIMINARY

Product specification

Americium-241 alpha foil and sources

Data
sheet
11262

Americium-241 alpha particle emitting foil, made by Amersham International, is a versatile material which combines high integrity of containment with relatively high emission efficiency. It can be formed or cut into various shapes to suit a wide variety of applications.

In most cases, and particularly for use in ionization chamber smoke detectors, it is preferably mounted in specially designed holders to provide sealed sources.

Because americium-241 emits only alpha, low energy X- and gamma radiation with no beta radiation, it has a significant advantage over radium-226 which it is tending to replace in the majority of applications.

Construction

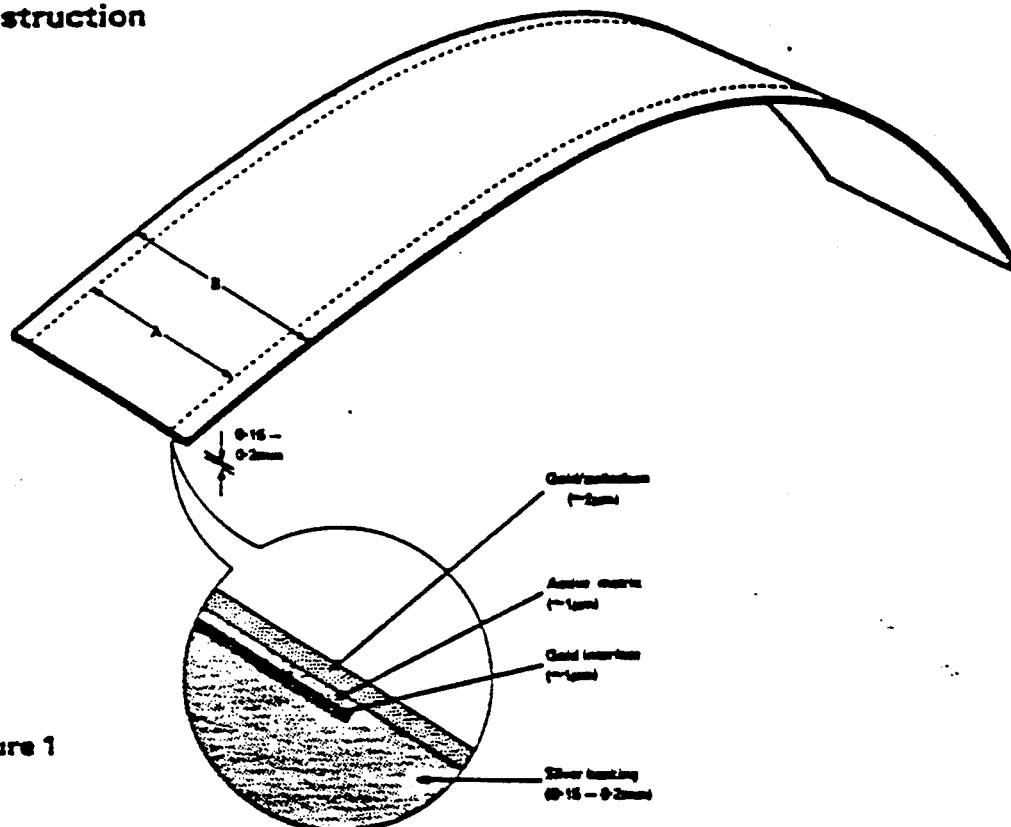


Figure 1

Foil

The radioactive material, in a gold matrix, is effectively contained between a palladium-gold alloy, palladium-gold laminate or pure fine gold face and a silver backing (see Figure 1). The front face is thick enough to retain completely the americium-241, but thin enough to allow efficient emission of the α -radiation. In some cases the silver backing is sandwiched between a second layer of americium-241/gold matrix and palladium/gold face to give double-sided foil, emitting from both faces.

The manufacturing process begins with the production of a small billet consisting of an intimate mixture of americium oxide and pure gold. The billet is first sintered and then hot forged in a silver case with a gold-palladium alloy face. Repeated rolling of this composite, under carefully controlled conditions, produces a continuously welded metal strip of the required dimensions with the active layer confined between inactive borders and protected by a thin face of gold, palladium-gold alloy or palladium-gold laminate.

Product range

Americium-241 foil is produced with several activity loadings. Those in regular production are listed here, but foils with other dimensions and activity loadings can be produced to customers' specifications.

