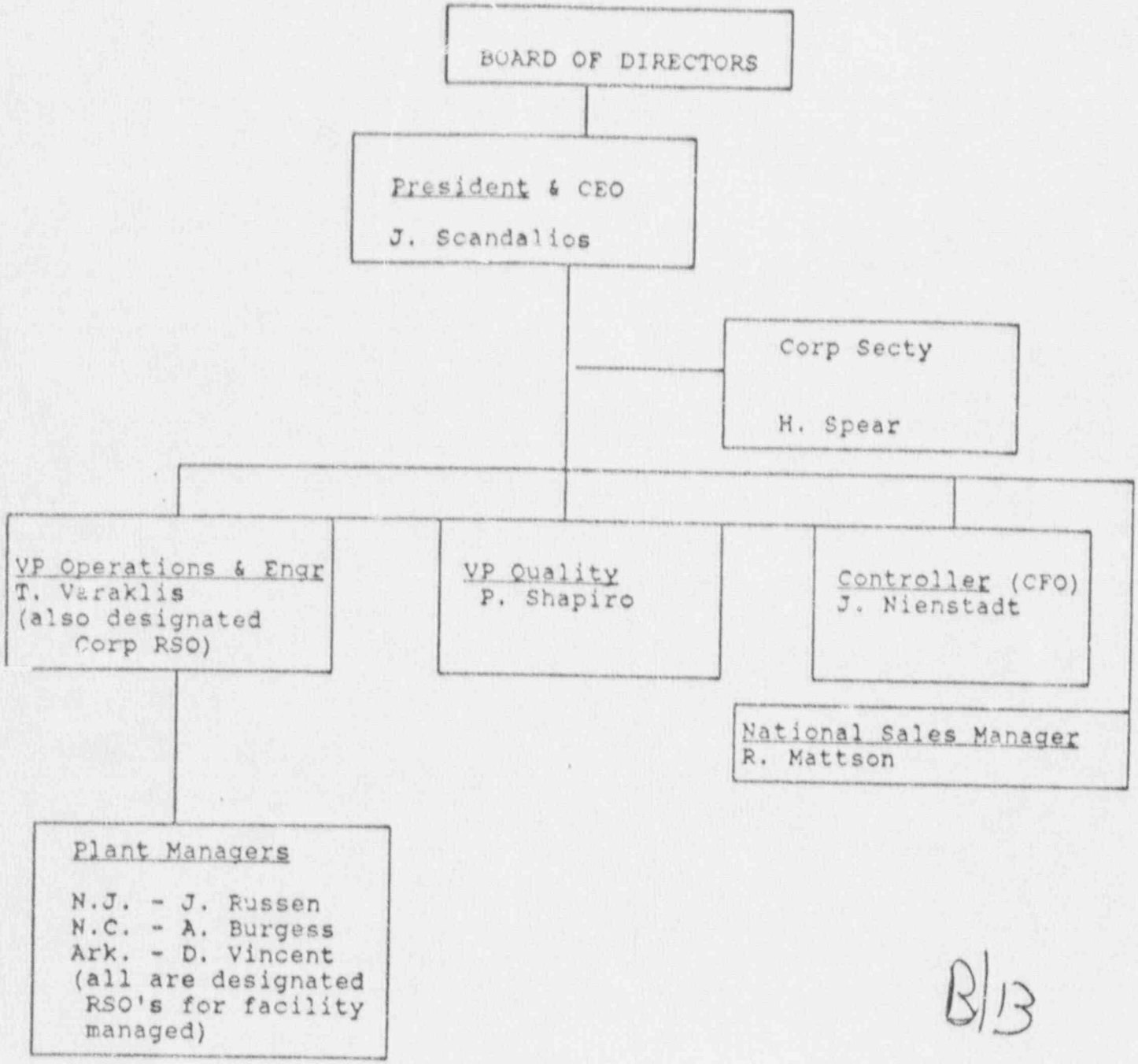
		Page 1 of 1
Subject: CORPORATE ORGANIZATION CHART		Number / Revision: 2.0 D
		Effective Date: MAY 1, 1989
Title: PRESIDENT	Name: JOHN SCANDALIOS	Signature:



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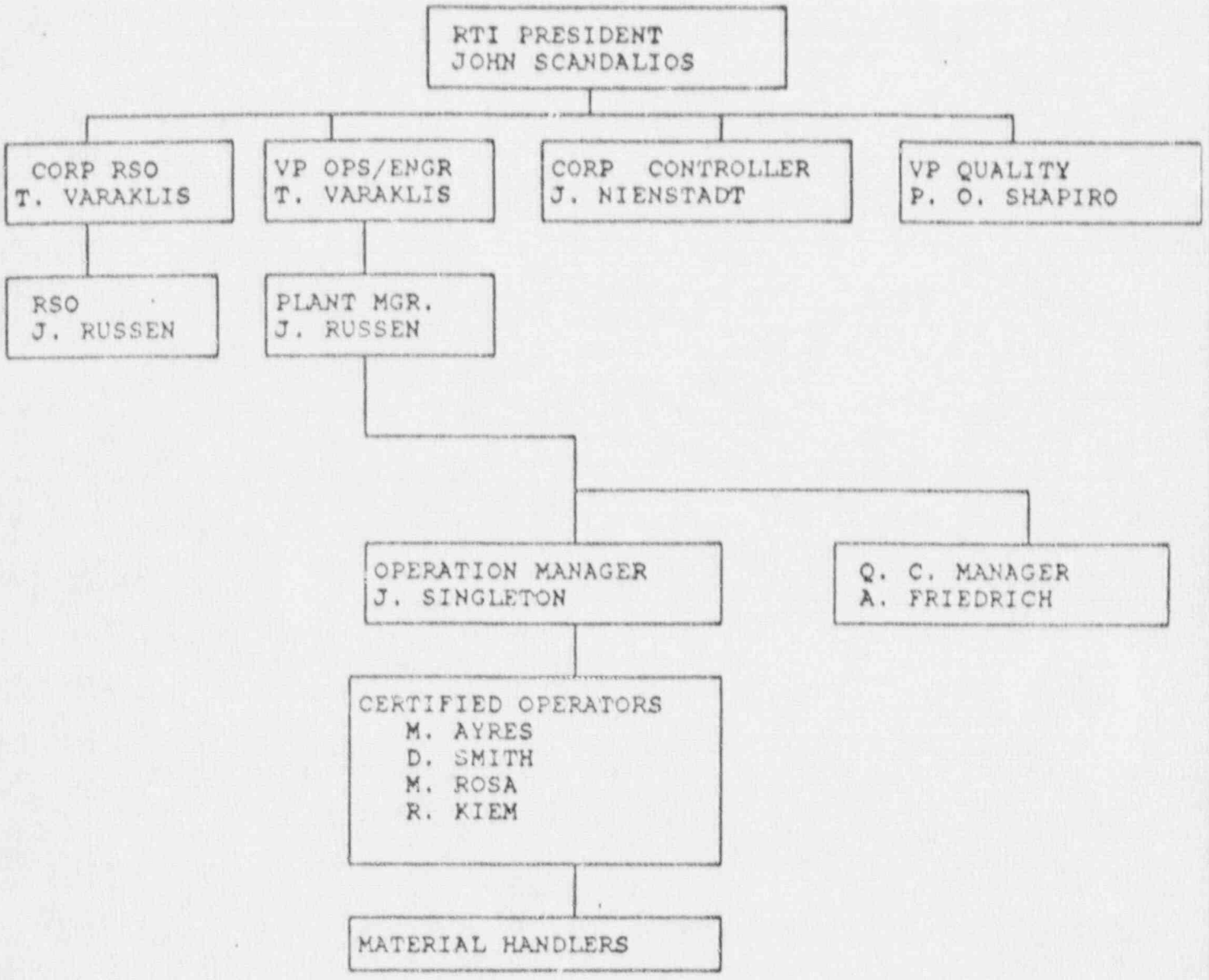
PROCESS TECHNOLOGY OF NORTH JERSEY

ORGANIZATIONAL CHART



April 28, 1988

Appendix A

OPERATING AND EMERGENCY PROCEDURES

3.6	Radiation Safety Audit Procedures
3.7	Corrective Action System
3.9	Training - Scheduling & Reporting Guide
9.100	Irradiator Startup
9.101	Irradiator Shutdown Normal
9.102	Irradiator Interlock Testing
9.103	Module Transfer
9.104	Cell Pool Level Monitoring System
9.105	Dosimetry Issue and Use
9.106	Radiological Post
9.107	Shift Turnover Procedure
9.200	Emergency Shutdown
9.201	Excessive Radiation Exposure Emergency
9.203	Fire in Radiation Room Emergency
9.204	Accidental Release of Radioactive Materials to the Uncontrolled Area
9.205	Leaking Irradiator Source Determination
9.300	Care and Use of Radiation Survey Equipment
9.302	Water Sampling and Analysis
9.304	Contamination Test of Inside of Shipping Containers
9.306	Ozone Concentration Quarterly Survey
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9.501	Resin Replacement
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9.503	Annual Fire Test
9.504	Irradiator Source Movement Log
9.600	Notification Requirements to US/NRC
9.601	Defect Reporting Requirements USNRC
9.700	Irradiator Operator Certification
12.100	Preventative Maintenance System
13.1	Design Control
13.2	Facilities Changes

Radiation Technology, Inc.
Process Technology Subsidiaries

Procedure

Facility: CORPORATE	Department: QUALITY ASSURANCE	Page 1 of 2
Subject: RADIATION SAFETY AUDIT PROCEDURES		Section/Number/Revision 3.6. ORIGINAL
		Effective Date: JULY 20, 1986
Prepared By: P.O. SHAPIRO P.O. Shapiro	Approved Technically - - -	Approved By Quality P.O. SHAPIRO P.O. Shapiro

1.0 PURPOSE

To outline a planned audit system to verify compliance with all aspects of the Radiation Safety Program.

2.0 SCOPE

Applies to the design, procurement, construction, and operations of all Radiation Technology and affiliated irradiator plants.

3.0 REFERENCES

The operating license and implementing procedures at each facility.

4.0 DEFINITIONS

4.1 Activity - those items involved with Radiation Safety.

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

None

6.0 SAFETY REQUIREMENTS

None

7.0 PROCEDURE

7.1 Audits will be performed by trained Quality Department personnel according to the appropriate checklist.

7.2 Audit schedules will be prepared to audit:

7.2.1 activities as early in their life as practicable.

7.2.2 applicable elements of the internal and on-site programs at least once every year or once within the life of an activity, whichever is shorter.

7.0 PROCEDURE (cont)

7.2.4 on-going activities on a regular basis.

7.2.5 unforseen events or changes as soon after they occur as possible.

7.3 Audit activities include, as appropriate:

7.3.1 Determination of the site features that affect plant safety.

7.3.2 Preparation, review, approval, and control of designs, specifications, procurement documents, instructions, procedures and drawings.

7.3.3 Request for proposals and evaluation of bids.

7.3.4 Indoctrination and training programs.

7.3.5 Receiving and plant installation operations.

7.3.6 Operation, maintenance, modification, and repair controls.

7.3.7 Implementation of operating and test procedures.

7.3.8 Evaluation of work areas, activities, processes, documents and records.

7.4 Audit findings will be discussed with the Operations Manager at an exit interview at the end of the audit. The audit report will be distributed to the Corporate President, V.P. of Operations and Engineering, Director-Quality, and the Operations Manager.

7.6 Corrective action (c/a) assignments with names and completion dates will be made within 15 days following receipt of the audit report by the Operations manager. The Director-Quality and the V.P. of Operations and Engineering will receive copies of the c/a assignments.

7.7 Quality will reaudit c/a and document progress.

8.0 EXHIBITS

None

Facility: CORPORATE	Department: QUALITY ASSURANCE	Page: 1 of 9
Subject: CORRECTIVE ACTION SYSTEM		Section/Number/Revision: 3.7. ORIGINAL
		Effective Date: JULY 28, 1986
Prepared By: P.O. SHAPIRO	Approved Technically: - - -	Approved By Quality: P.O. SHAPIRO

1.0 PURPOSE

To establish a systematic procedure to assure that causes of discrepancies and problems are resolved in a timely manner and that their recurrence is prevented.

2.0 SCOPE

Applies to all Radiation Technology and Process Technology Affiliates.

3.0 REFERENCES

None

4.0 DEFINITIONS

None

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 Corrective Action Request Form (CARF) - Used for obtaining written replies from responsible management, when timely corrective action measures are required for permanent problem resolution. This corrective action form is not a vehicle for regular communication and management. People are paid to do that on a daily basis. The Corrective Action Request is initiated when the regular management process has failed to produce the required action, or simply, when verbal corrective action requests are not complied with.

5.2 Delinquent Corrective Action Notice - When the CARF is not complied with, a Delinquent Corrective Action Notice is affixed to the original form by the Quality Department and sent to the responsible department head for immediate follow-up and action. A written reply is required from the department head as to the corrective action taken to resolve the discrepant condition and measures taken to improve department responsiveness. Receiving a Delinquent Corrective Action Notice is not an honor - its receipt should be a serious matter, indicating that the management process has broken down.

5.0 EQUIPMENT/MATERIAL REQUIREMENTS (cont)

5.3 Corrective Action Request Log - Used by the plant Quality department to summarize all CARF's in chronological sequence, and provides a vehicle for tracking performance. Additionally, it serves as a permanent historical record.

6.0 SAFETY REQUIREMENTS

None

7.0 PROCEDURE

7.1 General

7.1.1 Merely correcting the particular unsatisfactory item does not achieve corrective action. Corrective action must create a change in the development, processing or control of the operation in order to permanently resolve problems.

7.1.2 Corrective action closes the loop of quality measurement and reporting and fulfills a responsibility of contributing to company profits through defect prevention.

7.1.3 The quality system should provide for problem identification, as well as ranking the potential corrective action projects in order of priority, based on urgency or cost benefit.

7.1.4 The corrective action system should assure the prompt incorporation of the proposed remedy and verification of its effectiveness. The problem root cause must be identified, addressed and eliminated.

7.2 Responsibility

7.2.1 Any person seeing a need for corrective action is to verbally request it of the supervisor in charge of the operation, or to the Quality department. Where verbal requests have been ignored, or where the situation is chronic or of a significant magnitude, the problem should be documented on a Corrective Action Request Form.

7.0 PROCEDURE (cont)

7.2.2 Responsibility for corrective action should be specifically assigned by the cognizant department manager or his representative. This may include coordinating, evaluating, monitoring, and reporting corrective action efforts to assure that appropriate action is taken promptly, and that the action taken is effective.

7.2.3 The specific department found responsible for conditions that lead to the problem, should be ultimately responsible for determining what corrective action should be taken, and for instituting all appropriate action.

7.2.4 The Quality department is responsible for assisting other operating departments in determining the actions required to prevent a recurrence of the discrepancy; participating at corrective action status meetings; and follow-up, to assure that action taken has permanently resolved the problem.

7.3 Corrective Action Request Log - In order for chronic or significant problems to be systematically and formally resolved, they must be identified, and officially reported, making use of the Corrective Action Request Form (Exhibit A). The use of this form indicates that verbal attempts at obtaining corrective action have been ineffective and a formal notice is necessary.

7.3.1 Originator - Describes the problem (and cause, if known) as well as noting the responsible department and manager in Section 1 of the CARF, signs and dates the form and forwards to the responsible department manager, with a copy to the Quality department.

7.0 PROCEDURE (cont)

7.3.2 Quality Department - Reviews request for completeness, assigns a CARF number, and signs and dates form. This completes Section 1 of the Corrective Action Request Form. An entry is made into the Corrective Action Log, which serves as a permanent historical record. If the CARF is not complete or valid, the form is returned to the originator for clarification and the responsible department manager is notified accordingly.

7.3.3 Responsible Department Manager - Assesses the nature of the report problem and initiates appropriate corrective action to preclude recurrence. The Quality department should be notified, in writing, within 48 hours after receipt, specifying the action date. Immediately after initiating corrective action, Section 2 of the Corrective Action Request Form is completed, dated and signed, and sent to the Quality Department.

7.3.4 Quality Department Follow-Up - Upon receipt of the completed Corrective Action Request Form, it is the Quality department's responsibility to assess corrective action effectiveness, and to complete Section 3 of the CARF.

7.3.5 If corrective action is acceptable, a copy of the completed form is sent to the originator to close the loop, and a copy is retained as part of the permanent record keeping system. The Corrective Action Request Log (Exhibit C) should be updated accordingly.

7.4 Delinquent Corrective Action Notice - Should corrective action be unsatisfactory or not accomplished by the designated date, the Delinquent Corrective Action Notice (Exhibit B) is used, in order to alert the next highest management level as to the seriousness of the problem.

7.0 PROCEDURE (cont)

7.4.1 Quality Department - Affixes the Delinquent Corrective Action Notice to the Corrective Action Notice Form; indicates corrective action status; signs and dates, forwards to the cognizant deparment head for immediate action, and retains a copy as part of the permanent record keeping system.

7.4.2 Responsible Department Head - Reviews status of the affected problem and assigns action on a priority basis. Due to its urgency, it is imperative that the Quality deparment be notified within 48 hours after receipt, as to the corrective action taken to resolve the discrepant condition and the person who failed to heed earlier notices. The original CARF serves as a convenient one sheet reporting vehicle.

7.4.3 Follow-Up - The receipt of a Delinquent Corrective Action Notice should be a serious matter. Appropriate reprimand to those failing to comply with the Corrective Action Request to correct the discrepant conditions is in order. Any department head collecting a series of Delinquent Corrective Action Notices should be brought to the attention of senior management and personnel for appropriate remedial action.

