

MATERIALS LICENSE

Amendment No. 08

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

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Licensee		In accordance with the application dated May 1, 1996, 3. License Number 37-20734-01 is amended in its entirety to read as follows:	
1. Allegheny Laboratories			
2. R.D. #2, Box 4-A Kennerdell, Pennsylvania 16374		4. Expiration Date April 30, 2001	
		5. Docket or Reference No. 030-22013	
6. Byproduct, Source, and/or Special Nuclear Material	7. Chemical and/or Physical Form	8. Maximum Amount that Licensee May Possess at Any One Time Under This License	
A. Iridium 192	A. Sealed radiography source contained in a source assembly registered pursuant to 10 CFR 32.210 or an equivalent Agreement State Regulation	A. Not to exceed 100 curies per source and 1500 curies total except as specified by Condition No. 12	
B. Cobalt 60	B. Sealed radiography source contained in a source assembly registered pursuant to 10 CFR 32.210 or an equivalent Agreement State Regulation	B. Not to exceed 100 curies per source and 1200 curies total except as specified by Condition No. 12	
C. Depleted Uranium	C. Metal	C. 999 kilograms	
9. Authorized use			
A. and B. For use in a compatible radiographic exposure device registered pursuant to 10 CFR 32.210 or an equivalent Agreement State Regulation for performing industrial radiography and in a compatible source changer registered pursuant to 10 CFR 32.210 or an equivalent Agreement State Regulation for source storage and exchange.			
C. Shielding material.			

CONDITIONS

10. Licensed material may be used at the licensee's facilities at 671 Colbert Avenue, Oil City, Pennsylvania and at temporary job sites of the licensee anywhere in the United States where the U.S. Nuclear Regulatory Commission maintains jurisdiction for regulating the use of licensed material.

**MATERIALS LICENSE
SUPPLEMENTARY SHEET**

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11. A. Licensed material shall only be used by, or under the supervision and in the physical presence of, individuals who have received the training described in the application dated August 1, 1983 and letter dated September 30, 1983 and have been designated in writing by the Radiation Safety Officer.
- B. The Radiation Safety Officer for this license is Michael B. Croghan.
12. The licensee is authorized to receive, possess, and use sealed sources of iridium-192 or cobalt-60 where the radioactivity exceeds the maximum amount of radioactivity specified in this license provided:
- A. such possession does not exceed the quantity per source specified in Item 8 by more than 20% for iridium-192 or 10% for cobalt-60; and
- B. records of the licensee show that no more than the maximum amount of radioactivity per source specified in this license was ordered from the supplier or transferor of the byproduct material; and
- C. the levels of radiation for radiographic exposure devices and storage containers do not exceed those specified in 10 CFR 34.21.
13. A. Notwithstanding the periodic leak test required by 10 CFR 34.25(b), the requirement does not apply to radiography sources that are stored and not being used. The sources excepted from this test shall be tested for leakage before use or transfer to another person. No sealed source shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.
- B. Sealed sources authorized for a use other than radiography shall be tested for leakage in accordance with 10 CFR 34.25.
14. Notwithstanding the requirements of 10 CFR 34.20(a), and pursuant to 10 CFR 34.51, radiographic equipment authorized for use in radiographic operations under this license need not comply with the torque criteria of Section 8.9.2(c) of American National Standard N432-1980.
15. The licensee is authorized to transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."
16. Sealed sources containing licensed material shall not be opened by the licensee.

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17. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

- A. Application dated August 1, 1983
- B. Letter dated September 30, 1983
- C. Letter dated October 12, 1994
- D. Letter dated January 3, 1995
- E. Application dated May 1, 1996
- F. Letter dated August 12, 1996



For the U.S. Nuclear Regulatory Commission

Original Signed By:
Duncan White

By

Nuclear Materials Safety Branch
Region I
King of Prussia, Pennsylvania 19406

Date SEP - 5 1996

SEP - 5 1996

Michael B. Croghan
Radiation Safety Officer
Allegheny Laboratories
RD #2 Box 4-A
Kennerdell, Pennsylvania 16374

Dear Mr. Croghan:

This refers to your license amendment request. Enclosed with this letter is the amended license. Please note that as part of this amendment, in accordance with 10 CFR 30.36, effective February 15, 1996, the expiration date of your license has been extended by a period of five years. Your new expiration date is stated in Item 4 of the license.

Please review the enclosed document carefully and be sure that you understand and fully implement all the conditions incorporated into the amended license. If there are any errors or questions, please notify the U.S. Nuclear Regulatory Commission, Region I Office, Licensing Assistance Team, (610) 337-5093 or 5239, so that we can provide appropriate corrections and answers.

Thank you for your cooperation.

Sincerely,

ORIGINAL SIGNED BY:

Duncan White
Division of Nuclear Materials Safety

License No. 37-20734-01
Docket No. 030-22013
Control No. 123179

Enclosure:
Amendment No. 08

DOCUMENT NAME: R:\WPS\MLTR\L3720734.01

To receive a copy of this document, indicate in the box: "C" = Copy w/o attach/enc "E" = Copy w/ attach/enc "N" = No copy

OFFICE	DNMS/RI	N	DNMS/RI				
NAME	DWhite						
DATE	09/05/96	09/	/96	09/	/96	09/	/96

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Q-4

August 12, 1996

License No. 37-20734-01
Docket No. 030-22013
Control No. 123179

Licensing Assistant Section
Nuclear Materials Safety Branch
875 Allendale Road
King of Prussia, PA 19406-1415

Dear Mr. Duncan White,

This is in reference to your letter dated July 17, 1996 for the review of the proposed amendment to our license submitted May 1, 1996. The following changes have been made to our license submittal:

Paragraph 1 of your letter:

Section 5.0.B of Administrative Procedures has been deleted. Personnel will be audited every three months or at their first evolution following the three month period. No simulations shall be used. Changes are submitted as Attachment A.

Paragraph 2 of your letter:

Section 5.1.1 of Administrative Procedures has been deleted. All personnel using radioactive sealed sources shall be subject to the three month inspection program. Changes are submitted as Attachment A.

Paragraph 3 of your letter:

Sections 5.1.2 through 5.1.5 of Administrative Procedures has been deleted. Personnel will be audited every three months or at the their first evolution following the three month period. Changes are submitted as Attachment A.

Paragraph 4 of your letter:

Section 8.3 of Administrative Procedures has been changed to reflect the visible and audible alarms activating when the source is exposed. Changes are submitted as Attachment A.

Paragraph 5 of your letter:

Calculations for permanent radiography facility are attached as Attachment B.

Paragraph 6 of your letter:

Section 15 (Reporting of defects and noncompliance) has been revised to reflect notification in the event of radiographic equipment incidents. Changes are submitted as Attachment C.

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Paragraph 7 of your letter:

Section 7 has been revised to restrict the transportation of radioactive material to the Radioactive Level II level only by Allegheny Laboratories personnel. Revised map to reflect current Agreement States. Changes are submitted as Attachment D.

Paragraph 8 of your letter:

Section 10 (Emergency Procedures) has been revised to reflect that the RSO shall contact Emergency source recovery personnel from Sentinel/Amersham for all recovery actions. Changes submitted as Attachment E.

I hope that this will clear up any confusion in our original submittal. Please contact me if there may be any further comment.

Sincerely,

A handwritten signature in dark ink, appearing to read 'm b croghan', written in a cursive style.

Michael B. Croghan

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ATTACHMENT A

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4.5 cont.

and emergency procedures, company policies for radiation safety practices and new regulations or requirements. This training will be documented and placed on file. Documentation of training shall indicate date training was held, duration of training, subject matter covered and the instructor.

- 5.0 Performance evaluations shall be conducted on radiographers and radiographer assistants to assure that regulations and operating and emergency procedures are followed. These inspections shall be conducted every (3) months by the RSO. If a radiographer or a radiographer's assistant has not participated in a radiographic operation for more than three months since the last inspection, that individual's performance shall be observed and recorded the next time the individual participates in a radiographic evolution. The method of inspection/evaluation shall be as follows:
- 5.0.1 Job site visits for the purpose of evaluating the degree of compliance with radiation safety requirements shall be unannounced.
 - 5.0.2 Radiographic Operations should be observed unannounced. After radiographic operations have been observed and personnel have been evaluated, the inspector will announce his intentions to conduct an inspection to determine the radiographer's and radiographer assistant's degree of competency.
 - 5.0.3 All observations made up to this point whether complimentary or detrimental should be presented to the radiographer for his comment.
 - 5.0.4 A physical inspection of the radiography unit, personnel monitoring equipment, survey instruments and exposure device is to be made by the inspector.
 - 5.0.5 The radiographer's controlled copy of Allegheny Laboratories Radiation Safety Operating and Emergency Procedures, 10 CFR, Parts 19, 20, 21, 30, 34, 40, 71, The NRC Byproduct Material License with amendments are to be examined to ensure they are complete and up to date. Sections requiring updating or replacing shall be conducted at this point prior to any additional work.
 - 5.0.6 The inspector shall review with the radiographer and radiographer assistant dosimeter records and the radiation reports.
 - 5.0.7 The inspector shall review with the radiographer and radiographer assistant his findings. The inspector will in definite terms outline all areas where conditions do not meet Operating and Emergency Procedures or NRC Regulations. Based on the severity of findings the RSO will determine whether radiographic operations may continue or be suspended until necessary corrective actions have been taken.
 - 5.0.8 The inspector will complete the inspection report, review findings with radiographer and radiographers assistant, initiate corrective actions and maintain on file for 3 years.

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- 6.0 Survey Meters for physical radiation surveys performed by qualified radiographic personnel of Allegheny Laboratories shall have a range sufficient to measure 2 milliroentgen per hour through 1 roentgen per hour, and shall be calibrated at intervals not to exceed 3 months and after each instrument repair. Prior to use the survey meter shall be inspected for satisfactory operation and calibration is current. Survey meters shall be calibrated so that the readings are + or - 20% of the actual values of the range of the instrument. Records of calibration shall contain the results of calibration, date of the last calibration, due date of the next calibration affixed to the survey meter. Records of calibration shall be retained for a minimum of 3 years. Authorized vendors for the calibration of survey meters are as listed below.

- (A) Applied Health Physics, Inc.
2986 Industrial Blvd
Bethel Park, PA 15102
(412)-835-9555 fax- (412)-835-9559
NRC License # 37-09135-01 PA License # PA-0228
- (B) Sentinel / Amersham Corporation
6134 Holly Field Dr.
Baton Rouge, LA 70809
(504)-751-5893
License # LA-5934-L01

Self Reading Pocket Dosimeters, Alarming Ratemeters (worn by personnel during radiographic evolutions) and Vault Gamma Alarm shall also be calibrated by the above on an annual basis. Records of calibration shall be retained for a minimum of 5 years.

- 7.0 Personnel Monitoring shall be required for radiographers and radiographer assistants during radiographic operations. Each radiographer and radiographer assistant shall be assigned a film badge which is to be worn and used only by him. Under no circumstances shall an individual use a film badge not assigned to him. The Film Badge is for recording legal record occupational exposures to ionizing radiation. The maximum time for the exchange of film badges is monthly. No radiographic evolution's will be conducted with a Film Badge which has exceeded this requirement. Badges will be turned in to the RSO monthly for processing at which time a replacement will be issued. Film Badges will be worn on the frontal chest or waist area of the body. At no time will you remove your film badge while conducting radiographic evolution's. Care shall be exercised to prevent loss or damage. Following a field assignment and radiographic operations has been completed, Film Badges will be turned in to the RSO for safe keeping. Records of exposure shall be kept on file indefinite or until the NRC authorizes otherwise.
- 7.1 Self Reading Pocket Dosimeters (2) shall be worn by the radiographer and radiographer assistant during radiographic operations. Pocket Dosimeters shall have a range of 0 to 200 milliroentgen and shall be recharged prior to the start of each shift. Pocket Dosimeters shall be calibrated at periods not to exceed one year for correct response to radiation. Pocket Dosimeters shall be worn adjacent to the Film Badge (frontal chest or waist). Pocket Dosimeters will be read on a frequent basis while engaged in radiographic operations. Pocket Dosimeters shall be read and exposures recorded daily. These records shall be retained for a minimum of 5 years.

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- 7.2 Each Radiographer and Radiographers Assistant shall wear an audible alarm ratemeter while engaged in radiographic operations. They shall be capable of giving an alarm at a preset dose rate of 500 mR/hr, require special means to change the preset alarm function and calibrated at periods not to exceed one year. The operation and alarm function must be verified prior to each shift. The audible alarm ratemeter shall be worn adjacent to the Film Badge and Pocket Dosimeters (frontal chest or waist).
- 8.0 Facilities
- 8.1 The purpose of the shielded facility is to permit the performance of training, maintenance of radiographic exposure devices, source transfers to and from shipping containers and the actual performance of source radiography. The storage of shipping containers, and exposure devices will be the only radioactive material stored in this facility.
- 8.2 The radiographic facility (Vault) Drawing #1 is located in building at 671 Colbert Ave., Oil City, Pennsylvania 16374. Exposure of the sources is accomplished by manipulating a remote control mechanism. The vault is designed with shielding sufficient to permit unrestricted access adjacent to the facilities. Drawing #2 and 2A show the vault dimensions and shielding. The walls and ceiling of the vault are a minimum of 35 inches of concrete and one half inch of steel. The floor is concrete with no access to the underside of the vault or any other area of the facility. Within the vault is a recessed "pit" area as shown on Drawings #2 and 2A. The exterior of the facilities building is constructed with a combination of brick, wood, and steel (for structural purposes). Overhead doors are electric and can only be opened from the building interior. All doors are locked or barricaded that would allow access into the facilities. Access to the vault is limited to the vault door which is maintained in a locked condition when not in use.
- 8.3 The vault is equipped with a visiole flashing light and an audible alarm which sounds whenever the source is exposed. This alarm shall be tested for proper operation every 3 months or prior to use. Unsatisfactory response shall be cause for the immediate repair or replacement of alarm and all radiographic evolution's shall be suspended until corrective actions are initiated. Any malfunctioning of alarm shall be reported to the RSO immediately.
- 8.4 The door to the vault shall be kept locked at all times when not being used. Only the RSO and qualified Allegheny Laboratories Radiographers shall have access to these keys. A locked storage box for vault keys shall be located in the RSO office. A separate key will be required to open and gain access to vault keys. The only personnel who will have keys to this separate lock box will be the RSO and qualified Allegheny Laboratories Radiographers. A Key Control Log will be maintained by the RSO of those personnel issued keys.
- 8.5 Drawing #1 shows the source storage positions for all sources and equipment. Each exposure device is locked at all times except when in actual use and keys are kept in the lock box as described above. Again, only the RSO and qualified Allegheny Laboratories Radiographers shall have access to these keys and the RSO shall maintain an up to date Key Control Log.

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- 8.5.1 Drawing #1 shows a secondary storage area for **empty** exposure devices and shipping containers that are no longer approved for use in radiographic evolutions. This storage area shall be utilized for all radiographic exposure devices and shipping containers until such time as the vault shown on drawing #1 is constructed. In the event that the vault is not available for storage, the secondary storage area shall be utilized until the vault becomes available for use. Under no circumstances will the secondary storage area be used for radiographic exposures.
- 8.6 The radiographic facility shall be surveyed extensively following the approval of this license and the results maintained on file by the RSO for the life of the approved license or until otherwise determined by the NRC. This survey will be accomplished by the RSO in accordance with Radiation Survey Procedures, Section 14 and shall be based on the highest source activity permitted by license. Radiographic evolution's utilizing cobalt 60 shall be accomplished with a collimator to the maximum extent possible. All radiographic evolution's shall be performed in the vault pit (drawing #2). Based on the vault shielding and design, the radiographic source (50 Curies of Co-60 or 100 Curies of Ir-192), when exposed shall remain away from all walls and ceiling for a minimum of 3 feet.
- 8.7 Posted film badges (M) as shown drawing #1 will show that no one would receive greater than a 2 milliroetgen in any one hour or 50 milliroetgen in a year if they were continuously present in the unrestricted area.

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ATTACHMENT B

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Permanent Radiography Facility Radiation level calculations

Vault as shown in Administrative Procedures shall be constructed of 1/2" of Steel and 35" of Concrete.

Calculations are based on the maximum curie content of Ir-192 (100 curies) and Co-60 (50 curies).

Attenuation factors were obtained from Amersham Radiation Safety Handbook (Attenuation charts attached).

100 curies of Ir-192 X 5.9 R/hr @ 1 foot = 590 R/hr @ 1 foot or 590,000 Mr/hr @ 1 foot

590,000 Mr/hr @ 1 foot X .55 (1/2" of steel attenuation factor) = 324,500 Mr/hr @ 1 foot

324,500 Mr/hr @ 1 foot X .00001 (35" of concrete attenuation factor) = 3.245 Mr/hr @ 1 foot

3.245 Mr/hr / 2 Mr/hr = 1.6225 Mr/hr @ 1 foot

$$\sqrt{1.6225} = 1.27 \text{ foot (2 Mr/hr distance)}$$

Therefore the 2 Mr/hr radiation level would remain confined within the vault.

100 curies of Co-60 X 14.3 R/hr @ 1 foot = 715 R/hr @ 1 foot or 715,000 Mr/hr @ 1 foot

715,000 Mr/hr @ 1 foot X .78 (1/2" of steel attenuation factor) = 557,700 Mr/hr @ 1 foot

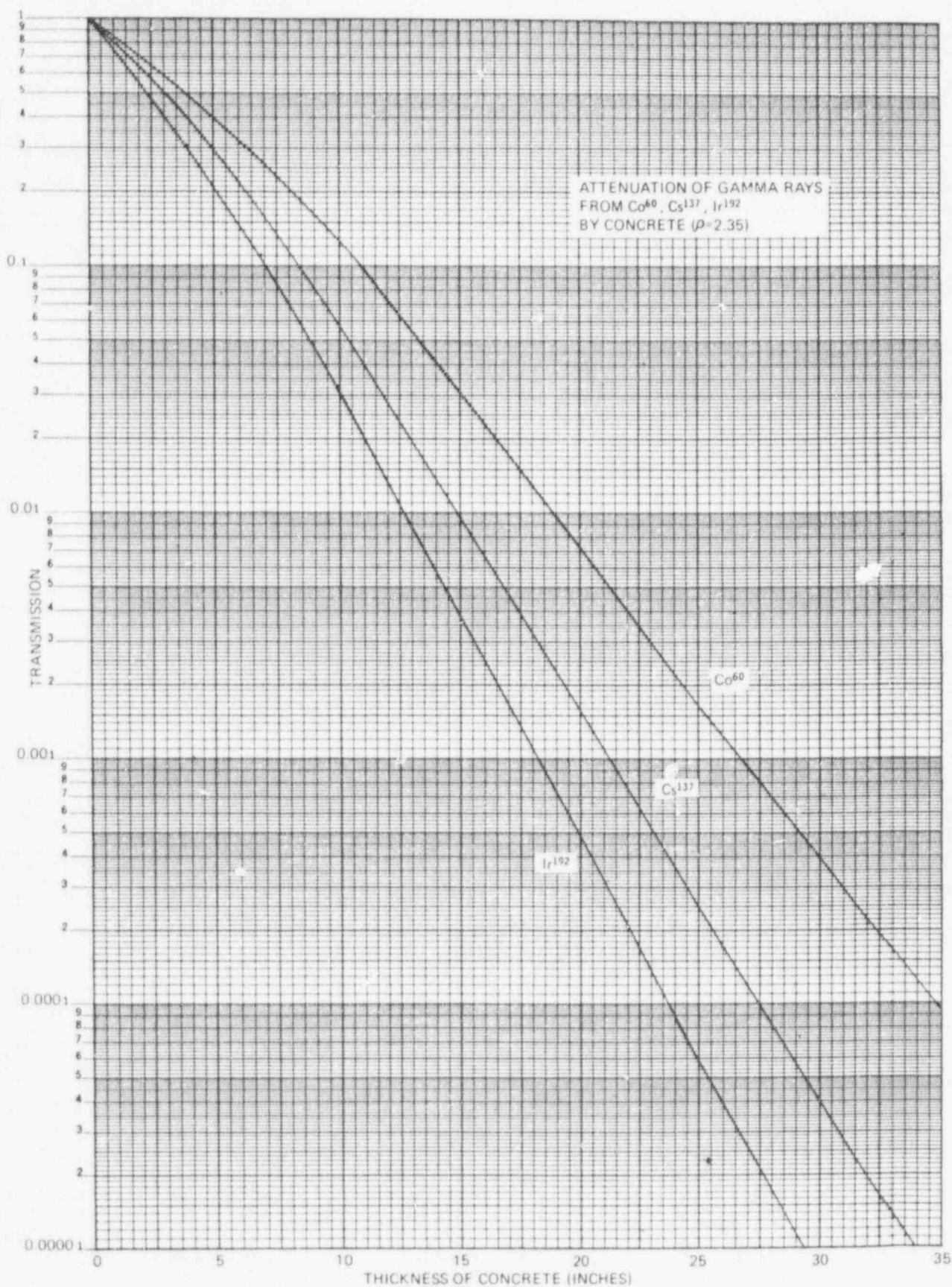
557,700 Mr/hr @ 1 foot X .000094 (35" of concrete attenuation factor) = 52.42 Mr/hr @ 1 foot

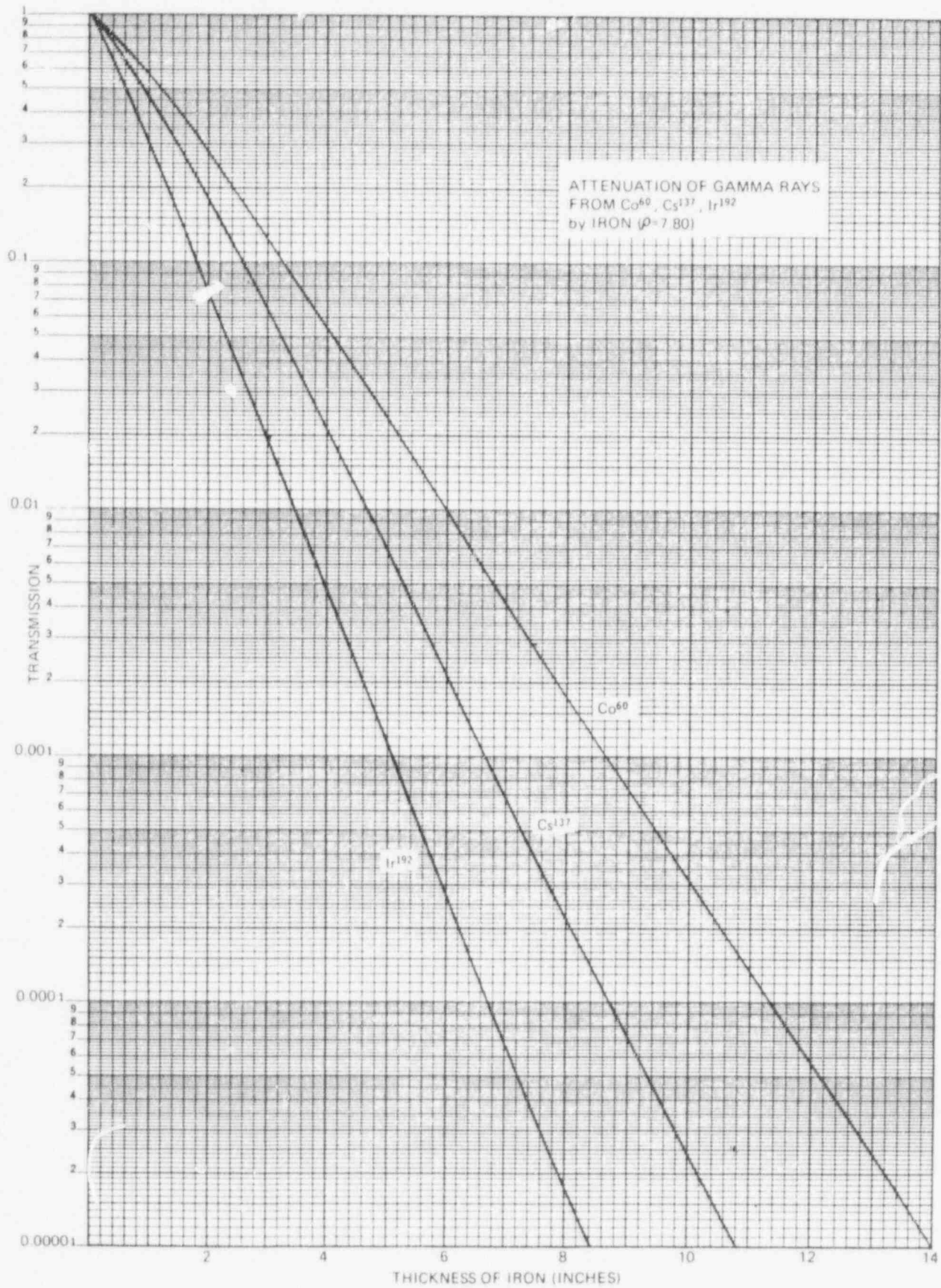
52.42 Mr/hr / 2 Mr/hr = 26.2 Mr/hr @ 1 foot

$$\sqrt{26.2} = 5.12 \text{ feet (2 Mr/hr distance)}$$

Therefore the 2 Mr/hr radiation level would remain confined within the vault. As stated in paragraph 8.6 of the Administrative Procedures all sources will remain away from any wall and ceiling by a minimum of 3 feet.

The floor is a concrete slab with no below ground facilities or basement.





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ATTACHMENT C

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- (6) In the case of a basic component which contains a defect or fails to comply, the number and location of all such components in use at, supplied for, or being supplied for one or more facilities or activities subject to the regulations.
- (7) The corrective action which has been, is being, or will be taken; the name of the individual or organization responsible for the action; and the length of time that has been or will be taken to complete the action.
- (8) Any advice related to the defect or failure to comply about the facility, activity, or basic component that has been, is being, or will be given to purchasers or licensees.

E. A written report shall be submitted by the RSO and/or radiographer in charge to the U.S. Nuclear Regulatory Commission; Division of Industrial and Medical Nuclear Safety; Medical, Academic and /Commercial Use Safety Branch; Washington, DC 20555, with a copy to the Director, Office for Analysis and Evaluation of Operational Data, U.S. Nuclear Regulatory Commission, Washington, DC 20555, within 30 days of an incident involving radiographic equipment. The following incidents require reporting:

- (1) Unintentional disconnection of the source assembly from the control cable.
- (2) In ability to retract the source assembly to its fully shielded position and secure it in this position.
- (3) Failure of any component (critical to safe operation of the device) to properly perform its intended function.

The following information shall be included in the report:

- (1) A description of the equipment problem
- (2) Cause of each incident, if known
- (3) Manufacturer and model number of equipment involved in the incident
- (4) Place, time and date of the incident
- (5) Actions taken to establish normal operations
- (6) Corrective actions taken or planned to prevent reoccurrence.
- (7) Qualifications of personnel involved in the incident

Reports of overexposure which involve failure of safety components of radiography equipment must also include the information specified above.

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ATTACHMENT D

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TRANSPORTATION OF RADIOACTIVE MATERIAL

1. The transportation of radioactive material for the purpose of this procedure, shall be defined as the movement of the material for the purpose of conducting radiographic operations.
 - A. When movement is by vehicle, the radiographic exposure device containing a sealed source shall be secured in a storage compartment of the transporting vehicle to prevent shifting or loss. The compartment must be locked to prevent unauthorized entry and the compartment must be posted with a sign bearing the radiation caution symbol (yellow and magenta background) with the words "CAUTION - RADIOACTIVE MATERIAL" or "DANGER - RADIOACTIVE MATERIAL".
 - I. Exposure devices shall be properly package, marked, labeled and the correct shipping papers are complete and in the drivers compartment. (see attachment A)
 - II. The transportation of Radioactive Level III Material shall not be performed by Allegheny Laboratories personnel. Radioactive Level III material when required to be transported shall be performed by an authorized freight carrier or placed in a shielded storage container that will reduce the actual dose rates to a Radioactive Level II level.
 - III. A physical radiation survey shall be made of the storage compartment and the levels of the radiation shall not exceed 50 mR/hr at all outside surfaces and not more than 1.0 mR/hr at three feet from the surface. The radiation level at the drivers location shall not exceed two (2) mR/hr. Survey the transporting vehicle one (1) foot from all outer surfaces, radiation levels shall not exceed 2 mR/hr. Surveys for the purpose of transporting a radiographic source shall be documented on the Radiation Report Form.
 - IV. The radiation survey meter shall remain in the drivers compartment during transporting of the source.
 - V. The following equipment as a minimum shall be carried in the vehicle:
 - a. One thousand (1,000) feet of yellow and magenta line or tape.
 - b. Eight (8) "CAUTION - RADIATION AREA" signs
 - c. Eight (8) "CAUTION - HIGH RADIATION AREA" signs
 - d. Four (4) rope stands
 - e. Fire Extinguisher
 - f. Flashlight
 - g. Spare Tire
 - h. Vehicle Tools

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I. Emergency Flares or Reflective Triangles

VI. Notification and approval in advance must be obtained from any agreement state prior to transporting radioactive material across state lines. The customer and/or area tenant shall be informed of the tentative arrival on site with radioactive material. The RSO shall be contacted and briefed as to the route to be followed, the time of departure and the estimated time of arrival.

VII. During transportation of Radioactive Material;

- a. The vehicle will not be left unattended and unlocked. When parking, the vehicle load compartment shall be locked.
- b. Leave a clear space of a minimum 6 feet all around vehicle.
- c. All traffic rules and regulations shall be adhered to verbatim.
- d. No passengers shall be carried other than radiography personnel
- e. Personnel monitoring devices (film badge, pocket dosimeters and alarming Ratemeters) shall be worn at all times while transporting.
- f. Refer to the Emergency Procedures, Section 10, in the event of a breakdown or accident.

VIII. Upon arrival at destination:

- a. Monitor Exposure Device.
- b. Notify the RSO of your arrival
- c. Proceed with radiographic exposure procedures in accordance with Section 9.

IX. Leaving a field site to return to Allegheny Laboratories storage facility.

- a. Repeat all steps in this procedure
- b. The exposure device shall be surveyed upon arrival to facilities and also once placed in storage.

2. Security of seal sources

- A. Each Radiographic exposure device shall be provided with a lock designed to prevent unauthorized or accidental removal or expose of a sealed source and shall be kept locked at all times except when in use and under the direct surveillance of a radiographer or radiographer's assistant.

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- B. Each radiographic exposure device shall be stored in a container or place (such as a room, area, or truck) which is provided with locks and such other safeguards as may be needed to protect against unauthorized or accidental removal.
- C. Physical surveys shall be made at the outside surfaces of the storage container or place, and the radiation levels at the surface shall not exceed 2 mR/hr.
- D. A sign bearing the radiation caution symbol (magenta and yellow background) with the words "CAUTION -RADIOACTIVE MATERIAL" or "DANGER - RADIOACTIVE MATERIAL" must be posted on the outside of the container or place.
- E. Sealed sources, not assigned to job sites, **will not** remain in a vehicle overnight. Sources must be secured in storage areas designated for Allegheny Laboratories.
- F. The sealed sources will be stored in a container(s) similar to that in the sketch attached. This container(s) will be constructed of a material and in such a way as to retain the radiation level at 2 mR/hr or less at the surface.

AGREEMENT STATES

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ATTACHMENT E

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EMERGENCY PROCEDURES

1. Notification
 - A. In the event of any emergency (as defined in Section 4 Definitions), the Radiation Safety Officer will be notified immediately.
2. Loss of Control of Radioactive Material
 - A. Extend area if necessary in order to maintain the 2 mR/hr line. Security of the area shall be maintained until otherwise directed by the RSO.
 - B. Notify the RSO immediately.
 - C. The Radiographer in charge will locate the general position of the source using survey meter. Under no circumstances shall he attempt to approach the High Radiation Area and cause undue exposure.
 - D. Having personnel place lead sheet and /or lead shot bags over the source may not always be appropriate as it may hinder any recovery actions. All recovery actions for a loss of control shall be performed in accordance with a planned procedure in such a manner to limit individual exposures to less than 100 mrem. All recovery actions shall be planned and performed by Sentinel/Amersham emergency recovery personnel with the RSO in attendance.
 - E. The RSO will investigate and determine cause.
 - F. The RSO with Sentinel/Amersham emergency recovery personnel will plan corrective action and direct recovery.
 - G. Limit exposure by utilizing TIME / DISTANCE / SHIELDING.
3. Exposure to Personnel not Monitored
 - A. Detain the exposed person or persons
 - B. Immediately note the following:
 - (1) Approximate distance from source
 - (2) Time at this distance
 - (3) Shielding, if any (structural walls, storage tanks etc.)
 - C. Obtain Name of individual(s), Company's Name and Supervisors
 - D. Notify RSO
 - E. The RSO, will determine the approximate dose from notes taken by the Radiographer. If appropriate the exposed person(s) will be transported to the nearest hospital for evaluation by medical personnel.

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4. Overexposure to Monitored Personnel

- A. In the event of any exposure exceeding the limits set forth in Section 5 LIMITS OF EXPOSURE of this License, notify the RSO immediately.
- B. The RSO shall prepare a report as required by Section 15 REPORTING OF DEFECTS AND NONCOMPLIANCE of this license.

5. Fire Directly Involving Radioactive Material

- A. If the source is in the exposed position - retract into exposure device, survey source guide tube, collimator and exposure device, then lock exposure device.
- B. Notify:
 - (1) Fire Department
 - (2) RSO
 - (3) Police
- C. Remove radioactive material from the area of the fire.