The maximum loading is normally 200 $\mu\text{Ci}/\text{cm}^2$ (7.4 MBq/cm²).

linear activity		activity on active area		active width A	total width B	code
$\mu\text{Ci}/\text{cm}$	MBq/cm	$\mu\text{Ci}/\text{cm}^2$	MBq/cm ²	mm	mm	
10	0.37	8	0.296	12.5	20	AMM.7
30	1.11	100	3.70	3	20	AMM.1
40	1.48	32	1.18	12.5	20	AMM.4
125	4.63	100	3.70	12.5	20	AMM.8
160	5.92	128	4.74	12.5	20	AMM.2
240	8.88	192	7.10	12.5	20	AMM.3

Widths A and B refer to the dimensions shown in Figure 1.

Availability: D4

Quality control

Wipe test A

for lengths of foil, the test is carried out over the complete α -emitting face;

α -emission rate and energy checked using a Si surface barrier detector.

Safety performance testing

A comprehensive integrity test programme has been carried out on foils and sources; details on request.

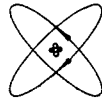
ISO Classification: C54444

IAEA Special Form: Americium-241 alpha foil has passed the tests for Special Form radioactive material as specified in IAEA Safety Series No. 6.

Enclosure (5)
Services to be Provided by
Physics Associates

MEDICAL PHYSICS
SHIELDING RECOMMENDATIONS

RADIATION PHYSICS
EMERGENCY CONSULTATION



PHYSICS ASSOCIATES

Lee S. Anthony, Ph. D.
Certified Health Physicist
Certified Medical Physicist
Certified Radiologic Physicist

5346 Peters Creek Road
Roanoke, Virginia 24019
Tel: (540) 563-0165

Robert C. Hudson, M.S.
Kay A. Saul, B.S.
Lee S. Anthony, Jr., B.S.;M.A.

December 22, 1999

Mr. Ed Kessler, General Manager
Science Technology Research, Inc.
7210 Pindell School Road
Fulton, MD 20759-9721

Dear Mr. Kessler:

This letter is a follow up to our recent communications in which we discussed consultation support by Physics Associates to STR.

We do provide routine safety services, such as wipe tests, training for personnel, and open- ended consultation services.

Physics Associates has been in existence, headquartered in the Roanoke, Virginia area, since approximately 1963.

We provide the complete spectrum of Health Physics/Radiation Physics services to our clients; although the majority of our clients are medically oriented, we also provide services to industrial clients as well. These industrial clients include Merck & Company, Dupont, General Electric, and Ross Laboratories. We have also provided services in the past for IT&T.

We perform leak tests of sealed sources, wipe tests of appropriate areas, and/or analyze such wipes in our offices. The charges for these depend upon how many wipes are performed at any given time; a good ballpark is around \$50/wipe. This actually varies from \$25 to \$100, depending upon circumstances.

Our normal consultation with Industrial Clients is to provide at least one day on site each year, during which time an in-service on Radiation Safety can be given to the facility employees, as appropriate. The charge for one day of consultation is approximately \$1,000.

Page 2 – December 22, 1999
Mr. Ed Kessler, General Manager
Science Technology Research, Inc.
Fulton, MD 20759-9721

In addition to the routine services mentioned above, we also provide assistance in preparing license applications, license amendments, and other regulatory items.

We also provide emergency consultation in the case of unexpected serious problems. Such consultation in the past has included searching for lost sources, responding to serious contamination situations, etc. Our rates for emergency operations are normally \$150 per hour, portal to portal.

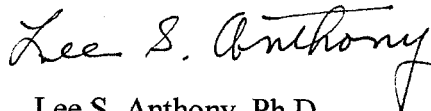
I would note that we do have a calibrated Americium-241 source in our office, which would be appropriate for the analysis of leak tests or wipe tests for operations using Americium-241.

We also have other standard sources available. We use a PC based Sodium Iodide detector with a multi-channel analyzer for normal wipe tests analysis in the office.

Appropriate credentials are held in our group: (1) Certified Health Physicist (Comprehensive) for the American Board of Health Physics; (2) Certified Radiological Physicist (includes Diagnostic Radiology, Nuclear Medicine, and Radiation Therapy Physics) by the American Board of Radiology; and (3) Certified Medical Physicist by the American College of Medical Physics. There are various lesser certificates also held.

I shall look forward to working with you and STR.