7.5 Corrective Action Log - Exhibit C presents the Corrective Action Log, which should be maintained by the plant Quality department. It also can be used by the originator or responsible department, to summarize and track progress of open Corrective Action Requests.

This log summarizes all Corrective Action Request in chronological sequence, provides a vehicle for tracking performance and serves as a permanent historical record keeping system.

7.6 Corrective Action Status Meetings

A proven method of assuring timely and effective corrective action is to establish three levels of constant activity as follows:

7.0 PROCEDURE (cont)

7.6.1 Short meetings should be held between operations and the quality representative to examine the problems verbally reported and to prevent their recurrence. These meetings fail to be productive when the activity reverts to dispositioning non-conforming products, rather than identifying and eliminating the root cause of the problem.

7.6.2 Weekly meetings should be held to resolve problems that were not solved. Open items on the Corrective Action Log could be the subjects for these meetings. Meeting actions should be documented.

7.6.3 Monthly, special meetings should be held by the plant general manager and his staff to review the problems with overdue resolutions. Usually items reaching this level need senior mangement decisions. Items requirieng complex or long-range action, may be assigned to a task team.

8.0 EXHIBITS

A - Corrective Action Request Form
B - Delinquent Corrective Action Notice
C - Corrective Action Log

EXHIBIT A

Corrective Action Request

Statement of Problem (What, When, Where) ____________________

Statement of Cause (How - If Known) ____________________

Supvr. Dept. Signature ____________________ Date ________

Statement of C/A (True Cause If Not Given) ____________________

Has the individual responsible for or contributing to the problem been informed? Yes ☐ No ☐ | Action Date | C/A Implemented Date ________

Signature ____________________ Date ________

Corrective Action Followup

C/A Acceptable ☐ C/A Performed Unacceptable ☐ C/A Not Performed ☐

Comments ____________________

Signature ____________________

EXHIBIT B

DELINQUENT C/A NOTICE STAMP

DELINQUENT C/A NOTICE

C/A NOT COMPLETED ☐

C/A NOT ACCEPTABLE ☐

QUALITY SIGNATURE _____ DATE _____

EXHIBIT C

Corrective Action Log

Item	Request No. / Date Issued	Responsible Dept. Mgr. / Department	Statement of Problem	Action Date	Date RCAR Issued	Responsible Dept. Head	[illegible]	[illegible]	Date C/A Initiated

Radiation Technology, Inc.
Process Technology Subsidiaries

Procedure

Facility:	Department:	Page
CORPORATE	QUALITY ASSURANCE	1 of 7

Subject:	Section/Number/Revision
TRAINING-SCHEDULING & REPORTING GUIDE	3.9. ORIGINAL
	Effective Date: SEPTEMBER 29, 1986

Prepared By:	Approved Technically	Approved By Quality
P.O. SHAPIRO P.O. Shapiro	. . .	P.O. SHAPIRO P.O. Shapiro

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FOR INFORMATION ONLY

1.0 PURPOSE

To provide a guide for the establishment of a uniform program for the scheduling, reporting, and monitoring of training.

2.0 SCOPE

This guide applies to all RTI and PTI facilities.

3.0 REFERENCES

None

4.0 DEFINITIONS

4.1 Training - Regular, scheduled instruction given by qualified individuals to assure that employees learn and remain familiar with their duties and RTI's current Good Manufacturing Practice.

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 Appropriate lesson plans

5.2 Attendance roster

6.0 SAFETY

None

7.0 PROCEDURE

7.1 Formal scheduled and documented training is a RTI requirement for hourly and management personnel. Training assures that our employees understand their responsibilities and have sufficient knowledge to properly perform their duties. Instruction should be given by qualified individuals who exhibit teaching ability. For maximum retention, courses should be brief, but held often; a minimum of 2 sessions each month with, durations of 45 minutes to 1 hour maximum. Lesson plans, training aids, and handouts should be used wherever possible. The range of topics covered should begin with department systems and instruction, courses and seminars may be utilized.

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7.0 PROCEDURE (cont)

7.2 Scheduling

7.2.1 A training schedule, (Exhibit A), extending for six months, assures proper planning, provides visibility, and allows attendees and instructors to arrange their schedules accordingly.

7.2.2 The schedule should identify the plant, the department and manager preparing the schedule, and the scheduled period (year & half). It should list the topics to be reviewed, procedure or instruction numbers, and scheduled dates.

7.2.3 Each June and December a training schedule is to be prepared by every department for the following six month period. The Operations Manager is responsible for ensuring that the schedules are prepared in a timely manner and should review them for completeness and adequacy. The schedule should then be forwarded to Quality.

7.2.4 When a training session is canceled, an explanation should be recorded, and the session rescheduled within the half, if at all possible. Repeated failure to hold training sessions should be considered a failure in the basic program.

7.3 Reporting

7.3.1 It is desireable to use a single form for both scheduling and reporting of training, (Exhibit A). This provides an efficient method of documenting and reporting training status. It also allows for easy review of progress.

7.3.2 The first week of each month, each department should record the actual dates training was held during the previous month, for each applicable shift. Copies should be sent to the Training Administrator and Quality. the Training Administrator should monitor the completeness and timely manner in which the reports are prepared and received.

7.0 PROCEDURE (cont)

7.4 Documenting

7.4.1 An important requirement is that training attendance Records (Exhibit B) be maintained and be available to verify the individual training of employees.

7.4.2 This record should identify the facility, department, and shift receiving training and whether they are hourly or management personnel.

7.4.3 It should indicate the scheduled month and session, topic reviewed, procedure of instruction number, the instruction's name with space for his/her signature, and date the session was conducted.

7.4.4 A training summary or special notes section should include reference to a prepared lesson plan or simply outline highlights reviewed.

7.4.5 The names of the employees expected to attend the training should be typed or printed. The employees sign next to their names to establish their attendance.

7.5 Maintenance and Consolidation of Records

7.5.1 Attendance records should be kept in the respective department for a minimum of 2 years and should be periodically audited by the facility Quality group.

7.5.2 Copies should be forwarded to the Training Department where they should be consolidated onto an employee training record (Exhibit C). This "Consolidated Employee Training Record" should be prepared jointly by Training and the employee's department supervisor for each individual employee. It will serve as a guide for the minimum orientation and training required for that specific employee and is a permanent record of actual training given. The Personnel Department should maintain these records for no less than 2 years after termination or retirement of the employee.

8.0 EXHIBITS

A - Training Schedule and Monthly Report
B - Training Attendance Records
C - Consolidated Employee Training Record

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EXHIBIT A

Facility ____________

Training Schedule & Monthly Report

____ [illegible] ____

To	CC
From	Department

[illegible]	Topic to be Reviewed	[illegible]	Date Scheduled	Date Conducted					
				1st Shift		2nd Shift		3rd Shift	
				[illegible]	Hours	[illegible]	Hours	[illegible]	Hours

EXHIBIT B

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Facility _____

Training Attendance Record

Department | Shift | ☐ Hourly Employee ☐ Management Personnel

Month & Session

Topic Reviewed

Proc. or Manual #

Instructor's Name

Instructor's Signature

Date Conducted

TRAINING SUMMARY OR SPECIAL NOTES

ATTACH additional pages for additional comments or notes

I HAVE ATTENDED THIS CLASS

(Initial or print) Name	Signature

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EXHIBIT C

Facility _____

Consolidated Employee Training Record

Employee Name	Employee Number
Department	Hire or Title
Date Hired	Date Started Each Position

REQUIRED ORIENTATION	DATE ORIENTATION/TRAINING GIVEN			
Personnel Policies				
Plant/Department Safety Policies				
Good Manufacturing Practices				

SPECIFIC DEPARTMENT PROCEDURES	DATE ORIENTATION/TRAINING GIVEN			
Department Function				

Radiation Technology, Inc.
Process Technology Subsidiaries

Procedure

Facility: NORTH JERSEY	Department: IRRADIATOR OPERATIONS	Page 1 of 5
Subject: AUTO RUN MODE IRRADIATOR START-UP		Section/Number/Revision: 9.100 C
		Effective Date: APRIL 21, 1989
Prepared By: JOHN D. SCHLECHT	Approved Technically: T. VARAKLIS	Approved By Quality: PAUL O. SHAPIRO

1.0 PURPOSE

Describe the operations required to start-up the irradiator.

2.0 SCOPE

Applies to irradiator operations at the Rockaway facility.

3.0 REFERENCES

NRC License #29-13613-02

4.0 DEFINITIONS

None

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 Calibrated radiation survey instrument.

5.2 Irradiator key.

6.0 SAFETY REQUIREMENTS

6.1 Irradiator interlock testing shall be performed prior to initial operations of the irradiator on any day and if:

6.1.1 The irradiator has been shut down due to a barrier fault;

6.1.2 There has been a power interruption at the facility;

6.1.3 The interlocks have not been tested in 24 hours and the irradiator has not been in continuous operation during this time period;

6.1.4 There has been a computer malfunction;

6.1.5 Operation of the irradiator without all interlocks functioning is prohibited.

6.2 The irradiator key shall be under the control of a certified operator or stored in a secure location at all times when the irradiator is not operating.

7.0 PROCEDURE

7.1 Ensure that the 120 Vac line power is "ON" and that the controller is turned "ON" and functioning properly.

7.2 Reset the MCR Relay by pressing the Reset button.

7.3 Check the CRT Monitor for a "start-up/run permissive". If the "start-up/run permissive" is not given, then an alarm message will be displayed. After the alarm has been corrected, press the reset button to receive the "start-up/run permissive" indication.

7.4 Enter the Auto Run Mode from the key board.

7.5 Using the keyboard, input Product Information including the Dwell Time. This will provide a "Run Valid" indication, without which, the controller will not allow start-up.

7.6 Check the radiation monitor for a green light.

7.7 Perform the following to ensure proper operation of the portable survey instrument:

7.7.1 Test the batteries on the survey instrument;

NOTE: If an unsatisfactory reading is obtained, replace the batteries or use another survey instrument and note in the supervisors log.

7.7.2 Check the instrument calibration date;

7.7.3 Place the survey instrument range selector to the lowest scale and ensure audible switch is in the "ON" position;

7.7.4 Place the survey instrument probe beside the personnel door key switch and verify that the instrument responds to the check source;

7.0 PROCEDURE (CONT)

7.7.5 Move the survey instrument away from the check source, and verify that the reading returns to a normal background level.

7.8 Place the irradiator key into the personnel door electric lock and unlock the door.

7.9 Disconnect the air line supply to the source hoists.

7.10 Enter the maze observing the following:

7.10.1 Check the meter on the survey instrument continually for indications of radiation levels higher than background.

NOTE: If the radiation level in the maze exceeds 0.5 mR/hr or higher, exit the maze immediately and close the gate. Report the condition to the RSO. Record in the supervisors log.

If the radiation level over the pool exceeds 5 mr/hr or greater at waist level, exit the cell immediately and close the gate. Report the condition to the RSO. Record in the supervisore log.

7.11 Manually push the carriers into the cell from the "unprocessed" storage area. Place the carriers into the source pass positions. Check that all carriers are secure by activating the carrier latch.

7.12 Have all personnel leave the cell. The operator must be the last individual to exit the cell.

7.13 Activate the 90 second start-up time delay with the machine key.

NOTE: Observe that the start-up alarm sounds and the warning light in the maze begins to blink.

7.0 PROCEDURE (CONT)

7.14 Exit the cell:

7.14.1 Reconnect the air line supply to the source hoist;

7.14.2 Close the personnel door;

7.14.3 Pull on the personnel door to ensure it is locked;

7.14.4 Check that the red light by the personnel door illuminates.

7.15 Turn the system run switch "ON" with the machine key.

NOTE: If the 90 second time delay expires before this switch is turned "ON", return to the cell and repeat the start up procedure starting with step number 7.6.

7.16 With the run switch "ON", the source will rise.

7.17 Observe indications of the source being raised:

7.17.1 The SOURCE DOWN indicator extinguishes;

7.17.2 The SOURCE IN MOTION bell sounds;

7.17.3 The DANGER HIGH RADIATION light over the personnel door illuminates;

7.17.4 The yellow alert light on the maze monitor illuminates.

7.18 Observe indications that the source is in the fully raised position:

7.18.1 The SOURCE IN MOTION bell silences;

7.18.2 The SOURCE UP indicator on the controller illuminates;

7.18.3 The source timer starts to count.

7.0 PROCEDURES (CONT)

NOTE: If any of these indications are not received and the source is not lowered, push the STOP button on the panel.

7.19 Automatic operation of the system will begin for completing the batch process cycles.

7.20 Record the date, start time, customer run code, master timer setting, run time reading, and initial on the irradiator log sheet for all start-ups.

7.21 When the batch process cycles are complete, the system will automatically shutdown and lower the source into the shielded position.

7.22 To enter the cell repeats steps 7.6 through 7.10.

7.23 The carriers should then be taken to the "processed" storage area, and new carriers loaded. The same procedure is then followed for initiating the re-start and automatic batch cycling.

NOTE: Deviation from this procedure is prohibited without the express written approval of the RSO or his alternate designated in the license.

7.24 Log any deviations from this procedure in the supervisor's log, including the date and time that permission was granted by the RSO or his designated alternate.

8.0 EXHIBITS

None

Facility: ROCKAWAY	Department: IRRADIATOR OPERATIONS	Page: 1 of 3
Subject: IRRADIATOR SHUTDOWN NORMAL		Section/Number/Revision: 9.101. ORIGINAL
		Effective Date: JULY 17, 1986
Prepared By: R. G. COCKRELL	Approved Technically: RG Cockrell	Approved By Quality

1.0 PURPOSE

To describe the process for performing a normal shutdown on the irradiator facility.

2.0 SCOPE

Applies to irradiator operators at the Rockaway facility.

3.0 REFERENCES

NRC License #29-13613-02

4.0 DEFINITIONS

4.1 Normal Shutdown - the termination of irradiator operations not dictated by emergency or similar abnormal circumstances.

4.2 Inadvertent Shutdown - the termination of irradiator operations due to the initiation of an automatic shutdown function.

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

None

6.0 SAFETY REQUIREMENTS

None

7.0 PROCEDURE

7.1 The irradiator operator shall perform the following on a normal shutdown prior to completion of a normal irradiation cycle.

7.1.1 Observe the conveyor control panel to ensure a completed shuffle has occured (all green lights for piston positions).

7.0 PROCEDURE (cont)

7.1.2 Observe the time remaining on the master timer.

7.1.3 Push the STOP button and observe:

7.1.3.1 The SOURCE UP light extinguishes.

7.1.3.2 The source-in-motion horn sounds.

7.1.3.3 The SOURCE DOWN light energizes.

7.1.3.4 The maze monitor radiation level decreases.

7.1.4 Turn the machine key switch to the OFF position.

7.1.5 Remove the key.

7.1.6 Place the key in the power switch and turn to reset to clear the alarm.

7.1.7 Push the ALERT light on the maze monitor when the radiation level decreases below 8 times background.

7.1.8 Turn the power key switch to the ON position.

NOTE: To restart the irradiator use RTI Procedure 9.100.

7.2 The irradiator operator shall perform the following on a normal shutdown which completes the run cycle.

7.2.1 Perform steps 7.1.3.1 - 7.1.8

7.3 If the irradiator is to be secured:

7.3.1 Turn the power key switch to OFF.

7.0 PROCEDURE (cont)

7.3.2 Place the key in the key storage area and lock the cabinet.

7.3.3 Log the key as returned in the key control log book.

7.4 In ADVERTENT SHUTDOWNS:

7.4.1 Determine the cause of the shutdown.

7.4.2 Turn the power key switch to the reset position to clear all alarms.

NOTE: If the alarms will not clear or the cause can not be determined contact the RSO, or his alternate as designated in the license, before proceeding.

7.4.3 Perform a normal start up per Procedure No. 9.100

8.0 EXHIBITS

None

Facility:	Department:	Page
NORTH JERSEY	IRRADIATOR OPERATIONS	1 of 4

Subject:	Section/Number/Revision
IRRADIATOR INTERLOCK TESTING	9.102. C
	Effective Date: SEPTEMBER 27, 1988

Prepared By:	Approved Technically:	Approved By Quality:
J. SCHLECHT	T. VARAKLIS	P.O. SHAPIRO

1.0 PURPOSE

To describe the methods used to test the irradiator interlocks.

2.0 SCOPE

Applies to irradiator operations at the Rockaway facility.

3.0 REFERENCES

NRC license #29-13613-02

4.0 DEFINITIONS

None

5.0 EQUIPMENT/MATERIALS REQUIREMENTS

None

6.0 SAFETY REQUIREMENTS

6.1 Operation of the irradiator without all interlocks functioning is prohibited.

6.2 Operation of the irradiator without two persons present is prohibited.

7.0 PROCEDURE

7.1 Daily interlock testing shall be performed as follows:

7.1.1 Perform a normal start-up in accordance with Procedure 9.100 if the irradiator is not currently in operation.

7.1.2 Actuate the STOP button on the irradiator control panel:

7.1.2.1 Check that the fault indicator horn activates.

7.0 PROCEDURE (cont)

7.1.2.2 Check that the SOURCE UP indicator on the controller extinguishes.

7.1.2.3 Check that the source in motion bell sounds.

7.1.2.4 Check that the SOURCE DOWN indicator on the controller illuminates.

7.1.3 With source in down position activate access door microswitch.

7.1.3.1 Check Red LED by personnel access door. ON light indicates that maze door microswitch is operable.

7.1.4 Perform a normal start up.

7.1.5 Depress microswitch test button by personnel access door.

7.1.5.1 Check that the SOURCE UP indicator extinguishes.

7.1.5.2 Check that the Fault Indicator Horn activates.

7.1.5.3 Check that the Source in motion bell sounds.

7.1.5.4 Check that the SOURCE DOWN indicator on the controller illuminates.

7.1.6 With source in down position place check source against RMS-II probe.

7.1.6.1 Check that Fault Indicator Horn activates.

7.1.6.2 Check that Yellow "Alert" indicator on RMS-II monitor activates.

7.0 PROCEDURE (cont)

NOTE: If any of the daily interlock tests were unsatisfactory, notify the RSO, take corrective action, and repeat the test for the unsatisfactory interlock. Under no circumstance will the irradiator be allowed to commence normal operations with a malfunctioning interlock.