6. Vehicular Accidents

- A. Survey the exposure device.
- B. If no operating radiation survey instruments are available (due to accident), it will be assumed that a RADIATION HAZARD exists and the procedure established below will be followed.
- C. If a RADIATION HAZARD exists, clear the area and rope off and post the 2 mR/hr line.
 - (1) Distances to the 100 mR/hr and 2 mR/hr line, in feet are as follows:

Activity (curies Ir-192)	100 mR/hr	2 mR/hr
100	76.8	543
90	72.9	515
80	68.7	485
70	64.3	455
60	59.5	420
50	54.3	384
40	48.6	343
30	42.1	297
20	34.4	243
10	24.3	172

Activity (curies Co-60)	100 mR/hr	2 mR/hr
50	83.7	592
40	74.8	529.2
30	64.8	458.3
20	53.0	374.2
10	37.4	265.0

ALLEGHENY LABORATORIES
RD #2 BOX 4-A
KENNERDELL, PA 16374

(2) Notify

- (a) Radiation Safety Officer (RSO)
 - (b) Local and/or State Police
- (3) The RSO will take charge of operations at the scene to minimize exposure to all personnel and reduce the effect of surrounding operations. In the event the RSO is not in the immediate area, the radiographer in charge shall establish control at the scene, notify the RSO by phone and brief him as to the status at the scene. The RSO shall direct immediate actions via phone, mobilize himself to the emergency site and contact Sentinel/Amersham emergency recovery personnel to execute recovery actions.
- (4) The RSO shall IMMEDIATELY notify the NRC Operations Center by phone at (301)-951-0550 and by telegram, mailgram, or facsimile to the Administrator NRC Regional Office #1, 475 Allendale Road, King of Prussia, PA. 19406 phone # (215)-337-5000 and FTS 346-5000.
- (5) In addition to the notifications above the RSO shall submit written reports as required and discuss in Section 15 "REPORTING OF DEFECTS AND NONCOMPLIANCE" of these operating and emergency procedures.

JUL 17 1996

License No. 37-20734-01
Docket No. 030-22013
Control No. 123179

Michael B. Croghan
Allegheny Laboratories
R.D. #2 Box 4-A
Kennerdell, Pennsylvania 16374

Dear Mr. Croghan:

This is in reference to your application dated May 1, 1996 to amend License No. 37-20734-01. In order to continue our review, we need the following additional information:

1. In Section 5.0.B of your Administrative Procedures, you indicate that a radiographer or radiographer's assistant could be audited by means of a simulated radiographic operation if their three month audit is due. 10 CFR 34.11(d)(1) requires that the applicant for a specific license for use of sealed sources in radiography must have an audit program that includes the observation of the performance of each radiographer and radiographer's assistant during an actual radiographic operation at intervals not to exceed three months. Please modify your procedures for auditing of radiographic personnel to comply with 10 CFR 34.11(d)(1).
2. Section 5.1.1 of your Administrative Procedures indicate that the Radiation Safety Officer (RSO) is exempt from the inspection program if certain conditions are met. All personnel who use or personally supervise the use sealed sources in a radiographic exposure device or source exchanger are subject to the inspection program requirements in 10 CFR 34.11(d). Please modify your procedures to ensure that all personnel, including the RSO, who use radiographic equipment are subject to the inspection program required in 10 CFR 34.11(d).
3. Section 5.1.2 through 5.1.5 of your Administrative Procedures specify conditions in which radiographic personnel are audited if they do not perform radiographic operations within a specific period of time. Please modify these procedures to comply with the requirements of 10 CFR 34.11(d)(1) and (2).
4. In Section 8.3 of your Administrative Procedures, you state that the audible and visible alarms will actuate when the vault door is opened and radiation levels exceed 10 milliroentgens per hour. 10 CFR 34.29(b) requires that the audible and visible alarm actuate when radiation is present. Please modify your procedures and permanent radiographic facility to comply with the requirements of 10 CFR 34.29.

OFFICIAL RECORD COPY

ML 10

5. Please provide the results of radiation level calculations or actual radiation measurements adjacent to, above, and below your permanent radiography facility. The radiation level in all directions around the facility, including the roof, should not exceed 2 milliroentgens in any one hour. Clearly identify the type of source (isotope), the amount of licensed material in the source (activity in curies), and the position of the source within the facility for the calculations or measurements. Calculations should be for a "worst case" set-up with the source one foot from each wall providing shielding. Describe any limitations that will be used in the facility to minimize radiation. Examples of limitations include source position limitations, limits on the types of sources (isotopes) that will be used, limits on the maximum amount (curies) of any source, and/or use of a collimator.
6. Your application does not contain sufficient instructions to your personnel that the NRC should be notified whenever there is an incident involving radiographic equipment as described in 10 CFR 34.30(a). Please modify your procedures to require this notification.
7. In Section 7 of your application, you describe your procedures for transportation of radioactive materials. Please modify your procedures to include:
 - a. compliance with the requirements of 49 CFR 390 through 397 when operating a placarded vehicle; and
 - b. an updated map of Agreement States in the Appendix. A copy of Agreement States and contacts are enclosed.
8. Section 10 of your procedures appear to authorize the Radiation Safety Officer to perform source retrieval. NRC expects individuals who perform source retrieval operations to have special training and equipment for performance of this task. Please describe your specific Radiation Safety Officer training which prepares you for these operations. You may choose to use an outside consultant with expertise in source recovery as an alternative. If you intend to do your own source recovery please also include detailed O&E procedures describing special equipment, (high range self-reading dosimetry, shields and remote handling tools) and its use.

We will continue our review upon receipt of this information. Please reply in duplicate to my attention at the Region I Office and refer to Mail Control No. 123179. If you have any technical questions regarding this deficiency letter, please call me at (610) 337-5042.

Michael B. Croghan
Allegheny Laboratories

-3-

If we do not receive a reply from you within 30 calendar days from the date of this letter, we shall assume that you do not wish to pursue your application.

Sincerely,

Original Signed By:
Duncan White

Duncan White
Nuclear Materials Safety Branch 3
Division of Nuclear Materials Safety

License No. 37-20734-01
Docket No. 030-22013
Control No. 123179

Enclosures:

1. 10 CFR Parts 20 and 34
2. Agreement State List

DOCUMENT NAME: R:\WPS\DLTR\L3720734.01

To receive a copy of this document, indicate in the box: "C" = Copy w/o attach/encl "E" = Copy w/ attach/encl "N" = No copy

OFFICE	DNMS/RI	N	DNMS/RI				
NAME	DWhite						
DATE	07/16/96	07/	/96	07/	/96	07/	/96

OFFICIAL RECORD COPY

(10-94)
10 CFR 30, 32, 33,
34, 35, 36, 39 and 40

APPLICATION FOR MATERIAL LICENSE

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 9 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-6 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.

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. *030-22013*

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
611 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) <input type="checkbox"/> A. NEW LICENSE <input checked="" type="checkbox"/> B. AMENDMENT TO LICENSE NUMBER <u>37-20734-01</u> <input type="checkbox"/> C. RENEWAL OF LICENSE NUMBER _____		2. NAME AND MAILING ADDRESS OF APPLICANT (Include Zip code) <u>Allegheny Laboratories</u> <u>RD #2 Box 4-A</u> <u>Kennerdell, PA 16374</u>			
3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED <u>671 Colbert Ave.</u> <u>Oil City, PA 16374</u> <u>Temporary Job sites in states subject to NRC's</u> <u>Regulatory Authority</u>		4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION <u>Michael B. Croghan</u> <u>Radiation Safety Officer</u> TELEPHONE NUMBER <u>814-385-6607</u>			
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 <u>refer to 37-20734-01</u>		6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED <u>refer to 37-20734-01</u>			
7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING EXPERIENCE <u>refer to 37-20734-01</u>		8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS <u>refer to 37-20734-01</u>			
9. FACILITIES AND EQUIPMENT <u>refer to 37-20734-01</u>		10. RADIATION SAFETY PROGRAM <u>refer to 37-20734-01</u>			
11. WASTE MANAGEMENT <u>refer to 37-20734-01</u>		12. LICENSEE FEES (See 10 CFR 170 and Section 170.31) FEE CATEGORY <u>amendment</u> AMOUNT ENCLOSED \$ <u>720.00</u>			
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 <u>Michael B. Croghan Radiation Safety Officer</u>		SIGNATURE <u>[Signature]</u> DATE <u>May 1, 1996</u>			
FOR NRC USE ONLY					
TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
			\$		
APPROVED BY				DATE	

ALLEGHENY LABORATORIES
RD #2 BOX 4-A
KENNERDELL, PA 16374

May 1, 1996

Licensing Assistant Section
Nuclear Materials Safety Branch
475 Allendale Road
King of Prussia, PA 19406-1415

Dear Sir,

A license amendment is being submitted for review and approval on this date for the following reasons:

The reorganization of Allegheny Laboratories

- A. The designation and location of Allegheny Laboratories facilities. Included in Attachment A.
- B. The hiring and appointment (based on NRC approval) of a Radiation Safety Officer. Letter of Appointment and Credentials included as Attachment B.
- C. A complete rewrite on Allegheny Laboratories Operating and Emergency Procedures. Included as Attachment A.
Note: The Training Program, exams and answer keys shall remain as previously submitted with existing license.
- D. The construction of a permanent exposure and storage facility (shielded "Vault"). Included in Attachment A.

Our immediate needs in regard to this license amendment submittal are:

- A. Obtain approval of Radiation Safety Officer appointment in the interim while review of Allegheny Laboratories Operating and Emergency Procedures is being conducted.
- B. Obtain temporary approval to procure the Amersham Model 660B Exposure Device, drive cable assembly and source guide tubes.
- C. Conduct radiographic operations with the Amersham Model 660B Exposure Device utilizing existing Operating and Emergency Procedures until rewrite amendment submittal is approved for use.
- D. Begin construction of the permanent radiographic storage and exposure facility ("Vault"). It is our intention to use this as a temporary (field) radiographic operations site until License Amendment is approved and the "Vault" meets all NRC regulations.

ALLEGHENY LABORATORIES
RD #2 BOX 4-A
KENNERDELL, PA 16374

Continue to be licensed for the following:

Gamma Industries Model Century S and SA Exposure Devices with:

- a. Amersham/Technical Operations Iridium 192 source Model 89912 with a maximum curie content of 100.

Gamma Industries Model Gammatron 100A Exposure Device with:

- a. Gamma Industries Cobalt 60 source Model A8A with a maximum curie content of 100.

***NOTE: The above Exposure Devices and Sources will not be used in any radiographic operations. We will continue to store until the necessary arrangements can be made to properly dispose of the Sources along with the exposure devices with Sentinel/Amersham Corporation.

Amersham Amertest Model 660B Exposure Device with:

- a. Amersham/Technical Operations Iridium 192 source Model A424-9 with a maximum curie content of 100.

Amersham Technical Operations Model 680 Exposure Device with:

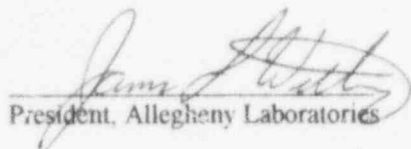
- a. Amersham/Technical Operations Cobalt 60 source Model A424-14 with a maximum curie content of 100.

***NOTE: The above Exposure Device is currently empty and will remain so until the retrofit locking assembly is performed. This will then be designated as a Model 680A Exposure Device by the manufacturer. We would like our license to reflect this retrofit model number along with the new manufactured Exposure Device Model 680B. The source assembly, model and curie content will remain as above.

Amersham/Technical Operations Model 650L Source Changer to be utilized with the Amersham/Technical Operations Iridium 192 source model A424-9

Thank you for your attention to this matter.

Sincerely,


President, Allegheny Laboratories

ALLEGHENY LABORATORIES
RD #2 BOX 4-A
KENNERDELL, PA 16374

Date: May 1, 1996

License No. 37-20734-01
Docket No. 30-22013

To: Licensing Assistant Section
Nuclear Materials Safety Branch
475 Allendale Road
King of Prussia, PA 19406-1415

Dear Sir,

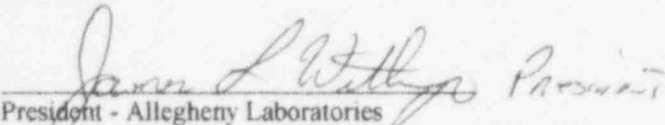
You are hereby notified that on May 1, 1996, I intend on assigning and appointing Michael B. Croghan to the position of Radiation Safety Officer. His assignment and permanent appointment will be based on a satisfactory review and approval of his credentials, (submitted as attachment A). Upon assignment he will be solely responsible for the Radiation Safety Program for Allegheny Laboratories.

Please direct any further correspondence to:

Allegheny Laboratories
RD #2 Box 4-A
Kennerdell, PA 16374
814-385-6607

Please contact me should you have any questions, and I thank you for your cooperation.

Very truly,

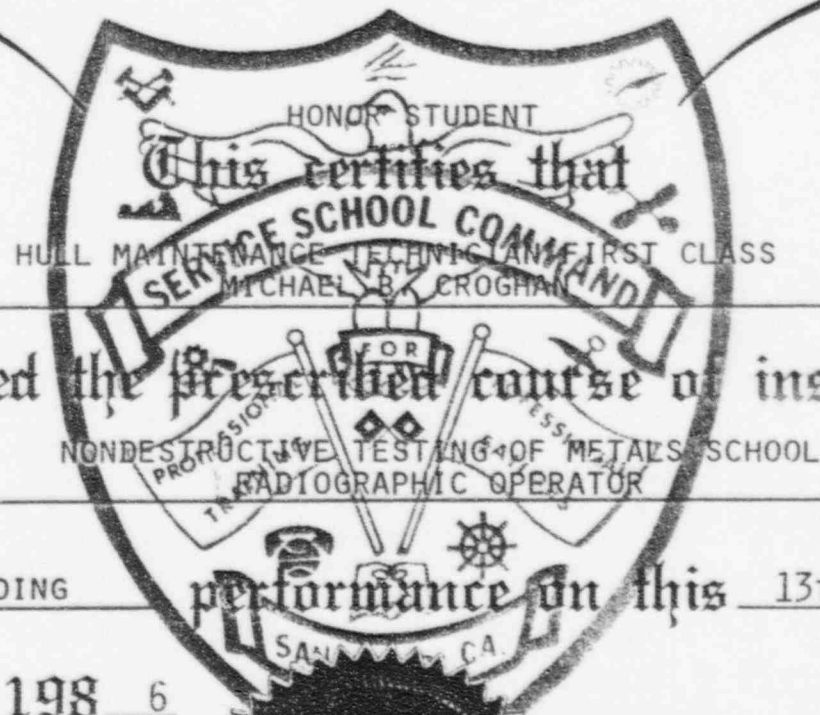

President - Allegheny Laboratories

CERTIFICATE OF RELEASE OR DISCHARGE FROM ACTIVE DUTY

1. NAME (Last, First, Middle) CROGHAN, MICHAEL BERNARD		2. DEPARTMENT, COMPONENT AND BRANCH NAVY-USN		3. SOCIAL SECURITY NO. 555 27 6085	
4. GRADE, RATE OR RANK HTC	4.b. PAY GRADE E-7	5. DATE OF BIRTH (YYMMDD) 580628		6. RESERVE OBLIG. TERM. DATE Year NA Month NA Day NA	
7.a. PLACE OF ENTRY INTO ACTIVE DUTY PITTSBURGH, PA		7.b. HOME OF RECORD AT TIME OF ENTRY (City and state, or complete address if known) NEW KENSINGTON, PA			
8.a. LAST DUTY ASSIGNMENT AND MAJOR COMMAND NUCLEAR POWER TRAINING UNIT BALLSTON SPA NY		8.b. STATION WHERE SEPARATED PERSONNEL SUPPORT ACTIVITY DETACHMENT SCOTIA NY			
9. COMMAND TO WHICH TRANSFERRED N/A		10. SGLI COVERAGE Amount: \$ 100,000.00		None	
11. PRIMARY SPECIALTY (List number, title and years and months in specialty. List additional specialty numbers and titles involving periods of one or more years) HT-4938 NDT EXAMINER (NUCLEAR) (03 YRS, 05 MOS) 4933 NDT RADIOGRAPHIC INSPECTOR (NON NUCLEAR) (03 YRS, 05 MOS) 4941 IMA PIPE SHOP JOURNEYMAN (06 YRS, 05 MOS) 9594 INTERMEDIATE MAINTENANCE ACTIVITY (IMA)		12. RECORD OF SERVICE Year(s) Month(s) Day(s) a. Date Entered AD This Period 87 MAY 22 b. Separation Date This Period 93 MAY 21 c. Net Active Service This Period 06 00 00 d. Total Prior Active Service 08 10 29 e. Total Prior Inactive Service 00 00 00 f. Foreign Service 00 00 00 g. Sea Service 00 00 00 h. Effective Date of Pay Grade 88 AUG 16			
13. DECORATIONS, MEDALS, BADGES, CITATIONS AND CAMPAIGN RIBBONS AWARDED OR AUTHORIZED (All periods of service) ENLISTED SURFACE WARFARE BREAST INSIGNIA, BATTLE EFFICIENCY "E" AWARD, NATIONAL DEFENSE SERVICE MEDAL, GOOD CONDUCT AWARD (THIRD), SEA SERVICE DEPLOYMENT RIBBON (FOURTH), NAVY EXPEDITIONARY MEDAL, HUMANITARIAN SERVICE MEDAL, EXPERT RIFLE RIBBON, EXPERT PISTON RIBBON					
14. MILITARY EDUCATION (Course title, number of weeks, and month and year completed) HULL MAINTENANCE TECHNICIAN CLASS "A" SCHOOL, 12 WKS, NOV 78; CWEA BASIC WELDING, 6 WKS, NOV 82; CWEA GENERAL MAINTENANCE WELDING, 6 WKS, JAN 82; FOAM GENERATING OPERATIONS AND MAINTENANCE 2 WKS, APR 82; VT, MT, PT OPERATOR INSPECTOR, 9 WKS, APR 86; RT OPERATOR, 10 WKS, JUN 86;					
15.a. MEMBER CONTRIBUTED TO POST-VIETNAM ERA VETERANS' EDUCATIONAL ASSISTANCE PROGRAM XX		15.b. HIGH SCHOOL GRADUATE OR EQUIVALENT XX		16. DAYS ACCRUED LEAVE PAID 15.7	
17. MEMBER WAS PROVIDED COMPLETE DENTAL EXAMINATION AND ALL APPROPRIATE DENTAL SERVICES AND TREATMENT WITHIN 90 DAYS PRIOR TO SEPARATION XX					
18. REMARKS BLK 11 CONT: NUCLEAR WELDER (03 YRS, 06 MOS) 4935-NDT RADIOGRAPHIC INSPECTOR (NUCLEAR) (05 YRS, 08 MOS) 4932-RADIOGRAPHER (06 YRS, 11 MOS) 4931-VT, MT AND PT INSPECTOR (07 YRS, 01 MOS) 4954-GENERAL MAINTENANCE (11 YRS, 04 MOS) BLK 14 CONT: RADIOGRAPHIC INSPECTOR, 5 WKS, SEP 87					
19.a. MAILING ADDRESS AFTER SEPARATION (Include Zip Code)			19.b. NEAREST RELATIVE (Name and address - include Zip Code) SALLY NELSON,		
20. MEMBER REQUESTS COPY 6 BE SENT TO NY DIR. OF VET AFFAIRS XX Yes XX No			22. OFFICIAL AUTHORIZED TO SIGN (Typed name, grade, title and signature) W T JOHNSON, PNC(SW), USN, DIVOFF, BY DIROIC		
21. SIGNATURE OF MEMBER BEING SEPARATED [Signature]					
SPECIAL ADDITIONAL INFORMATION (For use by authorized agencies only)					
23. TYPE OF SEPARATION DISCHARGE		24. CHARACTER OF SERVICE (Include upgrades) HONORABLE			
25. SEPARATION AUTHORITY MILPERSMAN 3620100		26. SEPARATION CODE KBK		27. REENTRY CODE RE-R1	
28. NARRATIVE REASON FOR SEPARATION EXPIRATION OF TERM OF ENLISTMENT					
29. DATES OF TIME LOST DURING THIS PERIOD TL: NONE				30. MEMBER REQUESTS COPY 4 MBG [Signature] Initials	

Service School Command

San Diego, Ca.



has completed the prescribed course of instruction in
with OUTSTANDING performance on this 13TH day of
JUNE, 1986


V. O. YOUNG, CAPTAIN, USN
COMMANDING OFFICER



AF 143

CATALOG OF NAVY TRAINING COURSES

DATE OF LAST CATALOG REVISION: 1992-03-19

COURSE SECURITY: UNCLAS

A-701-0032

NON-DESTRUCTIVE TESTING OF METALS RADIOGRAPHIC OPERATOR

LOCATION AND CDP: SSC ANNEX SD , 320F

LENGTH: 68 days P, 56 days M

CLASS OF SCHOOL/COURSE: C1

SKILL IDENTIFIER FOR WHICH TRAINED: NEC 4907

PURPOSE:

To provide necessary training on the specific equipment or skill described.

SCOPE:

Duties and responsibilities of the nondestructive test operator/inspector utilizing the following inspection processes on joints and weld zones: X-ray and gamma ray radiography utilizing radioactive sources. Special emphasis is placed on radiation control and detection and requirements for safe usage of radioactive sources. Graduates will be qualified to take radiographs.

PREREQUISITES:

Personnel meeting the following criteria: Must have satisfactorily completed the Nondestructive Testing of Metals Visual, Magnetic Particle, and Liquid Penetrant Operator/Inspector course, A-701-0033. GCT*ARI*MECH=155. Prior to reporting for training, candidates must be given a radiation physical in accordance with NAVMED P-5055, otherwise valuable training time is lost accomplishing the above.

QUOTA CONTROL: ACQU USN: PERS 402; OTHERS: See Volume I

PERSONNEL REPORT TO:

Commanding Officer, Service School Command Annex, Personnel Office, Bldg 56 (Window 5), Naval Station, 32nd St, San Diego, CA 92136 (After check-in, proceed to Bldg. 76)

SPECIAL INFORMATION:

This course is NOT available to foreign nationals. This course must be completed to become eligible for the certification program for NEC HT 4932.

See Skills Profile in Volume III.

TRAINING PLAN COORDINATOR: 03330

MODEL MANAGER CDP: 320F

SOURCE RATING: HT

CONVENING SCHEDULES: CDP LOCATION SHRTITLE
320F SSC ANNEX SD NDT RAD OPER

YR DATES
92 1013
93 0104 0315 0524 0802

23.0 1-3-2 0.0520

Adhere to equipment safety precautions used in NPPG welding.

TOTAL 1.000000

AF 094

SKILLS PROFILE

NON-DESTRUCTIVE TESTING OF METALS RADIOGRAPHIC OPERATOR

CIN: A-701-0032 COP: 320F

EFFECTIVE DATE: 1982-01-14

SKILL OR KNOWLEDGE ITEM

NUMBER	OBJECTIVE	WEIGHT
1.0	1.2 Phase II	0.0500
2.0	1.2 Phase I	0.0500
3.0	1.4 Phase I	0.0500
4.0	1.5 Phase I	0.0500
5.0	1.6 Phase I	0.1000
6.0	1.7 Phase I	0.1000
7.0	1.2.1 Phase II	0.1000
8.0	1.2.2 Phase II	0.1000
9.0	1.2.3 Phase II	0.0500
10.0	1.3.0 Phase II	0.1000
11.0	1.4.1 Phase II	0.1000
12.0	1.4.2 Phase II	0.0500
13.0	1.4.3 Phase II	0.1000
TOTAL		1.000000

Demonstrate a knowledge of the terms, NRC requirements and principles of safety of isotope radiation.

Solve mathematical problems to determine expected radiation exposure.

Properly use radiation monitoring equipment.

Demonstrate a knowledge of organizational and supervisory authorities for radiographic operations.

Demonstrate a knowledge of Federal Regulations, Title 10, Part 19, 20, 30, and 34.

Perform radiographic exposures using radiographic sources without violating safety requirements.

Demonstrate an understanding of definitions and fundamentals of radiography.

Demonstrate a knowledge of X-ray machine characteristics and variables.

Perform preventative maintenance and utilize safety precautions of X-ray equipment.

Process radiographic film utilizing manual methods.

Select the proper shims and penetrameters for use in radiography.

Determine the depth of a defect using the radiography technique.

Determine radiographic requirements for various systems in naval vessels and produce quality radiographs.



Kesselring Site Operation

Certificate of Appreciation awarded to

HTC MICHAEL CROGHAN

*in recognition of your
Positive Performance in the Radiological Controls Program*



J. M. Parson

Manager
J. Hauser

Manager, Radiological Controls

ALLEGHENY LABORATORIES
RD #2 BOX 4-A
KENNERDELL, PENNSYLVANIA 16374

RADIATION SAFETY ADMINISTRATION MANUAL

ALLEGHENY LABORATORIES
RD #2 BOX 4-A
KENNERDELL, PENNSYLVANIA 16374

MATERIALS LICENSE.....	1
NOTICE TO EMPLOYEES.....	2
ADMINISTRATIVE PROCEDURES.....	3
DEFINITIONS.....	4
LIMITS OF EXPOSURE.....	5
OPERATING INSTRUCTIONS FOR EQUIPMENT.....	6
TRANSPORTATION OF RADIOACTIVE MATERIAL.....	7
PROCUREMENT, RECEIPT AND TRANSFER OF RADIOACTIVE MATERIAL.....	8
RADIOGRAPHIC EXPOSURE PROCEDURE.....	9
EMERGENCY PROCEDURES.....	10
INSPECTION AND MAINTENANCE PROGRAM FOR RADIOGRAPHY EQUIPMENT	11
LEAK TEST PROCEDURE.....	12
SWIPE TEST PROCEDURE.....	13
RADIATION SURVEY PROCEDURES.....	14
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MATERIALS LICENSE
SECTION 1

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NOTICE TO EMPLOYEES
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ADMINISTRATIVE PROCEDURES
SECTION 3

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ADMINISTRATIVE PROCEDURES

- 1.0 PURPOSE AND SCOPE
- 2.0 REFERENCES
- 3.0 ADMINISTRATIVE ORGANIZATION AND RESPONSIBILITIES
- 4.0 PERSONNEL TRAINING AND QUALIFICATION REQUIREMENTS
- 5.0 REQUIREMENTS FOR INSPECTIONS OF RADIOGRAPHIC OPERATIONS
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- 7.0 PERSONNEL MONITORING
- 8.0 FACILITIES

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ALLEGHENY LABORATORIES ORGANIZATIONAL CHART

PRESIDENT

RADIATION SAFETY OFFICER

RADIOGRAPHERS

RADIOGRAPHER ASSISTANCES

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1.0 Purpose and Scope

The purpose of this manual is to promulgate operating and emergency procedures for assuring the safe handling of radioactive materials used in gamma radiography.

The procedures set forth herein are designed to control the use of radioactive materials used by qualified Allegheny Laboratories personnel. These procedures provide for radiation protection of individuals directly concerned with radiography and all personnel in the area where radioactive materials are used or stored. Radioactive isotopes are capable of inflicting serious bodily harm if used improperly or without proper regard for safety. The rules and regulations set forth herein are based on those of the Nuclear Regulatory Commission's, and the Department of Transportation.

2.0 References

- (a) Title 10 Code of Federal Regulations, Nuclear Regulatory Commission Rules and Regulations
- (b) Title 49 Code of Federal Regulations, Department of Transportation Rules and Regulations
- (c) Byproduct Material License No. 37-20734-01
- (d) Allegheny Laboratories Operating and Emergency Procedures (for the use of byproduct material). Amendments #1 - #7 and letters A - O.

3.0 Administrative Organization and Responsibilities

- 3.1 Radiation Safety Officer (RSO) is responsible for all matters related to industrial radiography and for the safe handling of radioactive sources used in radiographic operations. Should there exist an unsafe or potentially unsafe situation with regard to radiographic sources, the RSO shall be notified immediately. The only individual with authority to issue or change administrative, operating, or emergency procedures is the RSO. The name of the Radiation Safety Officer is Mr. Michael B. Croghan.

The RSO shall be responsible for :

- A. Establishing in writing and implementing the radiation safety program including assignment of responsibilities, operating and emergency procedures, conducting local training or orientation courses on radiation safety for Radiographers, Radiographer Assistants.
- B. Maintaining all records for the radiation safety program.
- C. Maintaining current copies of radiation protection standards operating and emergency procedures, and appropriate reference material.
- D. Performing accurate radiation surveys and leak tests, or ensuring that such surveys and leak tests are performed by qualified personnel. The accuracy of the surveys and leak tests, if performed by others, remains the responsibility of the RSO. The RSO will

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3.1 D cont.

maintain records of surveys and leak tests in accordance with the Commission's requirements.

E. Investigating and reporting appropriate findings of radiological accidents.

F. Assuring that radiation detection instruments respond to the type, energy and intensity of radiation to be measured; that the detection instruments are properly calibrated, and are available in sufficient quantities.

G. Conducting surveys/inspections in accordance with NRC requirements and as otherwise needed to ensure compliance with the radiation safety program.

H. Taking the following action with regard to ionizing radiation sources for which he is responsible, prior to being relieved of duty/position:

(1) Securing all sources in such a manner as to preclude use or removal during the period for which there is no RSO appointed.

(2) Turning over to a properly qualified and authorized individual all sources and records for which he is responsible. Such an individual will have the qualifications and training necessary to assume this position of authority.

I. Maintaining a current radiation source inventory, knowing the exact location of each source, and assuring the sources are secured against unauthorized use or removal.

J. Posting appropriate warning signs and notices.

K. Assuring that Radiographers and Radiographer Assistants have received thorough instructions prior to using, or being exposed to radiation.

L. Controlling contamination and personnel exposure.

M. Enforcing radiation safety procedures, rules and regulations of NRC 10 CFR's.

N. Maintain accurate receipt and transfer records of sources.

O. Ensuring performance or maintenance and inspections, surveys and leak tests.

3.2 Radiographer is the individual directly responsible to the RSO for assuring that radiography is performed in accordance with NRC regulations and the conditions of the NRC license. Radiographers shall be trained and held responsible for:

A. Knowing and complying with the radiation safety procedures, rules, and special instructions. Radiographers shall have in their possession controlled copies of the Allegheny Laboratories "Operating and Emergency Procedures", 10 CFR Parts 19, 20, 21, 30, 34, 40 and 71.

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- B. Operating safety equipment properly
- C. Performing maintenance and inspections.
- D. Reporting to the RSO any incident, personnel injury, suspected overexposure, contamination, or internal deposition involving radiation sources as soon as possible.
- E. Reporting to the RSO any hazardous or potentially hazardous working condition.
- F. Training Radiographer Assistants (Direct Supervision) in the safe handling of ionizing radiation sources and producing quality radiographs using ionizing radiation sources.
- G. Reporting to the RSO any malfunctioning equipment, probable cause of malfunction and recommended corrective measures.

3.3 Radiographer Assistants Shall be deemed to have acceptable judgment, comprehension and stability, in the opinion of the RSO, to participate safely in the use of radiographic exposure devices.

- A. A qualified Allegheny Laboratories Radiographer may act as a Radiographer Assistant with no additional qualification or training.
- B. A Radiographer Assistant will report to the Radiographer in charge and shall not perform or participate in any evolution prior to successfully completing the training requirements in Section 4.0 of this procedure.
- C. He shall demonstrate competence in the use, under the direct personal supervision of the radiographer, of radiographic exposure devices, sealed sources, related handling tools, and radiation safety instruments that will be used in his assigned duties.
- D. Personnel selected as Radiographer's Assistants will be assigned controlled copies of Allegheny Laboratories "Operating and Emergency Procedures", 10 CFR Parts 19, 20, 21, 30, 34, 40 and 71.

4.0 Personnel Training and Qualification Requirements

- 4.1 Radiation Safety Officers shall meet one of the following minimum qualification requirements:
 - A. Three years practical experience in the performance or direction of industrial radiographic operations.
 - B. Successful completion of an approved formal course of instruction in radiation health physics.

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- 4.1.1 The experience and training records of the RSO shall be maintained on file for submittal and auditing purposes. These records shall be retained for a minimum of three years after relieved/replaced as RSO.
- 4.2 Radiographers shall meet the following requirements:
- A. Assigned controlled copies of Allegheny Laboratories "Operating and Emergency Procedures", 10 CFR Parts 19, 20, 21, 30, 34, 40 and 71.
 - B. Have attended a minimum of 40 hours of formal classroom instruction in the topics of Appendix A to 10 CFR part 34. A minimum satisfactory grade of 80 % must be achieved by written examination of a minimum of 50 questions. All incorrect answers must be identified and discussed. If this formal training was administered by an outside training group; a 25 question written examination shall be administered to gauge the individuals understanding and knowledge of Allegheny Laboratories Operating and Emergency procedures. A minimum satisfactory score of 80% must be achieved. All incorrect answers must be identified and discussed.
 - C. Have served a minimum of 3 months (520 hours) of on-the-job training as a radiographer's assistant.
 - D. Demonstrate by a practical field examination the ability to properly utilize radiation survey instruments, personnel monitoring equipment and evidence a thorough understanding of the survey techniques involved. Must be aware of the correct operation of such instruments, the calibration requirements and the limitation of the instruments used. Must also have a working knowledge of the primary mathematics involved in basic radiation calculations. A minimum passing grade is 80% and all incorrect answers/actions shall be reviewed and discussed.
 - E. Demonstrate by a practical field examination thorough familiarity with the radiographic exposure equipment used, daily inspection and maintenance requirements, and with instructions for safe application of the units involved. A minimum passing grade is 80% and all incorrect answers/actions shall be reviewed and discussed.

Radiographers previously qualified by another licensee shall meet the following:

Objective quality evidence in the form of written training records, test scores, hours of experience and date of last performance evaluation from a licensee RSO shall be required as well as those specified below. In the event necessary records are unobtainable the individual will be considered a Radiography Assistant under training and must satisfy Allegheny Laboratories qualification and testing requirements.

- A. Assigned controlled copies of Allegheny Laboratories "Operating and Emergency Procedures", 10 CFR Parts 19, 20, 21, 30, 34, 40 and 71.
- B. Attend an "in-house" formal classroom training session on Allegheny Laboratories Operating and Emergency Procedures. This training shall be a minimum of 6 hours in duration.