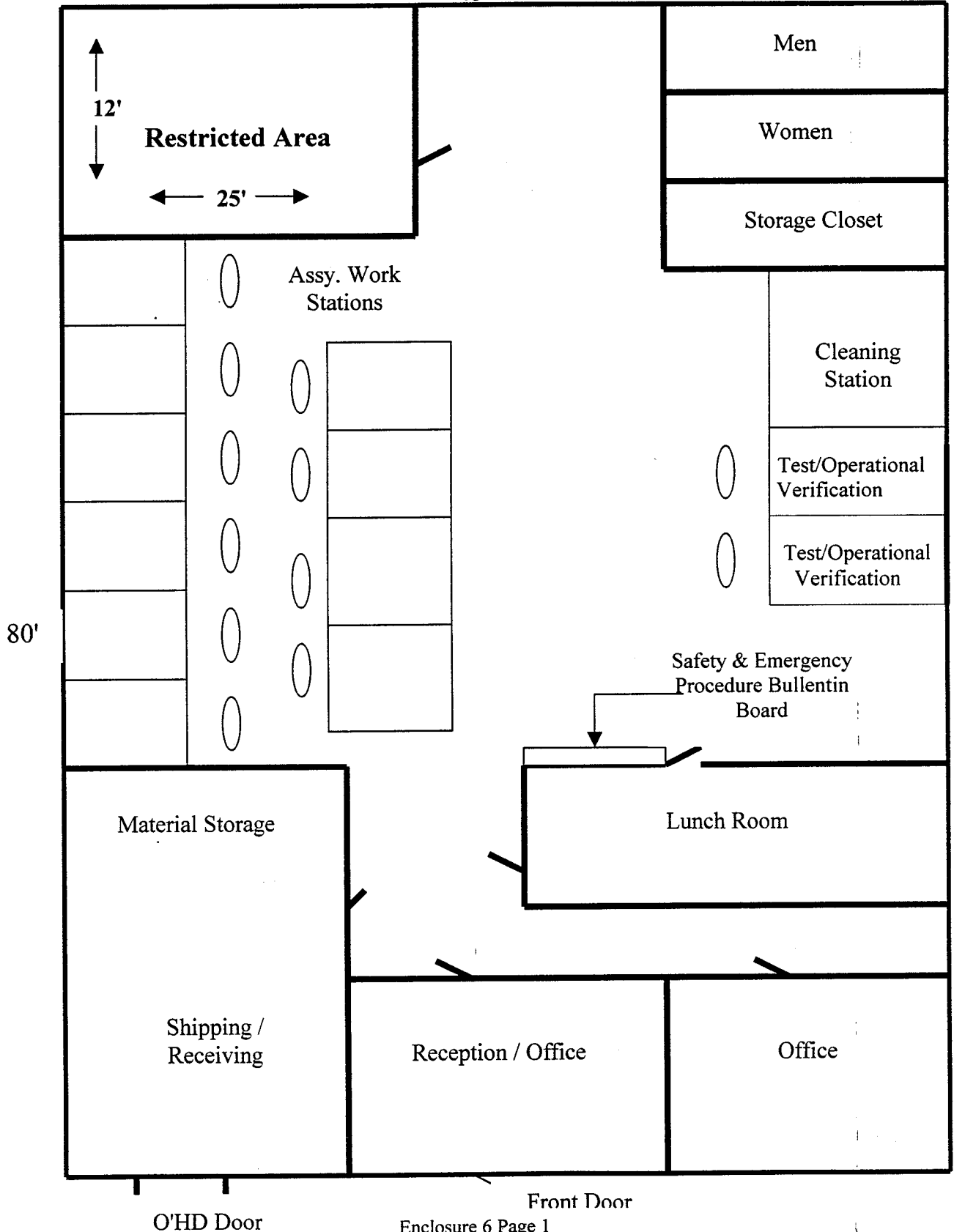
Sincerely,



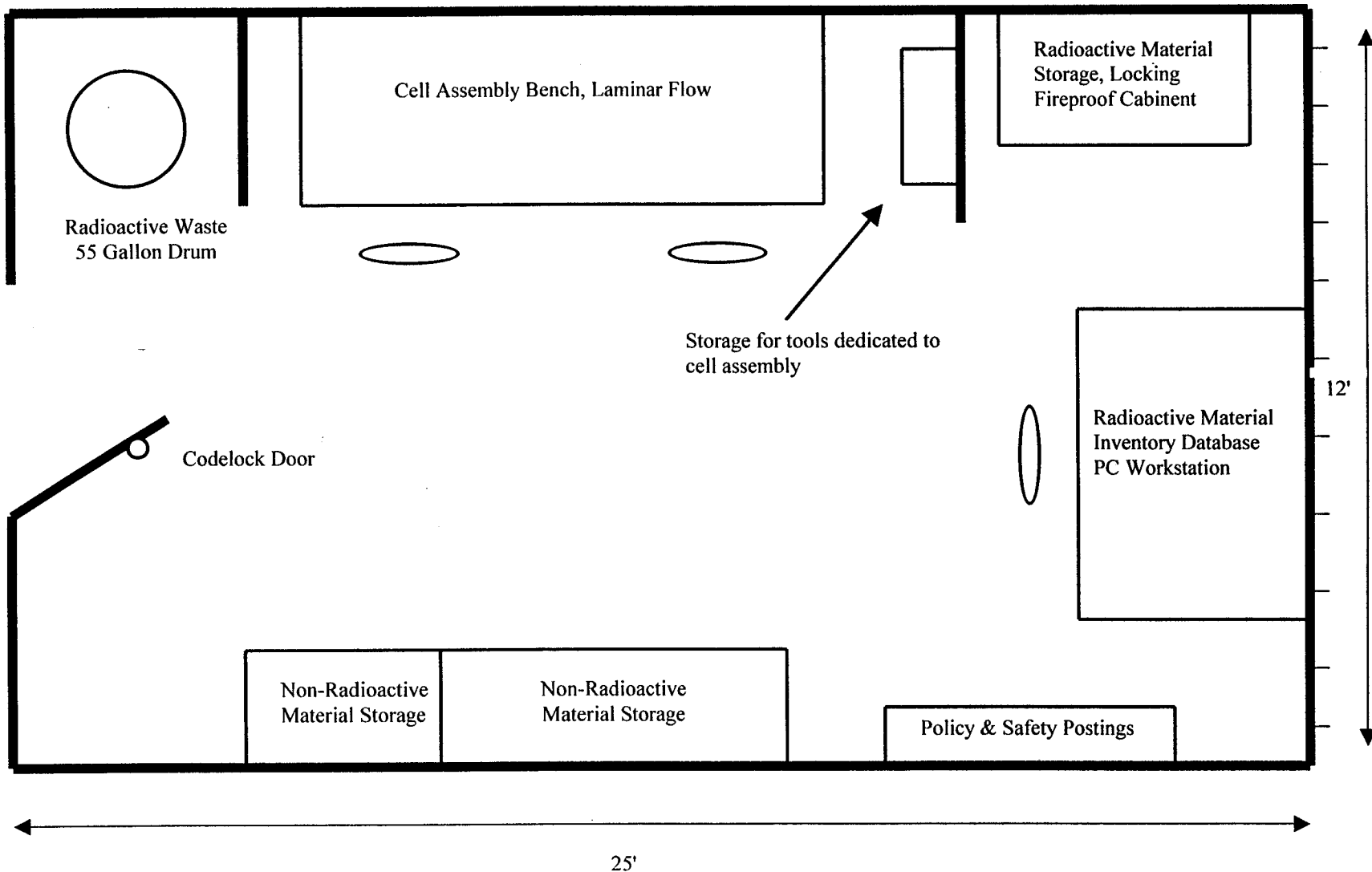
Lee S. Anthony, Ph.D.
C.M.P., C.H.P., C.R.P.

LSA/hg

Enclosure (6)
9008 Will Loop Road
King George, Virginia 22485
Facility Layout - 3,600 FT²
45'



Enclosure (6)
Restricted Access Area
STR Cell Assembly/Radioactive Material Room



Enclosure (7)

Ship ACADA Radiation Safety Program

1. Scope:

The Ship ACADA Radiation Scope Program defines the responsibilities and procedures for the procurement, receipt, storage, handling, control, and disposal of radioactive material used in the manufacture of Ship ACADA systems.

2. Purpose:

This document serves as the formal policy to be understood and complied with by those persons involved in the manufacture of Ship ACADA systems.

3. General:

The Ship ACADA is a portable Chemical Agent detection system developed by the U.S. Navy for use on ships. The system uses an Americium 241 (^{241}Am) radioactive source to ionize air samples which allows for subsequent detection and identification of the compounds of interest. A single source is installed in each cell module. Once installed in the cell module there is no physical contact or direct line of sight possible with the source. The cell module is not sealed; air enters the cell passes over the source and exits the cell. Each system contains two cell modules.