7.1.7 The remaining interlocks will be tested during semiannual routine maintenance activities.

7.2 Records

7.2.1 Document the performance of the interlock test on the interlock test check list (Exhibit A).

7.2.2 Keep the interlock test checklist in a convenient location for inspection by QA or by regulatory authorities.

7.2.3 Retention time for the interlock checklist is two years.

8.0 EXHIBITS

A - Interlock Test Check List

EXHIBIT A

NJPTI IRRADIATOR FACILITY SAFETY INTERLOCK DAILY TEST CHECK LIST

Date _____, 19__ Time: _____

	Stop Button Control Panel	Maze Door	Microswitch	Check Source
	Source Up	Source Down	Source Up	Source Down
Source up light extinguishes		X		X
Source in motion bell sounds		X		X
Source down indicator illumination		X		X
Fault indicator horn activates		X		
Microswitch functional light illumination	X		X	X
RMS-II Yellow "Alert" light illumination	X	X	X	

Facility: ROCKAWAY	Department: IRRADIATOR OPERATIONS	Page 1 of 4
Subject: MODULE TRANSFER		Section/Number/Revision 9.103
		Effective Date: July 17, 1986
Prepared By: R. G. COCKRELL	Approved Technically R G Cockrell	Approved By Quality

1.0 PURPOSE

To describe the methods used to handle Co60 sources located in the irradiator pool.

2.0 SCOPE

Applies to irradiator operators at the Rockaway facility.

3.0 REFERENCES

None

4.0 DEFINITIONS

4.1 Source - radioactive material.

4.2 Pencil - the smallest physical source configurationin the irradiator. Usually the pencil is cylindrical with a diameter of 0.5 to 1.0 inches and a length of 12 to 24 inches.

4.3 Module - a rectangular structure that holds the pencils. Usually the module holds the pencils parallel to each other in a planar configuration.

4.4 Plaque - a rectangular structure that holds the modules. Usually the plaque holds the modules in a planar configuration. At Rockaway the modules are installed vertically in a configuration of two rows of 3 modules each.

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 Calibrated radiation survey instrument with audible function

5.2 Source handling tools

5.3 Swipes

5.0 EQUIPMENT/MATERIALS REQUIREMENTS (cont)

5.4 Underwater lighting where practical

5.5 Water samples

5.6 Filmbadge and pocket dosimeter

6.0 SAFETY REQUIREMENTS

6.1 Two persons shall be present, at least one being a certified operator, when source modules are moved. A certified operator shall do moving. The move should be documented on a map.

6.2 All source modules handling shall be performed underwater.

6.3 The source should not be raised closer than 10 feet from handler. Source handling tools shall be marked so that the handler knows when he is reaching the 10 foot limit.

6.4 All equipment in contact with Co60 sealed sources should be swiped and measured for activity.

6.5 Gloves should be worn by the operator moving the modules.

6.6 The number of personnel in the pool area when source handling is in progress should be limited to those personnel necessary to safely perform the work.

7.0 PROCEDURE

7.1 Take Post and pre water samples.

7.2 Perform a radiation survey of the area.

7.0 PROCEDURE (cont)

7.3 Place the available response survey instrument on the walkway above the pool and turn on the audible function. The survey instrument should be positioned close to handler so he can view it and hear its audible alarm.

A short extension on the handler's side of the pool should be used. The importance of extension is added length when needed, easily removable for shorter needs. The added length also keeps the handlers hands out of the pool water.

7.4 Move the source modules using the source handling tools.

7.5 Record the location of the moved modules in the cell source movement log book.

NOTE: Exhibit A.

7.6 Notify QA to perform a post source handling radioactivity analysis.

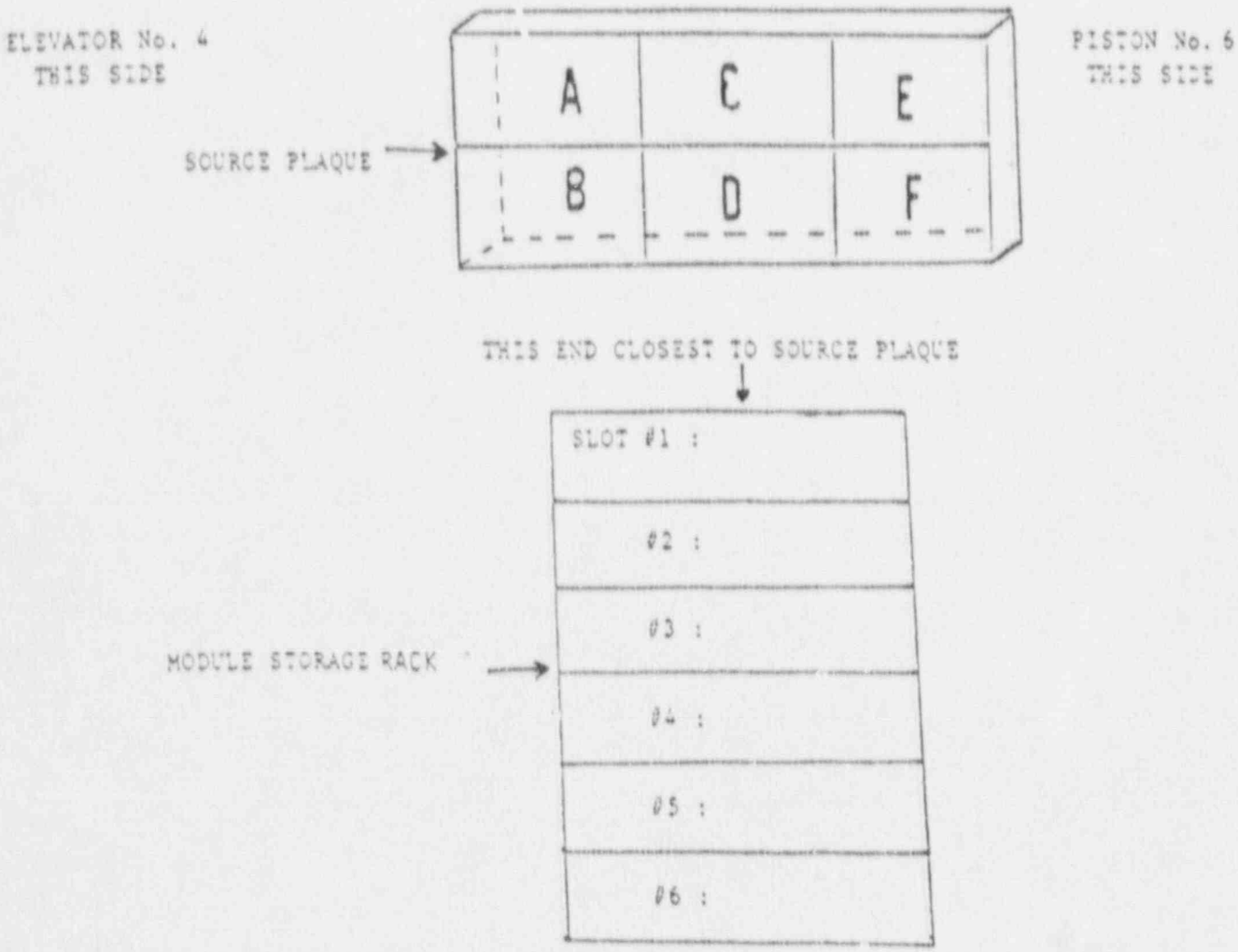
NOTE: The sample should be taken between 8 and 24 hours after movement.

8.0 EXHIBITS

A - Source Movement Log Book Sample Sheet

Facility	Department	Page
ROCKAWAY	IRRADIATOR OPERATIONS	4 of 4
Subject:	Section/Number/Revision	
	9.103	
MODULE TRANSFER	Effective Date	
	July 17, 1986	

Exhibit A



STATUS OF SOURCE PLAQUE: Before Moving Modules _____,

After Moving Modules _____.

MODULE MOVED BY: _____ DATE OF MOVEMENT: _____

WITNESSED BY: _____ PURPOSE: _____

Procedure

Facility: ROCKAWAY	Department: IRRADIATOR OPERATIONS	Page 1 of 5
Subject: CELL POOL LEVEL MONITORING SYSTEM		Section/Number/Revision 9.104 A
		Effective Date: September 24, 1987
Prepared By: Q. SINGLETON	Approved Technically: T. VARAKLIS	Approved By Quality: P.O. SHAPIRO

1.0 PURPOSE

To describe the operations of the cell pool level monitoring system.

2.0 SCOPE

Applies to irradiator operators at the Rockaway facility.

3.0 REFERENCES

None

4.0 DEFINITIONS

None

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 Calibrated Radiation Survey Instrument

6.0 SAFETY REQUIREMENTS

None

7.0 PROCEDURE

7.1 Checks on the pool level monitoring system

7.1.1 The irradiator operator shall check the following settings daily to ensure the cell pool monitoring system is adjusted to deliver an accurate indication of the cell pool level.

a.	Air pressure regulator	5-6 psig
b.	Air flow meter	3-4 cuft/hr
c.	High water alarm setting	7 inches of water
d.	Low water alarm setting	4 inches of water
e.	Alarm panel is energized	

7.0 PROCEDURE (cont)

7.1.2 The irradiator operator shall verify the high level alarm is operational by:

7.1.2.1 Adjusting the high level alarm set point below the water level indicator (black needle).

7.1.2.2 Observing the alarm light illuminates and the alarm bell operates.

7.1.3 The irradiator operator shall readjust the high level alarm set point to 7 inches of water.

7.1.4 The irradiator operator shall verify the low level alarm is operational by:

7.1.4.1 Adjusting the low level alarm set point above the water level indicator (black needle).

7.1.4.2 Observing the alarm light illuminates and the alarm bell operates.

7.1.5 The irradiator operator shall readjust the low level alarm set point to 4 inches of water.

7.2 High Level Alarm

7.2.1 The irradiator operator shall respond to a high level alarm in the cell pool by:

7.2.1.1 Ensuring makeup water to the cell pool has been turned off.

7.2.1.2 Entering the cell and verifying the pool has not overflowed.

7.2.1.3 Monitoring the pool level to ensure the level is not increasing.

7.0 PROCEDURE (cont).

7.2.2 The irradiator operator shall ensure the water from the cell is removed when the pool has overflowed. This includes removal of the water from the elevator pits.

7.2.3 If the pool is inadvertently over filled, (above 7") the operator shall collect a water sample for radiological analysis.

7.2.4 The irradiator operator shall log the following in the Shift Supervisor's Log:

a. Time of the alarm.
b. Cause of the alarm.
c. Actions taken to correct the alarm condition.
d. Record level the pool was filled to in case of overfilling above 7".

7.3 Low Level Alarm

7.3.1 The irradiator operator shall respond to a low level alarm in the cell pool by:

7.3.1.1 Pushing the stop button and dropping the source.

7.3.1.2 Entering the irradiator to verify the cell pool water level.

7.3.1.3 Turning on makeup water to the cell pool.

7.3.1.4 Monitoring the cell pool level to ensure the water level is increasing.

7.3.1.5 Securing the makeup water when the water level has returned to the high end of the normal operating bank (5-6").

7.0 PROCEDURE (cont).

7.3.3 The irradiator operator shall notify the Operations Manager and Radiation Safety Officer (RSO) if the pool level conditions to drop.

7.4 The irradiator operator shall take weekly cell pool temperature and pool level readings and record in water temperature and level log (Exhibit A).

7.4.1 The Radiation Safety Officer shall be notified if the cell pool water exceeds 130°F.

NOTE: The demineralizer resin materials degrade at temperatures exceeding 140°F.

8.0 EXHIBITS

A - Water Temperature and Level Log

EXHIBIT A

WATER TEMPERATURE AND LEVEL LOG

DATE	TIME	TEMPERATURE °F CELL POOL	POOL LEVEL

NC-14

Radiation Technology, Inc.
Process Technology Subsidiaries

Procedure

Facility:	Department:	Page
CORPORATE	IRRADIATOR OPERATION	1 of 9

Subject: DOSIMETRY ISSUE AND USE

Section/Number/Revision: 9.105, A

Effective Date: 10/01/86

Prepared By	Reviewed By	Approved By Quality
LES ROSS	R. COCKRELL	P. O. SHAPIRO

1.0 PURPOSE

To describe procedures pertinent to the control, issuance and documentation of personnel dosimeters including review of personnel exposure records.

2. SCOPE

Applies to all persons who routinely work in a restricted area or any person required to enter a potential radiation area of any Radiation Technology, Inc. or affiliate facility.

3.0 REFERENCES

10 CFR 20.202
10 CFR 20.3 (14)

4.0 DEFINITIONS

4.1 Restricted Area - any area, access to which is controlled by the licensee for purposes of protection of individuals from exposure to ionizing radiation and radioactive materials.

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 Film Badges/Holders

5.2 Pocket Dosimeters/Charger

5.3 Film Badge Record Sheet

5.4 Pocket Dosimeter Record Sheet

5.5 Visitor Survey Log

6.0 SAFETY REQUIREMENTS

6.1 Loss of or damage to a film badge or pocket dosimeter shall be cause for immediate exiting of a radiation area.

7.0 PROCEDURE

7.1 The Radiation Safety Officer (RSO) or his designee is responsible for issuance of film badges or pocket dosimeters to personnel who routinely work in the restricted area of the facility or any person required to enter a potential radiation area.

7.2 The RSO or his designee is responsible for:

7.2.1 Assigning a film badge to RTI employees who routinely work in a restricted area.

7.2.2 Assigning film badges to visitors that will routinely work within the restricted area such as a vendor doing extensive maintenance or installation over a period of several days.

NOTE: Instructing wearer that Dosimetry Devices are to be worn on the frontal portion of the body such as belt or breast pocket.

7.2.3 Recording the following information on the Film Badge Record Sheet:

7.2.3.1 Badge #

7.2.3.2 Date Issued

7.2.3.3 Date Returned

7.2.3.4 Name (Last, First, Middle Initial)

7.2.3.5 Address

7.2.3.6 Social Security Number

7.2.3.7 Previous Exposure History for Current Calendar Quarter (if known).

7.2.4 Assigning of pocket dosimeters to employees or visitors not normally assigned film badges, who are entering a restricted area.

7.0 PROCEDURE (cont)

7.2.5 Recording the following information on the Pocket Dosimeter Record Sheet:

7.2.5.1 Name (Last, Initials)

7.2.5.2 Social Security Number

7.2.5.3 Company

7.2.5.4 Mailing Address

7.2.5.5 Issued Serial #

7.2.5.6 Zeroed and Issued By

7.2.5.7 Date/Time Issued

7.2.5.8 Date/Time Returned

7.2.5.9 Escorted By

7.2.5.10 Dosimeter Reading

7.2.5.11 Acknowledgement of Dose Statement

7.2.5.12 Signature

NOTE: Zero the pocket dosimeter upon issuance.

7.2.6 Pocket dosimeters, the dosimeters will be read after exiting the restricted area. The reading is to be recorded on the Pocket Dosimeter Record Sheet (Exhibit B) and reported verbally to the employee or visitor. The employee or visitor shall sign the Acknowledgement Statement indicating his/her awareness of recorded exposure estimate.

7.2.7 Film badges being collected and issued monthly.

7.0 PROCEDURE (cont)

7.2.7.1 In the event that badges are only partially exchanged for any reason, a non-issued visitor film will be retained to use as a control film for the remainder of badges when collected and sent to lab for evaluation. This badge should be marked as a control so that the laboratory will be aware of its function.

7.2.8 Issuing of visitor film badges to employees in case of lost/damaged film badge.

7.2.8.1 Causing a thorough search to be made by the employee in an effort to find the lost film badge.

7.3 The Manager of Operations is responsible for:

7.3.1 Reviewing and signing of monthly dosimetry reports.

7.3.2 Ensuring operations personnel are adequately trained in the care/use of dosimeters.

NOTE: Dosimeters are not to be taken from issuing facility premises.

7.3.3 Investigation of lost/damaged film badges to arrive at an estimated dose for period utilizing a combination of the following criteria:

7.3.3.1 Co-workers exposure for similar-like work periods.

7.3.3.2 Prior exposure history of employee for previous similar-like work periods.

7.0 PROCEDURE (cont)

7.3.3.3 Pocket dosimeter readings or replacement film badge readings for period subsequent to lost or damaged film.

7.3.4 Generation of a letter to personnel dosimetry file describing the circumstances of lost/damaged film and assignment of an estimated dose for period of lost/damaged film badge.

7.3.4.1 Letter must contain rationale for assignment of dose estimate, and the signature of the RSO and the affected individual as evidence of concurrence of the assigned dose estimate.

7.3.5 Conducting an investigation should company action limits be exceeded other than under circumstances specifically approved by RSO for safe operation of the facility. The investigation will determine the cause of overexposure and in conjunction with the RSO will determine corrective or disciplinary action necessary to prevent further exposures in excess of company action limits.