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- C. Attend an "in-house" formal classroom training session on the safe use of radiographic equipment utilized by Allegheny Laboratories. This training shall be a minimum of 4 hours in duration.
- D. Successfully pass a written examination of a minimum of 50 questions dealing with the subject matter of Appendix A to 10 CFR part 34. A minimum satisfactory grade of 80 % must be achieved. All incorrect answers must be identified and discussed. A 25 question written examination shall be administered to gauge the individuals understanding and knowledge of Allegheny Laboratories Operating and Emergency procedures. A minimum satisfactory score of 80% must be achieved. All incorrect answers must be identified and discussed.
- E. Demonstrate by a practical field examination the ability to properly utilize radiation survey instruments, personnel monitoring equipment and evidence a thorough understanding of the survey techniques involved. Must be aware of the correct operation of such instruments, the calibration requirements and the limitation of the instruments used. Must also have a working knowledge of the primary mathematics involved in basic radiation calculations. A minimum passing grade is 80% and all incorrect answers/actions shall be reviewed and discussed.
- F. Demonstrate by a practical field examination thorough familiarity with the radiographic exposure equipment used, daily inspection and maintenance requirements, and with instructions for safe application of the units involved. A minimum passing grade is 80% and all incorrect answers/actions shall be reviewed and discussed.

4.3 Radiographer Assistants shall meet the following requirements:

- A. Assigned controlled copies of Allegheny Laboratories "Operating and Emergency Procedures", 10 CFR Parts 19, 20, 21, 30, 34, 40 and 71.
- B. Attend an "in-house" formal classroom training session on Allegheny Laboratories Operating and Emergency Procedures. This training shall be a minimum of 6 hours in duration.
- C. Attend an "in-house" formal classroom training session on the safe use of radiographic equipment utilized by Allegheny Laboratories. This training shall be a minimum of 4 hours in duration.
- D. Successfully pass a written examination of a minimum of 25 questions dealing with the subject matter of Allegheny Laboratories operating and emergency procedures and the proper use of radiographic equipment. A minimum satisfactory grade of 80 % must be achieved. All incorrect answers must be identified and discussed.

4.4 Any examination written or practical for initial qualification, requalification or annual refresher training less than 80 % is a failure. Reexamination shall not take place until an upgrading in the deficient areas has been conducted and documented in the individuals training file. A reexamination with different questions shall be taken.

4.5 All qualified radiographers and radiography assistants shall receive at least 8 hours of training on an annual basis. Areas to be addressed shall be radiation safety principles, regulations, operating

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and emergency procedures, company policies for radiation safety practices and new regulations or requirements. This training will be documented and placed on file. Documentation of training shall indicate date training was held, duration of training, subject matter covered and the instructor.

- 5.0 Performance evaluations shall be conducted on radiographers and radiographer assistants to assure that regulations and operating and emergency procedures are followed. These inspections shall be conducted every (3) months by the RSO. The method of inspection/evaluation shall be as follows.
- 5.1 Job site visits for the purpose of evaluating the degree of compliance with radiation safety requirements shall be unannounced.
 - 5.2 Radiographic Operations should be observed unannounced. After radiographic operations have been observed and personnel have been evaluated, the inspector will announce his intentions to conduct an inspection to determine the radiographer's and radiographer assistant's degree of competency.
 - 5.3 All observations made up to this point whether complimentary or detrimental should be presented to the radiographer for his comment.
 - 5.4 A physical inspection of the radiography unit, personnel monitoring equipment, survey instruments and exposure device is to be made by the inspector.
 - 5.5 The radiographer's controlled copy of Allegheny Laboratories Radiation Safety Operating and Emergency Procedures, 10 CFR, Parts 19, 20, 21, 30, 34, 40, 71, The NRC Byproduct Material License with amendments are to be examined to ensure they are complete and up to date. Sections requiring updating or replacing shall be conducted at this point prior to any additional work.
 - 5.6 The inspector shall review with the radiographer and radiographer assistant dosimeter records and the radiation reports.
 - 5.7 The inspector shall review with the radiographer and radiographer assistant his findings. The inspector will in definite terms outline all areas where conditions do not meet Operating and Emergency Procedures or NRC Regulations. Based on the severity of findings the RSO will determine whether radiographic operations may continue or be suspended until necessary corrective actions have been taken.
 - 5.8 The inspector will complete the inspection report, review findings with radiographer and radiographers assistant, initiate corrective actions and maintain on file for 3 years.
- 5.0.B Radiographic operations may be inspected by means of a simulated radiographic evolution staged by the RSO in the event no scheduled radiographic operations coincide with the radiographer's and radiographer assistant's (3) month interval due date. No actual source exposures are necessary, but radiation reports are to be prepare and noted. All inspections and surveys shall be conducted and recorded in accordance the operating and emergency procedures. All applicable forms and reports shall be initiated and shall reflect a performance evaluation/inspection as necessary.

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- 5.0.B.1 All observations made up to this point whether complimentary or detrimental should be presented to the radiographer for his comment.
- 5.0.B.2 A physical inspection of the radiography unit, personnel monitoring equipment, survey instruments and exposure device is to be made by the inspector.
- 5.0.B.3 The radiographer's controlled copy of Allegheny Laboratories Radiation Safety Operating and Emergency Procedures, 10 CFR, Parts 19, 20, 21, 30, 34, 40, and 71. The NRC Byproduct Material License with amendments are to be examined to ensure they are complete and up to date. Sections requiring updating or replacing shall be conducted at this point prior to any additional work.
- 5.0.B.4 The inspector shall review with the radiographer and radiographer assistant dosimeter records and the radiation reports.
- 5.0.B.5 The inspector shall review with the radiographer and radiographer assistant his findings. The inspector will in definite terms outline all areas where conditions do not meet Operating and Emergency Procedures or NRC Regulations. Based on the severity of findings the RSO will determine whether radiographic operations may continue or be suspended until necessary corrective actions have been taken.
- 5.0.B.6 The inspector will complete the inspection report, review findings with radiographer and radiographers assistant, initiate corrective actions and maintain on file for 3 years.
- 5.1 Conditions may exist where inspections of radiographic operations may be exempt or postponed until a later date. These conditions are as follows:
 - 5.1.1 The RSO on occasions will perform radiographic evolutions in order to test equipment, develop techniques, or on jobs of delicate or sensitive nature. The RSO will be exempted from inspections provided A, B, & C are met.
 - A. Have a minimum of three years practical experience in the actual performance of radiographic evaluations.
 - B. Have successfully completed an approved formal course of instruction in radiation health physics.
 - C. Records of both (A) and (B) shall be available for immediate retrieval and audit.
 - 5.1.2 Radiographers and Radiographer Assistants employed on assignments other than radiography which makes them unavailable for thirty (30) days shall be evaluated and inspected no later than thirty (30) days upon their return prior to conducting any radiographic evolution. This may be performed on the first radiographic evolution assigned or by a simulated radiographic evolution staged by the RSO. Records shall reflect why there was a lapse in the (3) month inspection interval.
 - 5.1.3 Radiographers and Radiographer Assistants performing on assignments for a period of thirty (30) days where entry of the inspector is not permitted due to security (National Defense or contractual) shall be evaluated and inspected no later than thirty (30) days upon their return prior to conducting any radiographic evolution. This may be

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5.1.3 cont.

performed on the first radiographic evolution assigned or by a simulated radiographic evolution staged by the RSO. Records shall reflect why there was a lapse in the (3) month inspection interval.

5.1.4 Radiographers and Radiographer Assistants performing on assignments for a period of thirty (30) days where working conditions are considered as hazardous (above normal) shall be evaluated and inspected no later than thirty (30) days upon their return prior to conducting any radiographic evolution. This may be performed on the first radiographic evolution assigned or by a simulated radiographic evolution staged by the RSO. Records shall reflect why there was a lapse in the (3) month inspection interval.

5.1.5 Radiographers and Radiographer Assistants performing radiography on assignments for a period of thirty (30) days which is inaccessible by commercial transportation shall be evaluated and inspected no later than thirty (30) days upon their return prior to conducting any radiographic evolution. This may be performed on the first radiographic evolution assigned or by a simulated radiographic evolution staged by the RSO. Records shall reflect why there was a lapse in the (3) month inspection interval.

5.1.6 Radiographers and Radiographer Assistants having interrupted service which causes a lapse in the three (3) month inspection interval (vacation, lay-off or illness) shall be evaluated and inspected upon their return prior to conducting any radiographic evolution. This may be performed on the first radiographic evolution assigned or by a simulated radiographic evolution staged by the RSO. Records shall reflect why there was a lapse in the (3) month inspection interval.

6.0 Survey Meters for physical radiation surveys performed by qualified radiographic personnel of Allegheny Laboratories shall have a range sufficient to measure 2 milliroentgen per hour through 1 roentgen per hour, and shall be calibrated at intervals not to exceed 3 months and after each instrument repair. Prior to use the survey meter shall be inspected for satisfactory operation and calibration is current. Survey meters shall be calibrated so that the readings are + or - 20% of the actual values of the range of the instrument. Records of calibration shall contain the results of calibration, date of the last calibration, due date of the next calibration affixed to the survey meter. Records of calibration shall be retained for a minimum of 3 years. Authorized vendors for the calibration of survey meters are as listed below.

(A) Applied Health Physics, Inc.
2986 Industrial Blvd
Bethel Park, PA 15102
(412)-835-9555 fax- (412)-835-9559
NRC License # 37-09135-01 PA License # PA-0228

(B) Sentinel / Amersham Corporation
6134 Holly Field Dr.
Baton Rouge, LA 70809
(504)-751-5893
License # LA-5934-1.01

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- 6.0 cont. Self Reading Pocket Dosimeters, Alarming Ratemeters (worn by personnel during radiographic evolutions) and Vault Gamma Alarm shall also be calibrated by the above on an annual basis. Records of calibration shall be retained for a minimum of 5 years.
- 7.0 Personnel Monitoring shall be required for radiographers and radiographer assistants during radiographic operations. Each radiographer and radiographer assistant shall be assigned a film badge which is to be worn and used only by him. Under no circumstances shall an individual use a film badge not assigned to him. The Film Badge is for recording legal record occupational exposures to ionizing radiation. The maximum time for the exchange of film badges is monthly. No radiographic evolution's will be conducted with a Film Badge which has exceeded this requirement. Badges will be turned in to the RSO monthly for processing at which time a replacement will be issued. Film Badges will be worn on the frontal chest or waist area of the body. At no time will you remove your film badge while conducting radiographic evolution's. Care shall be exercised to prevent loss or damage. Following a field assignment and radiographic operations has been completed, Film Badges will be turned in to the RSO for safe keeping. Records of exposure shall be kept on file indefinite or until the NRC authorizes otherwise.
- 7.1 Self Reading Pocket Dosimeters (2) shall be worn by the radiographer and radiographer assistant during radiographic operations. Pocket Dosimeters shall have a range of 0 to 200 milliroentgen and shall be recharged prior to the start of each shift. Pocket Dosimeters shall be calibrated at periods not to exceed one year for correct response to radiation. Pocket Dosimeters shall be worn adjacent to the Film Badge (frontal chest or waist). Pocket Dosimeters will be read on a frequent basis while engaged in radiographic operations. Pocket Dosimeters shall be read and exposures recorded daily. These records shall be retained for a minimum of 5 years.
- 7.2 Each Radiographer and Radiographers Assistant shall wear an audible alarm ratemeter while engaged in radiographic operations. They shall be capable of giving an alarm at a preset dose rate of 500 mR/hr, require special means to change the preset alarm function and calibrated at periods not to exceed one year. The operation and alarm function must be verified prior to each shift. The audible alarm ratemeter shall be worn adjacent to the Film Badge and Pocket Dosimeters (frontal chest or waist).
- 8.0 Facilities
- 8.1 The purpose of the shielded facility is to permit the performance of training, maintenance of radiographic exposure devices, source transfers to and from shipping containers and the actual performance of source radiography. The storage of shipping containers, and exposure devices will be the only radioactive material stored in this facility.
- 8.2 The radiographic facility (Vault) Drawing #1 is located in building at 671 Colbert Ave., Oil City, Pennsylvania 16374. Exposure of the sources is accomplished by manipulating a remote control mechanism. The vault is designed with shielding sufficient to permit unrestricted access adjacent to the facilities. Drawing #2 and 2A show the vault dimensions and shielding. The walls and ceiling of the vault are a minimum of 35 inches of concrete and one half inch of steel. The floor is concrete with no access to the underside of the vault or any other area of the facility. Within the vault is a recessed "pit" area as shown on Drawings #2 and 2A. The exterior of the facilities building is constructed with a combination of brick, wood, and steel (for structural purposes). Overhead doors are electric and can only be opened from the building interior. All

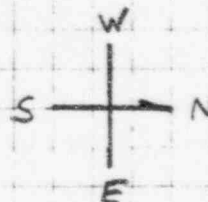
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- 8.2 cont. doors are locked or barricaded that would allow access into the facilities. Access to the vault is limited to the vault door which is maintained in a locked condition when not in use.
- 8.3 The vault is equipped with a visible flashing light and an audible alarm which sounds if the vault door is opened when the radiation level exceeds 10 milliroentgen per hour. This alarm shall be tested for proper operation every 3 months or prior to use. Unsatisfactory response shall be cause for the immediate repair or replacement of alarm and all radiographic evolution's shall be suspended until corrective actions are initiated. Any malfunctioning of alarm shall be reported to The RSO immediately.
- 8.4 The door to the vault shall be kept locked at all times when not being used. Only the RSO and qualified Allegheny Laboratories Radiographers shall have access to these keys. A locked storage box for vault keys shall be located in the RSO office. A separate key will be required to open and gain access to vault keys. The only personnel who will have keys to this separate lock box will be the RSO and qualified Allegheny Laboratories Radiographers. A Key Control Log will be maintained by the RSO of those personnel issued keys.
- 8.5 Drawing #1 shows the source storage positions for all sources and equipment. Each exposure device is locked at all times except when in actual use and keys are kept in the lock box as described above. Again, only the RSO and qualified Allegheny Laboratories Radiographers shall have access to these keys and the RSO shall maintain an up to date Key Control Log.
- 8.5.1 Drawing #1 shows a secondary storage area for **empty** exposure devices and shipping containers that are no longer approved for use in radiographic evolutions. This storage area shall be utilized for all radiographic exposure devices and shipping containers until such time as the vault shown on drawing #1 is constructed. In the event that the vault is not available for storage, the secondary storage area shall be utilized until the vault becomes available for use. Under no circumstances will the secondary storage area be used for radiographic exposures.
- 8.6 The radiographic facility shall be surveyed extensively following the approval of this license and the results maintained on file by the RSO for the life of the approved license or until otherwise determined by the NRC. This survey will be accomplished by the RSO in accordance with Radiation Survey Procedures, Section 14 and shall be based on the highest source activity permitted by license. Radiographic evolution's utilizing cobalt 60 shall be accomplished with a collimator to the maximum extent possible. All radiographic evolution's shall be performed in the vault pit (drawing #2). Based on the vault shielding and design; the radiographic source (50 Curies of Co-60 or greater specific activity), when exposed shall remain away from all walls and ceiling for a minimum of 3 feet.
- 8.7 Posted film badges (M) as shown drawing #1 will show that no one would receive greater than a 2 milliroetgen in any one hour or 50 milliroetgen in a year if they were continuously present in the unrestricted area.

CHAIN LINK FENCE

LOCKED GATE

OVERHEAD
Door



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DRAWING #1

VAULT

SOURCE
STORAGE AREA

OVERHEAD
Door

RAM STORAGE AREA.

EMPTY EXPOSURE DEVICES
AND SHIPPING CONTAINERS

LOCKED DOOR

DARK
Room

BATH
Room

LOCKED
Door

OFFICE

OFFICE

OVERHEAD DOORS

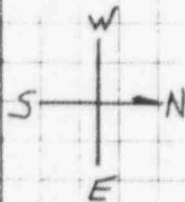
$\frac{3}{16}" = 5 \text{ FOOT}$

(M) FILM BADGE MONITORS

WAREHOUSE

35" CONCRETE
1/2" STEEL

GAMMA
ALARM AND LIGHT



3/16" = 6"

PIT AREA - BELOW FLOOR

SOURCE LOCATION FOR SURVEY



SOURCE MUST REMAIN
A MINIMUM OF 3 FEET
FROM ANY INNER WALL
OR CEILING

35" CONCRETE
1/2" STEEL

35" CONCRETE
1/2" STEEL

DRAWING #2

35" CONCRETE
1/2" STEEL

WARNING
LIGHT

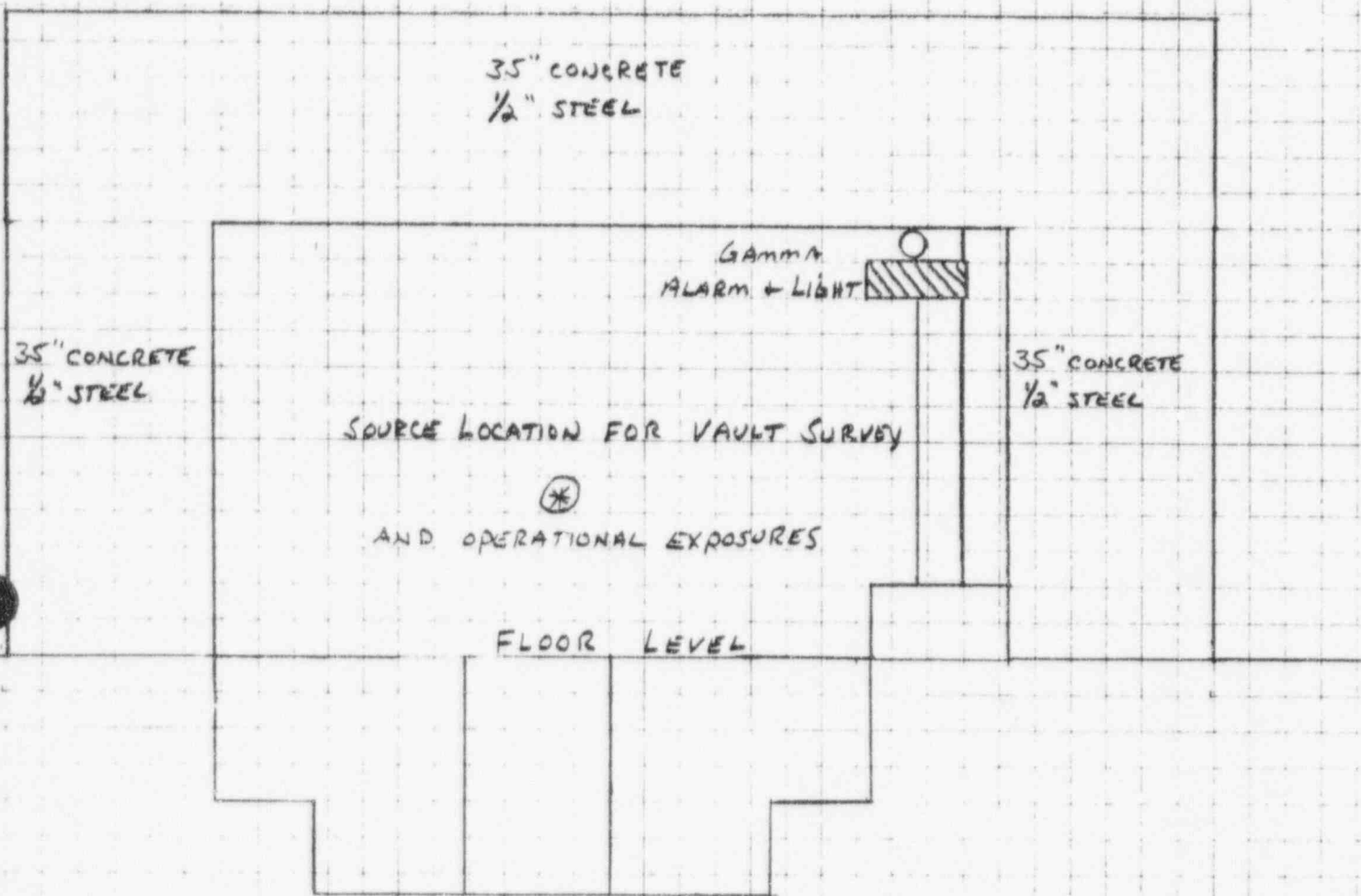


1/2" STEEL
DOOR

35" CONCRETE
1/2" STEEL

GAMMA
ALARM
HORN

WARNING
LIGHT



VIEW FACING WEST

$3/16" = 6"$

DRAWING #2A

SOURCE SHALL REMAIN A MINIMUM OF 3' FROM ANY WALL OR CEILING.

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DEFINITIONS
SECTION 4

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1.0 Definitions The following definitions will apply.

Absorbed dose: means the energy imparted by ionizing radiation per unit mass of irradiated material
The units of absorbed dose are the rad and the gray (Gy)

Act: means the Atomic Energy Act of 1954 including any amendments thereto.

Activity : is the rate of disintegration (transformations) or decay of radioactive material, The units of activity are the curie(Ci) and the becquerel (Bq).

Adult: means an individual 18 or more years of age

Agreement State: means any state with which the Atomic Energy Commission or the Nuclear Regulatory Commission has entered into an effective agreement under subsection 274B. of the Act

ALARA: (acronym for "as low as is reasonably achievable") means making every reasonable effort to maintain exposures to radiation as far below the dose limits in this license as is practical consistent with the purpose for which the license activity is undertaken.

Background radiation: means radiation from cosmic sources; naturally occurring radioactive materials, including radon (except as a decay product of source or special nuclear material) and global fallout as it exists in the environment from the testing of nuclear explosive devices. "background radiation" does not include radiation from source, byproduct, or special nuclear materials regulated by the Commission.

Byproduct material: means any radioactive material (except special nuclear material) yielded in, or made radioactive by, exposure to the radiation incident to the process of producing or utilizing special nuclear material.

Carrier: means a person engaged in the transportation of passengers or property by land or water as a common, contract, or private carrier, or by civil aircraft

Collective dose : is the sum of the individual doses received in a given period of time by a specified population from exposure to a specified source of radiation.

Commission: means the Nuclear Regulatory Commission or its duly authorized representatives.

Controlled area: means an area, outside of a restricted area but inside the site boundary, access to which can be limited by the licensee for any reason.

Declared pregnant woman: means a woman who has voluntarily informed her employer, in writing, of her pregnancy and the estimated date of conception.

Deep-dose equivalent: which applies to external whole-body exposure, is the dose equivalent at a tissue depth of 1 cm (1000 mg/cm²).

Dose or radiation dose: is a generic term that means absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, or total effective dose equivalent, as defined in 10 CFR Part 20.

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Dose equivalent: means the product of the absorbed dose in tissue, quality factor, and all other necessary modifying factors at the location of interest. The units of dose equivalent are the rem and sievert (Sv).

Dosimetry processor: means an individual or organization that processes and evaluates individual monitoring equipment in order to determine the radiation dose delivered to the equipment.

Effective dose equivalent: is the sum of the products of the dose equivalent to the organ or tissue and the weighting factors applicable to each of the body organs or tissues that are irradiated.

Embryo/fetus: means the developing human organism from conception until the time of birth.

Emergency (Site area emergency): means events may occur, are in progress, or have occurred that could lead to a significant release of radioactive material and that could require response by offsite response organizations to protect persons offsite. Such as:

- Loss of control of radioactive material due to equipment malfunction or carelessness.
- Exposure to personnel not monitored.
- Over-exposure to monitored personnel
- Fire
- Vehicular accidents

Entrance or access point: means any location through which an individual could gain access to radiation areas or to radioactive materials. This includes entry or exit portals of sufficient size to permit human entry, irrespective of their intended use.

Exposure: means being exposed to ionizing radiation or to radioactive material.

External dose: means that portion of the dose equivalent received from radiation sources outside the body.

Extremity: means hand, elbow, arm below the elbow, foot, knee, or leg below the knee.

Eye dose equivalent: applies to the external exposure of the lens of the eye and is taken as the dose equivalent at a tissue depth of 0.3 centimeter (300 mg/cm).

Field Sites: means an area(s) where radiographic operations are conducted other than in Allegheny Laboratories Vault located at 671 Colbert Ave. Oil City, P.A. 16374

Government agency: means any executive department, commission, independent establishment, corporation wholly or partly owned by the United States of America, which is an instrumentality of the United States, or any board, bureau, division, service, office, officer, authority, administration, or other establishment in the executive branch of the Government.

High radiation area: means an area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 0.1 rem (1 mSv) in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.

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Individual: means any human being.

Individual monitoring: means the assessment of dose equivalent by the use of devices designed to be worn by an individual; the assessment of committed effective dose equivalent by bioassay or by determination of the time-weighted air concentrations to which an individual has been exposed, or the assessment of dose equivalent by the use of survey data.

Individual Monitoring Devices: means devices designed to be worn by a single individual for the assessment of dose equivalent such as film badges, thermoluminescent dosimeters (TLDs), pocket ionization chambers, and personal ("label") air sampling devices.

License: means a license issued to Allegheny Laboratories under the regulations in parts 30 and 34.

Licensed material: means source material, special nuclear material, or by product material received, possessed, used, transferred or disposed of under a general or specific license issued by the Commission.

Licensee: means the holder of a license

Limits (dose limits): means the permissible upper bounds of radiation doses.

Lost or missing licensed material: means licensed material whose location is unknown. It includes material that has been shipped but has not reached its destination and whose location cannot be readily traced in the transportation system.

Member of the public: means an individual in a controlled or unrestricted area. However, an individual is not a member of the public during any period in which the individual receives an occupational dose.

Microcurie: means that amount of radioactive material which disintegrates at the rate of 37 thousand atoms per second

Millicurie: means that amount of radioactive material which disintegrates at the rate of 37 million atoms per second.

Minor: means an individual less than 18 years of age.

Monitoring (radiation monitoring, radiation protection monitoring): means the measurement of radiation levels, concentrations, surface area concentrations or quantities of radioactive material and the use of the results of these measurements to evaluate potential exposures and doses.

Non-Agreement State: means any other State

NRC: means the Nuclear Regulatory Commission or its duly authorized representatives.

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Occupational dose: means the dose received by an individual in a restricted area or in the course of employment in which the individual's assigned duties involve exposure to radiation and to radioactive material from licensed and unlicensed sources of radiation, whether in the possession of the licensee or other person. Occupational dose does not include dose received from background radiation, as a patient from medical practices, from voluntary participation in medical research programs, or as a member of the general public.

Packaging: means the assembly of components necessary to ensure compliance with the packaging requirements of 10 CFR Part 71. It may consist of one or more receptacles, absorbent materials, spacing structures, thermal insulation, radiation shielding, and devices for cooling or absorbing mechanical shocks. The vehicle, tie-down system, and auxiliary equipment may be designated as part of the packaging.

Permanent radiographic installation: means a shielded installation or structure designed or intended for radiography and in which radiography is regularly performed. The only authorized and approved permanent radiographic installation is Allegheny Laboratories Vault located at 671 Colbert Ave. Oil City, P.A. 16374

Person: means any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, Government agency other than the Commission or the Department of Energy (see 10 CFR part 20 for more on DOE).

Public dose: means the dose received by a member of the public from exposure to radiation and to radioactive material released by a licensee, or to another source of radiation either within a licensee's controlled area or in unrestricted areas. It does not include occupational dose or doses received from background radiation, as a patient from medical practices, or from voluntary participation in medical research programs.

Quarter: means a period of time equal to one-fourth of the year observed by the licensee (approximately 13 consecutive weeks), providing that the beginning of the first quarter in a year coincides with the starting date of the year and that no day is omitted or duplicated in consecutive quarters.

Rad: is the special unit of absorbed dose. One rad is equal to and absorbed dose of 100 ergs/gram or 0.01 joule/kilogram (0.01 gray).

Radiation Safety Officer (RSO): is that individual assigned in writing by the Company president who is responsible for all matters pertaining to radiation safety and certifies the personnel employed in regard to radiation safety competence.

Radiographer: means any individual who performs or who, in attendance at the site where the sealed source or sources are being used, personally supervises radiographic operations and who is responsible to the licensee for assuring compliance with the requirement of the Commission's regulations and conditions of the license.

Radiographer's assistant: means any individual who, under the direct personal supervision of a radiographer, uses radiographic exposure devices, sealed sources or related handling tools, or radiation survey instruments in radiography.

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- Radiography:** means the examination of the structure of materials by non-destructive methods, utilizing sealed sources of byproduct materials.
- Radiographic exposure device:** means any instrument containing a sealed source fastened or contained therein, in which the sealed source or shielding thereof may be moved, or otherwise changed, from a shielded to unshielded position for purposes of making a radiographic exposure.
- Radiation (ionizing radiation):** means alpha particles, beta particles, gamma rays, x-rays neutrons, high-speed electrons, high-speed protons, and other particles capable of producing ions. Radiation, as used in this license, does not include non-ionizing radiation, such as radio- or microwaves, or visible, infrared, or ultraviolet light.
- Radiation area:** means an area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 5 milliroentgens in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.
- Rem:** is the special unit of any of the quantities expressed as dose equivalent. The dose equivalent in rems is equal to the absorbed dose in rads multiplied by the quality factor (1 rem = 0.01 sievert).
- Restricted area:** means an area, access to which is limited by the licensee for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials. Restricted area does not include areas used as residential quarters, but separate rooms in a residential building may be set apart as a restricted area.
- Sealed Source:** means any byproduct material that is encased in a capsule designed to prevent leakage or escape of the byproduct material.
- Sievert:** is the SI unit of any of the quantities expressed as dose equivalent. The dose equivalent in sieverts is equal to the absorbed dose in grays multiplied by the quality factor (1 Sv = 100 rems).
- Source changer:** means a device designed and used for replacement of sealed sources in radiographic exposure devices, including those also used for transporting and storage of sealed sources.
- Special form radioactive material:** means radioactive material which satisfies the following conditions:
It is either a single solid piece or is contained in a sealed capsule that can be opened only by destroying the capsule; The piece or capsule has at least one dimension not less than 5 millimeters (0.197"); and It satisfies the test requirements specified in 10 CFR part 71.
- Storage area:** means any location, facility, or vehicle which is used to store, to transport, or to secure a radiographic exposure device, a storage container, or a sealed source when it is not in use and which is locked or has a physical barrier to prevent accidental exposure, tampering with, or unauthorized removal of the device, container, or source.
- Storage container:** means a device in which sealed sources are transported or stored.
- Survey:** means an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation. When appropriate, such an evaluation includes a physical survey of the location of radioactive material and measurements or calculations of levels of radiation, or concentrations or quantities of radioactive material present.

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Transport Index: means the dimensionless number (rounded up to the first decimal place) placed on the label of a package to designate the degree of control to be exercised by the carrier during transportation. The transport index is determined by the number expressing the maximum radiation level in millirem per hour at 1 meter from the external surface of the package.

Type B package: means a Type B package together with its radioactive contents. An approved type B package is designated by the NRC as B(U).

Unrestricted area: means an area, access to which is neither limited nor controlled by the licensee

Very high radiation area: means an area, accessible to individuals, in which radiation levels could result in an individual receiving an absorbed dose in excess 500 rads (5 grays) in 1 hour at 1 meter from a radiation source or from any surface that the radiation penetrates.

Week: means 7 consecutive days starting on Sunday.

Whole body: means, for purposes of external exposure, head, trunk (including male gonads), arms above the elbow, or legs above the knee.

Year: means the period of time beginning in January used to determine compliance with the provisions of the NRC.

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LIMITS OF EXPOSURE
SECTION 5

ALLEGHENY LABORATORIES
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1.0 Limits of Occupational Exposure

- 1.1 No person shall receive any occupational exposure to ionizing radiation unless a clear and legible record of previous exposures is on file for the individuals radiation health history. An attempt will be made to obtain written documentation of the individuals previous employers where occupational exposure had taken place. If no response has been made within 10 days, a written statement signed by the individual attesting to the nature and the amount of occupational dose received during the current year.
- 1.2 No person shall exceed 3 Rem per calendar quarter nor 5 Rem per calendar year.

Although these doses are permitted, any dose is excessive if it could have been prevented by developing safer work practices. Allegheny Laboratories considers doses over 100 mR per calendar week as excessive and the individual will be notified of the amount of the exposure using the Allegheny Laboratories "High Exposure Report" and a written explanation for the high exposure will be required.

If continued excessive doses are caused by careless and negligent working procedures, disciplinary action will be taken. All radiography personnel shall utilize TIME, DISTANCE and SHIELDING to the maximum extent possible.
- 1.3 An individual may only receive a dose of 1.250 Rems per calendar quarter if records cannot be produced to show exposure for the present and past calendar quarter and calendar year.
- 1.4 No individual under the age of 18 shall receive in any period of one calendar quarter or calendar year a dose in excess of 10% of the limits in 1.2 above
- 1.5 Once a female employee has voluntarily notified Allegheny Laboratories RSO in writing that she is pregnant and the estimated conception date she is from that point on a "Declared Pregnant Woman". No occupational exposure shall exceed 500 mrem for the entire pregnancy. An administrative control amount of exposure per month for the remainder of the pregnancy shall not exceed 30 millirem.
- 1.6 If the dose to the embryo/fetus is found to have exceeded 0.5 rem, or is within 0.05 rem of this dose, by the time the woman declares the pregnancy to the RSO, the RSO shall suspend all assignments that would potentially cause an additional dose of 0.05 rem during the remainder of the pregnancy.
- 1.7 Occupational Exposure shall be recorded on NRC Forms 4 & 5. An NRC Form 4 shall be maintained for all radiographic personnel. This form will be updated on a monthly basis with the occupational exposure report received from the film badge processing. The NRC Form 5 shall be prepared on an annual basis with the exposure reports from film badge processing and submitted to the NRC before April 30th of each new year for the preceding calendar year. The RSO shall prepare, maintain and forward the NRC Forms 4 & 5. When request by the individual(s) receiving the exposure and the NRC; The RSO shall publish, display, review and forward these record as required. These records shall be reviewed/audited by the RSO on an annual basis.
- 1.8 In emergency situations where it is desirable to enter a hazardous area to rescue injured personnel, facilities, eliminate further escape of contaminants, or to control fires, planned whole

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1.8 cont.

body dose should not exceed 25 rems. When an individual has been exposed to more than 3 rems during the calendar quarter, as a result of such an emergency, he shall be barred from any additional occupational exposure to radiation pending RSO review. Such an exposure shall be reported as set forth below.