Each cell contains 100 microcuries of ^{241}Am (which is primarily an alpha emitter) with a small percentage of radiation in the form of low-energy X and gamma. Although ^{241}Am is a relatively considered low energy radioactive material, proper precautions are necessary to avoid prolonged exposure and/or ingestion of material. Ingestion can result in collection of the material in body organs and long term radiation exposure to internal organs.

^{241}Am in the quantities used in the Ship ACADA system is a regulated material and requires compliance with all Federal, State, and/or local government regulations for control or radioactive materials.

4. Radioactive Material Safety Policy and Procedures

4.1 Responsibilities

The Radiation Safety Officer (RSO) maintains overall responsibility for radioactive materials. The RSO reports directly to the STR president on all issues regarding worker safety and regulatory compliance. The RSO establishes and revises all

policies and procedures related to the proper use and handling of Radioactive Material. The RSO is responsible for maintaining and ensuring compliance with the Radioactive Material License (RML) and applying for amendments as required. The RSO retains responsibility for inventory and control of all radioactive material. The RSO will be assigned an assistant to resume the responsibilities of the RSO during his absence. The specific duties of the RSO are further defined in the following paragraphs.

4.2 Radioactive Material Procurement

The Radiation Safety Officer authorizes the procurement of radioactive materials in accordance with authorized material and quantities specified by the RML. The RSO ensures that vendors are provided a current copy of the RML. All radioactive material will be shipped to the attention of the RSO.

4.3 Radioactive Material Receipt

Radioactive material will be received by the RSO, using the Radioactive Material Receipt Form, Figure 1. logged in on a Radioactive Material Receipt form, and data entered in the database. The RSO will inspect the shipping package and internal contents for any signs of damage that may have occurred during shipping. Any damage noted will be assessed by the RSO. In the event of visual or potential damage to the source material, the vendor will be notified, a Nonconforming Material Report form will be completed, and the shipment returned. If any radioactive material is suspected to have been released from the damaged package, the vendor will be notified and required to collect the package, appropriate wipe tests will be performed, and local authorities notified.

All transactions concerning radioactive materials will be recorded in the Master Radioactive Material Inventory Database.

4.4 Radioactive Material Storage

Radioactive materials will be stored in a fire-proof, locking cabinet. The RSO shall maintain possession of the key or combination. Additional keys or knowledge of the combination will be maintained by the appointed RSO assistant and the plant security officer.

Radioactive material will remain in the storage cabinet until required for assembly. The RSO will release only those sources required for the cells to be fabricated in that lot. Sources are to be installed during that work day or returned to the RSO for storage in the cabinet.

Figure 1

Radioactive Material Receipt Form

Shipper: _____

Carrier: _____

Date and Time of Receipt: _____

Condition of Package: _____ O.K. _____ Dry _____ Other

Radiation Label: _____ Transportation Index _____

Measured Radiation Levels:		Maximum Permissible Levels (mR/hr)		
(a) Background	_____ mR/hr	White I	Yellow II	Yellow III
(b) Surface	_____ mR/hr	0.5	50	200
(c) 1 meter	_____ mR/hr	B.G.	1.0	10
(d) Empty Container	_____ mR/hr			

Survey Instrument ID:

Mfg. _____ Model _____ Serial _____ Calibrated _____

Do packing slip and contents agree?

- (1) Radionuclide _____ yes _____ no
- (2) Activity _____ yes _____ no
- (3) Chemical/Physical form _____ yes _____ no

The RSO will log the source serial number out of storage and assign it to the specific cell serial number.

4.5 Radioactive Material Handling Procedures for Cell Assembly

Handling of radioactive materials for Ship ACADA production is limited to inserting the source material into the cell, sealing the cell, and performing a leak test to verify the outside of the cell is free of removable radioactive material. All source assembly will take place in the cell assembly area. Specific safe handling and worker safety guidelines are shown in Appendix A and are to be posted within the cell assembly area. The source will be released by the RSO for assembly in the cell by the trained assembler. Sources released are to be assembled in cells during that working period; no bare sources will be left out of storage area after the work period ends. Sources will be handled by gloved hands or tongs. No assembler is to touch the source with the bare hand. Source assembly will be performed over absorbent, disposable material. Following each installation period, the work area will be surveyed using a hand-held monitor for removable contamination. Workers' gloves, packing material, and other disposable materials that have had direct contact with the radioactive source are to be treated as hazardous waste and disposed of in the hazardous waste container.

An Emergency Plan is included in Appendix B. It shall be considered an emergency any time radioactive material is known or believed to be released from the radioactive source and/or a Ship ACADA unit in an uncontrolled manner.