7.3.6 Investigation of any suspect exposure inconsistent with normal personnel dosimetry results. Suspect readings, obviously in error as supported by investigation, may be reported to laboratory requesting removal from personnel exposure records with permission of RSO.

7.4 The Radiation Safety Officer (RSO) retains overall responsibility for all actions cited in this procedure including timely reviews/audits to ensure strict compliance.

7.0 PROCEDURE (cont)

7.5 The Radiation Safety Officer may allow supervised visits of the facility including the irradiator room provided the following criteria are met:

7.5.1 A visitor survey log must be completed which includes:

7.5.1.1 Date of Visit

7.5.1.2 Time entered irradiator

7.5.1.3 Time exited irradiator

7.5.1.4 Type survey meter and serial number

7.5.1.5 Survey reading and operator signature

7.5.1.6 Signature and social security number of visitor

8.0 EXHIBIT

A - Film Badge Log Sheet
B - Pocket Dosimeter Record Sheet
C - Visitor Survey Log

Exhibit A
1 of 3

BADGE NO.	ISSUED	RETURNED	NAME: _____ ADDRESS: _____ _____ ESCORT: _____ S.S. # _____ _____
BADGE NO.	ISSUED	RETURNED	NAME: _____ ADDRESS: _____ _____ ESCORT: _____ S.S. # _____ _____
BADGE NO.	ISSUED	RETURNED	NAME: _____ ADDRESS: _____ _____ ESCORT: _____ S.S. # _____ _____

Exhibit B
2 of 3

POCKET DOSIMETER RECORD

NAME (Last, Initials) | S.S. # | COMPANY | MAILING ADDRESS

Issued Serial #	Zeroed & Issued By	Date/Time Issued	Date/Time Returned	Escorted By	Dosimeter Reading

I hereby acknowledge notification of my dosimeter reading for the above issued period.

_____
Signature

NAME (Last, Initials) | S.S. # | COMPANY | MAILING ADDRESS

Issued Serial #	Zeroed & Issued By	Date/Time Issued	Date/Time Returned	Escorted By	Dosimeter Reading

I hereby acknowledge notification of my dosimeter reading for the above issued period.

_____
Signature

EXHIBIT C
3 of 3

==

VISITOR SURVEY LOG

FACILITY LOCATION:

==

SURVEY METER (TYPE): ____________ SERIAL #: ____________

==

DATE: ____________ TIME IN: ____________ TIME OUT: ____________

SURVEY READING: ____________ CONDUCTED BY: ____________

PURPOSE OF VISIT: ____________

(please print your name)

NAME: ____________ SS# ____________ NAME: ____________ SS# ____________

NAME: ____________ SS# ____________ NAME: ____________ SS# ____________

NAME: ____________ SS# ____________ NAME: ____________ SS# ____________

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NAME: ____________ SS# ____________ NAME: ____________ SS# ____________

Radiation Technology, Inc.
Process Technology Subsidiaries

Procedure

Facility:	Department:	Page
CORPORATE	IRRADIATOR OPERATION	1 of 2

Subject: RADIOLOGICAL POSTING

Section/Number/Revision: 9.106 A

Effective Date: 10/01/86

Prepared By:	Approved Technically:	Approved By Quality:
Robert G. Cockrell R. COCKRELL	Robert G. Cockrell R. COCKRELL	P. Shapiro P. O. SHAPIRO

1.0 PURPOSE

To describe the methods used to post radioactive areas and materials.

2.0 SCOPE

Applies to all personnel working in the restricted area of all Radiation Technology, Inc. or Process Technology, Inc. subsidiaries.

3.0 REFERENCES

10CFR20

4.0 DEFINITIONS

4.1 Radiation Area - any area greater than 5 mr/hr but less than 100mr/hr

4.2 High Radiation Area - any area equal to or greater than 100mr/hr

4.3 Contaminated Area - any area containing radioactivity greater than 200 dpm/100cm^2.

4.4 Restricted Area - any area, access to which is controlled by the licensee for purposes of protection of individuals from exposure to ionizing radiation and radioactive materials.

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 Radiation & Radioactive Material Labels.

5.2 Signs & ropes

6.0 SAFETY REQUIREMENTS

6.1 Be sure to use signs as required by 10CFR20. Place the signs where they are clearly visible by persons who are in the vicinity of the posted area.

7.0 PROCEDURE

7.1 The following signs shall be posted, where applicable:

7.1.1 Sign(s) stating "Caution Radiation Area" for any area with a radiation level greater than 5 mr/hr and less than 100 mr/hr.

7.1.2 Sign(s) stating "High Radiation Area" for any area with a radiation level equal to or greater than 100 mr/hr.

7.2 Sign(s) stating, "Caution Radioactive Material" or "Danger Radioactive Material" shall be attached to the radioactive material or container; or the material shall be segregated and roped off with a sign attached to the rope.

7.3 Sign(s) stating "Contaminated Area" shall be placed on a rope segregating a contaminated area from an uncontaminated area.

7.4 "Restricted Area" sign(s) shall be posted on the entrance to the irradiator, auxiliary equipment room and the R&D pool room.

8.0 EXHIBITS

None

Facility: CORPORATE	Department: IRRADIATOR OPERATION	Page: 1 of 2
Subject: SHIFT TURNOVER		Section/Number/Revision: 9.107. A
		Effective Date: 10/01/86
Prepared By: R. COCKRELL	Approved Technically: R. COCKRELL	Approved By Quality: P. O. SHAPIRO

UNCONTROLLED COPY
FOR INFORMATION ONLY

1.0 PURPOSE

To inform the irradiator operator of the status of the irradiator operations immediately prior to the operator accepting responsibility for operation.

2.0 SCOPE

Applies to all irradiator operators at Radiation Technology, Inc. (RTI) or Process Technology, Inc. (PTI) subsidiaries.

3.0 REFERENCES

None

4.0 DEFINITIONS

4.1 Shift turnover - the transfer of responsibility for operation of the irradiator from one certified operator to another certified operator.

4.2 Responsible operator - the certified operator who has responsibility for operating the irradiator at any given time.

4.3 Accepting operator - the certified operator who is accepting responsibility for operating the irradiator.

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

None

6.0 SAFETY REQUIREMENTS

None

7.0 PROCEDURE

7.1 Prior to shift turnover, the responsible operator should:

7.1.1 Brief the accepting irradiator operator on the status of the product being processed or being loaded at time of shift turnover.

8707300.D

7.0 PROCEDURE (cont)

7.1.2 Review the remainder of the processing schedule with the accepting irradiator operator.

7.1.3 Review any special instructions concerning product loading, dosimeter placement, processing, placement or removal of any radiological test samples or storage of product after processing.

7.1.4 Show the accepting irradiator operator the physical location of the next product to be processed or any other product that is to be processed under special instructions.

7.1.5 Review any malfunction problems that occurred with the operation of the irradiator and what has been done to correct the problem.

7.1.6 Review the list of miscellaneous items that are to be accomplished for that day as recorded in supervisors instruction log.

7.1.7 The responsible operator will inform the accepting operator of the next required time for safety interlock testing.

7.1.8 Review that there is an adequate supply of dosimeters, Avery Dots, stamps, tape, and pens for the processing that will be done on the shift.

8.0 EXHIBITS

None

Facility: ROCKAWAY	Department: IRRADIATOR OPERATIONS	Page 1 of 4
Subject: EMERGENCY SHUTDOWN		Section/Number/Revision 9.200.A
		Effective Date: March 6, 1987
Prepared By: R. G. COCKRELL	Approved Technically: R. COCKRELL	Approved By Quality: P. O. SHAPIRO

1.0 Purpose

To provide a guideline for the actions to be taken if a manual emergency shutdown of the irradiator is required.

2.0 Scope

Applies to all qualified operators of the RTI 2102 irradiator.

3.0 References

NRC License #29-13613-02

4.0 DEFINITIONS

None

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

None

6.0 SAFETY REQUIREMENTS

None

7.0 PROCEDURE

7.1 There are two emergency shutdown switches associated with the RTI Model 2102 irradiator.

7.1.1 A cable actuated switch is located inside the radiation room. This switch can be pulled to immediately shut down the irradiator in case of an emergency.

7.1.2 A "STOP" button is located on the control panel outside the radiation room. Push the "STOP" button to immediately shut down the irradiator.

7.0 PROCEDURE (cont)

7.2 Another method to perform an emergency shutdown is to disconnect the air feed line located in front of the access gate. This will cause a loss of air supply to the plaque hoist assembly and lower the source to the shielded position.

NOTE: Location of shutdown switches and air line as shown in Exhibit A.

7.3 After clearing up the emergency situation, the irradiator may be restarted by conducting a normal startup per procedure 9.100.

7.4 If during shutdown the source fails to return to the shielded position and bleeding the air supply to the source hoist assembly will not lower the source, notify the RSO or RSS immediately.

7.5 Log into the supervisors log book all details of the emergency shutdown and related corrective actions.

7.6 Notify the RSO of all unusual events.

8.0 EXHIBITS

A - Shutdown Switch and Air Line Location Maps

Exhibit A
1 of 2

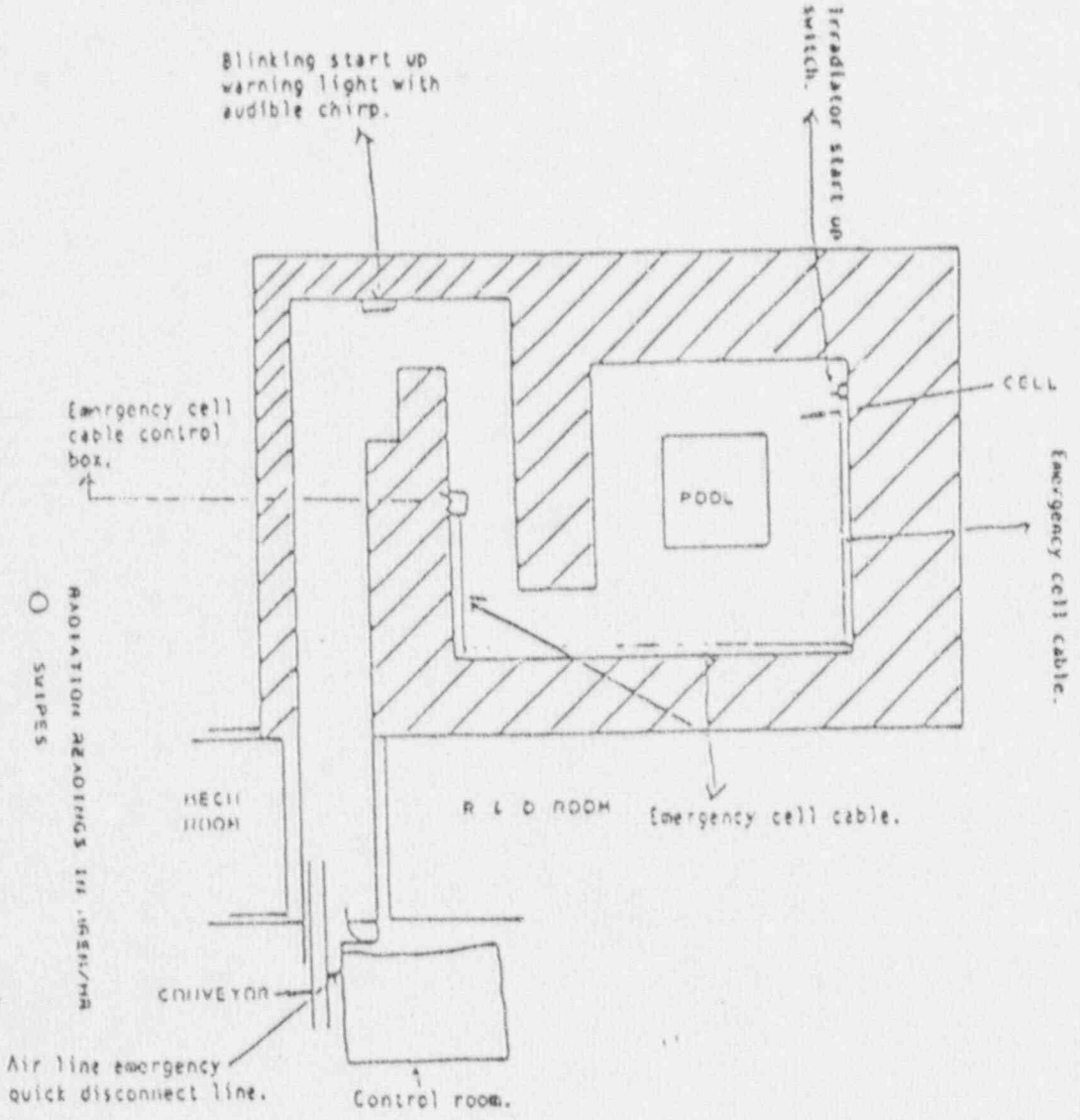
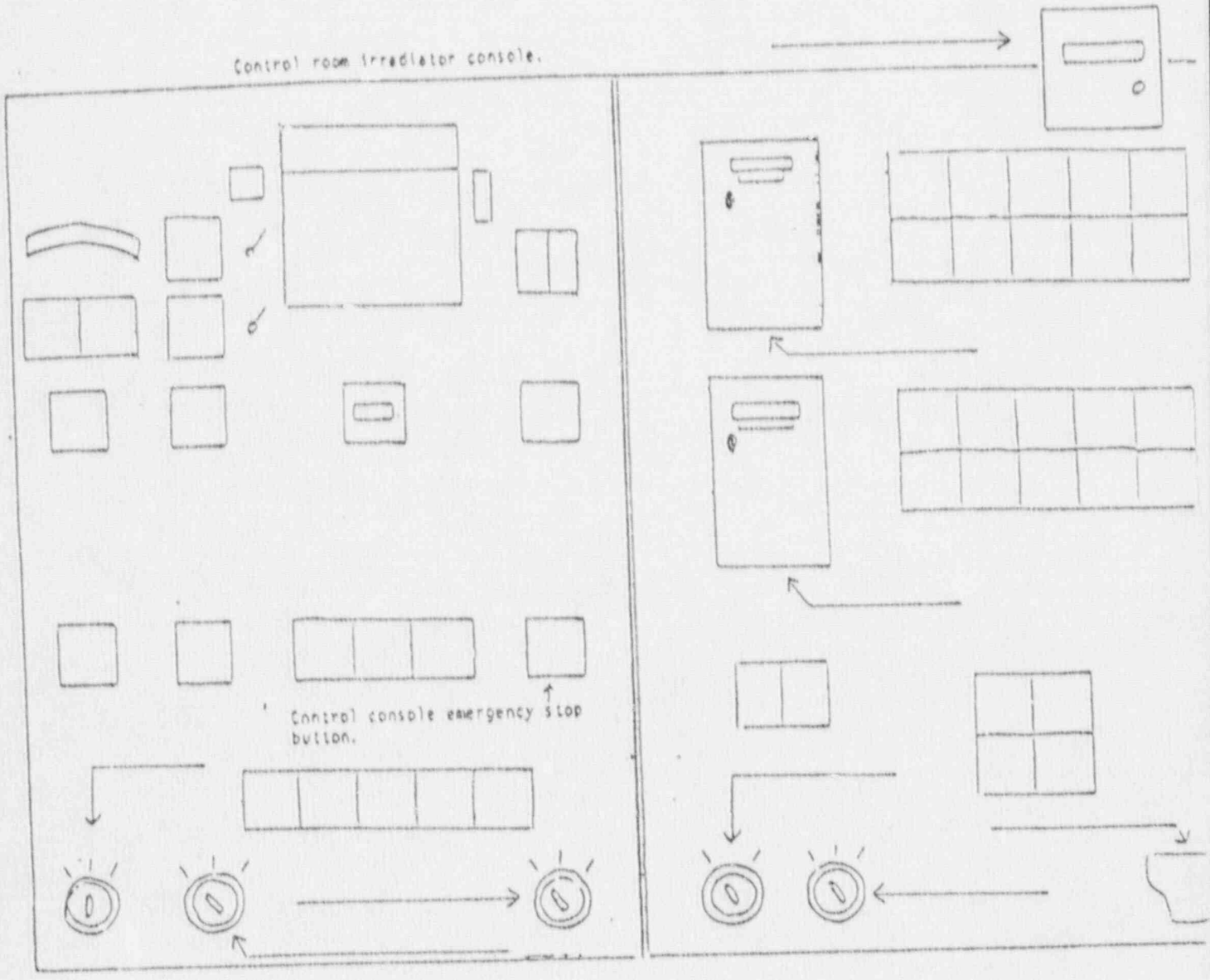


Exhibit A
2 of 2



Facility: ROCKAWAY	Department: IRRADIATOR OPERATIONS	Page 1 of 2
Subject: EXCESSIVE RADIATION EXPOSURE EMERGENCY		Section/Number/Revision 9.201
		Effective Date: JULY 17, 1986
Prepared By: R.G. COCKRELL	Approved Technically R G Cockrell	Approved By Quality

1.0 PURPOSE

To establish a series of steps to be taken should a whole body exposure to an individual exceed 1.25 REM, or an exposure to the hands and forearms, feet and ankles exceed 18.75 REM, or an exposure to the skin exceed 7.5 REM.

2.0 SCOPE

All supervisory personnel at the Rockaway facility.

3.0 REFERENCES

10 CFR 20
RTI by product material license

4.0 DEFINITIONS

4.1 Whole Body Exposure - condsidered to be exposure to the trunk of the body, head, upper legs or upper arms.

4.2 Radiation area - an accessible area where an individual could receive a whole body exposure greater than 100 MREM in five days (40 hours).

4.3 High Radiation Area - An accessible area where an individual could receive a whole body exposure greater than 100 MREM in one hour.