- 1.8.1 Immediate notification shall be made by phone to the NRC Operations Center (301)-951-0550 and by telegram, mailgram, or facsimile to the Administrator of the NRC Regional Office #1, 475 Allendale Road, King of Prussia, PA 19406 (24 hour phone # 215-337-5000) for the following:

- A. An individual receiving 25 rems or more

In addition a written report shall be submitted within 30 days to the U.S. Nuclear Regulatory Commission, Document Control Desk, Washington, DC 20555 with a copy to the NRC Regional Office #1, 475 Allendale Road, King of Prussia, PA 19406. The written report shall contain the following:

- A. The extent of exposure of individuals to radiation and radioactive material
- B. Estimates of each individual's dose
- C. The levels of radiation and concentrations of radioactive material involved
- D. The cause of the elevated exposures, dose rates, or concentrations.
- E. Corrective steps taken or planned to ensure against a recurrence.
- F. The report shall include: Name, Social Security account number, and date of birth. This information shall be contained on a separate piece of paper.

- 1.8.2 Twenty-four hour notification shall be made by phone to the NRC Operations Center (301)-951-0550 and by telegram, mailgram, or facsimile to the Administrator of the NRC Regional Office #1, 475 Allendale Road, King of Prussia, PA 19406 (24 hour phone # 215-337-5000) for the following:

- A. An individual receiving in excess of 5 rems in a 24 hour period.

In addition a written report shall be submitted within 30 days to the U.S. Nuclear Regulatory Commission, Document Control Desk, Washington, DC 20555 with a copy to the NRC Regional Office #1, 475 Allendale Road, King of Prussia, PA 19406. The written report shall contain the following:

- A. The extent of exposure of individuals to radiation and radioactive material
- B. Estimates of each individual's dose
- C. The levels of radiation and concentrations of radioactive material involved

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1.8.2 cont.

- D. The cause of the elevated exposures, dose rates, or concentrations.
- E. Corrective steps taken or planned to ensure against a recurrence.
- F. The report shall include: Name, Social Security account number, and date of birth .
This information shall be contained on a separate piece of paper.

1.8.3 A written report shall be submitted within 30 days to the U.S. Nuclear Regulatory Commission, Document Control Desk, Washington, DC 20555 with a copy to the NRC Regional Office #1, 475 Allendale Road, King of Prussia, PA 19406 for the following:

- A. An occupational dose in excess of 500 mrem of a minor (under the age of 18)
- B. An occupational dose in excess of 500 mrem to the embryo/fetus of a declared pregnant woman.
- C. A dose in excess of 100 mrem in a year to a member of the public.
- D. A dose in excess of 2 mrem in any one hour in an unrestricted area.

The written report shall contain the following:

- A. The extent of exposure of individuals to radiation and radioactive material
- B. Estimates of each individuals dose
- C. The levels of radiation and concentrations of radioactive material involved
- D. The cause of the elevated exposures, dose rates, or concentrations.
- E. Corrective steps taken or planned to ensure against a recurrence.
- F. The report shall include: Name, Social Security account number, and date of birth .
This information shall be contained on a separate piece of paper.

**In any of the above instances, a copy of such exposure must be furnished to the individual concerned.

NRC FORM 4
(5-92)
10 CFR PART 20

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0005

EXPIRES:

CUMULATIVE OCCUPATIONAL EXPOSURE HISTORY

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS
INFORMATION COLLECTION REQUEST: MINUTES FORWARD
COMMENTS REGARDING BUREAU ESTIMATE TO THE INFORMATION AND
RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR
REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE
PAPERWORK REDUCTION PROJECT (3150-0005), OFFICE OF
MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

1. NAME (LAST, FIRST, MIDDLE INITIAL)				2. IDENTIFICATION NUMBER		3. ID TYPE		4. SEX MALE <input type="checkbox"/> FEMALE <input type="checkbox"/>		5. DATE OF BIRTH	
6. MONITORING PERIOD		7. LICENSEE NAME		8. LICENSE NUMBER		9. RECORD ESTIMATE <input type="checkbox"/> NO RECORD <input type="checkbox"/>		10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>			
11. DOE	12. LDE	13. SOE, WB	14. SOE, ME	15. CEDE	16. CDE	17. TEDE		18. TOOE			
6. MONITORING PERIOD		7. LICENSEE NAME		8. LICENSE NUMBER		9. RECORD ESTIMATE <input type="checkbox"/> NO RECORD <input type="checkbox"/>		10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>			
11. DOE	12. LDE	13. SOE, WB	14. SOE, ME	15. CEDE	16. CDE	17. TEDE		18. TOOE			
6. MONITORING PERIOD		7. LICENSEE NAME		8. LICENSE NUMBER		9. RECORD ESTIMATE <input type="checkbox"/> NO RECORD <input type="checkbox"/>		10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>			
11. DOE	12. LDE	13. SOE, WB	14. SOE, ME	15. CEDE	16. CDE	17. TEDE		18. TOOE			
6. MONITORING PERIOD		7. LICENSEE NAME		8. LICENSE NUMBER		9. RECORD ESTIMATE <input type="checkbox"/> NO RECORD <input type="checkbox"/>		10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>			
11. DOE	12. LDE	13. SOE, WB	14. SOE, ME	15. CEDE	16. CDE	17. TEDE		18. TOOE			
6. MONITORING PERIOD		7. LICENSEE NAME		8. LICENSE NUMBER		9. RECORD ESTIMATE <input type="checkbox"/> NO RECORD <input type="checkbox"/>		10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>			
11. DOE	12. LDE	13. SOE, WB	14. SOE, ME	15. CEDE	16. CDE	17. TEDE		18. TOOE			
6. MONITORING PERIOD		7. LICENSEE NAME		8. LICENSE NUMBER		9. RECORD ESTIMATE <input type="checkbox"/> NO RECORD <input type="checkbox"/>		10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>			
11. DOE	12. LDE	13. SOE, WB	14. SOE, ME	15. CEDE	16. CDE	17. TEDE		18. TOOE			
19. SIGNATURE OF MONITORED INDIVIDUAL		20. DATE SIGNED		21. CERTIFYING ORGANIZATION		22. SIGNATURE OF DESIGNEE		23. DATE SIGNED			

NRC FORM 5
(8-92)
10 CFR PART 20

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0006
EXPIRES:

OCCUPATIONAL EXPOSURE RECORD FOR A MONITORING PERIOD

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS
INFORMATION COLLECTION REQUEST: _____ MINUTES.
FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO
THE INFORMATION AND RECORDS MANAGEMENT BRANCH
(MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION,
WASHINGTON, DC 20555, AND TO THE PAPERWORK
REDUCTION PROJECT (3150-0006), OFFICE OF
MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

1. NAME (LAST, FIRST, MIDDLE INITIAL)		2. IDENTIFICATION NUMBER	3. ID TYPE	4. SEX <input type="checkbox"/> MALE <input type="checkbox"/> FEMALE	5. DATE OF BIRTH
6. MONITORING PERIOD		7. LICENSEE NAME		8. LICENSE NUMBER(S)	9A. <input type="checkbox"/> RECORD <input type="checkbox"/> ESTIMATE 9B. <input type="checkbox"/> ROUTINE <input type="checkbox"/> PSE

INTAKES

10A. RADIONUCLIDE	10B. CLASS	10C. MODE	10D. INTAKE IN μ CI

DOSES (in rem)

DEEP DOSE EQUIVALENT (DDE)	11.
EYE DOSE EQUIVALENT TO THE LENS OF THE EYE (LDE)	12.
SHALLOW DOSE EQUIVALENT, WHOLE BODY (SDE,WB)	13.
SHALLOW DOSE EQUIVALENT, MAX EXTREMITY (SDE,ME)	14.
COMMITTED EFFECTIVE DOSE EQUIVALENT (CEDE)	15.
COMMITTED DOSE EQUIVALENT, MAXIMALLY EXPOSED ORGAN (CDE)	16.
TOTAL EFFECTIVE DOSE EQUIVALENT (BLOCKS 11 + 15) (TEDE)	17.
TOTAL ORGAN DOSE EQUIVALENT, MAX ORGAN (BLOCKS 11 + 16) (TODE)	18.
19. COMMENTS	

20. SIGNATURE -- LICENSEE

21. DATE PREPARED

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OPERATING INSTRUCTIONS FOR EQUIPMENT
SECTION 6

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Operating Instructions for Equipment

A. **Film Badges**

Personnel Monitoring shall be required for radiographers and radiographer assistants during radiographic operations. Each radiographer and radiographer assistant shall be assigned a film badge which is to be worn and used only by him. Under no circumstances shall an individual use a film badge not assigned to him. The Film Badge is for recording legal record occupational exposures to ionizing radiation. The maximum time for the exchange of film badges is monthly. No radiographic evolution's will be conducted with a Film Badge which has exceeded this requirement. Badges will be turned in to the RSO monthly for processing at which time a replacement will be issued. Film Badges will be worn on the frontal chest or waist area of the body. At no time will you remove your film badge while conducting radiographic evolution's. Care shall be exercised to prevent loss or damage. Following a field assignment and radiographic operations have been completed, Film Badges will be turned in to the RSO for safekeeping. Records of exposure shall be keep on file indefinite or until the NRC authorizes otherwise.

B. **Pocket Dosimeters**

Self Reading Pocket Dosimeters (2) shall be worn by the radiographer and radiographer assistant during radiographic operations. Pocket Dosimeters shall have a range of 0 to 200 milliroentgen and shall be recharged prior to the start of each shift. Pocket Dosimeters shall be calibrated at periods not to exceed one year for correct response to radiation. Pocket Dosimeters shall be worn adjacent to the Film Badge (frontal chest of waist). Pocket Dosimeters will be read periodically while engaged in radiographic operations. Pocket Dosimeters shall be read and exposures recorded daily. Of the two Pocket Dosimeters being worn and read; the highest reading dosimeter is the value that will be recorded. Exposures shall be recorded on the Radiation Report Form and the Dosimetry Report Form. See Record-Keeping Forms, Section 17. These records shall be retained for a minimum of 3 years.

Should one pocket dosimeter read 150 mR or more, the individual will leave the Radiation Area and report to the RSO for further instructions. If both pocket dosimeters become fully discharged the individual shall immediately leave the Radiation Area and deliver his film badge to the RSO for immediate processing. The RSO will send the film badge to Landauer, Inc., 2 Science Road, Glenwood, Illinois, 60425-1586 and request immediate processing and interpretation. A written report will be prepared by the individual setting forth all pertinent facts regarding the off-scale dosimeter readings and forward to the RSO for review and comment. The RSO shall make recommendations as deemed appropriate. The individual shall be restricted from further exposure until it has been established that he has not exceeded any radiation exposure limits.

C. **Pocket Dosimeter Chargers**

Insert the pocket dosimeter onto the charger socket.

Press the pocket dosimeter down firmly and hold it in contact against the spring pressure of the internal connector's.

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C. **Pocket Dosimeters cont.**

Look into the dosimeter and turn the charging knob clockwise or counter-clockwise, as required, to bring the hairline to "0".

Remove the pocket dosimeter from the charger and recheck the hairline position by looking into the dosimeter while pointing it at a source of bright light.

D. **Alarming Ratemeters**

Each Radiographer and Radiographers Assistant shall wear an audible alarm ratemeter while engaged in radiographic operations. They shall be capable of giving an alarm at a preset dose rate of 500 mR/hr, require special means to change the preset alarm function and calibrated at periods not to exceed one year. The operation and alarm function must be verified prior to each shift. The audible alarm ratemeter shall be worn adjacent to the Film Badge and Pocket Dosimeters (frontal chest or waist).

Alarming Ratemeters shall be calibrated a minimum of once a year. When a unit reaches the calibration expiration date, it is to be turned in and replaced with a unit that is within calibration.

In the event of an alarming ratemeter while conducting radiographic operations, the radiographer shall take the following steps.

- a. Stop work (place source in the shielded position and exposure device locked. Verify by survey).
- b. Read pocket dosimeters (2). If a reading on either shows excessive exposure all operations will be suspended. Follow the actions required by the Emergency Procedures.
- c. Have your assistant read their pocket dosimeters also.
- d. If no excessive readings are revealed by pocket dosimeters as well as any assistants readings radiography operations may recommence. A replacement alarming rate meter shall be obtained that is operating properly, and is within calibration. The potentially non operating alarming ratemeter shall be tagged out of service and turned in for repair.

E. **Operating Instructions for Radiation Detection Instruments**

Calibrated and operable radiation survey instruments having a range such that two milliroentgens per hour through 1 roentgen per hour can be measured shall be available and used to make physical radiation surveys. Specific procedures for making radiation surveys will be found in the Radiation Survey Procedures, Section 14.

Each radiation survey instrument shall be calibrated at intervals not to exceed three months and after each repair. Records shall be maintained of calibrations. The calibration void date shall be with each instrument.

If a radiation survey instrument becomes inoperative or is beyond its required date of recalibration, the radiographer shall suspend all activities using sealed sources until it is replaced with properly calibrated and operable instrument.

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E. cont. Radiation survey instruments transported in company vehicles shall be carried in the driver's compartment.

Operating Instructions are as follows:

Verify that meter is currently calibrated and expiration date is attached to meter
Turn on/off switch to zero/battery position
Verify battery is within acceptable range on meter face
Allow minimum 30 seconds warm up time

F. **Radiographic exposure devices and sealed source assemblies**

Gamma "Century" S & SA (capacity - 100 curies of Ir-192)
Amersham/Technical Operations Model 89912

*** These exposure devices are no longer authorized for use as they have no locking device that is actuated when source is returned to the shielded position. These exposure devices shall be stored in the secondary storage area (Administrative Procedures, Facilities, Section 8.0 until such time as they can be transferred to the manufacturer or properly disposed of in accordance with all NRC rules and regulations.

The following procedure (in conjunction with Section 9) shall only be used for transferring a source into an approved shipping container (Sentinel/Amersham Corporation Model 650L) for proper disposal. A prior to use inspection and maintenance shall be performed in accordance with Section 11. Verification of a current source leak test is required prior to transferring source into shipping container.

The Exposure Device shall be surveyed prior to removal from storage.

A proper survey is performed with a operational meter, currently within calibration periodicity, calibration expiration date attached to meter, a satisfactory battery level and capable of detecting 2 mr/hr to 1 r/hr. Survey the exposure device 360 degrees of it circumference, as well as the top and bottom. The radiation intensity shall not exceed 50 mr/hr at 6 inches. Any intensity in excess shall be cause for implementing the Emergency Procedures in Section 10.

Upon receipt of the source changer survey the source changer to ensure that there is no source present.

A proper survey is performed with a operational meter, currently within calibration periodicity, calibration expiration date attached to meter, a satisfactory battery level and capable of detecting 2 mr/hr to 1 r/hr. Survey the source changer / shipping container 360 degrees of it circumference, as well as the top and bottom. The radiation intensity shall not exceed 200 mr/hr on contact or 10 mr/hr at 3 feet. Any intensity in excess shall be cause for implementing the Emergency Procedures in Section 10.

Locate the source changer and exposure device in a restricted area. Locate the devices so as to avoid sharp bends in the guide tube or control housing.

Remove the protector cap from the lock box thereby exposing the pigtail connector.

Crank the control cable to a length of approximately six inches.

Remove the cover from the shipping container by breaking the seal wire and removing the bolts.

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F. cont.

Remove the source holddown cap by breaking the seal wire and unbolting.

Connect one end of a guide tube extension to the projector and the other end to the fitting above the empty chamber in the source changer.

Close and latch the source guides.

Connect control cable to the source pigtail protruding from the exposure device.

Crank the control cable in so that male connection thread can be screwed into lock box.

Screw control cable into lock box.

Remove safety plug from protruding nipple approximately one inch from top of unit and connect the guide tube.

Place guide tube in desire position as straight as possible an avoiding kinks. Not to be less than a 20" radius.

Stretch control cable away from exposure device in as straight a line as possible. Not to be less than 36" radius.

Unlock exposure device.

Crank source out as smoothly as possible. When source is approaching end of guide tube, slow turning speed so that source enters shipping container smoothly. Survey meter shall be watched as source transits to shipping container. Radiation levels should spike then drop off once source is in the shipping container.

Approach the exposure device with the survey meter. Survey the exposure device on all sides, survey the guide tube and survey the shipping container all sides to ensure the source has been properly transferred. Survey the source changer / shipping container 360 degrees of it circumference, as well as the top and bottom. The radiation intensity shall not exceed 200 mr/hr on contact or 10 mr/hr at 3 feet. Any intensity in excess shall be cause for imlementing the Emergency Procedures in Section 10.

Open the source guides. Disconnect the drive cable from the source assembly by moving the lock pin down and sliding the drive cable connector out through the keyway.

Disconnect the guide tube from the shipping container.

Affix the identification plate of the source to the source holddown cap.

Bolt the source holddown cap in place and seal wire.

Bolt the source changer cover in place and seal wire.

Survey all exterior surfaces of the source changer.

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F. cont.

A proper survey is performed with a operational meter, currently within calibration periodicty, calibration expiration date attached to meter, a satisfactory battery level and capable of detecting 2 mr/hr to 1 r/hr. Survey the source changer / shipping container 360 degrees of it circumference, as well as the top and bottom. The radiation intensity shall not exceed 200 mr/hr on contact or 10 mr/hr at 3 feet. Any intensity in excess shall be cause for imlementing the Emergency Procedures in Section 10.

Retract control cable to fully retracted position.

Depress the plunger lock.

Disconnect control cables and replace protector cap.

Disconnect source tube and insert safety plug.

Empty exposure device shall be placed into storage until such time of shipping for disposal.

Shipping Container shall be placed into storage until such time of shipping to authorized agency.

Gamma Industries Gammatron 100A (capacity - 100 curies of Co-60)
Gamma Industries Model A8A

*** This exposure device is no longer authorized for use as it has no locking device that is actuated when source is returned to the shielded position. This exposure device shall be stored in the secondary storage area (Administrative Procedures, Facilities, Section 8.0 until such time as they can be transferred to the manufacturer or properly disposed of in accordance with all NRC rules and regulations.

The following procedure (in conjunction with Section 9) shall only be used for transferring a source into an approved shipping container (Sentinel/Amersham Corporation Model 771) for proper disposal. A prior to use inspection and maintenance shall be performed in accordance with Section 11. Verification of a current source leak test is required prior to transferring source into shipping container.

Upon receipt of the source changer survey the source changer to ensure that there is no source present.

A proper survey is performed with a operational meter, currently within calibration periodicty, calibration expiration date attached to meter, a satisfactory battery level and capable of detecting 2 mr/hr to 1 r/hr.

Survey the source changer / shipping container 360 degrees of it circumference, as well as the top and bottom. The radiation intensity shall not exceed 200 mr/hr on contact or 10 mr/hr at 3 feet. Any intensity in excess shall be cause for imlementing the Emergency Procedures in Section 10.

Prior to removing exposure device from storage it shall be surveyed.

A proper survey is performed with a operational meter, currently within calibration periodicty, calibration expiration date attached to meter, a satisfactory battery level and capable of detecting 2 mr/hr to 1 r/hr. Survey the source changer / shipping container 360 degrees of it circumference, as well as the top and

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F. cont.

bottom. The radiation intensity shall not exceed 200 mr/hr on contact or 10 mr/hr at 3 feet. Any intensity in excess shall be cause for implementing the Emergency Procedures in Section 10.

Locate the source changer and exposure device in a restricted area. Locate the devices so as to avoid sharp bends less than 20 inches in the guide tube or control housing. Position devices so that one length of guide tube will connect them.

Remove the safety plug from the out connection approximately two inches from tip of unit and connect the guide tube.

Remove the cover plate from the shipping container by breaking the seal wires and removing the bolts, and attach the other end of the tube to the empty changer. Assure that the selector ring of the shipping container is in the unlocked position.

Remove the protector cap from the lock box thereby exposing the pigtail connector.

Crank the control cable to a length of approximately six inches.

Connect control cable to source pigtail.

Crank control cable in so that male connecting thread can be screwed into lock box.

Screw control cable into lock box.

Stretch control cable away from exposure device in as straight a line as possible. Bend radius must not be less than 36"

Unlock exposure device.

At the exposure device control, rapidly crank the source from the exposure device to the shipping container. During this process, the survey meter reading should increase as the source is first exposed, fall slightly as the source is being cranked out, then drop to background when the source is in the source changer.

Approach the shipping container and source guide tube with the survey meter and survey the exposure device on all sides. Survey the guide tube and survey the shipping container on all sides to assure that the source is properly stored in the shipping container.

A proper survey is performed with a operational meter, currentiy within calibration periodicty, calibration expiration date attached to meter, a satisfactory battery level and capable of detecting 2 mr/hr to 1 r/hr. Survey the source changer / shipping container 360 degrees of it circumference, as well as the top and bottom. The radiation intensity shall not exceed 200 mr/hr on contact or 10 mr/hr at 3 feet. Any intensity in excess shall be cause for implementing the Emergency Procedures in Section 10.

Assure that the source is secured in the shipping container by assuring that the connector selector rings are in the lock position, the lock plungers are depressed, and the keys are removed.

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F. cont.

Disconnect the control unit and source guide tube from the exposure device, and disconnect the source guide tube from the shipping container. Disconnect the drive cable from the source assembly by moving the lock pin down and sliding the drive cable connector ball out through the key way.

Remove the source identification plate from the exposure device and attach it with seal wire to the shipping container connector assembly.

Empty exposure device shall be placed into storage until such time of shipping for disposal.

Shipping Container shall be placed into storage until such time of shipping to authorized agency.

Sentinel Amersham Corporation Model 660B (capacity - 140 curies Ir-192)
Sentinel Amersham Corporation Model A424-9

Prior to removal from storage the exposure device shall be surveyed.

Daily/Prior to Use Maintenance checks shall be performed on all equipment being utilized.

Section 9 shall be utilized in conjunction with this procedure.

A proper survey is performed with a operational meter, currently within calibration periodicty, calibration expiration date attached to meter, a satisfactory battery level and capable of detecting 2 mr/hr to 1 r/hr. Survey the Exposure Device 360 degrees of it circumference, as well as the top and bottom. The radiation intensity shall not exceed 50 mr/hr at 6 inches. Any intensity in excess shall be cause for imlementing the Emergency Procedures in Section 10.

Position the panoramic guide tube or the collimator at the exposure site and secure firmly in position. Always use the collimator whenever possible, to reduce radiation intensity, except in the direction that radiograph is to be made.

Connect the source tubes to the panoramic guide tube or the collimator and align the tubes between the exposure site and the exposure device location in such a manner that there are no kinks or sharp bends in the source guide tubes (bend radius shall not be less than 20") and also that the maximum distance between the exposure site and the exposure device is achieved.

NOTE: NO MORE THAN THREE (3) SECTIONS (21 FEET TOTAL) OF GUIDE TUBE SHALL BE UTILIZED BETWEEN THE EXPOSURE DEVICE AND THE COLLIMATOR OR EXPOSURE POSITION!

String out the drive cable from the reel as far as possible from the exposure point. Bend radius shall not be less than 36".

CAUTION: AVOID SHARP BENDS IN THE DRIVE CABLE TO PREVENT EXCESSIVE PRESSURE FROM BEING EXERTED IN THE CONTROL MECHANISM!

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F. cont.

Unlock the exposure device. Turn the selector dial to "CONNECT". Remove the storage cover and place it in the holder, if provided. The source cable end will be visible at this time. Attach the source cable end to the drive cable end. Test connection to insure that it is secured. Line up the drive cable plug with the exposure device connector, and insert. Turn the selector dial to the "LOCK" position and push the lock plunger down.

Remove the shipping plug and connect the source guide tubes.

Unlock and turn the selector dial to "OPERATE". Ensure there is no tension force in either direction on the drive cable. Push the slide bar (green marking) laterally from left to right (as seen behind the exposure device) until the slide bar (red marking) fully appears on the right side of the selector ring and you feel or hear the sleeve snap into slide. When the green marking is visible the source assembly is locked into the safety-stored position within the exposure device; when the red marking is visible the source assembly is free to be projected from/to the exposure device. The source is now free to move.

Turn crank handle clockwise to expose the source and counterclockwise to retract the source.

CAUTION: DO NOT FORCE!

At the completion of the exposure, retract the source. You should hear the slide bar "click" back into its original position and observe the green marking on the slide bar. Apply a slight amount of forward pressure on the crank handle as if to expose the source to ensure that the positive locking mechanism has actuated. Allow the crank handle to return to a neutral position, thereby relieving any tension (force) on drive cable which would cause source movement when unlocking the camera. At this point the source cannot be moved out of the stored position.

In the unlikely event the locking slide moves toward the lock position before the source is fully stored in the exposure device, turn the hand crank in the "RETRACT" (clockwise) direction until the crank stops turning. (The lock slide is designed to lock on the stop ball, not the drive cable). Do not use excessive force. The source will be in the exposure device but not in the fully shielded position. Approach the exposure device, from the rear, with a survey meter. The meter will read approximately 40 mr/hr at the rear plate of the projector when a 100 Ci source is in use.

CAUTION: Remain clear of the front of the exposure device minimize personal exposure. Reset the lock slide to the open position. Return to the control and turn the hand crank in the retract (clockwise) direction and store the source in the normal manner. **If the source can not be fully retracted after several attempts, treat the situation as an Emergency and implement Allegheny Laboratories Emergency Procedures.**

CAUTION: DO NOT RELY ON LAMP OR FOOTAGE INDICATORS. APPROACH THE EXPOSURE DEVICE WITH A SURVEY INSTRUMENT!

After each radiographic exposure, approach the exposure device from behind. Carefully survey the front of the exposure device including the opening where the source guide tube is attached to the exposure device. Continue the survey around the circumference of the exposure device and along the source guide tube. Check to see that the source is in its shielded position by approaching the exposure device with a survey instrument, and survey both the exposure device and the source guide tube to ensure safe storage of the source. The level at 6 inches should be approximately what it was prior to starting radiographic operations. Record results of after exposure survey in source utilization log.

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F. cont.

A proper survey is performed with a operational meter currently within calibration periodicty, calibration expiration date attached to meter, a satisfactory battery level and capable of detecting 2 mr/hr to 1 r/hr. Survey the exposure device 360 degrees of it circumference, as well as the top and bottom. The radiation intensity shall not exceed 50 mr/hr at 6 inches. Any intensity in excess shall be cause for imlementing the Emergency Procedures in Section 10.

WARNING: IF THE SOURCE CANNOT BE RETURNED TO A SHIELDED POSITION, TAKE ACTION SPECIFIED IN THE EMERGENCY PROCEDURES. MAKE SURE RESTRICTED AREAS ARE MAINTAINED.

Turn selector to "LOCK" position and depress the plunger. Disconnect the source guide tube. Insert and screw in the shipping plug. Unlock the exposure device and turn the selector to "CONNECT. Disconnect the drive cable, insert the storage over, turn the selector to "LOCK" and depress the lock plunger.

Sentinel Amersham Corporation Model 680, 680A, 680B (capacity - 110 curies Co-60)
Sentinel Amersham Corporation Model A424-14

The existing Amersham/Technical Operations Model 680 with a Model A424-14 sealed Cobalt 60 source that Allegheny Laboratories possesses is not authorized for use at the present time. This is due to the exposure device not have the required retrofit locking assembly. This exposure device shall be stored and not used until this locking mechanism upgrade has been installed. The following operation procedure shall apply once this locking mechanism upgrade has been installed as well as for the Model 680B. The Model 680A is the designation of Model 680's that have undergone the upgrade. The Model 680B is the currently manufactured Exposure Device with the locking mechanism installed at factory.

Prior to moving exposure device from storage it shall be surveyed.

Daily/Prior to Use Maintenance checks shall be preformed on all equipment being utilized.

Section 9 shall be utilized in conjuction with this procedure.

A proper survey is performed with a operational meter, currently within calibration periodicty, calibration expiration date attached to meter, a satisfactory battery level and capable of detecting 2 mr/hr to 1 r/hr. Survey the exposure device 360 degrees of it circumference, as well as the top and bottom. The radiation intensity shall not exceed 200 mr/hr on contact or 10 mr/hr at 3 feet. Any intensity in excess shall be cause for imlementing the Emergency Procedures in Section 10.

Move the exposure device to the operational location.

Position the panoramic guide tube or the collima.or at the exposure site and secure firmly in position. Always use the collimator whenever possible, to reduce radiation intensity, except in the direction that radiograph is to be made.

Connect the source tubes to the panoramic guide tube or the collimator and align the tubes between the exposure site and the exposure device location in such a manner that there are no kinks or sharp bends in the source guide tubes (bend radius shall not be less than 20") and also that the maximum distance between the exposure site and the exposure device is achieved.

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F. cont.

NOTE: NO MORE THAN THREE (3) SECTIONS (21 FEET TOAL) OF GUIDE TUBE SHALL BE UTILIZED BETWEEN THE EXPOSURE DEVICE AND THE COLLIMATOR OR EXPOSURE POSITION!

String out the drive cable from the reel as far as possible from the exposure point. Bend radius shall not be less than 36".

CAUTION: AVOID SHARP BENDS IN THE DRIVE CABLE TO PREVENT EXCESSIVE PRESSURE FROM BEING EXERTED IN THE CONTROL MECHANISM!

Unlock the exposure device. Turn the selector dial to "CONNECT". Remove the storage cover and place it in the holder, if provided. The source cable end will be visible at this time. Attach the source cable end to the drive cable end. Test connection to insure that it is secured. Line up the drive cable plug with the exposure device connector, and insert. Turn the selector dial to the "LOCK" position and push the lock plunger down.

Remove the shipping plug and connect the source guide tubes.

Unlock and turn the selector dial to "OPERATE". Ensure there is no tension force in either direction on the drive cable. Push the slide bar (green marking) laterally from left to right (as seen behind the exposure device) until the slide bar (red marking) fully appears on the right side of the selector ring and you feel or hear the sleeve snap into slide. When the green marking is visible the source assembly is locked into the safety-stored position within the exposure device; when the red marking is visible the source assembly is free to be projected from/to the exposure device. The source is now free to move.

Turn crank handle clockwise to expose the source and counterclockwise to retract the source.

CAUTION: DO NOT FORCE!

At the completion of the exposure, retract the source. You should hear the slide bar "click" back into its original position and observe the green marking on the slide bar. Apply a slight amount of forward pressure on the crank handle as if to expose the source to ensure that the positive locking mechanism has actuated. Allow the crank handle to return to a neutral position, thereby relieving any tension (force) on drive cable which would cause source movement when unlocking the camera. At this point the source cannot be moved out of the stored position.

In the unlikely event the locking slide moves toward the lock position before the source is fully stored in the exposure device, turn the hand crank in the "RETRACT" (clockwise) direction until the crank stops turning. (The lock slide is designed to lock on the stop ball, not the drive cable). Do not use excessive force. The source will be in the exposure device but not in the fully shielded position. Approach the exposure device, from the rear, with a survey meter. The meter will read approximately 40 mr/hr at the rear plate of the projector when a 100 Ci source is in use.

CAUTION: Remain clear of the front of the exposure device minimize personal exposure. Reset the lock slide to the open position. Return to the control and turn the hand crank in the retract (clockwise) direction and store the source in the normal manner. **If the source can not be fully retracted after several attempts, treat the situation as an Emergency and implement Allegheny Laboratories Emergency Procedures.**

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F. cont.

CAUTION: DO NOT RELY ON LAMP OR FOOTAGE INDICATORS. APPROACH THE EXPOSURE DEVICE WITH A SURVEY INSTRUMENT!

After each radiographic exposure, approach the exposure device from behind. Carefully survey the front of the exposure device including the opening where the source guide tube is attached to the exposure device. Continue the survey around the circumference of the exposure device and along the source guide tube. Check to see that the source is in its shielded position by approaching the exposure device with a survey instrument, and survey both the exposure device and the source guide tube to ensure safe storage of the source.

A proper survey is performed with a operational meter, currently within calibration periodicty, calibration expiration date attached to meter, a satisfactory battery level and capable of detecting 2 mr/hr to 1 r/hr. Survey the exposure device 360 degrees of it circumference, as well as the top and bottom. The radiation intensity shall not exceed 200 mr/hr on contact or 10 mr/hr at 3 feet. Any intensity in excess shall be cause for imlementing the Emergency Procedures in Section 10.

WARNING: IF THE SOURCE CANNOT BE RETURNED TO A SHIELDED POSITION, TAKE ACTION SPECIFIED IN THE EMERGENCY PROCEDURES. MAKE SURE RESTRICTED AREAS ARE MAINTAINED.

Turn selector to "LOCK" position and depress the plunger. Disconnect the source guide tube. Insert and screw in the shipping plug. Unlock the exposure device and turn the selector to "CONNECT. Disconnect the drive cable, insert the storage over, turn the selector to "LOCK" and depress the lock plunger.

G. **Radiographic Source Changer and Storage Container**

Sentinel / Amersham Corporation Model 650L

Procedure for removal of source from the Sentinel / Amersham 660B Exposure Device.

NOTE: SURVEY CONTAINER AT THIS TIME. Daily / Prior to Use Inspections shall be performed on all equipment to be used. Section 9 shall be used in conjunction with this procedure.

A proper survey is performed with a operational meter, currently within calibration periodicty, calibration expiration date attached to meter, a satisfactory battery level and capable of detecting 2 mr/hr to 1 r/hr. Survey the source changer / shipping container 360 degrees of it circumference, as well as the top and bottom. The radiation intensity shall not exceed 200 mr/hr on contact or 10 mr/hr at 3 feet. Any intensity in excess shall be cause for imlementing the Emergency Procedures in Section 10.

Cut the seal, remove the screws, and open the cover of the source changer.

Unscrew and remove the cap from the empty changer.

Open the coupler assembly to make a positive visual check to ensure that the channel is empty. If the channel is not empty, the pigtail from the source cable will be seen.

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G. cont.

Prior to removing exposure device from storage it shall be surveyed.