4.6 Radioactive Material Monitoring

Radiation sources and cell modules containing radiation sources will be leak tested on intervals not to exceed six months to determine the presence of removable radioactive material. The RSO or designate will conduct the leak tests which will consist of wiping the inactive areas and the area surrounding the source. The wipes will be analyzed by Physics Associates using certified measurement techniques capable of detecting less than 0.0005 microcuries of material.

The external surface of each cell module (approx. surface area of 100 sq. cm.) will be wipe tested following installation. The wipes will be analyzed by Physics Associates using certified measurement techniques. In addition, wipe tests will be conducted prior to delivery of the system to the Government.

All wipe test results will be recorded on a Wipe Test Results Form, Figure 2.

Figure 2

Wipe Test Results Form:

	<u>Back-ground</u>	<u>Gross CPM</u>	<u>Net CPM</u>	<u>Area(cm2)</u>	<u>DPM /100cm²</u>
(a) Outer Surface	_____	_____	_____	_____	_____
(b) Inner container	_____	_____	_____	_____	_____

"The NRC Regional Office must be notified if removable contamination exceeds 0.01 microCurie (22,000 dpm/100cm²)".

Wipe Test Instrument I.D.:

Mfg. _____ Model _____ Serial _____ Calibrated _____

APPENDIX A

Safety Policy for Ship ACADA Cell Assembly

1. All handling of radioactive material and unassembled cell modules containing radioactive sources shall take place in the designated radioactive material area.
2. Food and drinks are not allowed in the cell assembly area. No eating, drinking, or smoking is permitted within the cell assembly area.
3. Assemblers are to wear protective gloves when handling the radiation sources or performing cell assembly. Sources are not to be handled with bare fingers. Sources are to be handled using forceps and/or gloved hands.
4. Sources will be provided to assemblers by the RSO. The RSO will assign specific source serial numbers to specific cell modules. Source and cell inventory will be controlled by the RSO.
5. Sources are to be installed in cells or returned to the storage cabinet following each work period. Sources are not to be left on work benches at the end of the day.
6. Any tools used to handle the sources shall be stored separately from other tools.
7. The radioactive material work area should be surveyed using a Geiger counter for evidence of contamination following any period when sources were installed or cells were opened for repair.
8. Gloves/towels and other waste that was in contact with the source will be treated as hazardous waste and contained in a 4 mil (min.) polyethylene trash bag within the 55 gal. hazardous waste disposal drum. This waste will be stored separately from other waste. When full and/or at the completion of assembly of all cells required by the contract this waste will be removed by the RSO and disposed as radioactive waste in accordance with regulatory guidelines.
9. Cells/Sources are to be wipe tested every six months by the RSO or his designee. In addition, surface areas including table tops, and floors beneath the cell assembly area will be wiped and tested for contamination every two months.
10. The RSO should be consulted prior to attempting any changes in the cell assembly process regarding the radioactive source. Any questions, concerns or problems associated with the handling of radioactive materials shall be directed immediately to the RSO.

POST IN CELL ASSEMBLY AREA

APPENDIX B

Ship ACADA Radioactive Material Emergency Procedure

1. Emergency procedures shall be employed whenever radioactive material is known or believed to be released in a uncontrolled manner. Release may result from a damaged radioactive source, cell module, or unit.
2. The underlying philosophy is to prevent the spread of contamination by preventing entry or immediate exit of personnel or equipment from the area of contamination.
3. Once the actual or potential release has been realized, workers shall immediately notify the RSO. The RSO shall direct all activities related to the emergency situation, including directing the monitoring of personnel, equipment, and the facility.
4. Workers shall remain in the area of the incident to prevent contamination of other areas or personnel.
5. Persons not involved in the area of contamination shall stay out.
6. Workers shall attempt to isolate the specific areas of contamination. Do not remove any items, including personal belongings, from within area of contamination. The immediate contamination area shall be roped off.
7. All personnel known or believed to be contaminated with radioactive materials will be instructed to remove contaminated garments, and thoroughly wash areas of skin that may have been contaminated using a detergent solution.
8. The RSO will determine the extent of the contamination through analysis and radiation surveys.
9. All equipment suspected of contamination will be disposed of or quarantined by the RSO until radiation measurements (wipe test) have shown the equipment is clean.
10. The RSO will document facts concerning the incident and make the required notifications to the NRC pursuant to the regulatory requirements of Subpart M of 10 CFR Part 20.

POST IN CELL ASSEMBLY AREA