4.4 Locked High Radiation Area - an area where an individual could receive a whole body exposure greater than 1000 MREM in one hour.

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 Rope

5.2 Radiation area signs

5.3 High-radiation area signs

5.0 EQUIPMENT/MATERIAL REQUIREMENTS (cont)

5.4 Radiation survey instrument

5.5 Personal dosimeters

6.0 SAFETY REQUIREMENTS

None

7.0 PROCEDURE

7.1 Remove individual from the controlled areas of the facility .

7.2 Notify the Radiation Safety Officer (RSO) or Radiation Safety Supervisor immediately.

7.3 Return the area of exposure back to a safe condition. If the source of radiation cannot be reduced, a radiation survey shall be performed and documented and the area roped off and posted to prevent further access.

7.4 Carry out additional procedures as directed by the Radiation Safety Officer (RSO) or Radiation Safety Supervisor.

7.5 Collect dosimeter from individual and send out for immediate evaluation.

7.6 Determine approximate extent of the exposure using radiation survey data.

7.7 If the estimated exposure exceeds 25 REM, the Radiation Safety Officer (RSO) or Radiation Safety Suppervisor shall report the incident to NRC Region I.

7.8 Record the circumstances and details of the incident for future references.

8.0 EXHIBIT

None

Facility: ROCKAWAY	Department: IRRADIATOR OPERATIONS	Page: 1 of 3
Subject: FIRE IN RADIATION ROOM EMERGENCY		Section/Number/Revision: 9.203.A
		Effective Date: March 6, 1987
Prepared By: R. G. COCKRELL	Approved Technically: R. COCKRELL	Approved By Quality: P. O. SHIRO

1.0 PURPOSE

To describe the procedure for responding to a fire in the radiation room.

2.0 SCOPE

Applies to irradiator operators and materials handlers at the Rockaway facility.

3.0 REFERENCE

None

4.0 DEFINITIONS

None

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 Calibrated radiation survey instrument

5.2 Portable fire extinguisher

6.0 SAFETY REQUIREMENTS

6.1 Do not enter the radiation room until the smoke has cleared enough to read a radiation survey instrument.

7.0 PROCEDURE

7.1 In the event of smoke or any other indication of fire coming from the maze, the operator shall perform the following functions:

7.1.1 Push the STOP button to lower the source.

NOTE: The source should have automatically lowered due to the high temperature indication in the radiation room.

7.1.2 Shut down the conveyor system.

7.0 PROCEDURE (CONT)

7.1.3 Shut off the ventilation fan to the radiation room.

7.1.4 Notify the local fire department.

7.1.5 Notify the RSO or the alternate RSO designated in the license.

7.1.6 Proceed to the radiation room fire control area and perform the following:

7.1.6.1 *Open the isolation valve (round handle).

7.1.6.2 *Observe pressure indication on the meter.

7.1.6.3 *Open the ball valve by moving the lever until parallel with piping, which will send water to the sprinkler heads mounted on the wall inside the radiation room.

NOTE: *The controls and piping are painted red.

7.1.7 Check the maze monitor to determine if a source in a tote initiated the fire.

7.1.8 After the smoke clears, perform the following:

7.1.8.1 Close the isolation valve and ball valve for the sprinkler system.

7.1.8.2 Enter the maze and radiation room with the fire department while closely monitoring the radiation level.

NOTE: If the radiation level exceeds 8 times background or if the meter is not visible due to smoke, exit immediately.

7.0 PROCEDURE (CONT)

7.1.8.3 Ensure any smoldering items are contained.

7.1.8.4 Remove debris and clean the maze and radiation room.

NOTE: Maintain the pool cover to prevent debris from entering the pool.

7.1.9 Notify NRC Region I.

7.1.10 Prepare an incident report and identify the cause of the problem.

7.2 Source Hangup Incident

If the source will not lower when the STOP button is pushed:

7.2.1 Disconnect the air line interlock to vent the compressed air from the system.

7.2.2 Notify the RSO and Operations Manager,

7.2.3 If the source remains stuck, establish a plan for lowering the source plague.

8.0 EXHIBITS

None

Radiation Technology, Inc.
Process Technology Subsidiaries

Procedure

Facility: ROCKAWAY	Department: IRRADIATION OPERATIONS	Page 1 of 2
Subject: ACCIDENTAL RELEASE OF RADIOACTIVE MATERIALS TO THE UNCONTROLLED AREA		Section/Number/Revision 9.204
		Effective Date: July 17, 1986
Prepared By: R.G. COCKRELL	Approved Technically: R.G. Cockrell	Approved By Quality

1.0 PURPOSE

To establish a guideline for the control of an accidental release of radioactive materials to an uncontrolled area.

2.0 SCOPE

All personnel at the Rockaway facility.

3.0 REFERENCES

10 CFR 20
NRC Materials License #29-13613-02

4.0 DEFINITIONS

None

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 Rope

5.2 Contamination area signs

5.3 Radiation area signs

5.4 Step off pads

5.5 Anti-contamination materials

5.6 Calibrated Radiation Survey instrument

5.7 Change of footwear

5.8 Change of clothing

5.9 Personal dosimetry

SAFETY REQUIREMENTS

None

7.0 PROCEDURE

7.1 Upon discovering the uncontrolled release, take immediate action to prevent further release.

7.2 Establish a controlled area around the release by barricading with ropes and signs.

7.3 If a liquid release, cover floor drains in the area to prevent discharge to the environment.

7.4 Notify the Radiation Safety Officer and/or Radiation Safety Supervisor.

8.0 EXHIBITS

None

Radiation Technology, Inc.
Process Technology Subsidiaries

Procedure

Facility: CORPORATE	Department: IRRADIATOR OPERATIONS	Page 1 of 3
Subject: LEAKING IRRADIATOR SOURCE DETERMINATION		Section/Number/Revision 9.205 A
		Effective Date: May 11, 1988
Prepared By T. VARAKLIS	Approved Technically T. VARAKLIS	Approved By Quality P.O. SHAPIRO

1.0 PURPOSE

To establish a method for isolating a leaking irradiator source.

2.0 SCOPE

All irradiator operators at Radiation Technology, Inc. (RTI) or Process Technology, Inc. (PTI) subsidiaries.

3.0 REFERENCES

None

4.0 DEFINITION

None

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 Spill kit

5.1.1 Stainless steel closure

5.1.2 Calibrated low range radiation survey instrument

5.1.3 Standard source handling tools

5.1.4 Anti-contamination materials

5.1.5 Source handling table

5.1.6 Personnel dosimeters

5.1.7 Self Reading pocket dosimeters

6.0 SAFETY REQUIREMENTS

6.1 Operations shall be conducted under the direction of the Radiation Safety Officer (RSO) or his designated alternate.

6.2 General rules of radiation safety shall apply.

6.0 PROCEDURES (Cont.)

6.3 All operations shall be conducted with the sources located at a depth of greater than 10 feet in the pool.

6.4 The circulating pump of the demineralizer should be turned off and the transport tube cover between the main pool and the Research and Development (R&D) pool should be closed.

7.0 PROCEDURE

7.1 If the activity of the pool water or the radiation level on the charcoal filter indicates the presence of Co^{60}, the following actions should be taken to identify and isolate the leaking source.

7.1.1 Locate spill kit equipment listed in Section 5.0 and establish applicable radiological controls.

7.1.2 Move the end of the swipe tool directly adjacent to the source in the first module and take a swipe of the module. Analyze the swipe as per existing procedures.

NOTE: If a source has obviously been damaged due to an accident or equipment failure, the source or sources that have visual damage should be tested first. If the leaking source is not apparent due to damage, then sampling tests will be required to determine the location of the leaking source. Sampling tests shall be conducted in a uniform manner such that the test begins in one source module and progresses through the entire source plaque.

7.1.3 If a swipe of a particular source module reads significantly higher than the other source modules, remove the module from the source plaque and place it on the source handling table.

7.0 PROCEDURE (cont.)

7.1.4 Repeat the swipe tests of each module.

NOTE: This will verify that the leaking module has been removed.

7.1.5 Remove the sources one at a time from the leaking module, and sample test each to determine the leaking source.

7.1.6 Place the leaking source into a stainless steel enclosure in preparation for disposal or repair.

7.2 If this method of detection does not prove effective due to a very low leakage rate:

7.2.1 Sample each source individually .

7.2.2 Continue this process until the leaking source is isolated.

7.2.3 Place the leaking source into a stainless steel enclosure.

7.2.4 Ship off site for repair or disposal per RTI procedure 9.401.

8.0 EXHIBITS

None

Facility:	Department:	Page
CORPORATE	IRRADIATOR OPERATION	1 of 2

Subject:

CARE AND USE OF RADIATION SURVEY EQUIPMENT

Section/Number/Revision: 9.300 A

Effective Date: 10/01/86

Prepared By		Approved By Quality
Robert D. Cockrell	Robert D. Cockrell	P. S. Shapiro
R. COCKRELL	R. COCKRELL	P. O. SHAPIRO

1.0 PURPOSE

To provide a guide for the proper care and use of portable survey instruments.

2.0 SCOPE

Procedure covers all Radiation Technology, Inc. and Process Technology, Inc. personnel required to use survey instruments for routine surveys or personal protection.

3.0 REFERENCES

Manufacturer's operations manual

4.0 DEFINITIONS

None

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 Portable survey instrument

6.0 SAFETY REQUIREMENTS

6.1 Notify Operations Manager of all malfunctioning equipment, and affix an out-of-service tag to the instrument to prevent inadvertent use.

6.2 Log in Supervisor's log the reason and the date when the instrument was taken out of service. Also, note the calibration date. When the instrument is returned to service, it should have a new calibration sticker affixed.

7.0 PROCEDURE

7.1 Inspect survey instrument for physical damage that may affect the operability of the instrument. Should you drop or believe you have damaged a survey instrument, notify the Plant Superintendent or Operations Manager.

7.0 PROCEDURE (cont)

7.2 Check the instrument for a current calibration sticker.

CAUTION: Do not use instrument if calibration sticker is missing or out of date. Notify the Plant Superintendent or the Operations Manager of finding.

7.3 Turn on survey instrument and check the battery condition. If the survey instrument batteries are low, replace them prior to using.

7.4 Prior to performing a survey, expose the instrument to a known source of radioactivity and check for response. Verify that speakers are operative.

7.5 During performance of a survey, handle the instrument with care and avoid dropping or banging the instrument into walls or equipment.

7.6 Upon completion of surveys, turn off the survey instrument, clean it, and return it to its proper storage location.

NOTE: If at any time during irradiation operations a properly functioning survey instrument is not available to you, the irradiator operations shall be shut down until a properly functioning instrument can be made available.

8.0 EXHIBITS

None

Facility: CORPORATE	Department: IRRADIATOR OPERATION	Page: 1 of 12
Subject: WATER SAMPLING AND ANALYSIS		Section/Number/Revision: 9.302.A
		Effective Date: 10/01/86
Prepared By: LES ROSS	Approved By: R. COCKRELL	Approved By Quality: P. O. SHAPIRO

1.0 PURPOSE

To describe the process for obtaining and analyzing water samples for radioactivity.

2.0 SCOPE

Applies to quality assurance personnel and irradiator operators.

3.0 REFERENCES

NRC or State License as applicable.

4.0 DEFINITIONS

None

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 Single channel analyzer

5.2 Liquid Co60 calibration source

5.3 (3) 100 ml clean water sample bottles

5.4 Pool sampling extension stick

5.5 Filament Tape

5.6 (2) buffer solutions

5.7 (3) pH water sampling bottles (150 ml)

5.8 pH meter

5.9 Magnetic stirring bar

5.10 Magnetic stir plate

5.0 EQUIPMENT/MATERIAL REQUIREMENTS (cont)

5.11 (2) calibrated thermometers

5.12 (5) 100 ml water sample cups

5.13 Radiation survey meter

5.14 R and D filter survey log

5.15 Demineralizer filter survey log

5.16 Stop watch

5.17 Magnetic Wand

5.18 Clean, dry 5 gallon pail

6.0 SAFETY REQUIREMENTS

None

7.0 PROCEDURE

7.1 The QA/irradiator operator shall obtain water samples in the R and D pool and in cell pool by performing:

7.1.1 Tape the 100 ml and 150 ml bottles on the pool sampling stick.

NOTE: Use filament tape to avoid loss of bottles in the pool due to water soluble adhesives.

7.1.2 Place the stick in the pool and fill the water sample bottles.

7.1.3 Place a calibrated thermometer in the pH sample bottle, read and record the temperature.

NOTE: Rinse the pH bottle in the pool to ensure a representative sample is obtained.

7.0 PROCEDURE (cont)

NOTE: Ensure the sample is taken at a depth of 3 1/2 ft. or greater in the pools.

7.1.4 Remove the sample bottles from the pool and cap.

NOTE: Wipe the sample bottle and stick to remove the excess water.

7.1.5 Remove the sample bottles from the extension stick.

7.1.6 Label the water sample bottles with the following:

7.1.6.1 The location of the sample.

7.1.6.2 The date.

7.1.6.3 The time.

7.1.6.4 The temperature of the pool water.

7.1.7 Record the location and water temperature in the Water Chemistry Log (Exhibit A).

7.1.8 Measure the radiation level on the R and D filter using a radiation survey instrument.

7.1.9 Record the results on Survey Map - R and D Filter (Exhibit B).

7.2 The QA/irradiator operator shall sample the demineralizer output by performing the following on a weekly basis:

7.2.1 Reduce the flow rate to 1/2 gallon per minute by turning the valve No. 2.

NOTE: A clean, dry 5 gallon pail should be placed just below the quick disconnect of the demineralizer outlet.

7.0 PROCEDURE (cont)

7.2.2 Remove the quick disconnect on the demineralizer outlet hose.

7.2.3 Fill the 100 ml and 150 ml bottles with water.

NOTE: Read and record the temperature of the demineralizer outlet and purge the 150 ml sample bottle to ensure a representative sample is obtained for pH analysis.

7.2.4 Reconnect the demineralizer outlet.

7.2.5 Label the bottles with the following:

7.2.5.1 Demineralizer outlet.

7.2.5.2 Time.

7.2.5.3 The temperature.

7.2.5.4 The date.

7.2.6 Fully open valve #2 and restore full demineralizer flow.

7.2.7 Measure flow to assure greater than 2 gpm.

7.2.8 Enter the water temperature and demineralizer flow rate on the Water Chemistry Log.

7.2.9 If flow rate is below 2 gpm for 5 successive days, notify the RSO, NRC Region I or appropriate regulatory agency.

7.2.10 Survey the charcoal filter housing with a radiation survey instrument.

7.2.11 Record the results on Survey Map - Charcoal (Exhibit C).

7.3 Read the resistivity reading on the demineralizer and:

7.3.1 Record the input resistivity on the Water Chemistry Log for the cell and R and D pools.

7.0 PROCEDURE (cont)

7.3.2 Record the output resistivity on the Water Chemistry Log for the demineralizer.

7.3.3 If the resistivity is less than 100,000 ohm-cm, resin beds must be regenerated within 24 hours.

7.3.4 If resistivity is not restored within 24 hours, irradiator operations must be stopped until it is restored to greater than 100,000 ohm-cm.

7.3.5 If resistivity is out of specification for more than 10 out of 30 days, notify RSO, NRC or appropriate regulatory agency.

7.4 Set up the single channel analyzer as follows:

7.4.1 Fill a 100 ml bottle with tap water, tightly cap and dry the sample bottle.

7.4.2 Place the bottle in the shield pig touching the detector.

7.4.3 Perform a 60 minute background check.

7.4.4 Record the results in the Water Sampling Log.

7.4.5 Remove the 100 ml bottle from the pig.

7.4.6 Place the liquid Co60 source in the pig.

7.4.7 Perform a 10 minute count and record the results.

7.4.8 Perform an efficiency check on the instrument.

7.4.9 Perform an LLD and MDA, MDCR and SAF, if required.

7.4.10 Record the results, sign and date log.

7.4.11 Submit to the RSO or his designate for approval.

7.0 PROCEDURE (cont)

7.4.12 If the activity is greater than 5×10^{-6} uCi/ml, perform the following:

7.4.12.1 Notify the RSO or his designate.

7.4.12.2 Secure the demineralizer.

7.4.12.3 Secure the transfer tube between the two pools.

7.4.12.4 Resample the affected pool.

7.4.12.5 Isolate the leaking source using Procedure 9.205.

7.5 Read the sample for pH using the following:

7.5 1 Select 2 pH buffers to bracket the pH range.

7.5.2 Calibrate the pH meter as follows:

7.5.2.1 Wash the electrode and thermometer in distilled water.

7.5.2.2 Add 100 ml buffer solution to a 100 ml cup.

7.5.2.3 Place the magnetic stirrer in the bottom of the cup.

7.5.2.4 Place the cup on the magnetic stir plate.

7.5.2.5 Immerse the electrode and the calibrated thermometer in the buffer solution.

NOTE: Ensure the electrodes and the thermometer do not interfere with the actions of the stirrer.

7.5.2.6 Energize stir plate and start the timer simultaneously.

7.5.2.7 Calibrate the instrument to the proper temperature by turning the temperature knob to the thermometer reading.

7.0 PROCEDURE (cont)

7.5.2.8 Remove the circulating plug from the electrode.

7.5.2.9 Turn the knob of the pH meter from standby to operate.

7.5.2.10 Operate the pH meter for 4 minutes.

7.5.2.11 Turn the calibrate knob of the pH meter to the buffer solution reading.

NOTE: Adjust for temperature changes using the pH chart.