A proper survey is performed with a operational meter, currently within calibration periodicty, calibration expiration date attached to meter, a satisfactory battery level and capable of detecting 2 mr/hr to 1 r/hr. Survey the exposure device 360 degrees of it circumference, as well as the top and bottom. The radiation intensity shall not exceed 50 mr/hr at 6 inches. Any intensity in excess shall be cause for imlementing the Emergency Procedures in Section 10.

Position the source changer close to the exposure device and connect the source guide tube from the exposure device to the empty channel of the source changer. Bend radius sh~~al~~ not be less than 20".

Connect the drive cable to the source pigtail and lay out cable in a straight line as possible. Bend radius shall not be less than 36".

OPERATION PROCEDURE FOR EXPOSURE DEVICE SHALL BE AS SPECIFIED ABOVE IN F.

Crank the old source into the source the source changer.

Using the radiation survey instrument, ensure that the source is in the chamber of the changer.

A proper survey is performed with a operational meter, currently within calibration periodicty, calibration expiration date attached to meter, a satisfactory battery level and capable of detecting 2 mr/hr to 1 r/hr. Survey the source changer / shipping container 360 degrees of it circumference, as well as the top and bottom. The radiation intensity shall not exceed 200 mr/hr on contact or 10 mr/hr at 3 feet. Any intensity in excess shall be cause for imlementing the Emergency Procedures in Section 10.

Open the coupler assembly and disengage the connectors. The Model 660B exposure devices will have a locking sleeve actuating pin which is pressed toward the bottom of this storage container to disengage the source from the drive cable. The drive cable can then be pulled out of the pigtail.

CAUTION: ENSURE THAT THE SOURCE IS NOT PULLED OUT OF THE STORAGE CONTAINER WHILE DISENGAGING THE SOURCE FORM THE DRIVE CABLE!

Installing a new source in the 660B Exposure Device

Prior to any operations the shipping container and exposure device shall be surveyed

Daily Prior to Use Inspections shall be performed on all equipment to be utilized. Section 9 shall be utilized in conjunction with this procedure.

A proper survey is performed with a operational meter, currently within calibration periodicty, calibration expiration date attached to meter, a satisfactory battery level and capable of detecting 2 mr/hr to 1 r/hr.

Survey the source changer / shipping container 360 degrees of it circumference, as well as the top and bottom. The radiation intensity shall not exceed 200 mr/hr on contact or 10 mr/hr at 3 feet. Survey the exposure device 360 degrees of it's circumference, as well as the top and bottom. The radiation intensity

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G. cont.

shall not exceed 50 mr/hr at 6 inches. Any intensity in excess shall be cause for implementing the Emergency Procedures in Section 10.

Installing a new source and exchanging an old source shall be performed in the Vault (if constructed and certified for use) otherwise a field exposure shall take place requiring boundaries and postings to control the restricted area. A qualified radiographer is the only person authorized to perform a sealed source exchange. The RSO shall be present during removal and installation of the old and the new source.

After removing the old source, you should have the drive cable extending slightly past the source guide tube. Remove the label pertaining to the source and attach it to the exposure device. Remove the cap and attach the source guide tube.

Connect the source pigtail to the drive cable. Grasp the end of the source pigtail and the end of the drive cable and test for a positive connection. Ensure drive cable bend radius is not less than 36"

CAUTION: DO NOT PULL THE SOURCE FROM THE STORAGE CONTAINER!

Attach the source guide tube between the exposure device and the source changer. Ensure the bend radius is not less than 20".

OPERATIONAL PROCEDURE FOR EXPOSURE DEVICE SHALL BE AS SPECIFIED ABOVE IN F.

Retract the source into the exposure device.

CAUTION: DO NOT RELY ON INDICATION LIGHTS OR FOOTAGE INDICATORS. SURVEY THE EXPOSURE DEVICE WITH A SURVEY METER TO ENSURE THAT THE SOURCE IS SAFELY HOUSED IN THE SHIELDED POSITION. PLACE SELECTOR DIAL IN LOCK POSITION, AND DEPRESS LOCK PLUNGER.

**WARNING: IF THE SOURCE CANNOT BE RETRACTED TO A SHIELDED POSITION, T
SPECIFIED IN THE EMERGENCY PROCEDURES. INSURE RADIATION AREAS ARE MAINTAINED.**

Survey the exposure device.

A proper survey is performed with a operational meter, currently within calibration periodicty, calibration expiration date attached to meter, a satisfactory battery level and capable of detecting 2 mr/hr to 1 r/hr. Survey the exposure device 360 degrees of it circumference, as well as the top and bottom. The radiation intensity shall not exceed 50 mr/hr at 6 inches. Any intensity in excess shall be cause for implementing the Emergency Procedures in Section 10.

Disconnect the source guide tube from the exposure device and the source changer and insert the shipping plugs in the exposure device. Unlock exposure device and turn the selector to "CONNECT" position. Disconnect the control cable, insert storage cover, turn selector to "LOCK" and depress plunger. Record the results of the after exposure survey in the source utilization log.

Replace the cap on the empty channel of the storage container. Replace the cover, the screws and seal.

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G. cont.

Prepare for shipment as outlined in Procurement, Receipt and Transfer of Radioactive Material, Section 8.

Sentinel / Amersham Corporation Model 771

Procedure for removal of source from the Sentinel / Amersham Model 680, 680A, 680B Exposure Devices.

NOTE: SURVEY CONTAINER AND EXPOSURE DEVICE AT THIS TIME.

Daily /Prior to Use Inspections shall be performed on all equipment to be utilized.

Section 9 shall be used in conjunction with this procedure.

A proper survey is performed with a operational meter, currently within calibration periodicty, calibration expiration date attached to meter, a satisfactory battery level and capable of detecting 2 mr/hr to 1 r/hr. Survey the exposure device and shipping container 360 degrees of it circumference, as well as the top and bottom. The radiation intensity shall not exceed 200 mr/hr on contact or 10 mr/hr at 3 feet. Any intensity in excess shall be cause for imlementing the Emergency Procedures in Section 10.

Cut the seal, remove the screws, and open the cover of the source changer.

Unscrew and remove the cap from the empty changer.

Open the coupler assembly to make a positive visual check to ensure that the channel is empty. If the channel is not empty, the pigtail from the source cable will be seen.

Position the source changer close to the exposure device and connect the source guide from the exposure device to the empty channel of the source changer. Ensure the bend radius is not less than 20"

Connect drive cable to source pigtail an lay out cable as straight as possible. Ensure bend radius is not less than 36"

OPERATIONAL PROCEDURES FOR EXPOSURE DEVICE SHALL BE AS SPECIFED ABOVE IN F.

Crank the old source into the source the source changer.

Using the radiation survey instrument, ensure that the source is in the chamber of the changer.

A proper survey is performed with a operational meter, currently within calibration periodicty, calibration expiration date attached to meter, a satisfactory battery level and capable of detecting 2 mr/hr to 1 r/hr. Survey the source changer / shipping container 360 degrees of it circumference, as well as the top and bottom. The radiation intensity shall not exceed 200 mr/hr on contact or 10 mr/hr at 3 feet. Any intensity in excess shall be cause for imlementing the Emergency Procedures in Section 10.

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G. cont.

Open the coupler assembly and disengage the connectors. The Model 680, 680A, 680B exposure devices will have a locking sleeve actuating pin which is pressed toward the bottom of this storage container to disengage the source from the drive cable. The drive cable can then be pulled out of the pigtail.

CAUTION: ENSURE THAT THE SOURCE IS NOT PULLED OUT OF THE STORAGE CONTAINER WHILE DISENGAGING THE SOURCE FROM THE DRIVE CABLE!

Installing a new source in the 680A, 680B Exposure Device

Installing a new source and exchanging an old source shall be performed in the Vault (if constructed and certified for use) otherwise a field exposure shall take place requiring boundaries and postings to control the restricted area. A qualified radiographer is the only person authorized to perform a sealed source exchange. The RSO shall be present during removal and installation of the old and the new source.

Survey the shipping container and exposure device at this time

Daily / Prior to Use Inspections shall be accomplished on all equipment to be utilized.

Section 9 shall be utilized in conjunction with this procedure.

A proper survey is performed with a operational meter, currently within calibration periodicty, calibration expiration date attached to meter, a satisfactory battery level and capable of detecting 2 mr/hr to 1 r/hr. Survey the exposure device and shipping container 360 degrees of it circumference, as well as the top and bottom. The radiation intensity shall not exceed 200 mr/hr on contact or 10 mr/hr at 3 feet. Any intensity in excess shall be cause for imlementing the Emergency Procedures in Section 10.

After removing the old source, you should have the drive cable extending slightly past the source guide tube. Remove the label pertaining to the source and attach it to the exposure device. Remove the cap and attach the source guide tube. Ensure bend radius is not less than 20".

Connect the source pigtail to the drive cable. Grasp the end of the source pigtail and the end of the drive cable and test for a positive connection.

CAUTION: DO NOT PULL THE SOURCE FROM THE STORAGE CONTAINER!

Attach the source guide tube between the exposure device and the source changer. Ensure bend radius is not less than 20".

Lay drive cable out in as straight line as possible. Ensure ben radius is not less than 36".

OPERATION PROCEDUES FOR EXPOSURE DEVICE SHALL BE AS SPECIFIED ABOVE IN F.

Retract the source into the exposure device.

Survey the Exposure Device

A proper survey is performed with a operational meter, currently within calibration periodicty, calibration expiration date attached to meter, a satisfactory battery level and capable of detecting 2 mr/hr to 1 r/hr.

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G. cont.

Survey the exposure device 360 degrees of its circumference, as well as the top and bottom. The radiation intensity shall not exceed 200 mr/hr on contact or 10 mr/hr at 3 feet. Any intensity in excess shall be cause for implementing the Emergency Procedures in Section 10.

CAUTION: DO NOT RELY ON INDICATION LIGHTS OR FOOTAGE INDICATORS. SURVEY THE EXPOSURE DEVICE WITH A SURVEY METER TO ENSURE THAT THE SOURCE IS SAFELY HOUSED IN THE SHIELDED POSITION. PLACE SELECTOR DIAL IN LOCK POSITION, AND DEPRESS LOCKING PLUNGER.

WARNING: IF THE SOURCE CANNOT BE RETRACTED TO A SHIELDED POSITION, TAKE ACTION SPECIFIED IN THE EMERGENCY PROCEDURES. INSURE RADIATION AREAS ARE MAINTAINED.

Disconnect the source guide tube from the exposure device and the source changer and insert the shipping plugs in the exposure device. Unlock exposure device and turn the selector to "CONNECT" position. Disconnect the control cable, insert storage cover, turn selector to "LOCK" and depress plunger. Record the results of the after exposure survey in the source utilization log.

Replace the cap on the empty channel of the storage container. Replace the cover, the screws and seal.

Prepare for shipment as outlined in Procurement, Receipt and Transfer of Radioactive Material, Section 8.

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TRANSPORTATION OF RADIOACTIVE MATERIAL
SECTION 7

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TRANSPORTATION OF RADIOACTIVE MATERIAL

- I. The transportation of radioactive material for the purpose of this procedure, shall be defined as the movement of the material for the purpose of conducting radiographic operations.
 - A. When movement is by vehicle, the radiographic exposure device containing a sealed source shall be secured in a storage compartment of the transporting vehicle to prevent shifting or loss. The compartment must be locked to prevent unauthorized entry and the compartment must be posted with a sign bearing the radiation caution symbol (yellow and magenta background) with the words "CAUTION - RADIOACTIVE MATERIAL" or "DANGER - RADIOACTIVE MATERIAL".
 - I. Exposure devices shall be properly package, marked, labeled and the correct shipping papers are complete and in the drivers compartment. (see attachment A)
 - II. The vehicle must be posted in accordance with Department of Transportation regulations, with radiation warning signs stating "RADIOACTIVE" if transporting radioactive material. The signs / placards shall be placed on all four (4) sides of the vehicle.
 - III. A physical radiation survey shall be made of the storage compartment and the levels of the radiation shall not exceed 2 mR/hr at all outside surfaces. The radiation level at the drivers location shall not exceed two (2) mR/hr. Survey the transporting vehicle one (1) foot from all outer surfaces, radiation levels shall not exceed 2 mR/hr. Surveys for the purpose of transporting a radiographic source shall be documented on the Radiation Report Form.
 - IV. The radiation survey meter shall remain in the drivers compartment during transporting of the source.
 - V. The following equipment as a minimum shall be carried in the vehicle:
 - a. One thousand (1,000) feet of yellow and magenta line or tape.
 - b. Eight (8) "CAUTION - RADIATION AREA" signs
 - c. Eight (8) "CAUTION - HIGH RADIATION AREA" signs
 - d. Four (4) rope stands
 - e. Fire Extinguisher
 - f. Flashlight
 - g. Spare Tire
 - h. Vehicle Tools
 - i. Emergency Flares or Reflective Triangles

ALLEGHENY LABORATORIES
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VI. Notification and approval in advance must be obtained from any agreement state prior to transporting radioactive material across state lines. The customer and/or area tenant shall be informed of the tentative arrival on site with radioactive material. The RSO shall be contacted and briefed as to the route to be followed, the time of departure and the estimated time of arrival.

VII. During transportation of Radioactive Material;

- a. The vehicle will not be left unattended and unlocked. When parking; the vehicle load compartment shall be locked.
- b. Leave a clear space of a minimum 6 feet all around vehicle.
- c. All traffic rules and regulations shall be adhered to verbatim.
- d. No passengers shall be carried other than radiography personnel
- e. Personnel monitoring devices (film badge, pocket dosimeters and alarming Ratemeters) shall be worn at all times while transporting.
- f. Refer to the Emergency Procedures, Section 10, in the event of a breakdown or accident.

VIII. Upon arrival at destination:

- a. Monitor Exposure Device.
- b. Notify the RSO of your arrival
- c. Proceed with radiographic exposure procedures in accordance with Section 9.

IX. Leaving a field site to return to Allegheny Laboratories storage facility.

- a. Repeat all steps in this procedure
- b. The exposure device shall be surveyed upon arrival to facilities and also once placed in storage.

2. Security of seal sources

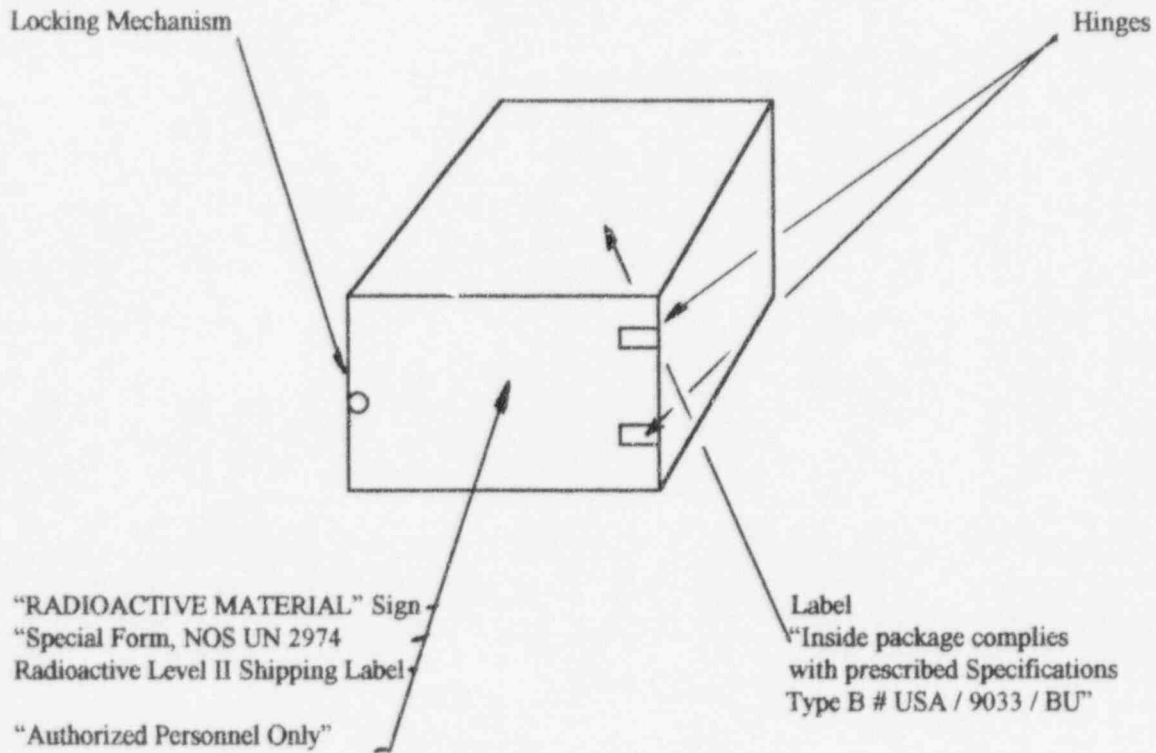
- A. Each Radiographic exposure device shall be provided with a lock designed to prevent unauthorized or accidental removal or expose of a sealed source and shall be kept locked at all times except when in use and under the direct surveillance of a radiographer or radiographer's assistant.
- B. Each radiographic exposure device shall be stored in a container or place (such as a room, area, or truck) which is provided with locks and such other safeguards as may be needed to protect against unauthorized or accidental removal.

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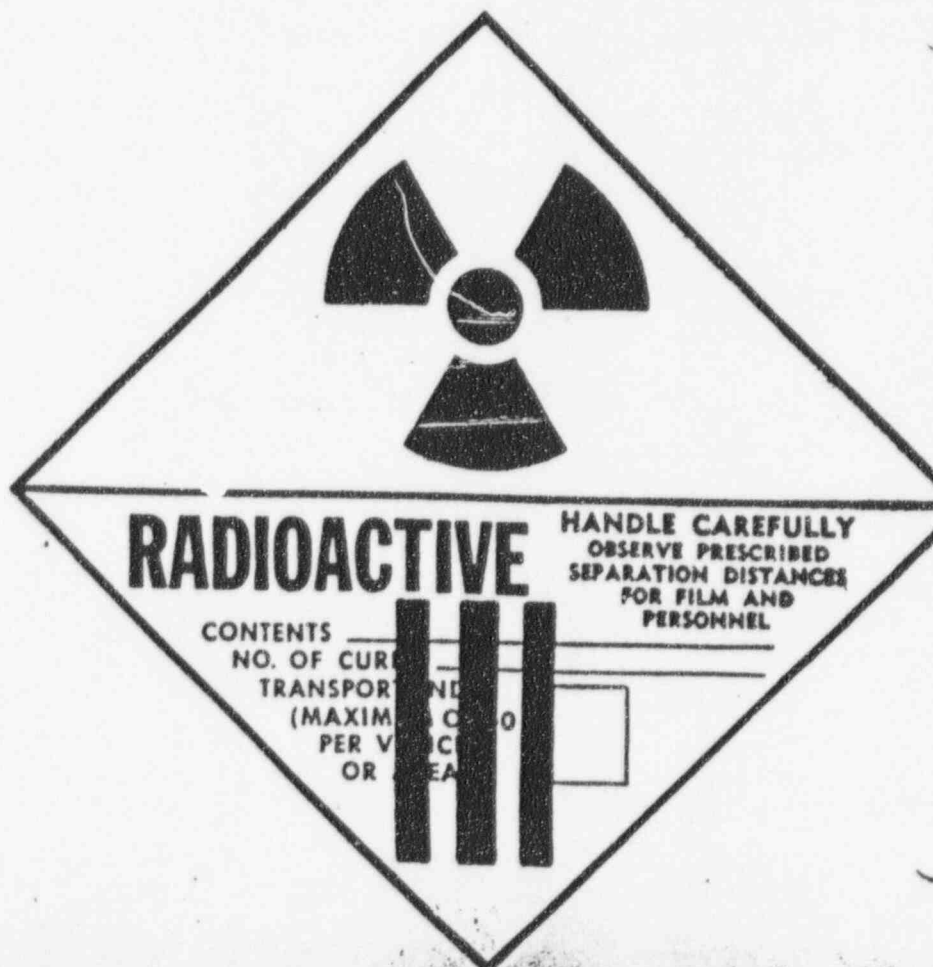
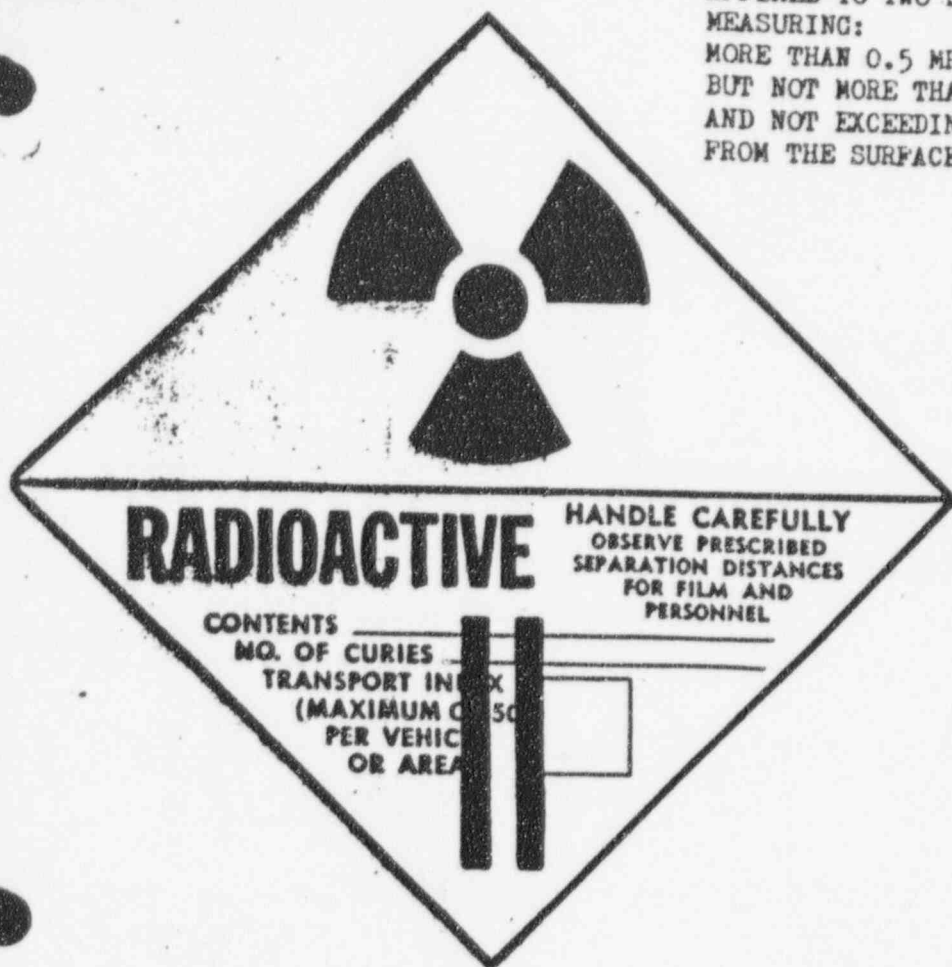
- C. Physical surveys shall be made at the outside surfaces of the storage container or place, and the radiation levels at the surface shall not exceed 2 mR/hr.
- D. A sign bearing the radiation caution symbol (magenta and yellow background) with the words "CAUTION -RADIOACTIVE MATERIAL" or "DANGER - RADIOACTIVE MATERIAL" must be posted on the outside of the container or place.
- E. Sealed sources, not assigned to job sites, **will not** remain in a vehicle overnight. Sources must be secured in storage areas designated for Allegheny Laboratories.
- F. The sealed sources will be stored in a container(s) similar to that in the sketch attached. This container(s) will be constructed of a material and in such a way as to retain the radiation level at 2 mR/hr or less at the surface.

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Storage Container



RADIOACTIVE YELLOW II LABELS MUST BE
AFFIXED TO TWO SIDES OF EACH PACKAGE
MEASURING:
MORE THAN 0.5 MR AT ANY SURFACE.
BUT NOT MORE THAN 50 MR AT ANY SURFACE.
AND NOT EXCEEDING 1.0 MR AT THREE FEET
FROM THE SURFACE.



RADIOACTIVE YELLOW III LABELS
MUST BE USED FOR EACH PACKAGE
EXCEEDING THE LIMITS FOR
EITHER LABEL I OR II.

AGREEMENT STATES

ALLEGHENY LABORATORIES
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PROCUREMENT, RECEIPT AND TRANSFER OF RADIOACTIVE MATERIAL
SECTION 8

ALLEGHENY LABORATORIES
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Procurement, Receipt, and Transfer of Radioactive Material

1. The RSO shall be directly responsible for the procurement, receipt, and transfer of radioactive material.
 - A. Ordering
 - (1) The RSO shall prepare necessary documents for procurement of radioactive material authorized for use by this license.
 - (2) When ordering radioactive material to be delivered, give detailed instructions to the shipper, covering mode of transportation, delivery instructions, and name of individual who will be notified at time of delivery.
 - (3) When ordering radioactive material that will be picked up at carrier's terminal, give detailed instructions to the shipper, covering mode of transportation, person to be notified, and a phone number where that person can be contacted.
 - B. Receipt
 - (1) When notified of the arrival of a shipment of radioactive material (that is to be picked up), the person notified shall see that the shipment is picked without delay.
 - (2) Inspect for signs of shipping damage. If damage is evident, the outer crating should be opened with the carrier present.
 - (3) Survey the shipping container as soon as practical after receipt, but no later than 3 hours if received during working hours, or eighteen hours if received after normal working hours.
Survey results shall be documented on the Requisition, Receipt and Transfer Form, Section 17.
 - (4) If readings are found that exceed the requirements of 200 mR/hr on contact or 10 mR/hr at 3 feet the Emergency Procedures of Section 10 shall be implemented immediately.
 - (5) The Operating Instructions for Equipment of Section 6 shall be followed for opening packages of radioactive material.
 - (6) If the source is not accompanied by a current leak test record, it shall be leak tested utilizing the procedure in Section 12.
 - (7) The packing list or slip will be kept on file by the RSO
 - C. Transfers
 - (1) The RSO will prepare the Radioactive Material for shipment.

ALLEGHENY LABORATORIES
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- (2) No Allegheny Laboratories employee will offer a package of radioactive material to a carrier for transportation unless the following requirements are met.
- (3) Only shipping containers authorized by Allegheny Laboratories license are to be used.
 - a. Properly packaged exposure devices are classified as shipping containers.
 - b. Authorized shipping containers are contained in Section 6 of these Operating and Emergency Procedures.
- (4) The step by step instructions issued by the manufacture of the container are followed in detail and in sequence presented.
- (5) The source shall be securely locked in the fully shielded position and confirmed by surveys.
- (6) The outside of each radioactive materials package must incorporate a feature such as a seal or lock which is not readily breakable and which, while intact, will be evidence that the package has not been illicitly opened.
- (7) The survey of the shipping container and survey meter information will be recorded on the Allegheny Laboratories Requisition, Receipt and Transfer Form.
- (8) An outside surface Swipe Test shall be performed in accordance with Section 13, with satisfactory results prior to transferring/shipping.
- (9) A visual inspection shall be made of the shipping container for damage that could cause a radiation hazard.
- (10) No package with radiation levels in excess of 200 mR/hr on contact of 10 mR/hr at 3 feet shall be released for shipment.
- (11) Package labeling and accompanying shipping papers shall be properly completed.
 - a. Two appropriate radioactive materials warning labels (shipping labels) must be affixed to opposite sides of the package. These labels and application are shown on Attachment A.
 - b. The warning label shall indicate:

Contents (Ir-192, Co-60 etc.)

Number of curies

Transport index number (transport index number is equal to the radiation level in mR/h at 3 feet from the package.

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- c. Remove all old shipping labels and apply a new label(s) that indicate:

Shipper (Company name, address and phone number).

Consignee (Company name, address, phone number and the name of the individual to be notified upon delivery).

RADIOACTIVE MATERIAL IS GENERALLY LIMITED TO TWO (2) MODES OF TRANSPORTATION; MOTOR FREIGHT AND AIR FREIGHT. ALL RADIOACTIVE MATERIAL USED BY ALLEGHENY LABORATORIES IN INDUSTRIAL TYPE AND CANNOT BE SHIPPED BY PASSENGER CARRYING AIRCRAFT.

- d. Air freight shipments require (2) documents:

Air bill (see attachment B for example and instructions)

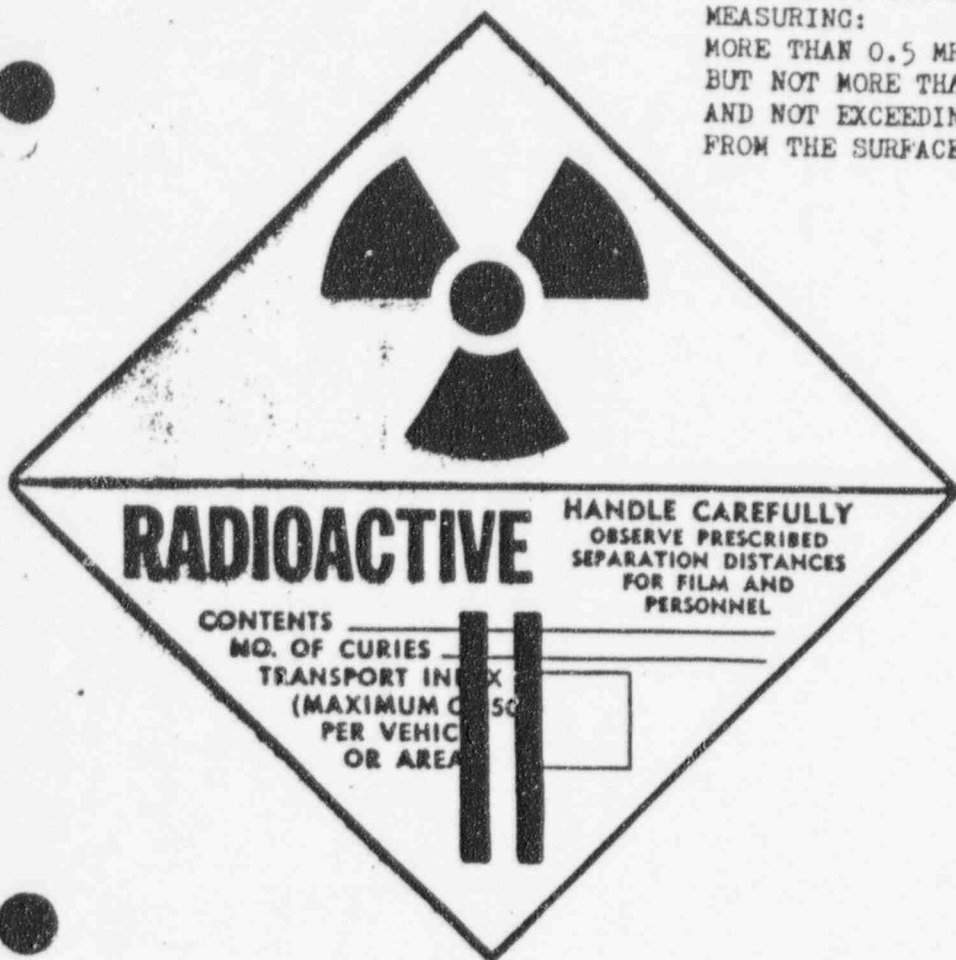
Shippers certification (see attachment C for example and instructions).

- e. Motor freight shipments require one (1) document:

Bill of Lading (see attachment D for example and instructions)

** A notice with name of consignor and consignee shall accompany any shipment stating "This package conforms to the conditions and limitations specified in 49 CFR 173.424 for excepted radioactive material, articles manufactured from depleted uranium, UN 2909.

RADIOACTIVE YELLOW II LABELS MUST BE
AFFIXED TO TWO SIDES OF EACH PACKAGE
MEASURING:
MORE THAN 0.5 MR AT ANY SURFACE.
BUT NOT MORE THAN 50 MR AT ANY SURFACE.
AND NOT EXCEEDING 1.0 MR AT THREE FEET
FROM THE SURFACE.



RADIOACTIVE YELLOW III LABELS
MUST BE USED FOR EACH PACKAGE
EXCEEDING THE LIMITS FOR
EITHER LABEL I OR II.

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AIR BILL FORM

The shipment of Radioactive Materials by air require specific documentation other than that found with motor freight. The below information must be on the Air Bill prior to release to the shipper:

1. Enter Shipper and address
2. Enter Consignee and address
3. Enter number of pieces being shipped
4. Enter description of articles being shipped
 - a. Model 660B Gamma Ray Projector
Radioactive Material, Special Form N.O.S.
UN2974 RQ-10
Iridium-192 Curie Content
Radioactive Label attached (II) Non-Fissile material
Transport Index #: = mR/hr at 1 meter
USA / 9033 / B (U) Type B
5. Certification statement must accompany shipping document "This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation".
6. Declaration statement must accompany shipping document "I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and are in all respects in the proper condition for transport by air according to international and national government regulations".
7. Statement must accompany shipping document "This shipment is within the limitations prescribed for cargo-only aircraft".

ALLEGHENY LABORATORIES
APPENDIX



Shipper Number		Date Shipped		Airbill No.	
Shipper Allegheny Laboratories		Consignee		Bill to:	
Street		Street		Street	
City State		City State		City State	
Nat. No. Zip		P.O. No. Zip		Bill to number Zip	
Charges: <input checked="" type="checkbox"/> Prepaid <input type="checkbox"/> Collect Paid by: <input type="checkbox"/> Check <input type="checkbox"/> Cash <input type="checkbox"/> Bill To (fill in upper right)				NON-NEGOTIABLE AIRBILL SUBJECT TO CONDITIONS OF CONTRACT SET FORTH ON REVERSE OF SHIPPER'S COPY.	
				Freight Charges	
				DrV	
				Advance Origin	
				Advance Destination	
Service: <input type="checkbox"/> P-1 <input type="checkbox"/> SAS <input type="checkbox"/> SEE <input type="checkbox"/> Sat. Del. <input checked="" type="checkbox"/> Haz. Mat. <input type="checkbox"/> P&S <input type="checkbox"/> Gov't Invoice <input type="checkbox"/> Other				Received at: <input type="checkbox"/> Shipper's Door <input type="checkbox"/> FEC Station FEC Rep. Date/Time	
Delivery Instructions: CARGO AIRCRAFT ONLY <input type="checkbox"/> Deliver <input type="checkbox"/> Hold at airport and Notify:				Other Total Charge	
Tel. No.					