7.5.2.12 Turn off the magnetic stirrer.

7.5.2.13 Turn the pH meter lower knob to standby.

7.5.2.14 Remove the electrodes and the thermometer.

7.5.2.15 Place the magnetic wand on the bottom of the sample cup and empty the buffer solution.

7.5.2.16 Remove the stir bar.

7.5.2.17 Rinse the electrode, stir bar and thermometer with distilled water.

7.5.2.18 Place the stir bar in a clean dry 100 ml cup.

7.5.2.19 Place 100 ml of the other buffer solution in a dry cup.

7.5.2.20 Repeat steps 7.5.2.4 through 7.5.2.17.

7.5.2.21 Place 100 ml of the water sample in a clean dry 100 ml cup.

7.5.2.22 Repeat steps 7.5.2.4 through 7.5.2.18.

7.5.2.23 Record the pH in the Water Chemistry Log.

7.0 PROCEDURE (cont)

7.5.2.24 Read and record the results of the other two water samples.

7.5.2.25 Replace the circulating plug for the electrode.

7.5.2.26 Submit the results to the RSO or his alternate for review and approval.

7.5.3 pH Specifications:

7.5.3.1 Acceptable range for pool water pH is 3.0 - 11.0.

7.5.3.2 An action level is established at 3.5 (low) and 10.5 (high). Readings at or beyond action levels are to be reported to the Radiation Safety Officer (RSO) or the Radiation Safety Supervisor (RSS).

7.5.4 Readings at or below 3.5 require the following actions be taken:

- The cation bed will be isolated to provide for single loop operation through the anion bed for a period of approximately eight (8) hours.

- Resistivity readings shall be taken every four (4) hours during single loop operation, a pH reading shall be taken immediately following resumption of normal demineralizer operation.

7.5.5 Readings at or above 10.5 require the following actions be taken:

- The anion bed will be isolated to provide for single loop operation through the cation bed for a period of approximately eight (8) hours.

- Resistivity readings shall be taken every four (4) hours during a single loop operation, a pH reading shall be taken immediately following resumption of normal demineralizer operation.

7.0 PROCEDURE (cont)

7.5.6 Resume dual demineralizer bed operation once an acceptable pH for pool water has been recorded.

7.5.6.1 Take resistivity reading immediately once dual bed operation is resumed.

NOTE: Single loop operation may reduce resin bed efficiency below the level of 100,000 ohms/cm requiring resin bed regeneration.

8.0 EXHIBIT

A - Water Chemistry Log
B - R & D Pool Filter Survey Log
C - Charcoal Filter Survey Log

EXHIBIT A

WATER CHEMISTRY LOG

DATE	TIME	LOCATION	TEMP (°C)	(Ohms-cm) RESISTIVITY	(gal/min) FLOW RATE	pH	INIT.

EXHIBIT B

SURVEY

R & D Pool Filter

DATE	mR/HR COUNT		BY	CHECKED AND APPROVED BY	Q/A
	BACKGROUND	TEST			

108463

EXHIBIT C

SURVEY

CHARCOAL FILTER

DATE	mR/HR COUNT BACKGROUND	TEST	BY	CHECKED AND APPROVED BY	Q/A

Radiation Technology, Inc.
Process Technology Subsidiaries

Procedure

Facility: CORPORATE	Department: IRRADIATOR OPERATION	Page: 1 of 3
Subject: OZONE CONCENTRATION QUARTERLY SURVEY		Section/Number/Revision: 9.306 Original
		Effective Date: January 31, 1987
Prepared By: LES ROSS	Approved Technology: [signature]	Approved By Quality: [signature] P. O. SHAPIRO

1.0 PURPOSE

To provide guidelines for conducting and documenting ozone survey.

2.0 SCOPE

Applies to operator/supervisors of Radiation Technology, Inc. (RTI) and Process Technology, Inc. (PTI) subsidiaries.

3.0 REFERENCES

None

4.0 DEFINITIONS

None

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 Drager Pump

5.2 Drager Tubes (Ozone)

5.3 Calibrated Survey Meter

6.0 SAFETY REQUIREMENTS

6.1 Exercise care when inserting detector tube into Drager Pump to avoid injury from jagged glass ends of detector tube.

7.0 PROCEDURE

7.1 An Ozone Concentration Survey shall be performed quarterly in accordance with the following steps:

7.1.1 The initial ozone survey measurements are taken with the source in the fully raised position. The source must be up for a minimum of thirty minutes prior to taking the initial measurements set forth in steps 7.1.2 and 7.1.3.

7.0 PROCEDURE (cont)

7.1.2 Outside the maze personnel entry and exit doors, measure the ozone concentration and record readings on the Ozone Concentration Quarterly Survey Record (Exhibit A).

7.1.3 At the outlet vent of the radiation room ventilation system, measure the concentration and record reading on Exhibit A.

7.2 The remainder of the ozone survey measurements are taken with the source in the fully lowered position.

7.2.1 The operator must enter the radiation room with a calibrated survey meter and a Drager Pump.

7.2.2 In the radiation room adjacent to the irradiator pool, measure the ozone concentration and record reading on Exhibit A. This reading is recorded as measured one minute after shutdown.

7.2.3 In the radiation room adjacent to the irradiator pool, measure and record the ozone concentration five minutes after shutdown. Continue with ozone measurements every five minutes "ten minutes after shutdown", etc... until a zero parts per million (ppm) reading is obtained.

NOTE: The Threshold Limit Value (TLV) for personnel exposure to ozone for an eight hour period is 0.1 ppm.

7.3 A letter to the Ozone Concentration Quarterly Survey file is generated by filling in the ozone measurements on Exhibit A.

7.3.1 Exhibit A is completed and submitted to the Manager of Operations for review and signature.

7.3.2 Ozone survey data will be retained on file for the life of the facility.

8.0 EXHIBITS

A - Ozone Concentration Quarterly Survey Record

EXHIBIT A

OZONE CONCENTRATION QUARTERLY SURVEY

Date Survey Conducted _____

Survey Conducted By _____

The source is fully raised for 30 minutes prior to collecting samples 1 - 3, the remaining samples are collected with the source in the fully lowered position.

SAMPLE #	LOCATION	RESULTS
1	Outside Personnel Entry Door	ppm
2	Outside Personnel Exit Door	ppm
3	Radiation Room Ventilation Outlet Vent	ppm
4	Radiation Room (1 min. after shutdown)	ppm
5	Radiation Room (5 min. afte. shutdown)	ppm
6	Radiation Room (10 min. after shutdown)	ppm
7	Radiation Room (15 min. after shutdown)	ppm

NOTE: Arkansas facility will record readings commencing with Sample #2.

Date: _____ _____
Manager of Operations

1.0 PURPOSE

To establish the safe underwater handling techniques and mandatory requirements to ensure corrosion free radiation sources, source carriers, container cavities and shielding plugs, using the AECL F-168 shipping container and F-234 source carrier.

2.0 SCOPE

Applies to irradiator operators and all personnel involved in source receipt or shipping at the Rockaway facility.

3.0 REFERENCES

49 CRF
RTI Procedure 9.302, "Water Sampling and Analysis"
RTI Procedure 9.303, "Radiation Surveys"

4.0 DEFINITIONS

None

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 Calibrated radiation survey instrument with audible function

5.2 Source handling tools

5.3 Underwater lights

5.4 Crane

5.5 Self-Reading Pocket Dosimeters (#2, minimum)

6.0 SAFETY REQUIREMENTS

6.1 The handling of radioactive materials shall be performed by, or under the supervision and in the physical presence of, persons certified by the Radiation Safety Officer as having the training and experience necessary to conduct such services.

6.0 SAFETY REQUIREMENTS (cont)

6.2 There shall be a minimum of two (2) people in attendance during any source handling operation, one of whom shall be the Radiation Safety Officer (RSO) or a person certified by the Radiation Safety Officer (RSO).

6.3 Each person involved shall be equipped with a film badge and a self-reading dosimeter.

6.4 A portable radiation survey instrument shall be used to monitor the radiation level for each activity. Th survey instrument shall have a current calibratic sticker attached.

6.5 The Radiation Safety Officer (RSO) shall be notified immediately if any of the following deficiencies are evident:

6.5.1 Deficiencies of the container on arrival at the customer's site including radiation levels over 200 mr/h at 5 cm from the surface of the container.

6.5.2 Drainage of discolored water from the container. If this occurs, a sample of water should be taken and returned to AECL.

6.5.3 Surface contamination of the shipping container is found to be above 200 dpm/100 sq. cm.

6.5.4 Contamination found to be above the limit set in the RTI Procedure 9.303.

7.0 PROCEDURE

7.1 Preparation of Irradiator for Shipping container Ingress/Egress

7.1.1 Remove the conveyor structure that crosses the irradiator pool beneath the large opening in the cell roof through which the shipping container will pass.

7.0 PROCEDURE (cont)

7.1.2 Remove any mechanisms from the pool walls or bottom that may obstruct the lowering of the container, loading or unloading of source material, and removal of the container.

7.1.3 Take a sample of water from the irradiator pool and analyze it according to RTI Procedure 9.302.

7.1.4 Lower the water level in the pool approximately five (5) inches below the normal operating level (approximately 330 gallons).

NOTE: Do not discharge this water into the sewer if the specific activity is greater than 5×10^{-6} uCi/ml.

7.1.5 Perform a radiation survey in the vicinity of all penetrations into the irradiation room and record the results on a Survey Data Sheet.

7.1.6 Remove the shield plug from the large opening in the radiation room roof and place it on the roof.

7.1.7 Observe the response of the hoist to assure that it is adequately positioned.

7.1.8 Monitor the shipping container with a portable survey instrument. Readings of up to 200 mr/hr at 5 cm from the surface are normal shipping tolerances.

7.1.9 Remove the expanded metal heat shield from the top of the container.

7.1.10 Remove all paperwork from the containerexcept glued on labels.

7.1.11 Take six 100 sq. cm. swipes on the exterior of the container and analyze according to Procedure 9.302.

7.0 PROCEDURE (cont)

NOTE: Do not put the cask into pool until the analysis verifies that the surface contamination is less than 200 dpm/100 sq. cm.

7.1.12 Hose down or wet wipe the container to remove dirt and dust which may contaminate the pool.

7.1.13 Remove the hexagonal drain line cap and the two top vent plugs.

7.1.14 Perform contamination test per Procedure 9.303.

7.1.15 Remove the four 3/4 inch bolts attaching the container to the shipping skid.

7.1.16 Loosen to finger tight the eight 7/8 inch bolts securing the shield plug to the container. DO NOT REMOVE BOLTS.

7.1.17 Secure the clevis on the short single lift cable to the shield plug.

7.1.18 Lift the container by the lifting lugs and lower it through the cell roof opening into the pool until the top of the container is about 6 inches above the water level.

NOTE: Wire or tape closed the hook openings on the main sling and secure a light rope to the sling lifting ring for ease of handling.

7.1.19 Remove all but two diametrically opposite 7/8 inch shield plug bolts.

7.1.20 Lower the container to the bottom of the pool keeping it away from the source rack or any mechanism that could be damaged.

WARNING: STAND CLEAR AS STEAM AND HOT WATER MAY BLOW OUT OF THE VENT PLUG HOLES WHEN THE CONTAINER IS LOWERED INTO THE WATER.

7.0 PROCEDURE (cont)

7.1.21 Using the underwater socket tool, unscrew the last two 7/8 inch shield plug bolts until disengaged.

7.1.22 Unhook the hoist from the sling and attach to the shield plug lift cable.

7.1.23 Lift the shield plug clear of the container giving access to the source carrier.

NOTE: When handling unshielded sources underwater, always have an audible radiation survey instrument at your work position to warn you, if by accident, any sources are lifted too close to the pool surface. When removing any item from the pool, always check with the radiation survey instrument as the item is being brought to the surface.

7.1.24 Lift the source carrier out of the container cavity using the appropriate underwater tool, and place it on the bottom of the pool, clear of the container.

7.1.25 Make a physical count of the number of sources, and note this in the operating log.

7.2 Preparation for Return of Empty Shipping Container

7.2.1 Replace the shield plug making sure the bolt holes in the flange and container are in line. This can best be achieved by rotating the plug just before it is fully down.

7.2.2 Transfer the hoist hook to the container sling and lift out of the pool, allowing it to drain as it is lifted clear.

7.2.3 Position the container on its shipping skid securing with the four 3/4 inch bolts provided.

7.0 PROCEDURE (cont)

7.2.4 Secure the shield plug with the eight 7/8 inch bolts provided and tighten.

7.2.5 Blow air through each vent hole with an air line intermittently, blocking the open vent hole. Repeat until no water leaks from the drain tube.

7.2.6 Replace the hexagonal drain line cap and two top vent plugs.

7.2.7 Remove the plug lift cable and leave with the container.

7.2.8 Secure the expanded metal heat shield in position with the two 1/4 inch screws and washers provided.

7.2.9 Cover the caution plates with "empty" labels.

7.2.10 Remove the Category III labels or delete the word "RADIOACTIVE".

7.2.11 Affix AECL return address labels on two opposite sides of the container.

7.2.12 After the source reload, remove the empty source carrier from the pool and place in the box provided on the shipping skid.

7.1.13 The container is now ready for return shipment to AECL.

7.3 Return of Irradiator to an Operational Configuration

7.3.1 Replace the shield plug in the roof of the radiation room.

7.3.2 Refill the irradiator pool to the normal operating level. Do not run raw water directly into the pool; first, process it through the carbon filter and the ion exchanger. Steps 7.3.2 through 7.3.4 may be performed while Step 7.3.1 is in progress.

7.0 PROCEDURE (cont)

7.3.3 Transfer the source pencils from the AECL source carriers to source storage containers or source modules. Read the serial number of each pencil, and note the pencils location in the operating log. Continue until all pencils have been transferred from the AECL source carriers.

NOTE: When handling unshielded sources underwater, always have an audible radiation survey instrument at your work position to warn you, if by accident, any sources are lifted too close to the pool surface. When removing any item from the pool, always check with the radiation survey instrument as the item is being brought to the surface.

7.3.4 Remove the empty AECL source carriers from the irradiator pool.

7.3.5 Replace the conveyor structure that was removed in step 7.1.1.

7.3.6 Analyze a sample of water from the irradiator pool according to Radiation Safety Procedure 9.302. If the sample activity is greater than 5×10^{-6} uCi/ml notify the Radiation Safety Officer. Special procedures may be necessary to decontaminate the water.

7.3.7 Perform a Radiation Survey of the irradiator radiation room the entiances to the cell and the radiation room roof, and record the data on the Radiation Survey Sheet.

8.0 EXHIBIT

None

1.0 PURPOSE

To describe the operations necessary to replace demineralizer resin.

2.0 SCOPE

Applies to qualified irradiator operators.

3.0 REFERENCES

Operation and Maintenance Instructions for VaponicsModel VI-10F Manually Operated Two Bed Demineralizer, Manual No. 439-1
RTI Procedure 9.502, "Resin Regeneration"

4.0 DEFININTIONS

4.1 CATION RESIN - synthetic insoluble chemicals which remove metallic cations from solutions and gives up hydrogen ions.

4.2 ANION RESIN -synthetic insoluble chemicals which neutralize acids by replacing the anion with a hydroxyl ion.

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 Funnel

5.2 Radiation survey instrument

6.0 SAFETY REQUIREMENTS

6.1 Measure radiation levels on the resin bed with a radiation survey instrument.

6.2 Measure the radioactivity concentration of the pools to ensure no activity in the water.

7.0 PROCEDURE

7.1 Isolate the resin bed to be replaced by closing all valves and shutting pump. Disconnect the inlet and outlet connections to the resin bed.

7.2 Disconnect the retaining strap for the resin container.

7.3 Lift the resin container and remove from the demineralizer room.

7.4 Remove the upper and lower resin screens.

7.5 Survey the resin with the radiation survey instrument.

If a radiation level greater than background is observed, perform an analysis on the resin and utilize contamination control techniques during the removal.

7.6 Remove the depleted resin and place in a container for analysis and disposal.

7.7 Clean the upper and lower resin screens by disassembling the plastic washers.

7.8 Replace the lower screen.

7.9 Fill the resin container with 1.7 cubic feet of resin using a funnel.

7.10 Replace the upper resin screen.

7.11 Replace the resin container in the system.

7.11.1 Reconnect the retaining strap.

7.11.2 Reconnect the inlet and outlet connections.

7.12 All valves are still closed on the demineralizer system.

7.13 Open the service water line valve #18 and ensure valves A, B and Inlet valves are open.

7.0 PROCEDURE (cont)

7.14 Fill the cation column (left) with water.

7.14.1 Open valve 5.

7.14.2 Open valve 4.

7.14.3 Regulate valve 4 for a flow of 1 gpm.

7.14.4 Increase flow gradually to the maximum flow rate.

7.14.5 Close valve 4 and 5 when water appears in the sight glass, continue filling until no air appears in sight glass.

7.15 To fill the anion column (right).

7.15.1 Open valve 6.

7.15.2 Open valve 11.

7.15.3 Open valve 4.

7.15.4 Regulate valve 4 for a flow of 1 gpm.

7.15.5 Increase flow gradually to the maximum flow rate.

7.15.6 Close valves 4, 11, and 6 when water appears in the sight glass, continue filling until no air appears in sight glass.

7.16 Soak the resin columns for 24 hours.

NOTE: This soaking is necessary to completely hydrate the resin beds and allow them to expand from the dry state in which they are shipped.

7.0 PROCEDURE (cont)

7.17 Regenerate the new resin per procedure 9.502.

NOTE: It is not uncommon that two complete regenerations may be required before the required purity is achieved.