FEC-5040 Dec. 1979 Made in U.S.A.

BILLING COPY

"This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation."

"I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and are in all respects in the proper condition for transport by air according to international and national government regulations."

"This shipment is within the limitations prescribed for cargo-only aircraft".

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SHIPPER'S CERTIFICATION FOR RADIOACTIVE MATERIALS FORM

The shipment of Radioactive Materials by air require specific documentation other than that found with motor freight. The below information must be on the Shipper's Certification for Radioactive Materials Form prior to release to the shipper:

1. Cargo Air Craft only
2. Proper Shipping Name - Radioactive Material Special Form N.O.S.
3. Radionuclide - Iridium 192 Non-Fissile
4. Group Number - III
5. Form - Solid Metal, Special Form
6. Activity - Curies and amount
7. Number of packages
8. Category - Yellow II
9. Transport Index - mR/hr at 1 meter from container
10. Type - type B
11. Enter Source Serial #
12. Enter CARGO AIRCRAFT ONLY
13. Name and address of shipper
14. Person, title and phone number certifying - Radiation Safety Officer
15. Date of shipment and certifying signature

***NOTE: Air shipments require two (2) Danger-Peligro Labels attached to package

Two (2) copies of Form must be presented to carrier

Packages in excess of 110 pounds must have weight marked on the outside of the package.

SHIPPER'S CERTIFICATION FOR RADIOACTIVE MATERIALS

Two completed and signed copies of this certification shall be handed to the carrier.

(Use block letters)

WARNING: Failure to comply in all respects with the applicable regulations of the Department of Transportation, 49-CFR, CAB 82 and, for international shipments, the IATA Restricted Articles Regulations may be a breach of the applicable law, subject to legal penalties. This certification shall in no circumstance be signed by an IATA Cargo Agent or a consolidator for international shipments.

This shipment is within the limitations prescribed for: (mark one)

☐ passenger aircraft

And contains radioactive material intended for use in, or incident to, research, or medical diagnosis or treatment.

(1) ☒ cargo-only aircraft

NATURE AND QUANTITY OF CONTENT

PACKAGE

(2) PROPER SHIPPING NAME	(3) RADIOISOTOPE	(4) GROUP	(5) FORM	(6) ACTIVITY	(7) Number of Packages	(8) CATEGORY	(9) TRANSPORT INDEX	(10) TYPE
FOR U.S. SHIPMENTS, SEE SECTION 2, CAB 82, TARIFF 8-D	NAME OR SYMBOL OF PRINCIPAL RADIOACTIVE CONTENT	GROUP NUMBER OF GROUPS I TO VII	CHEMICAL FORM AND PHYSICAL STATE (GAS, LIQUID, SOLID), or SPECIAL FORM, or SPECIAL ENCAPSULATION	NUMBER OF CURIES, or MILLI CURIES		I—WHITE or II—YELLOW or III—YELLOW LABEL	FOR YELLOW LABEL CATEGORIES ONLY	INDUSTRIAL or TYPE A, or TYPE B
Radioactive Material Special Form Cargo only Aircraft	Iridium 192 Non-Fissile	III	Solid metal Special Form	Curies	1	II	2.0	Type B
(11) Source Serial #								

ADDITIONAL INFORMATION REQUIRED FOR FISSILE MATERIALS ONLY

EXEMPTED FROM THE ADDITIONAL REQUIREMENTS FOR FISSILE MATERIALS SPECIFIED IN 7.1. OF PART 2 OF THE IATA RESTRICTED ARTICLES REGULATIONS

NAMES, PLUS QUANTITY IN GRAMS, OR CONCENTRATION OR ENRICHMENT IN U235

NOT EXEMPTED: FISSILE CLASS I FISSILE CLASS II FISSILE CLASS III

Additional certificates obtained by the Shipper when necessary:

Special Form Encapsulation Certificate(s) 13

Type "B" Packaging Certificate(s)

Certificate(s) for Fissile Material

Certificate(s) for Large Radioactive Source 13
Government Approvals/Permits 13

Special Handling Information

(12)

CARGO ONLY AIRCRAFT

I hereby certify that the contents of this consignment are fully and accurately described above by Proper Shipping Name and are classified, packed, marked, labelled and in proper condition for carriage by air according to applicable national governmental regulations, and for International Shipments, the current IATA Restricted Articles Regulations.

Name and full address of Shipper (13)

Allegheny Laboratories

Name and title of person signing Certification (14)

Michael B. Croghan

Radiation Safety Officer

Phone (814) 676-5031

Date (15) Signature of the Shipper (see WARNING above)

Air Waybill No. *

Airport of Departure *

Airport of Destination *

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KENNERDELL, PA 16374

BILL OF LADING

The Transportation of Radioactive Material by truck or freight requires a Bill of Lading. This requirement applies regardless of whether Allegheny Laboratories Radiographers or a commercial carrier is transporting.

The following shall be used as a guide in the completion of a Bill of Lading:

1. Enter the Carrier of the Radioactive Material
2. Enter the date of shipment/transportation
3. Enter the Consignor and address (organization shipping/transporting)
4. Enter the Consignee and address (organization receiving/destination)
5. Enter the number of packages
6. Enter an "X" for Hazardous Material
7. Enter description of article(s)
 - a. Model 660B Gamma Ray Projector
 - b. Radioactive Material, Special Form N.O.S.
 - c. Enter identification number (UN2974) RQ-10
 - d. Enter Radionuclide (Ir-192) and Curie content at time of shipment
 - e. Enter category of label applied (Radioactive Level II) Non-Fissile
 - f. Enter Transport Index # (mR/hr at 1 meter)
 - g. Enter USNRC identification # (USA/9033/B(U) type B
 - h. Enter weight of package (660B shipping weight is 53 pounds)
Packages over 110 pounds must have weight marked on the outside of the package
8. Enter the Emergency Phone Numbers of the RSO
During normal working hours - (814) 676-5031
After working hours - (814) 385-6536
9. Enter USA Shippers certification: "This package conforms to the conditions and limitations specified in 49 CFR 173.424 for excepted Radioactive Material, articles manufactured from depleted uranium, UN2909".

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BILL OF LADING (cont.)

10. Drivers Signature
11. Radiation Safety Officer's signature and title
12. Enter Allegheny Laboratories
13. Enter Allegheny Laboratories and address
14. Enter the Route to taken for transporting
15. Enter Vehicle and License #

1. Subject to the classifications and security free tariffs in effect on the date of this Original Bill of Lading.

2. The carrier, in apparent good order, except as noted (currents and condition of packages unknown), marked, consigned and destined as indicated below, which carrier (the word carrier being understood throughout this contract) agrees to deliver to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classification in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.

3. The carrier hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back thereof, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

BY TRUCK ☐ FREIGHT ☐

DATE

SHIPPER'S NO.

19

CARRIER

CARRIER'S NO.

BY

Allegheny Laboratories

ROUTE

DELIVERING CARRIER

CAR OR VEHICLE
INITIALS & NO.

AGES	HM	DESCRIPTION OF ARTICLES, SPECIAL MARKS AND EXCEPTIONS	ERG #	WEIGHT (SUBJECT TO CORRL)	CLASS OR RATE	✓	Subject to Section 7 of conditions of applicable bill of lading. If this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement. The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.
X		Model 660B Gamma Ray Projector		53			Per (Signature of Consignor) If charges are to be prepaid, write or stamp here, "To be Prepaid."
		Radioactive Material, Special Form N.O.S.					
		UN2974 RQ-10					
		Iridium-192 Curies					
		Radioactive Level II Non-Fissile					Received \$ to apply in prepayment of the charges on the property described hereon.
		Transport Index # Mr/hr @ 1 meter					
		USA / 9033 / B (U) Type B					
		Emergency Phone Numbers					Agent or Cashier.
		814-576-5031 During Working Hours					
		814-385-6536 After Working Hours					
		This package conforms to the conditions and limitations specified					Per (The signature here acknowledges only the amounts prepaid).
		in 49CFR 173.424 for excepted Radioactive Material, articles					
		manufactured from depleted uranium, UN2909					Charges Advanced:

CARDS SUPPLIED ☐ YES ☐ NO

DRIVER'S SIGNATURE

EMERGENCY RESPONSE PHONE NO.

PERS CERTIFICATION: This is to certify that the above-named materials are properly filed, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

SIGNATURE

TITLE

\$

When moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight".
per's imprints in lieu of stamp; not a part of Bill of Lading approved by the Interstate Commerce Commission.
Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property
or declared value of the property is hereby specifically stated by the shipper to be not exceeding

TH IS CORRECTLY DESCRIBED.

† The fibre boxes used for this shipment conform to the specifications set forth in the box makers certificate thereon, and all other requirements of the Consolidated Freight Classification.

Allegheny Laboratories

Per

Shipper

C.O.D. SHIPMENT

C.O.D. Amt

Collection Fee

Total Charges

Allegheny Laboratories

Shipper, Per

Agent, Per

RD #2 Box 4A Kennerdell, PA 16374

Permanent post office address of shipper

1

ALLEGHENY LABORATORIES
RD #2 BOX 4-A
KENNERDELL, PA 16374

RADIOGRAPHIC EXPOSURE PROCEDURE
SECTION 9

ALLEGHENY LABORATORIES
RD #2 BOX 4-A
KENNERDELL, PA 16374

Radiographic Exposure Procedure

1. Vault Exposure

A. Prepare Specimen(s)

- (1) Identification
- (2) Location Markers
- (3) Shims
- (4) Penetrameters
- (5) Film
- (6) Calculate Exposure Time

B. Obtain keys to the vault and applicable Exposure Device.

C. Procedures for entering vault.

- (1) Ensure personnel entering vault are wearing the appropriate radiation monitoring devices.
- (2) Check survey meter for proper operation, within calibration and set on proper scale for entry.
- (3) Unlock vault door and open
- (4) Stand behind door and extend survey meter inside vault to conduct survey of inner vault entry way.
- (5) IF THE RADIATION LEVEL EXCEEDS 10 MR/HR, IMMEDIATELY SECURE VAULT AND NOTIFY RSO. RADIOGRAPHIC OPERATIONS SHALL NOT PROCEED EXCEPT AS DIRECTED BY RSO DIRECTION.
- (6) With survey instrument extended in front of you advance into the inner vault area (pit) observing survey meter as you advance. Verify that visual warning light is off. Verify that gamma alarm with warning light in pit area are operation. DO NOT DEPEND ON THIS ALARM SYSTEM, ALWAYS USE A SURVEY METER.
- (7) Ensure the inner vault storage are does not exceed 10 mR/hr.
- (8) Monitor all exposure devices and storage containers and check the identification tag of the source to be used.
Limits on Exposure Devices measuring less than 4 inches from the sealed source to the exterior shall not be greater than 50 mR/hr. Limits on Exposure Devices and Shipping Containers with a minimum of 4 inches from the sealed

ALLEGHENY LABORATORIES
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C. Procedures for entering vault cont.

source to the exterior shall not be greater than 200 mR/hr on contact or 10 mR/hr at 3 feet. Any radiation intensity greater than these shall be cause for implementing the Emergency Procedures of Section 10.

- (9) Position exposure device to be used on the pit platform
- (10) Record survey of exposure device to be used in the utilization log.

D. Setting up

- (1) Perform equipment inspection and maintenance checks in accordance with Section 11.
- (2) Position collimator or panoramic guide tube.
Use collimator whenever possible
- (3) Position exposure device and drive cable.
- (4) Position specimen and film
- (5) Connect drive cable
- (6) Remove shipping plug, connect source guide tube, unlock exposure device and place in "OPERATE" position.
- (7) Place drive cable on floor and string out to exterior of vault door.
- (8) Close vault door
- (9) Set timer for exposure time
- (10) Make entry in utilization log.

E. Exposure

NOTE: ALL RADIOGRAPHIC EXPOSURES SHALL BE CONDUCTED BY A QUALIFIED RADIOGRAPHER OR A RADIOGRAPHERS ASSISTANT UNDER THE PERSONAL SUPERVISION OF A QUALIFIED RADIOGRAPHER.

- (1) Expose the source, start timer and enter time "out" in utilization log.
- (2) Conduct survey. Observe that the gamma alarm is sounding an audible alarm and the flashing light is illuminated. If either of these are not functioning immediately retract source, conduct a proper entry and survey into the vault, survey the guide tube, collimator, exposure device, lock exposure device, exit vault, lock door and notify the RSO immediately. No radiographic operation shall take place including any vault entry until corrective actions have been implemented by the RSO.

ALLEGHENY LABORATORIES
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E. Exposure cont.

- (3) Retract source and enter time "in" the utilization log.

CAUTION: DO NOT OPEN VAILT DOOR FOR APPROXIMATELY 30 SECONDS. THIS ALLOWS THE CIRCUITRY OF THE INSTALLED GAMMA ALARM TO RESPOND TO A SAFE CONDITION.

- (4) Verify that the audible alarm has silenced and the flashing light has gone out.
- (5) Survey the exposure device, guide tube(s) and collimator. Survey 360 degrees of circumference including top and bottom. Radiation intensity shall not exceed 50 mR/hr at 6 inches.
- (6) Lock exposure device and record after exposure survey in the utilization log.
- (7) Disconnect source guide tube, and install shipping plug in exposure device.
- (8) Unlock exposure device, disconnect drive cable and lock exposure device.
- (9) If no further exposures are necessary, return the exposure device to its stored location, monitor, and record after storage reading in utilization log.
- (10) Re-store collimator or guide tube with source stop and lock vault door.
- (11) Turn off survey meter and re-store
- (12) Return keys to vault and exposure device to lock box

F. Reports

- (1) Make entries on Dosimetry Report Form, record highest reading from two pocket dosimeters worn
- (2) Complete Radiation Report Form
- (3) Ensure utilization log is completed
- (4) Notify RSO of any and all discrepancies, incidents, or malfunctions of equipment.

2. Field Exposures (Ir-192 only)

- A. The radiographer in charge shall initiate a Radiation Report Form(s) each time a temporary radiographic area is erected. Instruction for the completion of this form is in Section 17.
- B. Each radiographic area must be barricaded or roped off and posted with a minimum of four signs, one at each 90 degrees at the perimeter of the restricted area (2 mR/hr) reading "CAUTION - RADIATION AREA" or "DANGER - RADIATION AREA." The perimeter of the high radiation area shall be conspicuously posted with "CAUTION - HIGH RADIATION AREA" or "DANGER - HIGH RADIATION AREA" signs. These

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2. Field Exposures cont.

areas are as defined in Section 4. The perimeter of the radiographic area boundaries shall be by direct calculation utilizing the inverse square law [$I_1 (D_1)^2 = I_2 (D_2)^2$]. The curie content for the source shall be determined by the sources decay chart. A collimator shall be used to the maximum extent possible. Calculations for radiographic area boundaries shall be based on the collimated values when a collimator is used. The attenuation factor for the collimator shall be as specified by the manufacture and verified by the RSO prior to its first use when purchased. A radiation survey shall be made to adjust the boundaries of the restricted area as soon as the source has been exposed. The total quantity of radiation in any one hour shall not exceed 2 mR/hr at the barrier. The radiographer and /or radiographer assistant shall keep the area under constant surveillance to protect against unauthorized entry, except where areas are equipped with control devices, locks or alarm systems to protect against unauthorized or accidental entry.

(1) For cross country pipeline inspection, wherein the work progresses in a forward direction constantly changing with each radiograph, the radiographer shall:

A. All the requirements of paragraphs 2 A and B shall apply with the following exception:

Only one Radiation Report Form shall be completed due to the progression of work and it shall be performed on a shiftly basis.

C. The procedures specified above in paragraphs 2 A and B shall apply when conducting source exchanges from exposure devices to shipping containers if performed in any area other than the vault.

D. Preparation of equipment and personnel

(1) Personnel monitoring

- a. Film badge - one (1) per person
- b. Pocket Dosimeters two (2) per person
- c. Alarming Ratemeter one (1) per person

(2) Survey Instruments

- a. Victoreen Model 492 or equivalent - minimum of two (2)

(3) Area control equipment

- a. Line, tape or rope, yellow and magenta of sufficient quantity to erect boundaries.
- b. Stanchions of sufficient quantity for the erection of boundaries

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- (3) Area control equipment cont.
 - c. High Radiation Area signs - eight (8)
 - d. Radiation Area signs - eight (8)
 - e. Radioactive Material signs - four (4)
- (4) Exposure Equipment
 - a. Radiographic exposure device, drive cable assembly and source guide tubes with appropriate source and utilization log.
 - b. Timer
 - c. Lead letters and numbers
 - d. Shims
 - e. Penetrameters
 - f. Masking / duct tape
 - g. Film
 - h. Lead backing
- (5) Special Equipment
 - a. Collimator
 - b. Portable shielding
 - c. Copy of Operating and Emergency Procedures
 - d. 10 CFR Parts 19, 20, 21, 30, 34, 40, 71
 - e. Radiation Report Form(s)

C. Transporting

- (1) Transport of Radioactive Materials shall be in accordance with Section 7.

D. Set up area

Perform equipment inspection and maintenance checks in accordance with Section 11. Sign Radiation Report Form for this task.

- (1) The radiographer in charge shall be responsible for the touring and searching of all areas affected by radiographic boundaries. He will ensure that the area tenant/person in

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(1) cont.

charge has been briefed of the radiographic operations about to commence and ensure that all personnel in the immediate area are aware to stand clear of all boundaries.

(2) Rope off the area

- a. Measure area using predetermined calculations
- b. Place stanchions as applicable
- c. Place boundary ropes, tape

(3) Post the area

- a. HIGH RADIATION AREA signs at the calculated 100 mR/hr line
- b. RADIATION AREA signs at the calculated 2 mR/hr line
- c. The actual isodose line can be positioned at other than 2 mR/hr provided that no person is exposed to more than 2 mR in any one hour. If more than one exposure is to be made during any one hour, a full schedule of all exposures to be made will be available, since all exposures must be considered radiation exposures. Example: A 12 mR/hr line may be posted if the exposure time in any one hour does not exceed 10 minutes. THIS PRACTICE MAY NOT BE ALLOWABLE IN CERTAIN AGREEMENT STATES AND SHALL BE VERIFIED PRIOR TO USING!

(3) Position the Collimator

- a. Position collimator and/or portable shielding
- b. Position exposure device, guide tube(s) and drive cable
Avoid sharp bends and kinks!
- c. Connect source guide tube to collimator
- d. Place appropriate identification and Penetrameters
- e. Position film
- f. Survey the exposure device and record results in the utilization log.
Radiation Intensity shall not be greater than 50 mR/hr at 6 inches.
- g. Clear the area

WARNING: KEEP CONSTANT SURVEILLANCE OF RADIATION AREA BOUNDARIES TO INSURE UNAUTHORIZED ENTRIES ARE NOT MADE BY PERSONNEL.

- h. Unlock exposure device, attach drive cable, remove shipping plug, connect source guide tube and place in "OPERATE" position.

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(4) Conduct Exposure

NOTE: All radiographic exposures shall be conducted by a qualified radiographer or a radiographers assistant under the personal supervision of a qualified radiographer.

- a. Expose source and record time in the utilization log.
- b. Conduct survey and adjust boundaries accordingly
- c. Upon completion retract source and record time in utilization log.
- d. Survey the exposure device and source guide tubes.
Radiation Intensity shall not exceed 50 mR/hr at 6 inches.

(5) Secure the exposure device

- a. Lock device and record after exposure survey results in utilization log.
- b. Disconnect source guide tube, install shipping plug, disconnect and make up drive cable.

(6) Refer to Emergency Procedures, Section 10, in the event of:

- a. Unauthorized entry into the area
- b. Fire in the immediate vicinity
- c. Malfunction of equipment
- d. Loss of source

(7) Secure the area

- a. Remove signs
- b. Remove rope, tape boundaries
- c. Remove stanchions

(8) Transporting

- a. Transport of Radioactive Materials shall be in accordance with Section 7.

(9) Radiographic Operations complete

- a. Store all equipment
- b. Store exposure device in its designated storage position/area. Survey and record results in utilization log. Radiation Intensity shall not exceed 50 mR/hr at 6 inches.

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- (9) Radiographic Operations complete cont.
 - c. Store all other equipment. Ensure survey meters are turned off.
- (10) Records and Reports
 - a. Make sure all entries are made and signed for in the utilization log. (section 17)
 - b. Complete and turn in Radiation Report Form(s)
 - c. Record Pocket Dosimeter readings of Dosimetry Record Form (section 17).
 - d. Notify RSO that radiographic operations are complete. Report any unusual incidents or equipment malfunctions.

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EMERGENCY PROCEDURES
SECTION 10

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EMERGENCY PROCEDURES

1. Notification
 - A. In the event of any emergency (as defined in Section 4 Definitions), the Radiation Safety Officer will be notified immediately.
2. Loss of Control of Radioactive Material
 - A. Extend area if necessary in order to maintain the 2 mR/hr line. Security of the area shall be maintained until otherwise directed by the RSO.
 - B. Notify the RSO immediately.
 - C. The Radiographer in charge will locate the general position of the source using survey meter. Under no circumstances shall he attempt to approach the High Radiation Area and cause undue exposure.
 - D. Having personnel place lead sheet and /or lead shot bags over the source may not always be appropriate as it may hinder any recovery actions. All recovery actions for a loss of control shall be performed in accordance with a planned procedure in such a manner to limit individual exposures to less than 100 mrem to the maximum extent possible. All recovery actions shall be planned and performed under the direct supervision of the RSO unless extenuating circumstances demand other action.
 - E. The RSO will investigate and determine cause.
 - F. The RSO will plan corrective action and direct recovery.
 - G. Limit exposure by utilizing TIME / DISTANCE / SHIELDING.
3. Exposure to Personnel not Monitored
 - A. Detain the exposed person or persons
 - B. Immediately note the following:
 - (1) Approximate distance from source
 - (2) Time at this distance
 - (3) Shielding, if any (structural walls, storage tanks etc.)
 - C. Obtain Name of individual(s), Company's Name and Supervisors
 - D. Notify RSO
 - E. The RSO, will determine the approximate dose from notes taken by the Radiographer. If appropriate the exposed person(s) will be transported to the nearest hospital for evaluation by medical personnel.

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4. Overexposure to Monitored Personnel
 - A. In the event of any exposure exceeding the limits set forth in Section 5 LIMITS OF EXPOSURE of this License, notify the RSO immediately.
 - B. The RSO shall prepare a report as required by Section 15 REPORTING OF DEFECTS AND NONCOMPLIANCE of this license.
5. Fire Directly Involving Radioactive Material
 - A. If the source is in the exposed position - retract into exposure device, survey source guide tube, collimator and exposure device, then lock exposure device.
 - B. Notify:
 - (1) Fire Department
 - (2) RSO
 - (3) Police
 - C. Remove radioactive material from the area of the fire.
6. Vehicular Accidents
 - A. Survey the exposure device.
 - B. If no operating radiation survey instruments are available (due to accident), it will be assumed that a RADIATION HAZARD exists and the procedure established below will be followed.
 - C. If a RADIATION HAZARD exists, clear the area and rope off and post the 2 mR/hr line.
 - (1) Distances to the 100 mR/hr and 2 mR/hr line, in feet are as follows:

Activity (curies Ir-192)	100 mR/hr	2 mR/hr
100	76.8	543
90	72.9	515
80	68.7	485
70	64.3	455
60	59.5	420
50	54.3	384
40	48.6	343
30	42.1	297
20	34.4	243
10	24.3	172

Activity (curies Co-60)	100 mR/hr	2 mR/hr
50	83.7	592
40	74.8	529.2
30	64.8	458.3
20	53.0	374.2
10	37.4	265.0

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- (2) Notify
 - (a) Radiation Safety Officer (RSO)
 - (b) Local and/or State Police
- (3) The RSO will take charge of operations at the scene to minimize exposure to all personnel, reduce effect of surrounding operations, and to recover the radioactive material. In the event the RSO is not in the immediate area, the radiographer in charge shall establish control at the scene, notify the RSO by phone and brief him as to the status at the scene. The RSO shall direct immediate actions via phone, mobilize himself to the emergency site and contact (if necessary) the necessary agencies to execute recover actions. The recognized agency shall be Amersham Corporation which has on staff emergency recovery personnel.
- (4) The RSO shall IMMEDIATELY notify the NRC Operations Center by phone at (301)-951-0550 and by telegram, mailgram, or facsimile to the Administrator NRC Regional Office #1, 475 Allendale Road, King of Prussia, PA. 19406 phone # (215)-337-5000 and FTS 346-5000.
- (5) In addition to the notifications above the RSO shall submit written reports as required and discuss in Section 15 "REPORTING OF DEFECTS AND NONCOMPLIANCE" of these operating and emergency procedures.

7. Vehicle Breakdowns

- A. Do not leave the vehicle unattended. A message for help may be sent by a passing motorist or the police may be asked to guard the vehicle.

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INSPECTION AND MAINTENANCE PROGRAM FOR RADIOGRAPHY EQUIPMENT
SECTION 11

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Inspection and Maintenance Program for Radiography Equipment

1. The RSO, shall be responsible for the implementation of this program.
 - A. General program Requirements
 - (1) Any component essential to radiation safety that is found damaged or defective at any time shall be immediately removed from service and be repaired or replaced. The RSO, shall make the determination of the safe repair or replacement.
 - (2) An Inspection and Maintenance Record shall indicate the date, make, model, and serial number of device or component; radiographer's name, and the appropriate inspection item to be checked. There shall be a remarks section to state defects found and action taken. Results of inspection and maintenance shall be documented on the appropriate forms located in the Inspection and Maintenance of Radiographic Equipment Folder, Maintained by the RSO. All inspection and maintenance records shall be retained for a minimum of three years in accordance with NRC regulations.
 - (3) The RSO shall review the Inspection and Maintenance Record for accuracy and completeness and maintain the records on file. These records shall be reviewed at least quarterly.
 - B. Inspection Schedule
 - (1) Exposure Devices, Source Changers/Shipping Containers and Associated Equipment
 - (a) The equipment and its operation will be checked each day prior to its use, every quarter and when deemed necessary by competent authority (RSO) and following any unusual strain on equipment.
 - (b) Accomplished by any qualified radiographer
 - (2) Vault Gamma Alarm
 - (a) Test quarterly by holding an exposure device containing a source next to the Gamma Alarm. The Gamma Alarm shall cause an audible alarm to sound inside the vault as well as outside of the vault door exterior. The Gamma Alarm shall also cause a visible light to be illuminated inside the vault and outside of the vault door exterior. Test shall be conducted by a qualified radiographer. Notify the RSO of any discrepancies or malfunctions. Proper operation shall be verified at first exposure, of every day that radiographic operations are conducted in the vault.

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(2) Vault Gamma Alarm cont.

- (b) Verify that calibration is current and sticker is attached. (Calibration frequency shall be annually)
 - (c) Any malfunctioning of the gamma alarm requiring internal repair or adjustments to the unit shall be performed by the equipment manufacture or an authorized calibration and repair company licensed by the NRC (Applied Health Physics, Inc. see Section 6.0 of Administrative Procedures or Sentinel / Amersham Corporation).
- (3) Exposure devices and associated equipment (quarterly, daily and/or prior to use). NOTE: Inspection and maintenance of exposure devices and associated equipment shall be performed in the Vault. If the vault is not available or equipment is in the field, a Radiation Report Form shall be generated when the source is going to be moved from the shielded position and a Restricted area established. (See Section 9 for Radiographic Exposure Procedures).

THE FOLLOWING PROCEDURES ARE QUARTERLY INSPECTION/MAINTENANCE CHECKS. DAILY AND PRIOR TO USE CHECKS ARE SHOWN ON ATTACHMENT A AND ARE ALSO REQUIRED TO BE PERFORMED AT THIS TIME

For 660B Ir-192 and 680A,680B Co-60 Exposure Devices and accessories

- (a) Clean and inspect the drive cable assembly
- (b) Clean and inspect the source guide tubes
- (c) Clean and inspect Exposure Device for wear or obvious damage
Check that all labeling and warnings are legible and intact
- (d) Check that the source outlet shipping plug is in place and that the screws and nut turn freely, but are not loose
- (e) Check for wear in the cable connector using the go no go gauge. There are four tests - ball diameter; ball shank; slot width; and connector gap width.
- (f) Check that the selector ring and lock mechanism operate freely. If faulty only Amersham is authorized to service unless an Allegheny Laboratory individual has completed Amersham's 2 day maintenance course.
- (g) Check that transport cart and wheels are intact and operation (if applicable)

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- (4) Storage Containers/Shipping Containers (when used)
 - (a) Visually inspect for signs of damage.
 - (b) Inspect fittings for stripped threads.
 - (c) Visually verify that all labels and warnings are legible and attached
- (5) Collimators
 - (a) Check for stripped threads on fittings
- (6) Radiographic Source Quarterly Inventory
 - (a) The RSO shall conduct a quarterly physical inventory to account for all sealed sources received and possessed under this license. A qualified radiographer may perform the inventory when directed by the RSO.
 - (b) The records of the inventories shall be maintained for a minimum of 3 years from the date of the inventory for inspection by the NRC, and shall include as a minimum the following:
 - (1) Type(s) of by-product material
 - (2) Activity of sources(s)
 - (3) Quantities of by-product material
 - (4) Location of sealed sources
 - (5) Date sealed source was received
 - (6) Serial number of sealed sources
 - (7) Date of inventory
 - (8) Signature of person accomplishing inventory
 - (c) Documentation of quarterly inventory shall be on Quarterly Source Inventory Form from Section 17.

C. Preventative Maintenance (Quarterly)

NOTE: In addition to the quarterly maintenance, prior-to-use checks must be performed. These checks shall be documented on The Radiation Report Form. See Section 17.

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(1) Exposure Devices

- (a) Clean threaded holes and fittings with a solvent similar to Isopropyl Alcohol.
- (b) Lubricate threads with a light weight lubricant similar to WD-40
- (c) Clean locking mechanisms with a solvent similar to Isopropyl Alcohol and lubricate with a light weight lubricant similar to WD-40.

(2) Drive Cables

- (a) Remove drive cable from housing. Cable should be laid out on a clean, dry surface. If this is not possible, insert cable into a clean guide tube that is long enough to contain the entire length of cable.
- (b) Clean cable with Isopropyl Alcohol and dry thoroughly. Check the male connector of the drive cable with the GO - NO - GO Gauge. If the ball of the connector fits through the hole of the gauge or the ball shank fits into the slot in the gauge, the connector is worn and the cable must be replaced.
- (c) Lightly grease the cable using Texaco "uni-temp" grease or equivalent. Other grease may form tars or corrosive compounds when exposed to radiation.
- (d) Reinsert cable into housing and retract completely.

(3) Guide Tubes and Control Housings

- (a) Flush the control housings and source guide tubes with Isopropyl Alcohol.
- (b) Check the source guide tube for binding by holding them vertically and dropping a steel ball bearing slightly smaller than the internal diameter passage on the tube. The ball bearing shall pass through smoothly without binding or sticking.
- (c) Wipe the guide tubes and control housings with a cloth soaked in Isopropyl Alcohol and flex them to check for internal damage. Damage is evidenced by a crunching feeling when the housing or tube is bent. While doing this, feel for dented, cuts flattened or burnt control housings or guide tubes.
- (d) The guide tubes or control housings may be covered with tape where only the outer plastic is cut through.

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NOTE: THE FOLLOWING INSPECTION AND MAINTENANCE PROCEDURES SHALL ONLY BE USED ON THE GAMMA INDUSTRIES MODEL S & SA EXPOSURE DEVICES AND THE GAMMATRON MODEL 100A PRIOR TO DISPOSING OF SEALED SOURCES TO AN AUTHORIZED RECIPIENT/AGENCY. ONCE SOURCES ARE DISPOSED OF THESE EXPOSURE DEVICES WILL BE STORED UNTIL PROPERLY DISPOSED OF AS THEY ARE NO LONGER APPROVED FOR USE IN RADIOGRAPHIC OPERATIONS.

NOTE: Inspection and maintenance of exposure devices and associated equipment shall be performed in the Vault. If the vault is not available, a temporary area shall be established with all the requirements of a field operation, a Radiation Report Form shall be generated and a Restricted area established. (See Section 9 for Radiographic Exposure Procedures).

Gamma Industries Model century S & SA Exposure Device

1. Inspect the source pigtail.
 - (a) Inspect the connector for true elbow, straightness, excessive wear and cracks.
 - (b) Inspect the flexible cable at the connector for straightness

Maintenance: If defective, the source must be returned in the exposure device to the source supplier.

2. Inspect connector on drive cable. This hole will show some wear but should not be out-of-round to the extent that it will disconnect from the mating piece other than in the correct position. It should not be loose on the drive cable. The portion of the connector with the connector hole should not be bent, but should be straight and parallel with body of connector.

Maintenance: Replace, if the connector does not meet all of the above requirements.

3. Connect the drive cable to the source pigtail connector. Test the connection by pulling straight back on the cable applying about 30 to 40 pounds of pressure.

CAUTION: Be sure the lock plunger is depressed before making the pull test.

4. Remove drive cable from conduit and disassemble control assembly. Clean all parts with solvent and dry.

- (a) Inspect the drive cable for flexibility, wear and rust. The cable should be free of any stiffness, kinks or other damaging conditions that would prevent the cable from running on the gear in the gear housing.

Special attention should be given to the first 12 to 18 inches of the drive cable at the source connector end. This portion of the cable is unprotected by the cable conduit when connecting the components for use and is most susceptible to foreign matter and damage.

Maintenance: repair or replace, as needed. Lubricate with a light weight rust inhibitor.

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- (b) Inspect crank assembly parts for excessive wear or any damage that may impair operation. The bronze bushings in the gear housing and the plate are the most likely places to find wear. Worn bushing permit the gear to wobble and eventually wear out. Wear around the inner circumference of the housing permits the drive cable to slip on the gear and prevents the source from moving properly through the exposure device.

Maintenance: Reassemble and check for excessive wear and damage. Remove and replace parts as needed. Apply a light weight lubricant on the bushings.