7.18 Perform a radioactivity analysis on the used resin prior to disposal.

8.0 EXHIBIT

None

1.0 PURPOSE

To describe the operations required to regenerate the demineralizer resin beds.

2.0 SCOPE

Applies to irradiator operators at the Rockaway facility.

3.0 REFERENCES

Operation and Maintenance Instructions for Vaponics Model VI-10F, Manual No. 439-1.

4.0 DEFINITIONS

4.1 CATION RESIN - synthetic insoluble chemicals that remove cations from solutions and give up hydrogen ions.

4.2 ANION RESIN - synthetic insoluble chemicals that remove acids by replacing the anion with hydroxyl ion.

4.3 BACKWASH - water that flows upward through the cation and anion beds of resin at a controlled rate. This loosens and classifies the resin to aid the regeneration process. At the same time, dirt and fine particles of the resin are passed off to the drain.

4.4 REGENERATION - the process of flowing caustic or acid through a backwashed resin bed to replace anions or cations with hydroxyl or hydrogen ions. An acid solution is passed through the cation resin to remove the ions picked up by the resin during the run portion of the cycle. The cation resin is thereby returned to the hydrogen form for the next run cycle. Similarly, caustic solution is passed through the anion resin bed to remove the anions picked up during the run cycle and place the anion resin in a regenerated condition ready for the next run cycle.

4.0 DEFINITIONS (cont)

4.5 RINSE - the resin beds are first rinsed with plain water at a slow flow rate which slowly displaces the regenerated chemical solutions. During this slow rinse period, the resins are still in contact with the regenerated solutions. This slow rinse is important to allow sufficient contact time between the resins and the chemicals. Finally, a fast rinse removes regenerated products and any excess chemicals remaining in the columns.

4.6 RUN (commonly called SERVICE) - the use of the resin bed to purify water. Waste products are removed from the resin beds by rinsing for a short period. The ion exchange capacity will be at its peak of efficiency and the water produced is directed to service. The run is continued until the resistivity of the water falls below predetermined standards.

4.7 RESISTIVITY - with a two bed demineralizer, the resistivity of the processed (deionized) water will usually fall between 50,000 ohms-cm. at the low end to a high of 5,000,000 ohms-cm. This corresponds to a total dissolved solids level of roughly 0.8 ppm to 8.0 ppm when expressed as sodium chloride (NaCl).

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 Acid regeneration container.

5.2 Caustic regeneration container.

5.3 Service connections - regeneration containers to demineralizer.

5.4 Hose.

5.5 A retention tank of sufficient volume to hold regeneration waste water.

5.6 13 pounds of 50% liquid caustic with 10 pounds of water.

5.7 33 pounds 13 ounces (20% Baume) Hydrochloric Acid-undiluted.

6.0 SAFETY REQUIREMENTS

6.1 When handling chemicals, wear chemical goggles or full face shield, rubber gloves, aprons, boots, and respirator.

6.2 Ensure the room is adequately ventilated.

6.3 Avoid splashing solutions.

6.4 Ensure all piping connections are tight prior to regeneration.

6.5 Do not add water to Hydrochloric acid.

6.6 Do not release regeneration liquids to the floor drains or environment.

7.0 PROCEDURES

7.1 Prepare to regenerate.

When the purity of the processed water drops to 100,000 ohms-cm., the unit should be regenerated by a qualified irradiator operator using the following:

NOTE: Failure to regenerate when necessary may result in water which may be extremely corrosive to certain metals.

7.1.1 Contact QA and obtain a sample from the demineralizer outlet to check for radioactivity and pH.

7.1.2 Do not proceed until the results of the sample are obtained and are within specifications.

7.1.3 Ensure that the retention tank is on line to receive the discharge of solution from the backwash, regeneration and rinse.

7.2 Backwash the charcoal bed.

7.2.1 Shut off pump.

PROCEDURES (cont)

7.2.2 Shut valves A and B.

7.2.3 Open valves C and D.

7.2.4 Turn on pump and regulate water pressure with valve D. A slow water flow is desired.

7.2.5 Shut off pump when charcoal particles appear in sight glass.

7.2.6 Shut valves C and D.

7.2.7 Open valves A and B.

7.2.8 Turn on pump.

NOTE: The charcoal backwash is used to decrease the displacement pressure within the charcoal bed.

7.3 Backwash the cation resin.

7.3.1 Shut off pump.

7.3.2 Shut all valves including R & D and cell pool input valve. Check the discharge valve and the sampling station valve are closed on the retention tank.

7.3.3 Open valves A, B, and inlet valve.

7.3.4 Open valve #5.

7.3.5 Open valve #4.

7.3.6 Simultaneously open valve #18, raw water inlet and energize pump.

7.3.7 Regulate the water flow with valve #4 for maximum backwash, approximately 3 to 5 gallons per minute (GMP).

7.3.8 Backwash cation resin bed for 10-15 minutes.

7.3.9 Shut off pump.

PROCEDURES (cont)

7.3.10 Shut all valves, except A, B and inlet valve.

NOTE: Send all water discharge to the retention tank.

7.4 Regenerate the cation resin bed.

7.4.1 Thirty-three pounds thirteen ounces of (20% Baume) Hydrochloric Acid - undiluted is poured into the acid regeneration container.

7.4.2 Ensure resistivity meter is turned off.

7.4.3 Shut off pump.

7.4.4 All valves should still be in shut position from backwash.

7.4.5 Open valves #8 and #12.

7.4.6 Open valve #7, chemical metering valve, after ensuring proper hook up with acid regeneration container.

7.4.7 Energize pump while simultaneously opening raw water make up valve #18.

7.4.8 Adjust the chemical metering valve by setting the shorter pointer to 45 and watching the rate at which the solution is drawn up, no GPM indication should be noted.

NOTE: The chemical metering valves have two scales, one from 0-90, the other from 90-180. As the valve is opened, the shorter pointer moves from 0-90. As the valve is opened further, the longer pointer moves from 90-180. The higher the number, the greater the valve opening.

7.4.9 Suction of acid product should take approximately 30 minutes.

7.4.10 Note valve settings for future regenerations.

PROCEDURES (cont)

7.4.11 Regulate flow with metering valve #7.

7.4.12 The pressure gauge should read approximately 30 psig.

7.4.13 Shut valve #7 after the acid has been drawn into the column and the acid regeneration container is empty.

7.4.14 Add 1 gallon of water to empty acid regeneration container.

7.4.15 Open valve #7 and draw water from acid regeneration container in approximately 30 minutes.

7.4.16 Log the water pressure for proper draw-up rate in the supervisor log.

7.4.17 Ensure all contents have drained to the retention tank.

7.4.18 Shut valve #7 when water has been completely drawn up.

7.5 Slow rinse cation bed.

7.5.1 Ensure valve #7 is closed.

NOTE: Valves #8, #12, A, B, and inlet valves should still be in the open position from cation bed regeneration.

7.5.2 Slow rinse should be maintained at 1.5 GPM, this adjustment can be made with the rotation of valve #8.

7.5.3 Slow rinse should run for approximately 20 minutes.

7.5.4 Slow rinse contents are drained to the retention tank.

PROCEDURES (cont)

7.6 Fast rinse cation bed.

7.6.1 Shut all valves except A, B and inlet valves and valve #18.

7.6.2 Open valve #8, then valve #1.

7.6.3 Valve #8 should be fully open to ensure maximum flow rate.

7.6.4 Continue this cycle for 10 minutes.

7.6.5 Send all fast rinse contents to the retention tank.

7.7 Backwash anion resin bed.

7.7.1 Shut off pump.

7.7.2 Shut all valves except valves A, B, and inlet valve.

7.7.3 Open valves #6, #11 and #4.

7.7.4 Simultaneously open valve #18 and energize pump.

7.7.5 Regulate water flow with valve #4 for maximum backwash flow rate of 0.3 GPM.

7.7.6 Backwash anion resin bed for approximately 10 minutes.

7.7.7 Shut all valves.

7.7.8 Shut off pump.

7.8 Regenerate anion resin bed.

7.8.1 Mix thirteen pounds of 50% liquid caustic with ten pounds of water in the caustic regeneration container.

7.8.2 Open valves A, B and inlet valves.

PROCEDURES (cont)

7.8.3 Open valve #13.

7.8.4 Open valve #3.

7.8.5 Open valve #1.

7.8.6 Ensure proper hook up of caustic suction line to valve #9 from caustic solution regeneration tank.

7.8.7 Simultaneously open valve #18 and energize pump.

7.8.8 Adjust chemical metering valve #9 so suction of caustic solution takes 25-30 minutes.

NOTE: Pressure gauge should read approximately 30 psig.

7.9 Slow rinse anion resin bed.

7.9.1 Ensure valves #3, #13, and #1 are open.

7.9.2 Regulate valve #13 so flow rate is approximately 1.5 GPM and the pressure gauge reads 30 psig for 45 minutes.

7.9.3 Send all contents to the retention tank.

7.10 Final Rinse.

7.10.1 Shut all valves and turn off pump.

7.10.2 Open valve #1, #3, #10, A, B and inlet.

7.10.3 Simultaneously open valve #18 and energize pump.

7.10.4 Turn on conductivity meter.

NOTE: Processed water outlet initial resistance reading will be low and will gradually climb during service run.

PROCEDURES (cont)

7.10.5 Send all regeneration water to the retention tank.

7.10.6 Adjust flow to desired service flow rate 4.0 GMP.

NOTE: This final rinse should be continued until the resistivity of the processed water increases above the minimum desired valve as indicated by the conductivity meter.

7.10.7 Shut valve #3.

7.10.8 Open valve #2 when processed water has reached acceptable limits on conductivity meter of >100,000 ohms/cm, when achieved system is ready for service run.

NOTE: If the unit does not come up to the desired level of resistivity, the rinse may be continued. This should not be necessary as the resistivity should increase rapidly if the regeneration steps are performed as outlined.

NOTE: It is not uncommon that two complete regenerations are needed before the required resistivity is achieved.

7.11 Place demineralizer in service.

7.11.1 Open valves #1 and #10.

7.11.2 Shut valve #3.

7.11.3 Open valve #2.

NOTE: The demineralizer is now in service. The water flow is now to the distribution system.

7.12 Prior to release of regeneration solutions the following actions will be taken:

7.12.1 Operations personnel will check pH with pH paper to adjust waste water to neutral.

PROCEDURES (cont)

7.12.2 Notify QA to sample the contents of the retention tank for radioactivity and pH.

7.12.3 Confirm with QA that radioactivity and pH analysis readings are within established limits for release.

7.12.4 Obtain permission from RSO or RSS prior to releasing contents of retention tank.

NOTE: Following release of retention tank contents, the shift supervisor must check the discharge valve shut and record closure in the Shift Supervisor Log.

8.0 EXHIBIT

None

Radiation Technr logy, Inc.
Process Technology Subsidiaries

Procedure

Facility: ROCKAWAY	Department: IRRADIATOR OPERATIONS	Page: 1 of 2
Subject: ANNUAL FIRE TEST	Section/Number/Revision: 9.503. ORIGINAL	
	Effective Date: JULY 17, 1986	
Prepared By: R.G. COCKRELL	Approved By: R.G. Cockrell	Approved By Quality

1.0 PURPOSE

To describe the methods used to test the sprinkler system located in the radiation room.

2.0 SCOPE

Applies to irradiator operators at the Rockaway facility.

3.0 REFERENCES

NRC License #29-13613-02

4.0 DEFINITIONS

None

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 (2) Plastic bags

5.2 Radiation survey instrument

6.0 SAFETY REQUIREMENTS

None

7.0 PROCEDURE

7.1 Perform a radiation survey of the radiation room.

7.2 Place plastic bags over the fire protection system sprinklers and secure the bags in place.

7.3 Leave one person in the radiation room to monitor water from the sprinklers.

7.4 Open the isolation valve (round handle) on the fire protection system.

NOTE: The fire protection valves are located on the wall of the R and D area and are painted red.

7.5 Gradually open the throttling valve (lever handle) to allow water to enter the sprinklers.

7.0 PROCEDURE (cont)

7.6 Establish verbal communication between the in-cell person and the person operating the valves.

7.7 Close the throttling valve when good sprinkler action is observed in the radiation room.

NOTE: To prevent breakage do not overfill the plastic bags.

7.8 Close the isolation valve.

7.9 If the test was unsuccessful, correct the problem and perform the test until it is satisfactory.

7.10 Remove the plastic bags, ensuring no spillage of the water in the radiation room.

7.11 Log the results in the supervisors log and the Preventative Maintenance Check List.

7.12 Records

7.12.1 Supervisors log entry:

7.12.1.1 Date test performed

7.12.1.2 Time test performed

7.12.1.3 Test results (satisfactory or unsatisfactory)

7.12.1.4 Corrective actions, if applicable

7.12.2 Preventative Maintenance Check List:

7.12.2.1 Date performed

7.12.2.2 Corrective actions, if applicable

7.12.2.3 Initials of person performing the test

8.0 EXHIBITS

None

Facility: CORPORATE	Department: IRRADIATOR OPERATION	Page 1 of 4
Subject: IRRADIATOR SOURCE MOVEMENT LOG		Section/Number/Revision 9.504.B
		Effective Date March 6, 1987
Prepared By: LES ROSS	Approved Technically: R. COCKRELL	Approved By Quality: P. O. SHAPIRO

1.0 PURPOSE

To describe how to fill out the source movement log, which records source status and describes any malfunctions that may have caused source shutdown.

2.0 SCOPE

Applies directly to irradiator operations.

3.0 REFERENCES

None

4.0 DEFINITIONS

4.1 Time up - the clock time that the source was in a raised (unshielded) position.

4.2 Time down - the clock time that the source was in a lowered (shielded) position.

4.3 Malfunction - a brief description of why the source dropped, e.g., systems malfunction of conveyor, interlock violation, etc.

4.4 Operational Mode - a brief description of mode, e.g., static, automatic or manual.

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 Irradiator Source Movement Log.

6.0 SAFETY REQUIREMENTS

None

7.0 PROCEDURE

7.1 Irradiator Source Movement Log

7.1.1 Provides the dates and times of irradiator operation, i.e., up and down time records as well as a brief description of the malfunctions encountered with the raising and lowering of the source.

Note: Accuracy in malfunction recording will better facilitate the operations department in providing an adequate maintenance schedule with regard to recurring cell/conveyor/source malfunctions.

7.2 Overall, in normal operations, the Irradiator Source Movement Log provides the Operations Department immediate visual information regarding shift down time.

8.0 EXHIBITS

A. - Irradiator Source Movement Log
B. - Irradiation Log Sheet

EXHIBIT A

SOURCE MOVEMENT LOG

DATE	JOB #	TIME SOURCE DOWN	TIME SOURCE UP	TOTAL DOWNTIME	OPERATIONAL MODE	MALFUNCTION	INITIALS

RTI 1047

EXHIBIT B

DATE	START TIME	CUSTOMER RUN CODE	MASTER TIMER SETTING	RUN TIMER READING	SHUTTLE/FEET COUNTER SETTING	MODE	REMARKS	INITIAL

IRRADIATION LOG SHEET

Radiation Technology, Inc.
Process Technology Subsidiaries

Procedure

Facility: ROCKAWAY	Department: IRRADIATOR OPERATIONS	Page 1 of 7
Subject: NOTIFICATION REQUIREMENTS TO US/NRC		Section/Number/Revision: 9.600
		Effective Date: July 17, 1986
Prepared By: R. G. COCKRELL	Approved Technically: R G Cockrell	Approved By Quality

1.0 PURPOSE

Describe the events that require notification to the Nuclear Regulatory Commission.

2.0 SCOPE

Applies to anyone at RTI, Rockaway, New Jersey, who is aware of a condition or situation which is reportable to the Nuclear Regulatory Commission.

3.0 REFERENCES

10 CFR 20

4.0 DEFINITIONS

None

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

None

6.0 SAFETY REQUIREMENTS

None

7.0 PROCEDURE

On becoming aware of any event listed below, the cognizant individual will immediately notify the Radiation Safety Officer (RSO) or his designate. The Radiation Safety Officer or his designate is responsible for making the appropriate notification to the Nuclear Regulatory Commission.

7.0 PROCEDURE (cont)

7.1 Immediate Notification Events

The following events require immediate notification to the Nuclear Regulatory Commission, by telephone and facsimile telegram or mailaram to the Nuclear Regulatory Commission (Exhibit A).

7.1.1 The RSO shall immediately report any events involving the source possessed by the licensee that may have caused or threatens to cause:

7.1.1.1 Exposure of the whole body of any individual to 25 rems or more of radiation; exposure of the skin of the whole body of any individual of 150 rems or more of radiation; or exposure of the feet, ankles, hands or forearms of any individual to 375 rems or more of radiation; or

7.1.1.2 Release of radioactive material inconcentrations which, if averagedover a period of 24 hours, wouldexceed 5,000 times the limitsspecified for such materials inAppendix B, Table II of 10 CFR 20:- or

7.1.1.3 A loss of one working week or more of the operation of any facilitiesaffected; or

7.1.1.4 Damage to property in excess of $200,000; or

7.1.1.5 Theft or loss of licensed material upon discovery of such an incident; or

7.0 PROCEDURE (cont)

7.1.1.6 An incoming Type B shipping contaner with radiation level onthe external surface in excess of 200 millirem per hour, or at three feet from the external surface of the package in excess of ten millirem per hour; or

7.1.1.7 Removable radioactive contamination in excess of 0.01 microcuries(-22,000 disintegrations per minute)-per 100 square centimeters if foundon the external surface of an-incoming shipping container or-package.