- (c) Inspect drive cable conduit for any damage or kinking that can prevent the drive cable from moving freely. This includes examining the conduit near the end connection for damage from excessive flexing while being assembled and disassembled. Also, inspect the cable conduit end fitting and the inlet connection of the exposure device by mating the two parts and checking for extensive wear or slack.

Maintenance: In any case where the inner liner has been damaged, the conduit must be replaced. When the outer covering has been damaged, waterproof tape should be wrapped around the break to prevent the entrance of water or other corrosive substances. If the extreme ends of the conduit are damaged, these can be replaced with new pieces.

- (d) Connect the source tube to the exposure device. Test the connection by pulling straight back on the source tube applying about 5 pounds of pressure.
- (e) Inspect the source tube for foreign matter, kinks or damage that may effect the source travel through the tube.

Maintenance: Crimps, kinks, and other damaged places may be cut out and connectors placed on ends so that tube is not shortened excessively. The quick disconnect coupling and end cap may also be removed ore replaced. Remove foreign matter by washing with solvent and blowing with compressed air.

- (f) Inspect lock plunger for ease of operation. the plunger should retract about 1/2" inch. which is at its fullest extent. This permits free travel of the source in and out of the exposure device.
- (f1) If the lock mechanism is found to be defective it is to be replaced with original equipment.

Maintenance: Remove the lock plunger, wash with a solvent and lubricate. Lock may also be cleaned and lubricate by spraying a lubricant (such as WD-40) into the lock.

- (g) Check all labels for legibility.
- (h) Inspect for shifting of shield inside the device.
- (i) Inspect carriage, wheels, lifting lugs and handles on units if applicable

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- (j) Replace missing and damaged protector or safety plugs and caps.

Gammatron Model 100A Exposure Device

1. Remove safety dust cap from lock box and insect source connector. The holding pin should still have a true 90 degree elbow, it should be straight and parallel with axis of source connector, and the key on apex of elbow should not be worn excessively. Check flexible cable at connector for straightness.

Maintenance: If the elbow is not bent out of line, the mating drive cable connector should then be connected to the source cable connector and tested by pulling straight back on drive cable, applying about 30 to 40 pounds of force.

2. The lock plunger should be inspected and checked for ease of operation. Foreign matter may at times foul the plunger and make it inoperative, or the lock plunger may not retract its full 1/2". This would prevent free travel of the source in and out of the lock box.

Maintenance: CAUTION: the safety plug and dust cap should be in place before removing the lock plunger. The lock plunger may be removed by removing the two 8-32 set screws in the lock box. Wash lock in solvent to remove dirt or other foreign matter. Lock may also be cleaned and lubricated by spraying alight lubricant (such as WD-40) into the lock. Replace the lock and secure with the two 8-32 set screws.

3. Inspect the source outlet nipple by first removing the safety plug. The outlet nipple should be round and smooth so that it will match with the I.D. of the source tube.

Maintenance: If the outlet nipple should be out-of-round, it can sometimes be straightened by using a punch or round bar on the inside of the outlet. If it cannot be straightened, or if the nipple has been broken by dropping the unit, it must be replaced. This replacement can be done in the field shop, or returned to Sentinel/Amersham for source removal and disposal.

4. Inspect labeling on exposure device. The warning signs and source identification tags should be distinct and legible.
5. Inspect source tubes for damage such as crimps, foreign matter, ease of connecting and disconnecting from exposure device.

Maintenance: Crimps, kinks and other damaged places may be cut out and connectors used so that the tube is not shortened excessively. The quick disconnect coupling that connects to the outlet nipple of exposure device may be removed with heat and replaced. Foreign matter may be washed from tube with solvent and blown dry with compressed air.

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6. Inspect source connector on drive cable. The hole should be 7/64" in diameter when new. This hole should show some wear after much use, but should not be out-of-round to the extent that it will disconnect from the mating piece other than in the correct position. It should not be loose on the drive cable. The portion of the connector with the connector hole should not be bent, but should be straight and parallel with body of connector.

Maintenance: If this connector requires replacement and no others are available in order to dispose of source the drive cable and Exposure Device shall be transported to Sentinel / Amersham for safe removal of sealed source.

7. Inspect remainder of drive cable for wear, rusty sections, stiff and non-flexing sections, kinks, or other damaging conditions that would prevent cable from running on gear in the gear box housing.

Maintenance: The drive cable should be cleaned with a solvent that will not dry out. This is done to remove sand, dust and other foreign matter that will cause abrasions in the exposure device and gear box drive mechanism. Drive cable that has become rusty and non-flexible should be replaced. Failure to replace cable may cause controls to become stiff, hard to operate, wear excessively, and possibly break. (Experience has shown that the cable usually breaks when the source is exposed rather than shielded.) Lubrication of the drive cable is important. In areas where there is a problem with sand or other abrasive material, dry, powdered graphite is excellent. Graphite should not be used continually, however, since the graphite will tend to pack in the gear box and cause excessive wear to the gear housing and to the gear. Where the control cables can be kept reasonably clean, a light oil will be adequate.

8. Inspection of control assembly. This assembly consists of the gear box assembly and the crank handle. The ball bearings in the gear housing and the cover plate may not operate smoothly if dirt or moisture gets into the assembly. Usually (due to some build-up either on the drive cable or the gear teeth) there will be some wear around the inner circumference of the housing. This will permit the drive cable to slip on the gear and prevent source from moving properly through the exposure device.

Maintenance: It is suggested that if powdered graphite is used as a lubricant, the gear box should be cleaned with compressed air occasionally to remove any packed graphite in the gear mechanism. The application of some type light oil on ball bearings will help prevent excessive wear or rust. If the bearings cannot be cleaned to provide smoother operation, it is usually best to replace them.

9. Inspect drive cable housing or conduit. This conduit can be damaged by dropping it across a hot weld, severe kinking, by dropping some object on the conduit. Any of these can prevent the drive cable from moving freely. The conduit at the end connections may become damaged from excessive flexing while being assembled or disassembled.

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Maintenance: In any case where the inner liner has been damaged, the conduit must be replaced. when the outer covering has been damaged, waterproof tape should be wrapped around the break to prevent the entrance of water or other corrosive substances. If the extreme ends of the conduit are damaged the drive cable and Exposure device shall be transported to Sentinel /Amershm for proper source removal and disposal.

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Attachment A - Daily and Prior to Use Equipment Inspections

The following inspection shall apply to all equipment prior to use each day. In the event that more than one shift per day is conducting radiographic operations; the inspections shall be performed prior to each shift. These Inspections shall be performed in conjunction with quarterly maintenance and inspections. Quarterly maintenance and inspections shall be recorded on the Inspection and Maintenance Record Form. Daily / Prior to Use inspection shall be recorded on the Radiation Report Form.

Amersham/Technical Operations Model 660B, 680A and 680B Exposure Devices

1. Survey for excessive radiation levels

Model 660B shall not exceed 50 mr/hr at 6 inches from device

Model 680A & 680B shall not exceed 200 mr/hr on contact not 10 mr/hr at 3 feet

* Any level in excess of those listed shall be cause for implementing the Emergency procedures specified in Section 10.
2. Visually inspect for cracks and other signs of damage. Verify that all labels and warnings are intact and legible.
3. Check shipping plug for stripped threads and reinstall in device.
4. Check drive cable assembly for broken or damage parts and damage to cable coverings.
5. Check the guide tubes for stripped threads, broken coverings, dents, kinks, etc.
6. Unlock lock plunger. Turn selector to "CONNECT" position. Ensure that the drive cable is free and operates smoothly. Check drive cable source connector with GO - NO - GO Gauge. Check source pigtail connection with GO - NO - GO Gauge. Connect drive cable to source pigtail. With out bending the connection point of the drive cable and source pigtail; wiggle and lightly tug to ensure positive locking. Remove drive cable connector from source. Replace selector cover, turn to "LOCK", and lock plunger.
7. Inspect for shifting of shield inside the device.
8. Inspect carriage, wheels, lifting lugs and handles of units, if so equipped.
9. During the first exposure of the shift, check the operation of the selector ring, lock assembly and control crank for freedom of movement. If operation is difficult, retract the source and survey the equipment to ensure that the source has returned to the stored position. Any abnormalities shall cause radiographic operations to be suspended until corrected.

The inside of the source tube and all connecting parts should be free of any foreign material that may impair the operation of the device before the components are assembled for use.

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Shipping Containers/Storage Containers

1. Survey for excessive radiation levels

Shall not exceed 200 mr/hr on contact not 10 mr/hr at 3 feet

* Any level in excess of those listed shall be cause for implementing the Emergency procedures specified in Section 10.

2. Visually inspect for cracks and other signs of damage
3. Inspect fittings for stripped threads
4. Inspect carriage, wheels, lifting lugs and handles of units, if so equipped.
5. Check all labels for legibility.

Collimators

Check for stripped threads of fittings

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LEAK TEST PROCEDURE
SECTION 12

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LEAK TESTING OF SEALED SOURCES

- 1.0 All sealed sources will be tested for leakage at intervals not to exceed six months and upon receipt, if not accompanied by a leak test record. This test shall be capable of detecting the presence of .005 microcuries of contamination.
- 2.0 The Radiation Safety Officer (RSO) will be present during the actual leak test operation. All leak testing will be performed in the vault located at 671 Colbert Ave. , Oil City, PA. 16374
- 3.0 The leak test shall be performed by a qualified radiographer. The test shall be conducted with a leak test kit which meets all Federal and State Regulations.

- 3.1 The following leak test kit shall be used:

Amersham Corporation - KOWIPE LEAK TEST KIT
6134 Hollyfield Drive
Baton Rouge, LA 70809
(504)-751-5893
License # LA-5934-L01

- 4.0 Procedure

- 4.1 A calibrated survey meter shall be used to ensure that the source to be test is fully retracted in the shielded position.
- 4.2 A pair of rubber gloves shall be worn from this point on
- 4.3 Place the test kit on a sheet of disposable paper
- 4.4 Remove the shipping plug from the exposure device.
- 4.5 Dissolve the contents of attached packet in a small volume of water.
- 4.6 Remove swab in packet on left side of KOWIPE KIT (Do Not Discard Packet!). Dip cotton tip in the solution and proceed with the wipe test by swabbing areas nearest and most accessible to the source.
- 4.7 Replace the swab in the same container / packet from which it was removed.
- 4.8 Place the survey meter on its lowest scale and in a low background radiation environment. Slowly move the swab in its packet towards the survey meter (DO NOT MOVE SURVEY METER TOWARDS SWAB PACKET!). If there is no indication on the meter above background place the packet in the mailer envelope (left side) and continue with the next step. If there is an indication above background on the survey meter it shall be evidence of possible contamination. Immediately replace the shipping plug on exposure device and isolate the exposure device by taking care as to not potentially cross contaminate. Remove gloves carefully and place in a plastic bag adjacent to exposure device. The RSO shall initiate reports and corrective actions as required by 5.0 of this procedure.

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- 4.9 Remove the second swab on right side of KOWIPE KIT (Do Not Discard Packet!) and perform the wipe test with the swab dry.
- 4.10 Return the swab to the second container / packet from which it was removed. Place the survey meter on its lowest scale and in a low background radiation environment. Slowly move the swab in its packet towards the survey meter (DO NOT MOVE SURVEY METER TOWARDS SWAB PACKET!) If there is no indication on the meter above background place the packet in the mailer envelope (right side) and continue with the next step. If there is an indication above background on the survey meter it shall be evidence of possible contamination. Immediately replace the shipping plug on exposure device and isolate the exposure device by taking care as to not potentially cross contaminate. Remove gloves carefully and place in a plastic bag adjacent to exposure device. The RSO shall initiate reports and corrective actions as required by 5.0 of this procedure.
- 4.11 Reinstall shipping plug from the exposure device.
- 4.12 Remove gloves, place in a plastic bag and store in vault away from surrounding equipment. Label bag "Do Not Use". Once satisfactory results are obtained from test lab gloves may be removed and reused as well as the bag.
- 4.13 The following information shall accompany the leak test sample kit:
- A. Companies Name and Address
 - B. Source manufacturer
 - C. Date of test
 - D. Isotope
 - E. Source Strength (Ci) at test date
 - F. Source Serial Number
 - G. Remarks
- 4.14 Return the test kit for analysis.
- 5.0 Records and Reports
- 5.1 Each record of leak test results shall be kept in units of microcuries [or disintegration's per minute (dpm)] and retained for inspection by the Commission and or State of PA for a period 5 years after it was made.
- 5.2 Decontamination, repair or disposal in accordance with NRC Regulations shall be performed for any test result of 0.005 microcuries or more of removable contamination. Within 5 days of a test result showing 0.005 microcuries or greater the NRC shall be notified in writing. A report shall be sent to the Director of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555. A

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5.2 cont.

description of the equipment involved, the test results, and the corrective action taken.
A copy of this report shall be sent to the Administrator U.S. Nuclear Regulatory
Commission, Region 1, 475 Allendale Road, King of Prussia, PA 19406.

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SWIPE TEST PROCEDURE
SECTION 13

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SWIPE TEST PROCEDURE FOR CONTAINMENT SYSTEMS/SOURCE CHANGERS

- 1.0 All containment systems/source changers will be swipe tested upon receipt from the vendor and prior to transferring the container back to the vendor. This test shall be capable of detecting the presence of 0.0001 microcuries per square centimeter of contamination.
- 2.0 The Radiation Safety Officer (RSO) will be present during the swipe test operation. All swipe testing will be performed in the vault located at 671 Colbert Ave. , Oil City, PA. 16374
- 3.0 The swipe test shall be performed by a qualified radiographer. The test shall be conducted with a leak test kit which meets all Federal and State Regulations.

- 3.1 The following test kit shall be used:

Amersham Corporation - KOWIPE LEAK TEST KIT
6134 Hollyfield Drive
Baton Rouge, LA 70809
(504)-751-5893
License # LA-5934-L01

- 4.0 Procedure

- 4.1 A calibrated survey meter shall be used to ensure that the source to be test is fully retracted in the shielded position.
- 4.2 A pair of rubber gloves shall be worn from this point on
- 4.3 Place the test kit on a sheet of disposable paper
- 4.4 Remove any outer packaging covers in order that all accessible openings may be swiped. DO NOT UNDER ANY CIRCUMSTANCES REMOVE A PART OR COMPONENT THAT WOULD DISLODGE OR CAUSE THE ACTUAL SOURCE TO MOVE FROM IT'S SHIELDED POSITION!
- 4.5 Dissolve the contents of attached packet in a small volume of water.
- 4.6 Remove swab in packet on left side of KOWIPE KIT (Do Not Discard Packet!). Dip cotton tip in the solution and proceed with the swipe test by swabbing 300 square centimeters (top, bottom, sides and all openings) .
- 4.7 Replace the swab in the same container / packet from which it was removed.
- 4.8 Place the survey meter on its lowest scale and in a low background radiation environment. Slowly move the swab in its packet towards the survey meter (DO NOT MOVE SURVEY METER TOWARDS SWAB PACKET!) If there is no indication on the meter above background place the packet in the mailer envelope (left side) and continue with the next step. If there is an indication above background on the survey meter it shall be evidence of possible contamination. Immediately replace any and all covers removed and isolate the containment system/source changer taking care as to not potentially cross contaminate. Remove gloves carefully and place in a plastic bag

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- 4.8 cont. adjacent to containment system/source changer. The RSO shall initiate reports and corrective actions as required by 5.0 of this procedure.
- 4.9 Remove the second swab on right side of KOWIPE KIT (Do Not Discard Packet!) and perform the swipe test with the swab dry.
- 4.10 Return the swab to the second container / packet from which it was removed. Place the survey meter on its lowest scale and in a low background radiation environment. Slowly move the swab in its packet towards the survey meter (DO NOT MOVE SURVEY METER TOWARDS SWAB PACKET!) If there is no indication on the meter above background place the packet in the mailer envelope (right side) and continue with the next step. If there is an indication above background on the survey meter it shall be evidence of possible contamination. Immediately replace any and all covers removed and isolate the containment system/source changer taking care as to not potentially cross contaminate. Remove gloves carefully and place in a plastic bag adjacent to exposure device. The RSO shall initiate reports and corrective actions as required by 5.0 of this procedure.
- 4.11 Reinstall any and all covers removed and place into storage.
- 4.12 Remove gloves, place in a plastic bag and store in vault away from surrounding equipment. Label bag "Do Not Use". Once satisfactory results are obtained from test lab gloves may be removed and reused as well as the bag.
- 4.13 The following information shall accompany the wipe test sample kit:
- A. Companies Name and Address
 - B. Source manufacturer
 - C. Date of test
 - D. Isotope
 - E. Source Strength (Ci) at test date
 - F. Source Serial Number
 - G. Containment system/source changer serial #
 - H. Remarks
- 4.14 Return the test kit for analysis.
- 5.0 Records and Reports
- 5.1 Each record of swipe test results shall be kept in units of microcuries [or disintegration's per minute (dpm)] and retained for inspection by the Commission and or State of PA for a period 5 years after it was made.

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- 5.2 Decontamination, repair or disposal in accordance with NRC Regulations shall be performed for any test result of 0.0001 microcuries per square centimeter or more of removable contamination. A test result showing 0.0001 microcuries per square centimeter or greater shall be cause for immediate notification by telephone and by telegram, mailgram or facsimile to delivering carrier, the Director of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555. The written report shall contain a description of the equipment involved, carrier / personnel involved, the test results and the corrective action taken. A copy of this report shall be sent to the Administrator U.S. Nuclear Regulatory Commission, Region 1, 475 Allendale Road, King of Prussia, PA 19406, and the involved carrier.

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RADIATION SURVEY PROCEDURES
SECTION 14

ALLEGHENY LABORATORIES
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RADIATION SURVEY PROCEDURES

1. Purpose

- A. The purpose of radiation surveys of radiographic facilities and field exposure sites is to determine the extent of areas requiring personnel access and exposure controls. Sample form (Radiation Report Form) for use during field exposures is in Appendix A of Section 6 "Operating Instructions for Equipment as well as in Section 17 Record - Keeping Forms. Control of survey procedures for field exposures shall be in accordance with Radiographic Exposure Procedure, Section 9.
- B. To establish locations of radiation safety limits in the surrounding areas of the vault within Allegheny Laboratories Facility. The safety limits shall be bounded by a line along which the readings on a low range radiation detection instrument is 2.0 milliroentgen per hour. The 2 mR/hr line shall be shown on drawings in vault plan views of Section 3 part 8.0 after initial vault survey.

2. Periodicity and Personnel Conducting the Survey - Vault

- A. The survey will be conducted upon initial construction of the vault, when repairs/alterations are made, when using a source with a higher curie content than the original survey, and at other times considered necessary by the RSO.
- B. The RSO will plan and supervise the survey. An operational check of area monitor alarm, door alarm and flashing lights shall be performed at this point in accordance with Operating Instructions for Equipment Section 6. The Radiographic Exposure Procedure, Section 9 shall be used to control this evolution. The actual exposure of the source will be done by a qualified radiographer. The RSO and/or radiographer will secure, lock and place radiation signs as necessary to prevent all personnel, except those conducting the survey, from entering any part of the building. The actual reading of the survey instruments and the registering of the readings will be done under the supervision of the RSO.

3. Procedure

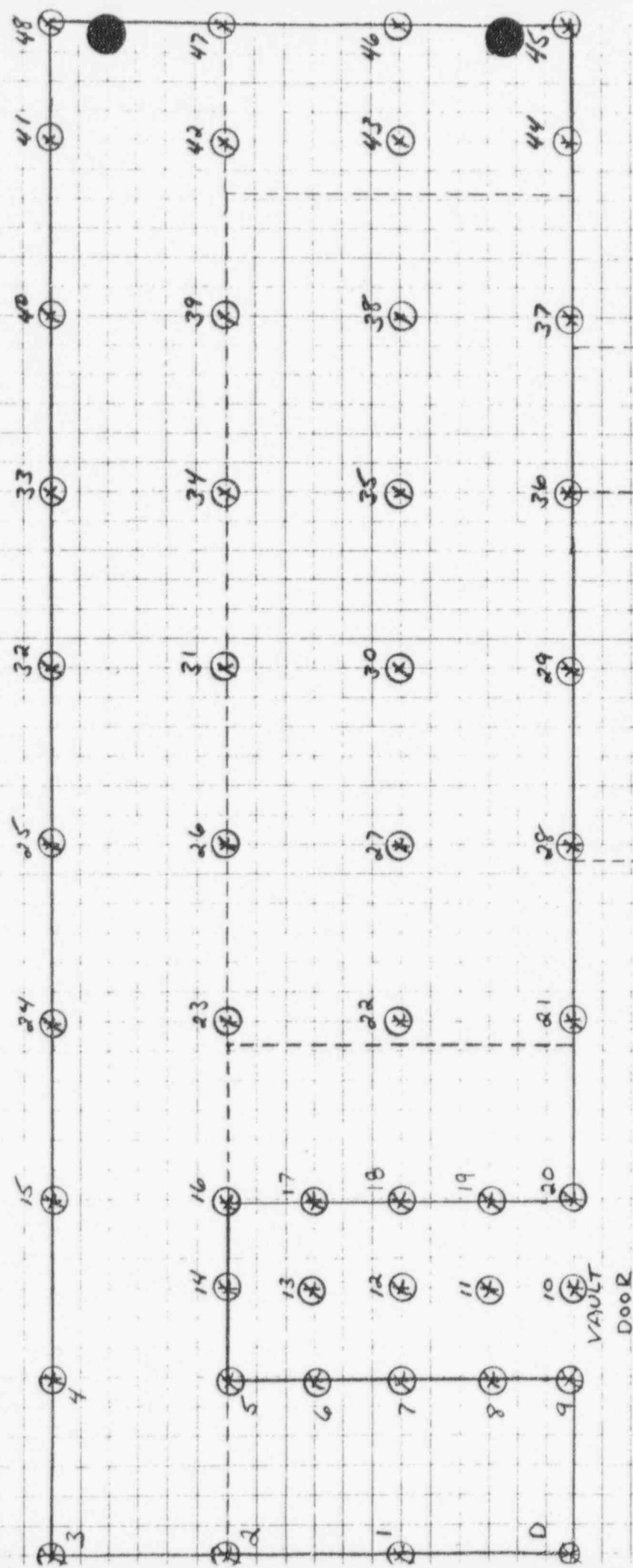
- A. All procedures shall be in accordance with the NRC Rules and Regulations and the license agreement.
- B. At least 2 low range radiation detection instruments shall be used in the survey. Variation between the instruments prior to commencement of the survey shall not be over 0.2 milliroentgens per hour.
 - (1) The survey meter shall be placed directly against the surface of the wall or door and within an inch of the numbered location marker shown on drawings 1 - 5 and held it there long enough to obtain a true radiation level reading. The survey shall progress in a consecutive order as shown by the numbering sequence of drawings 1 - 5.

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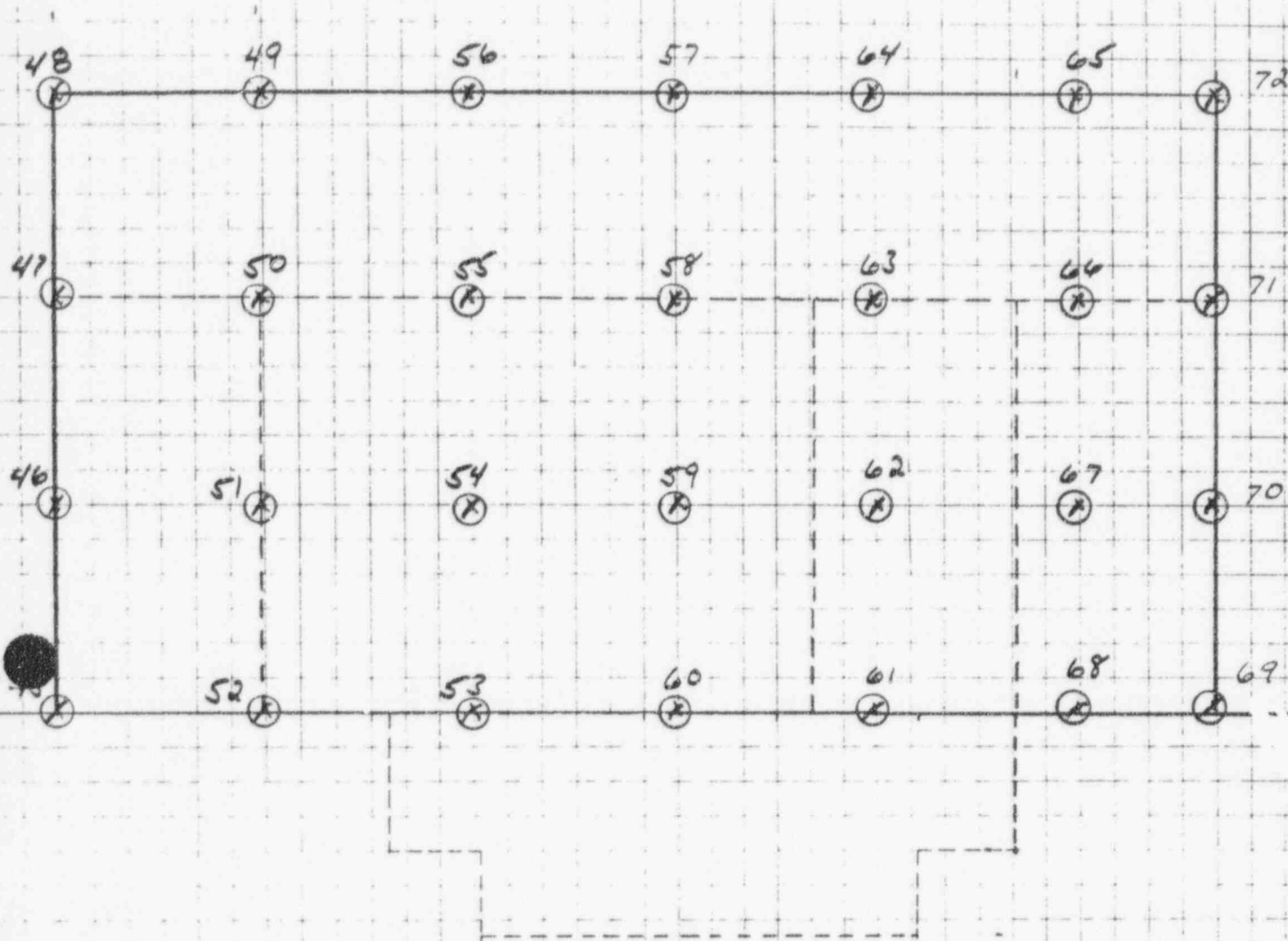
- C. After all locations shown on the drawings 1 - 5 have been surveyed and recorded, the RSO will cause the source to be retracted to the exposure device shielded condition, make a normal survey of the exterior of the vault, the vault door, survey the guide tube, exposure device, lock the exposure device secure and lock vault door. He will then ensure that all boundaries, signs, barriers and equipment have been properly removed and stored.
- D. The record of the survey will be checked and signed by the RSO, who will place the appropriate 2 mR/hr lines on the drawings, of areas outside the vault perimeter, based on the survey instrument readings.
- E. A copy of the survey drawings, with personnel names, social security numbers, and duties of personnel conducting survey will be placed in the files of the RSO.

Notes:

- 1. There are locations # 0 - 168 to be surveyed. If an erroneous reading is made, "Radiation - Safe conditions may be affected.
- 2. A sweep of a circular area, about 24" in diameter, should be made around each location, to assure that there is not a higher reading than those at the numbered locations. If this sweep results in a higher reading than the number location, the exact reading and its location will be added to the drawing. (Do not substitute such higher reading for the regular reading).
- 3. The type of radiation source, its activity on the day of the survey and its location in the vault shall all be noted on the vault survey drawings.
- 4. The readings are located on 36" centers unless otherwise indicated.

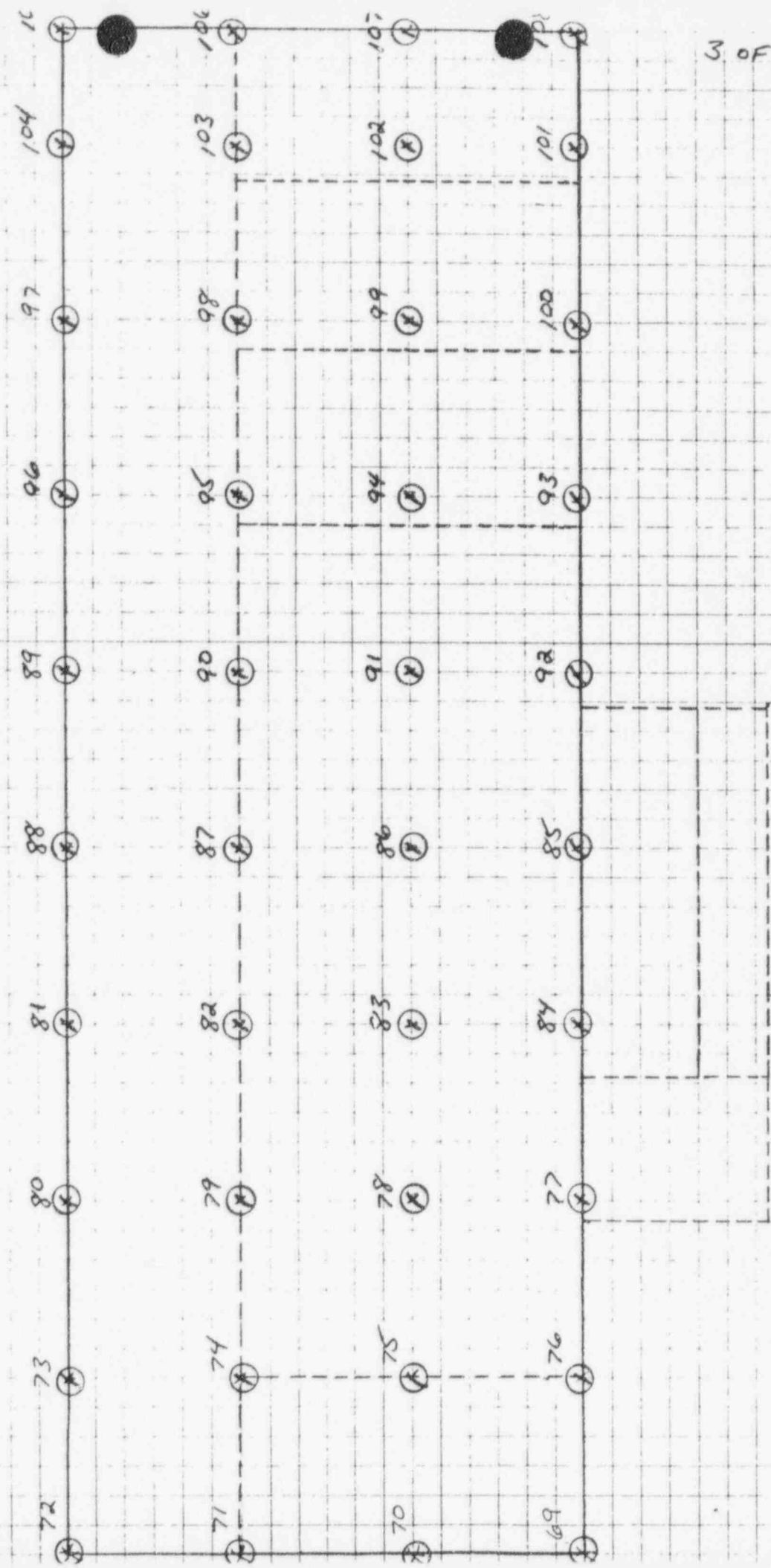


* SURVEY RECORDING POINT
3/16" = 6"

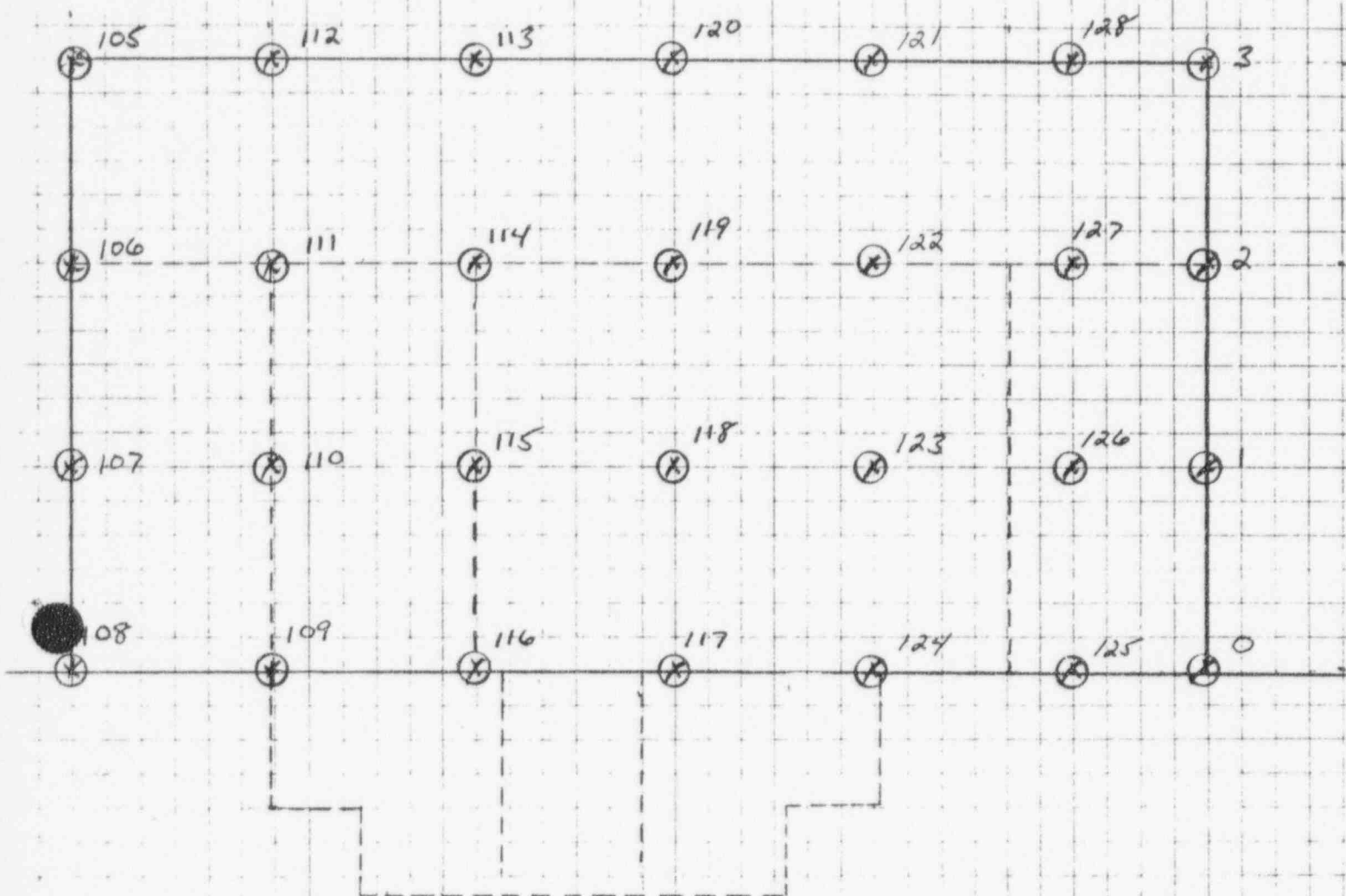


LOOKING EAST

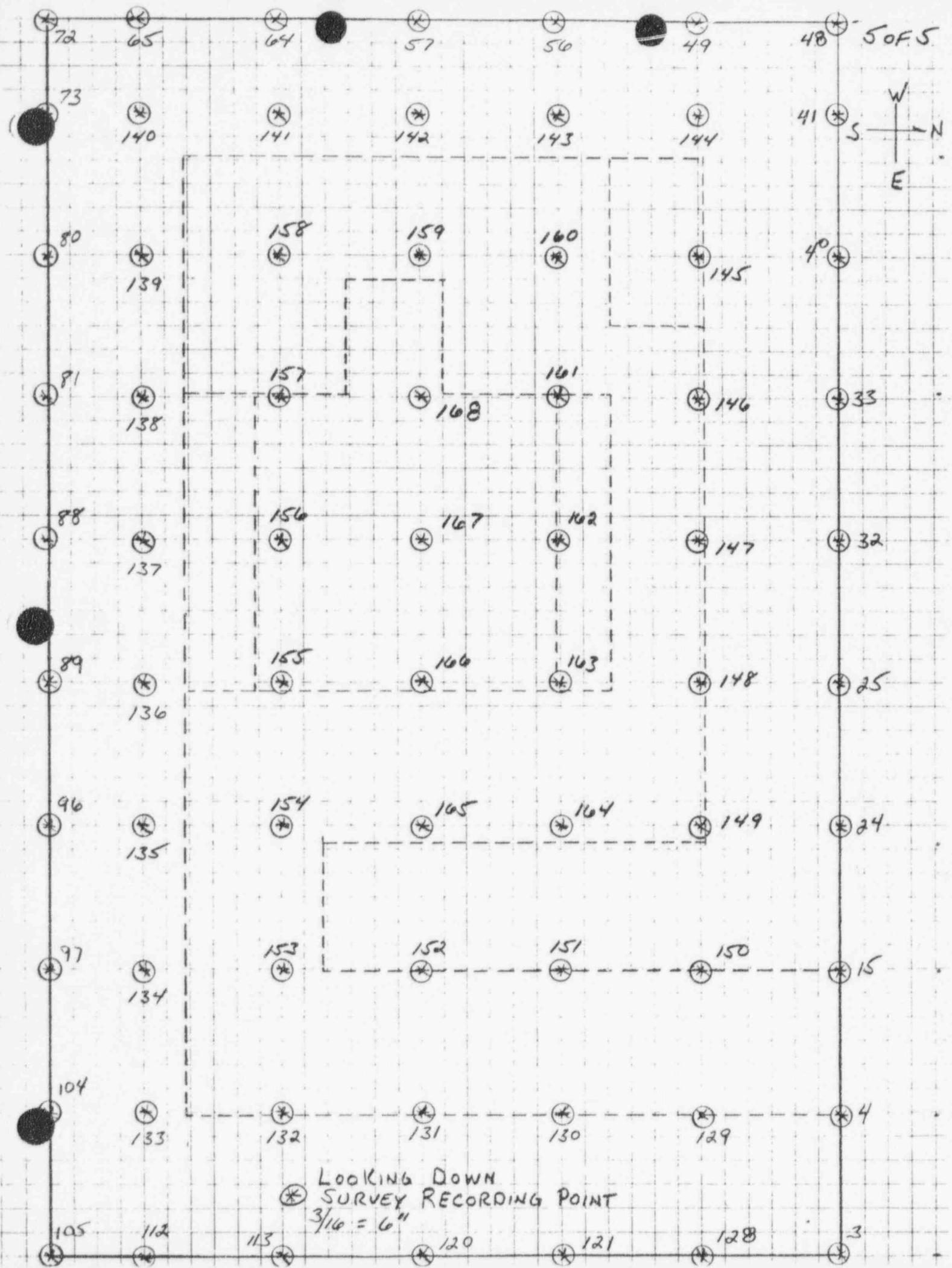
⊗ SURVEY RECORDING POINT
 $\frac{3}{16}'' = 6''$



FACING NORTH
⊗ SURVEY RECORDING POINT $\frac{3}{16}'' = 6''$



LOOKING WEST
⊗ SURVEY RECORDING POINT
 $\frac{3}{16} = 6"$



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REPORTING OF DEFECTS AND NONCOMPLIANCE
SECTION 15

ALLEGHENY LABORATORIES
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Reporting of Defects and Non-Compliance

1. Purpose

- A. To establish procedures and requirements for the implementation of section 206 f the Energy Reorganization Act of 1974. The aforementioned section requires notification of the Nuclear Regulatory Commission in the event of discovery of defects of material or noncompliance with the Atomic Energy Act of 1954.

2. Procedure

- A. In keeping with the requirements of NRC 10 CFR Part 21, the RSO will immediately notify the Nuclear Regulatory Commission when information is obtained indicating: (a) that Allegheny laboratories or basis components supplied to Allegheny Laboratories fail to comply with the Atomic Energy Act of 1954, as amended, or any applicable rule, regulation, order, or license of the Commission relating to substantial safety hazards, or (b) that Allegheny Laboratories, or basic component supplied to Allegheny Laboratories contains defects, which could create a substantial safety hazard.
- B. The RSO shall cause the conspicuous posting of section 206 of the Energy Reorganization Act of 1974 10 CFR 20 and a notice which describes the regulations/procedures, and including the individual to whom reports may be made, and where they may be examined.
- C. Initial notification shall be made within two days following receipt of the information. Notification shall be made to the NRC Operations Center by facsimile at 301-492-8187 or by telephone at 301-951-0550. Written notification shall be submitted with in 30 days to the Document Control Desk, U.S. Nuclear Regulatory Commission, Washington, DC 20555. A copy of this written notification shall be sent to the Regional Administrator, US. Nuclear Regulatory Commission, Region I, 475 Allendale Road, King of Prussia, PA 19406, phone # 215-337-5000.
- D. The written report shall include, but need not be limited to, the following information, to the extent known:
- (1) Name and address of the individual or individuals informing the Commission
 - (2) Identification of the facility, the activity , or the basic component supplied for such facility or such activity which fails to comply or contains a defect.
 - (3) Identification of the firm supplying the basic component which fails to comply or contains a defect.
 - (4) Nature of the defect or failure to comply and the safety hazard which is created or could be created by such defect or failure to comply.
 - (5) The date on which the information of such defect or failure to comply was obtained.

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- (6) In the case of a basic component which contains a defect or fails to comply, the number and location of all such components in use at, supplied for, or being supplied for one or more facilities or activities subject to the regulations.
- (7) The corrective action which has been, is being, or will be taken; the name of the individual or organization responsible for the action; and the length of time that has been or will be taken to complete the action.
- (8) Any advice related to the defect or failure to comply about the facility, activity, or basic component that has been, is being, or will be given to purchasers or licensees.

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INTERNAL INSPECTION PROCEDURES
SECTION 16

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Internal Inspection Procedures

1. The following shall be accomplished quarterly and whenever the RSO deems it necessary.
 - A. The following items will be performed by the RSO to determine compliance with Allegheny Laboratories Operating and Emergency Procedures and the NRC rules and regulations. If deficiencies are noted, radiographic operations shall be stopped until the noted deficiencies are corrected. These Inspection records shall be retained for a minimum of two years in accordance 10 CFR Part 34.

Radiographic Location: _____ Date: _____ Time: _____

Radiographer: _____ Inspector: _____

Radiographer Assistant: _____

Radioisotope: _____ Curies: _____ Serial #: _____

Exposure Device Model #: _____ Exposure Device Serial #: _____

Survey Meter Model #: _____ Serial #: _____ Calibration Date: _____

- | | Yes | No |
|------------------------------------------------------------------------------------------------------------------------------------------|-----|----|
| 1. Are personnel qualified at the level at which they are performing? | | |
| 2. Are all personnel involved in radiography wearing film badges, and do they have calibrated pocket dosimeters and alarming ratemeters? | | |
| 3. Are vault warning lights and alarms working properly? (vault operations) | | |
| 4. Was the restricted area posted with "CAUTION (or DANGER) RADIATION AREA" signs? | | |
| 5. Was the restricted area properly controlled to prevent unauthorized entry? | | |
| 6. Was the high radiation area posted with "CAUTION (or DANGER) HIGH RADIATION AREA" signs? | | |
| 7. Did the radiographer have a calibrated and properly operating survey meter? | | |
| 8. Is all equipment being handled properly to avoid damage? | | |
| 9. Is the source being surveyed properly prior to removal from and upon returning it to the vault/storage. | | |
| 10. Did the radiographer and/or assistant have sufficient knowledge of safety rules? (Ascertained by oral questions) | | |

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Yes No

11. Did the radiographer properly survey the source projector and source tube and take a radiation reading 1 foot in front of the source following the radiographic exposure?
12. Is a collimator being used to the maximum extent possible?
13. When transporting the source, are signs posted and vehicles placarded in accordance with DOT regulations, when required?
14. Are receipt and transfer records being maintained up-to-date?
15. Is the source utilization log being properly maintained?
16. Was the storage area posted with "CAUTION (or DANGER) RADIOACTIVE MATERIAL" signs?
17. Did the radiographer possess a copy of the Allegheny Laboratories Operating and Emergency Procedures and NRC 10 CFR Parts 19,20,21,30,34,40,71?
18. Is source inventory being accomplished quarterly and recorded?
19. Are leak and swipe tests being accomplished and recorded?
20. Are containment system/storage container quality assurance procedures being complied with?
21. Are vault surveys being conducted and recorded as required?
22. Are there any items of noncompliance other than those listed on this form?
(If any, explain in remarks)

Remarks: _____

RSO Signature

Date

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RADIATION SAFETY PROGRAM REVIEW

This review shall be conducted on an annual basis in order to assess the radiation protection program content and implementation. It shall be the responsibility of the Radiation Safety Officer to ensure that this program review is conducted.

The following inspection areas / records as a minimum shall be reviewed and evaluated:

1. Training Records and Qualification
2. Operating and Emergency Procedures current with NRC Regulations
3. Quarterly performance evaluations of radiography personnel
4. Equipment Inspections, Daily/Prior to Use and Quarterly
5. Maintenance of Equipment Records
6. Inventory of Sealed Sources
7. Vault alarms, postings and surveys
8. Leak Tests of Sealed Sources, and Swipe Tests of Shipping Containers
9. Utilization Logs and Radiation Report Forms
10. Calibration Records - Survey Meters, Dosimeters, Alarming Ratemeters, Vault Gamma Alarm
11. Personnel Exposure Records
12. Receipt and Transfer Records
13. Transportation Records
14. NRC letters, bulletins, informational notices are on file and have been reviewed for actions if necessary.

Documentation of this Radiation Safety Program Review shall identify deficiencies and corrective actions.

All areas listed above have been reviewed for compliance. Deficiencies and corrective actions are attached.

Radiation Safety Officer

Date

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RECORD - KEEPING FORMS
SECTION 17

RADIATION REPORT FORM

Date: _____ City/Location: _____ State: _____

Project: _____ Customer: _____

Source of Radiation: _____ Source Serial #: _____ Curie Content: _____

Exposure Device Model #: _____ Serial #: _____

Survey Meter Model #: _____ Serial #: _____ Cal Due Date: _____

DAILY/PRIOR TO USE INSPECTIONS OF EQUIPMENT ARE COMPLETED AND SATISFACTORY

Signature _____ Date and Time _____

Radiographer: _____

Film Badge #: _____ Date Issued: _____

Self Reading Pocket Dosimeters Serial #(s): _____ Cal Due Date(s): _____

Alarming Ratemeter Model #: _____ Serial #: _____ Cal Due Date: _____

Alarming Ratemeter Tested and Operational by: _____ Time & Date: _____

Radiographer Assistant: _____

Film Badge #: _____ Date Issued: _____

Self Reading Pocket Dosimeters Serial #(s): _____ Cal Due Date(s): _____

Alarming Ratemeter Model #: _____ Serial #: _____ Cal Due Date: _____

Alarming Ratemeter Tested and Operational by: _____ Time & Date: _____

Calculated High Radiation Area Distance

Calculated Restricted Area Distance

Unshielded: _____

Unshielded: _____

Shielded: _____

Shielded: _____

Type and thickness: _____

Collimated: _____

Collimated: _____

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Surveys:

Prior to removal from storage: _____ mR/hr @ 6" (Ir-192) _____ MR/hr on contact (Co-60)

_____ MR/hr @ 3' (Co-60)

In Transport Vehicle: _____ MR/hr @ Driver

_____ MR/hr @ outer surface of storage area/container

_____ MR/hr @ 1' from outer surface of storage area/container

Final Exposure of Day/Shift: _____ MR/hr @ 6" (Ir-192) _____ MR/hr on contact (Co-60)

_____ MR/hr @ 3' (Co-60)

Customer/Personnel Informed and Briefed of Operations: _____

High Radiation Area Erected and Posted By: _____ Sign./Date/Time

Restricted Area Erected and Posted By: _____ Sign./Date/Time

All Personnel Clear of Restricted Area: _____ Sign./Date/Time

Surveillance Maintained During Exposure(s): _____ Sign./Date/Time

Restricted Area Boundary Verified ≤ 2 mR/hr _____ Sign./Date/Time

Exposure Time: _____ Total Exposure Time for Shift: _____

Radiographer End of Shift Dosimeter Reading: _____

Radiographer Assistant End of Shift Dosimeter Reading: _____

Remarks: _____

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Dosimetry Report Form

Name: _____

Date of Birth: _____

SSN #: _____

Dosimeter(s) #: _____

Day	Month	Month	Month
1.-----	16.-----	1.-----	16.-----
2.-----	17.-----	2.-----	17.-----
3.-----	18.-----	3.-----	18.-----
4.-----	19.-----	4.-----	19.-----
5.-----	20.-----	5.-----	20.-----
6.-----	21.-----	6.-----	21.-----
7.-----	22.-----	7.-----	22.-----
8.-----	23.-----	8.-----	23.-----
9.-----	24.-----	9.-----	24.-----
10.-----	25.-----	10.-----	25.-----
11.-----	26.-----	11.-----	26.-----
12.-----	27.-----	12.-----	27.-----
13.-----	28.-----	13.-----	28.-----
14.-----	29.-----	14.-----	29.-----
15.-----	30.-----	15.-----	30.-----
31.-----		31.-----	
TOTAL	-----	TOTAL	-----
		TOTAL	-----

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Requisition, Receipt and Transfer Form

Requisition

Ordered By: _____ Date: _____

Type of Isotope: _____ Curies Ordered: _____

Ordered From: _____ Shipped via: _____

Receiving

Date: _____ Time: _____ AM/PM Received By: _____

Curies Received: _____ Source Serial #: _____

Shipping Container Model #: _____ Shipping Container Serial #: _____

Surveyed By: _____ Date: _____ Time: _____ AM/PM

Reading on Contact: _____ mR/hr Reading at 3 feet: _____ mR/hr

Transfers

Date: _____ Isotope: _____ Curies: _____ Serial #: _____

Transferred from SHP/CON #: _____ to Camera Model #: _____ Serial #: _____

Reading at 6 inches: _____ mR/hr Reading at 3 feet: _____ mR/hr

Transferred from Camera Model #: _____ Serial #: _____

To SHP/CON #: _____

Reading on Contact: _____ mR/hr Reading at 3 feet: _____ mR/hr

For transfer/disposal to: _____

Surveys conducted with:

Survey Meter Model: _____ Serial #: _____ Calibration Due Date: _____

Transfer and Survey By: _____

Copy of this form is to be attached to the source decay chart

SOURCE UTILIZATION LOG

[illegible]

ALLEGHENY LABORATORIES
RD #2 BOX 4-A
KENNERDELL, PA 16374

Radiographic Source Quarterly Inventory

Inventory conducted by: _____ Date: _____

Radiographic Exposure Device/
Shipping Container Model: _____ Serial #: _____

Isotope Stored Within: _____ Curies: _____

Source Serial #: _____ Date received: _____ Last Leak Check: _____

Physical Storage Location: _____

Signature and Date: _____

Inventory conducted by: _____ Date: _____

Radiographic Exposure Device/
Shipping Container Model: _____ Serial #: _____

Isotope Stored Within: _____ Curies: _____

Source Serial #: _____ Date received: _____ Last Leak Check: _____

Physical Storage Location: _____

Signature and Date: _____

Inventory conducted by: _____ Date: _____

Radiographic Exposure Device/
Shipping Container Model: _____ Serial #: _____

Isotope Stored Within: _____ Curies: _____

Source Serial #: _____ Date received: _____ Last Leak Check: _____

Physical Storage Location: _____

Signature and Date: _____

ALLEGHENY LABORATORIES
RD #2 BOX 4-A
KENNERDELL, PA 16374

Inspection and Maintenance Record Form

Date: _____ Radiographer: _____

Exposure Device Model #: _____ Serial #: _____

Drive Cable Assembly Model#: _____ Serial #: _____

Source Guide Tube(s) Model #: _____ Serial (s) #: _____

Survey Meter Model #: _____ Serial #: _____ Date Last Cal. _____

Quarterly Maintenance Checks: _____ Sat. _____ Unsat _____

Clean and inspect Source Guide Tube(s)

Clean and inspect Drive Cable Assembly

Clean and inspect Exposure Device

Warning Labels attached and legible

Shipping plugs threads smoothly turn free of damaged threads

Cable connector and source pigtail connector checked with go-no-go gauge

Exposure Device Locking Mechanism and Selector Rings operate freely

No disassembly of the locking mechanism is authorized
unless the manufactures maintenance course has been attended.

Vault Gamma Alarm visual and audible alarms function properly

Calibration is current and sticker is attached with due date

The above listed equipment has been inspected and maintenance performed in accordance with the requirements set for in Allegheny Laboratories Operating and Emergency Procedures.

Signature _____ Date _____

Remarks: _____

Corrective Action(s): _____

ALLEGHENY LABORATORIES
RD #2 BOX 4-A
KENNERDELL, PA 16374

ALLEGHENY LABORATORIES "HIGH EXPOSURE" REPORT

Date:

From: Radiation Safety Officer

To:

Subject: Exposure in excess of 100 mR in a calendar week

In accordance with Allegheny Laboratories Operating and Emergency Procedures, Section 5, an administrative limit of 100 mR per calendar week shall be adhered to by radiographic personnel.

Allegheny Laboratories is committed to the As Low As Reasonably Achievable (ALARA) philosophy and requires a written explanation as to the circumstances for the exposure.

Continued exposures in excess of 100 mR per week can be cause for disciplinary actions if due to poor workmanship practices and not utilizing TIME, DISTANCE and SHIELDING effectively.

Radiation Safety Officer Date

Comments/Explanation of exposure: _____

Signature of Radiographer and Date

NRC FORM 4
(5-92)
10 CFR PART 20

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0005
EXPIRES:

CUMULATIVE OCCUPATIONAL EXPOSURE HISTORY

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: MINUTES FORWARD COMMENTS REGARDING BUREAU ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0005), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

1. NAME (LAST, FIRST, MIDDLE INITIAL)				2. IDENTIFICATION NUMBER		3. ID TYPE		4. SEX MALE <input type="checkbox"/> FEMALE <input type="checkbox"/>		5. DATE OF BIRTH	
6. MONITORING PERIOD		7. LICENSEE NAME		8. LICENSE NUMBER		9. RECORD ESTIMATE <input type="checkbox"/> NO RECORD <input type="checkbox"/>		10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>			
11. DDE	12. LDE	13. SOE, WB	14. SOE, ME	15. CEDE	16. CDE	17. TEDE		18. TOOE			
6. MONITORING PERIOD		7. LICENSEE NAME		8. LICENSE NUMBER		9. RECORD ESTIMATE <input type="checkbox"/> NO RECORD <input type="checkbox"/>		10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>			
11. DDE	12. LDE	13. SOE, WB	14. SOE, ME	15. CEDE	16. CDE	17. TEDE		18. TOOE			
6. MONITORING PERIOD		7. LICENSEE NAME		8. LICENSE NUMBER		9. RECORD ESTIMATE <input type="checkbox"/> NO RECORD <input type="checkbox"/>		10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>			
11. DDE	12. LDE	13. SOE, WB	14. SOE, ME	15. CEDE	16. CDE	17. TEDE		18. TOOE			
6. MONITORING PERIOD		7. LICENSEE NAME		8. LICENSE NUMBER		9. RECORD ESTIMATE <input type="checkbox"/> NO RECORD <input type="checkbox"/>		10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>			
11. DDE	12. LDE	13. SOE, WB	14. SOE, ME	15. CEDE	16. CDE	17. TEDE		18. TOOE			
6. MONITORING PERIOD		7. LICENSEE NAME		8. LICENSE NUMBER		9. RECORD ESTIMATE <input type="checkbox"/> NO RECORD <input type="checkbox"/>		10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>			
11. DDE	12. LDE	13. SOE, WB	14. SOE, ME	15. CEDE	16. CDE	17. TEDE		18. TOOE			
6. MONITORING PERIOD		7. LICENSEE NAME		8. LICENSE NUMBER		9. RECORD ESTIMATE <input type="checkbox"/> NO RECORD <input type="checkbox"/>		10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>			
11. DDE	12. LDE	13. SOE, WB	14. SOE, ME	15. CEDE	16. CDE	17. TEDE		18. TOOE			
19. SIGNATURE OF MONITORED INDIVIDUAL		20. DATE SIGNED		21. CERTIFYING ORGANIZATION		22. SIGNATURE OF DESIGNEE		23. DATE SIGNED			

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-2006
EXPIRES:

OCCUPATIONAL EXPOSURE RECORD FOR A MONITORING PERIOD

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS
INFORMATION COLLECTION REQUEST: MINUTES
FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO
THE INFORMATION AND RECORDS MANAGEMENT BRANCH
(MNBS 7714), U.S. NUCLEAR REGULATORY COMMISSION,
WASHINGTON, DC 20555, AND TO THE PAPERWORK
REDUCTION PROJECT (3150-0006), OFFICE OF
MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

1. NAME (LAST, FIRST, MIDDLE INITIAL)	2. IDENTIFICATION NUMBER	3. ID TYPE	4. SEX <input type="checkbox"/> MALE <input type="checkbox"/> FEMALE	5. DATE OF BIRTH
6. MONITORING PERIOD	7. LICENSEE NAME	8. LICENSE NUMBER(S)	9A.	9B.
			RECORD	ROUTINE
			ESTIMATE	PSE

INTAKES				DOSES (in rem)	
10A. RADIONUCLIDE	10B. CLASS	10C. MODE	10D. INTAKE IN μ Cl		
				DEEP DOSE EQUIVALENT (DDE)	11.
				EYE DOSE EQUIVALENT TO THE LENS OF THE EYE (LDE)	12.
				SHALLOW DOSE EQUIVALENT, WHOLE BODY (SDE,WB)	13.
				SHALLOW DOSE EQUIVALENT, MAX EXTREMITY (SDE,ME)	14.
				COMMITTED EFFECTIVE DOSE EQUIVALENT (CEDE)	15.
				COMMITTED DOSE EQUIVALENT, MAXIMALLY EXPOSED ORGAN (CDE)	16.
				TOTAL EFFECTIVE DOSE EQUIVALENT (BLOCKS 11 + 15) (TEDE)	17.
				TOTAL ORGAN DOSE EQUIVALENT, MAX ORGAN (BLOCKS 11 + 16) (TODE)	18.
				19. COMMENTS	

20. SIGNATURE -- LICENSEE

21. DATE PREPARED

ALLEGHENY LABORATORIES
RD #2 BOX 4-A
KENNERDELL, PA 16374

QUALITY ASSURANCE PROGRAM
SECTION 18

QUALITY ASSURANCE PROGRAM APPROVAL
FOR RADIOACTIVE MATERIAL PACKAGES

0555

REVISION NUMBER

2

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, and Title 10, Code of Federal Regulations, Chapter 1, Part 71, and in reliance on statements and representations heretofore made in Item 5 by the person named in Item 2, the Quality Assurance Program identified in Item 5 is hereby approved. This approval is issued to satisfy the requirements of Section 71.101 of 10 CFR Part 71. This approval is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

2. NAME <u>Allegheny Laboratories</u>			3. EXPIRATION DATE <u>April 30, 2001</u>
STREET ADDRESS <u>RD #2 Box 4-A</u>			4. DOCKET NUMBER <u>71-0555</u>
CITY <u>Kennerdell</u>	STATE <u>PA</u>	ZIP CODE <u>16374</u>	

5. QUALITY ASSURANCE PROGRAM APPLICATION DATE(S)

April 18, 1991 and April 15, 1996

6. CONDITIONS

1. Activities authorized by this approval: procurement, maintenance, repair, and use to be executed with regard to transportation packagings for radioactive materials in special form. All other activities (i.e., design, fabrication, assembly, testing, and modification) shall be satisfied by obtaining certifications from packaging suppliers that these activities were conducted in accordance with an NRC-approved Quality Assurance Program. It shall remain the responsibility of the Quality Assurance Program holder that all transportation activities meet the requirements of 10 CFR § 71.101.
2. Records shall be maintained in accordance with the provisions of 10 CFR Part 71. Specifically:
 - a. Records of each shipment of licensed material shall be maintained for three years after that shipment [10 CFR § 71.91(a)].
 - b. Records providing evidence of packaging quality shall be maintained for three years after the life of the packaging [10 CFR § 71.91(c)].
 - c. Records describing activities affecting packaging quality shall be maintained for three years after this Quality Assurance Program Approval is terminated (10 CFR § 71.135).

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

John P. Jankovich

JOHN P. JANKOVICH, SECTION LEADER
TRANSPORTATION AND STORAGE INSPECTION SECTION
SPENT FUEL PROJECT OFFICE, NMSS

April 25, 1996

DATE

ALLEGHENY LABORATORIES
RD #2 BOX 4-A
KENNERDELL, PA 16374

QUALITY ASSURANCE PROGRAM

1. Organization

The final responsibility for the Quality Assurance (QA) Program for Part 71 requirements rests with Allegheny Laboratories. Design and Fabrication shall not be conducted under this QA Program. The QA Program is implemented using the following organization:

The Radiation Safety Officer (RSO) is responsible for overall administration of the program, training, and certification, document control, and auditing.

The Radiographers are responsible for handling, storing, shipping, inspection, test and operating status and record keeping.

2. Quality Assurance Program

The management of Allegheny Laboratories Quality Assurance Program establishes and implements this QA Program. Training, prior to engagement, for all QA functions is required according to written procedures. QA Program revisions will be made according to written procedures with management approval. The QA Program will ensure that all defined QC procedures, engineering procedures, and specific provisions of the package design approval are satisfied. The QA Program will emphasize control of the characteristics of the package which are critical to safety.

The Radiation Safety Officer shall assure that all radioactive material shipping packages are designed and manufactured under a QA Program approved by the Nuclear Regulatory Commission for all packages designed or fabricated after January 1, 1979. This requirement will be satisfied by receiving a certification to this effect from the manufacturer.

3. Document Control

All documents related to a specific shipping package will be controlled through the use of written procedures. All document changes will be performed according to written procedures approved by management.

The Radiation Safety Officer shall insure that all QA functions are conducted in accordance with the latest applicable changes to these documents.

4. Handling, Storage and Shipping

Written safety procedures concerning the handling, storage and shipping of packages for certain special form radioactive material will be followed. Shipments will not be made unless all tests, certifications, acceptances, and final inspections have been completed. Work instructions will be provided for handling, storage and shipping operations.

Radiography personnel shall perform the critical handling, storage and shipping operations.

ALLEGHENY LABORATORIES
RD #2 BOX 4-A
KENNERDELL, PA 16374

5. Inspection, Test and Operating Status

Inspection, test and operating status of packages for certain special form radioactive material will be indicated and controlled by written procedures. Status will be indicated by tag, label, marking or log entry. Status of non-conforming parts or packages will be positively maintained by written procedures.

Radiography personnel shall perform the regulatory required inspections and tests in accordance with written procedures. The Radiation Safety Officer shall ensure that these functions are performed.

6. Quality Assurance Records

Records of package approvals, procurement, inspection, tests, operating logs, audit results, personnel training and qualifications and records of shipments will be maintained. Descriptions of equipment and written procedures will also be maintained.

These records will be maintained in accordance with written procedures. The records will be identified and retrievable. A list of these records, with their storage locations, will be maintained by the Radiation Safety Officer.

7. Audits

Established schedules of audits of the QA Program will be performed using written check lists. Results of audits will be maintained and reported to management. Audit reports will be evaluated and deficient areas corrected. The audits will be dependent on the safety significance of the activity being audited, but each activity will be audited at least once per year. Audit reports will be maintained as part of the quality assurance records. Members of the audit team shall have no responsibility in the activity being audited.

ALLEGHENY LABORATORIES
RD #2 BOX 4-A
KENNERDELL, PA 16374

10 CFR PART 19
SECTION 19

ALLEGHENY LABORATORIES
RD #2 BOX 4-A
KENNERDELL, PA 16374

10 CFR PART 20
SECTION 20

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10 CFR PART 21
SECTION 21

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10 CFR PART 30
SECTION 22

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10 CFR PART 34
SECTION 23

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RD #2 BOX 4-A
KENNERDELL, PA 16374

10 CFR PART 40
SECTION 24

ALLEGHENY LABORATORIES
RD #2 BOX 4-A
KENNERDELL, PA 16374

10 CFR PART 71
SECTION 25

**DIVISION OF ACCOUNTING AND FINANCE
REQUEST FOR REFUND TO EMPLOYEE/VENDOR**

JUL 3 1996

THE EMPLOYEE/VENDOR IDENTIFIED BELOW HAS OVERPAID THE NUCLEAR REGULATORY COMMISSION FOR GOODS AND/OR SERVICES PROVIDED AND IS DUE A REFUND

EMPLOYEE/VENDOR/PAYEE CODE: _____

NAME: ALLEGHENY LABORATORIES

ADDRESS: ATTN: MICHAEL B. CROGHAN, RADIATION SAFETY OFFICER

ADDRESS: RD #2 BOX 4-A

CITY: KENNERDELL STATE: PA ZIP: 16374

TRANS CODE: PX

TRANS TYPE: FE FUND: X5280 JOB CODE: _____ AMOUNT: \$20.00

TRANS TYPE: IR FUND: R1435 JOB CODE: INTR AMOUNT: _____

TRANS TYPE: IR FUND: R1099 JOB CODE: ADCH AMOUNT: _____

TRANS TYPE: IR FUND: R1099 JOB CODE: FINE AMOUNT: _____

TOTAL REFUND AMOUNT: \$20.00

COMMENTS: Lic 37-20734-01/CK 2717/30 AND OVRPYT

(Limit comments to 40 characters, including spaces)

PREPARED BY: Bruce Brown DATE: 6/24/96

AUTHORIZED BY: Sandra Kennedy DATE: 7/3/96

ORIGINAL INV. NO: _____ DATE PAID: _____ AMOUNT: _____

REFUND ENTERED INTO COLLECT BY: _____

REFUND DETERMINED BY: _____ DATE: _____

PLEASE ATTACH APPROPRIATE SUPPORTING DOCUMENTATION

June 9 I 66
APPL DTD 5/1/96
30 AND OVRPYT
30 AND FBE IS \$700
(123179)

BETWEEN:

LICENSE FEE MANAGEMENT BRANCH, ARM
AND
REGIONAL LICENSING SECTIONS

: (FOR LFMS USE)
:
: INFORMATION FROM LTS
:
:
:
: PROGRAM CODE: 03320
: STATUS CODE: 0
: FEE CATEGORY: 30 28
: EXP. DATE: 20010430
: FEE COMMENTS: -----
: DECOM FIN ASSUR REQD: N
:

LICENSE FEE TRANSMITTAL

A. REGION I

1. APPLICATION ATTACHED
APPLICANT/LICENSEE: ALLEGHENY LABORATORIES
RECEIVED DATE: 960503
DOCKET NO: 3022013
CONTROL NO.: 123179
LICENSE NO.: 37-20734-01
ACTION TYPE: AMENDMENT

2. FEE ATTACHED
AMOUNT: \$720.00
CHECK NO.: 2717

3. COMMENTS

SIGNED M. A. Perkins
DATE 5/17/96

B. LICENSE FEE MANAGEMENT BRANCH (CHECK WHEN MILESTONE 03 IS ENTERED ☒)

1. FEE CATEGORY AND AMOUNT: 30 28 \$700

2. CORRECT FEE PAID. APPLICATION MAY BE PROCESSED FOR:
AMENDMENT ☒
RENEWAL ☐
LICENSE ☐

3. OTHER -----

Log June 9 I (96) SIGNED AB DATE 6/12/96
Remitter CHAS W. MACLELLANS, INC
Check No. 2717
Amount \$720 Refunded \$20
Category 2-2-28
Fee ARM
Rec'd 6/12/96
Completed AB

1996 MAY 23 AM 8:31