NOTE: Incidents involving Sections 7.1.-1.6 and 7.1.1.7 also require notification of the final delivery-carrier. A package containing TypeA quality of licensed material whose radiation levels exceed thosespecified in Section 7.1.1.6 shall notify the shipper of his findings.

7.1.2 Events associated with Section 7.1.1.5 require a written report within 30 days after-learning of a loss or theft to be sent to the U.S. Nuclear Regulatory Commission at the a-ddresses listed in Items 1 and 2 of Exhibit-A. The report shall include the following information.

7.1.2.1 A description of the licensed material involved, including kind,-quantity, chemical, and physical-form;

7.1.2.2 A description of the circumstancesunder which the loss or theftoccurred;

7.0 PROCEDURE (cont)

7.1.2.3 A statement of disposition or probable disposition of thelicensed material involved;

7.1.2.4 Radiation exposures to individuals, circumstances under which the exposures occurred, and the extent of possible hazard to persons inunrestricted areas;

7.1.2.5 Actions which have been taken, or will be taken, to recover thematerial; and

7.1.2.6 Procedures or measures which have been or will be adopted to prevent a recurrence of the loss or theft of licensed material.

7.1.2.7 Subsequent to filing the written report, the Radiation Safety Officer shall also report any substantive additional information on the loss or theft which becomes available to the Radiation Safety Officer, within 30 days after he learns of such information.

7.1.2.8 Any report filed with the Commission pursuant to this section shall be so prepared that names of individuals who may have received exposure to radiation are stated in a separate part of the report.

7.2 24 Hour Notification Events

The following events require 24 hour notification to the Nuclear Regulatory Commission by telephone and by telegram, mailgram, or facsimile to the Nuclear Regulatory Commission location listed in Item 1 of Exhibit A.

7.0 PROCEDURE (cont)

7.2.1 Exposure of the whole body of any individual to 5 rems or more of radiation; exposure of the skin of the whole body of any individual to 30 rems or more ofradiation; or exposure of the feet, ankles, hands or forearms to 75 rems or more of radiation; or

7.2.2 The release of radioactive material in concentration which, if averaged over a period of 24 hours, would exceed 500 timesthe limits specified for such materials inAppendix B, Table II of 10 CFR 20; or

7.2.3 A loss of one day or more of the operation of any facilities affected; or

7.2.4 Damage to property in excess of $2,000.

7.2.5 Any report filed with the Commission pursuant to this section shall be prepared so thatnames of individuals who have received exposure to radiation will be stated in a separate part of the report.

7.3 30 Day Notification Requirements

The following events require a written report within 30 days to the Nuclear Regulatory Commission (Exhibit A) of any one of the following types of events:

7.3.1 Each exposure of an individual to radiationin excess of the applicable limits in 10 CFR 0.101 or 10 CFR 20.140(a) or the license;

7.3.2 Each exposure of an individual to radioactive material in excess of the applicable limitsin 10 CFR 20.103(a)(1), 10 CFR 20.103(a)(2),or 10 CRF 20.104(b) or in the license;

7.0 PROCEDURE (cont)

7.3.3 Levels of radiation or concentrations of radioactive material in a restricted area in excess of any other applicable limit in the license;

7.3.4 Any incident for which notification is required by 10 CFR 20.403; or

7.3.5 Levels of radiation or concentrations of radioactive material (whether or notinvolving excessive exposure of anyindividual) in an unrestricted area in excess of ten times any applicable limit set forth in 10 CFR 20 or in the license.

7.3.6 Each report required of this section must describe the extent of exposure of individuals to radiation or to radioactivematerial, including:

7.3.6.1 Estimates of each individual's exposure as required by Section-7.3.6.5 of this section;

7.3.6.2 Levels of radiation and concentrations of radioactivematerial involved;

7.3.6.3 The cause of the exposure, levels or concentrations; and

7.3.6.4 Corrective steps taken or plannedto prevent recurrence.

7.3.6.5 Any report filed with the Commission pursuant to Section7.3.6 of this section shall includefor each individual exposed the name, social security number, and date of birth, and an estimate of the individual's exposures. There port shall be prepared so that this information is stated in aseparate part of the report.

7.0 PROCEDURE (cont)

7.4 Transportation Reporting Requirements

The following transportation event requires that:

7.4.1. Any shipment or part of a shipment for which acknowledgement is not received within the ties set forth in Section 7.4.1.1 must:

7.4.1.1 Be investigated by the Radiation Safety Officer if the shipper has not received notification of receipt within 20 days after transfer; and

7.4.1.2 Be traced and reported. The investigation shall include tracing the shipment and filing a report with the U.S. Nuclear Regulatory Commission listed in Item 1 of Exhibit A. The Radiation Safety Officer who conducts a trace investigation shall file a written report with the Commission within two weeks of the completion of the investigation.

8.0 EXHIBIT

A - U.S. Nuclear Regulatory Commission
Addresses and Telephone Numbers

Item 1. U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, Pennsylvania 19406
(215) 337-5000
Attention: Regional Administrator

Item 2. U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Facility: CORPORATE	Department: IRRADIATOR OPERATIONS	Page: 1 of 7
Subject: DEFECT REPORTING REQUIREMENTS USNRC		Section/Number/Revision: 9.501
		Effective Date: July 17, 1986
Prepared By: R.G. COCKRELL	Approved Technically: R G Cockrell	Approved By Quality

1.0 PURPOSE

Describes defect reporting requirements to U.S. Regulatory Commission.

2.0 SCOPE

Applies to any dedicated safety related component in RTI irradiator.

3.0 REFERENCES

10 CFR 21

4.0 DEFINITIONS

4.1 "Basic component" - when applied to RTI or subsidiary facilities and when applied to activities licensed pursuant to 10 CFR Parts 30 and 71, means a component structure, system, or part thereof that is directly procured by the licensee of a facility or activity subject to the regulations in 10 CFR 21 and in which a defect (see 10 CFR 21.3(d)) or failure to comply with any applicable regulations in 10 CfR, order, or license issued by the Commision could create a substantial safety hazard (see definitions).

4.2 "Basic component" - includes design, inspection, testing, or consulting services important to safety that are associated with the component hardware, whether these services are performed by the component supplier or others.

4.3 "Commercial grade item" - an item that is (1) not subject to design or specification requirements that are unique to facilities or activities licensed pursuant to Parts 30, 71 and (2) used in applications other than facilities or activities licensed pursuant to Parts 30, 71 and (3) to be ordered from the manufacturer/supplier on the basis of specifications set forth in the manufacturer's published product description (for example a catalog). A commercial grade item is not a part of a basic component until after dedication (see definition in Section 4.5)

4.0 DEFINITIONS (cont)

4.4 "Constructing" or "construction" - the design, manufacture, fabrication, placement, erection, installation, modification, inspection, or testing of a facility or activity which is subject to the regulations in and consulting services related to the facility or activity that are important to safety.

4.5 "Dedication" of a commercial grade item occurs after receipt when that item is designated for use as a basic component.

4.6 "Defect" means:

4.6.1 A deviation (see definitions in Section 4.7) in a basic component delivered to a purchaser for use in a facility or an activity subject to the regulations in this part if, on the basis of an evaluation (see definition in Section 4.9) the deviation could create a substantial safety hazard: or

4.6.2 The installation, use or operation of a basic component containing a defect as defined in Section 4.6.1.

4.7 "Deviation" - a departure from the technical requirements included in a procurement document (see definition in Section 4.11).

4.8 "Director" - an individual appointed or elected according to law, who is authorized to manage and direct the affairs of a corporation, partnership or other entity. In the case, of an individual proprietorship "director" means the individual.

4.9 "Evaluation" - the process accomplished by or for RTI to determine whether a particular deviation could create a substantial safety hazard.

4.0 DEFINITIONS (cont)

4.10 "Operating" or "operation" - the operation of a facility or the conduct of a licensed activity which is subject to the regulations in this part and consulting services related to operations that are important to safety.

4.11 "Procurement document" - a contract that defines the requirements which facilities or basic components must meet in order to be considered acceptable by the purchaser.

4.12 "Responsible officer"- the President, Vice President, or other individual in the organization of a corporation, partnership or other entity who is vested with executive authority over activities subject to this part.

4.13 "Substantial safety hazard" - a loss of safety function to the extent that there is a major reduction in the degree of protection provided to public health and safety for any facility or activity licensed, other than for export pursuant to 10 CFR, Parts 30.

4.14 "Supplying" or "supplies" - contractually responsible for a basic component used or to be used in a facility or activity which is subject to the regulations in 10 CFR 21.

5.0 EQUIPMENT/MATERIALS REQUIREMENTS

None

6.0 SAFETY REQUIREMENTS

None

7.0 PROCEDURE

7.1 The Vice President of Operations or responsible officer subject to the regulations of this part or a person designated by RTI management shall notify the Commission when he obtains information reasonably indicating a failure to comply or a defect affecting (a) the construction or operation of RTI or a subsidiary facility or an activity that is subject to the licensing requirements under 10 CFR Parts 30, 71 and that is within his organization's responsiblity and is supplied for a facility or an activity within the United States that is subject to the licensing requirements under 10 CFR Parts 30,71 or 72. The above notification is not required if such individual has actual knowledge that the Commision has been adequately informed of such defect or such failure to comply.

7.2 Initial notification required by this paragraph shall be made within two days following receipt of the information. Notification shall be made to the Director, Office of Inspection and Enforcement, or to the Regional Administrator of Region I (Exhibit B). If initial notification is by means other than written communication, a written report shall be submitted to the appropriate Office within 5 days after the information is obtained. Three copies of each report shall be submitted to the Director, Office of Inspection and Enforcement (Exhibit A).

7.3 RTI and its subsidiaries shall post current copies of following documents in a conspicuous position on any premises, within the United States where the activities subject to this part are conducted (1) the regulations in 10 CFR 21 (2) section 206 of the Energy Reorganization Act of 1974, and (3) procedures adopted pursuant to the regulations in 10 CFR 21 or corresponding Agreement State regulation.

7.0 PROCEDURE (cont)

If posting of regulations in this procedure or the procedures adopted pursuant to the regulations in this part is not practicable, the licensee or firm subject to the regulations in this part may, in addition to posting section 206, post a notice which describes the regulations/procedures, including the name of the individual to whom reports may be made, and states where they may be examined.

7.4 Exemptions

The Commission may, upon application of any interestedperson or upon its own initative, grant such exemptions from the requirements of the regulations in 10 CFR 21 as it determines are authorized by law and will not endanger life of property or the common defense and security and are otherwise in the public interst. Suppliers of commercial grade items are exempt from the provisions of this part to the extent that they supply commercial grade items.

7.4.1 Maintenance of Records

RTI and its subsidiaries shall maintain such records in connection with the licensed facility or activity as may be required to assurecompliance with the regulations in 10 CFR 21 or corresponding Agreement State Regulations.

7.4.2. RTI personnel shall prepare records in connection with the designs, manufacture, fabrication, placement, erection, installation, modification, inspection or testing of any facility, basic component supplied for any licensed facility or to be used in any licensed activity sufficient to assure compliance with the regulations in 10 CFR 21 or appropriate Agreement State Regulations. After delivery of the facility or component and prior to the destruction of the records relating to evaluations or notifications to the Commission such records shall be offered to the purchaser of the facility or component. If such purchaser determines any such records.

7.0 PROCEDURE (cont)

7.4.2.1 Are not related to the creation of a substantial safety hazard, he may authorize such records to be destroyed or

7.4.2.2 Are related to the creation of a substantial safety hazard, he shall cause such records to be offered to the organization to which he supplies basic components or for which he constructs a facility or activity.

If such purchaser is unable to make the determination as required above then the responsibility for making the determination shall be transferred to the individual, corporation, partnership, or other entity subject to the regulations in 10 CFR 21 or Appropriate Agreement State regulations that issued the procurement document to the purchaser. In the event that the determination cannot be made at that level then the responsibility shall be transferred in a similar manner to another individual, corporation, partnership, or other entity subject to the regulations in this part until, if necessary the licensee shall make the determination.

7.4.3 Records that are prepared only for the purpose of assuring compliance with the regulations in this procedure and are not related to evaluations or notifications to the Commission may be destroyed after delivery of the facility or component.

.5 RTI and its subsidiaries shall assure that each procurement document for a facility, or a basic component specifies, when applicable, that the provisions of 10 CFR Part 21 apply.

7.0 PROCEDURE (cont)

7.6 RTI and its subsidiaries shall permit duly authorized representatives of the Commission or appropriate Agreement State Representatives to inspect its records, premises, activities, and basic components as necessary to effectuate the purposes of this part.

8.0 EXHIBITS

NRC Addresses

A - Director Office of Inspection and Enforcement

U. S Nuclear Regulatory Commission
Washington, DC 20555
Attention: Director Office of Inspection and Enforcement

B - Regional Administration

U. S. Regulatory Commissic .
Region 1
631 Park Avenue
King of Prussia, PA 19406
Attention: Regional Administrator

1.0 PURPOSE

To outline the training requirements for an Irradiator Operator.

2.0 SCOPE

Applies to all trainees selected for operator training.

3.0 REFERENCES

None

4.0 DEFINITIONS

4.1 Radiation Safety Officer - The qualified individual who is responsible for carrying out the licensee's radiation safety program and who is listed as the Radiation Safety Officer on the application for the license.

4.2 Training Coordinator - Individual designated by Vice President of Operations/Engineering to coordinate the training of certified operators for all facilities. The Training Coordinator shall have been certified s an operator on at least one Irradiator similar to those operated by RTI and subsidiaries.

4.3 Annual - Once every twelve (12) months plus or minus three (3) months.

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

None

6.0 SAFETY REQUIREMENTS

None

7.0 PROCEDURE

7.1 Irradiator Operator Certification shall require a minimum of four (4) months training.

7.1.1 The initial three (3) months shall consist of on the job training (OJT).

NOTE: OJT includes forty (40) hours formal classroom training outlined in Exhibit B.

7.1.2 The fourth month is a provisional qualification period. After the operator trainee has completed three (3) months OJT, has received forty (40) hours of formal classroom instruction and has passed a comprehensive examination, then the operator trainee is provisionally qualified as an Irradiator Operator for thirty (30) days. During this provisional period, the trainee will assume the duties/responsibilities of an operator under the direct supervision of a certified operator. An Operator Qualification Card (Exhibit C) will be issued during this period and initialed only by the certified operator directly surpervising the trainee. The initials fo the certified operator on the trainee's card attests to the trainee's proficiency in that particular area.

7.1.2.1 The provisional qualification period may be extended if a minimum level of proficiency is not demonstrated within thirty (30) days.

NOTE: Management reserves the right to remove any operator trainee from provisional operator status and operator training program for failure to possess the proper aptitude or failure to demonstrate the necessary skills to perform the duties/responsibilities of a certified operator.

7.0 PROCEDURE (cont)

7.2 Upon completion of three (3) months OJT and forty (40) hours formal classroom instruction, a comprehensive written examination shall be given. The operator trainee shall achieve a minimum score of 80% to pass. The examination shall consist of a minimum of one hundred (100) questions.

7.2.1 If a trainee should fail to pass the written examination, a second examination may be given.

NOTE: Retaken exams shall have a maximum of 30% repeat questions form the previous exam.

7.2.1.1 A minimum of thirty (30) days shall elapse between initial examination and retest to allow for meaningful study and improvement on the behalf of the trainee.

7.2.1.2 Failure to pass the written examination on second attempt shall be cause for termination from opertor trainee status. The resulting deselection from operator training program is permanent.

7.2.2 The Training Coordinator is responsible for preparation, control, and administration of all examinations. He shall be assisted by the Manager of Operations at each facility.

7.2.2.1 All examinations will be graded and retained by the Training Coordinator. The examination scores will be reported, by letter, to the appropriate Manager of Operations for ultimate inclusion in the individual operator training folder.

NOTE: All examinations will be strictly controlled - a red stamp "Do Not Duplicate" will be stamped on each exam.

7.0 PROCEDURE (cont)

7.3 Refresher training for plant operational personnel will be conducted annually. This annual refresher training should be a minimum of four (4) hours in length. Topics shall include radiation safety, facility license review and updating in regards to operational/emergency procedural changes. The training will be conducted by the Training Coordinator, Radiation Safety Officer, or his designee.

7.3.1 A written examination will be given following the refresher training. A score of 80% is required to pass. Areas where the examination reveals deficiencies will be discussed with examinees following grading of the exams. Documentation of successful completion of annual refresher training will be recorded in the operators individual training folders. Examination scores will be provided to the Manager of Operations, by letter, from the Training Coordinator.

7.3.1.1 Failure to achieve 80% on the refresher examination will be cause for an interview with the Training Coordinator to determine the corrective measures required to bring the operator's knowledge level to the desired standard. The minimum measure to be taken is self study and the taking of a similar exam. A serious and continued deficiency could be cause for retraining or dismissal.

7.4 A certified operator, when transferred to another facility, shall be re-certified.

7.4.1 If the operator was previously certified on the same model Irradiator, he may be re-certified by passing the Irradiator Operator Examination and completing walk-through (oral examination) of the facility with the Manager of Operations or the Radiation Safety Officer.

7.0 PROCEDURE (cont)

7.4.2 If the operator was previously certified on a different model Irradiator, he shall be re-certified by the completion of the following:

7.4.2.1 pass the Irradiator Operator exam with a score of 80% or high to waive the three (3) month OJT requirement;

7.4.2.2 complete a thirty (30) day provisional operator period under the direct supervision of a certified operator;

7.4.2.3 complete the items on the Operator Qualification Card, having them initialed by the certified operator who supervised the trainee's provisional qualification period.

NOTE: All re-certifications must be reviewed and signed by the Radiation Safety Officer.

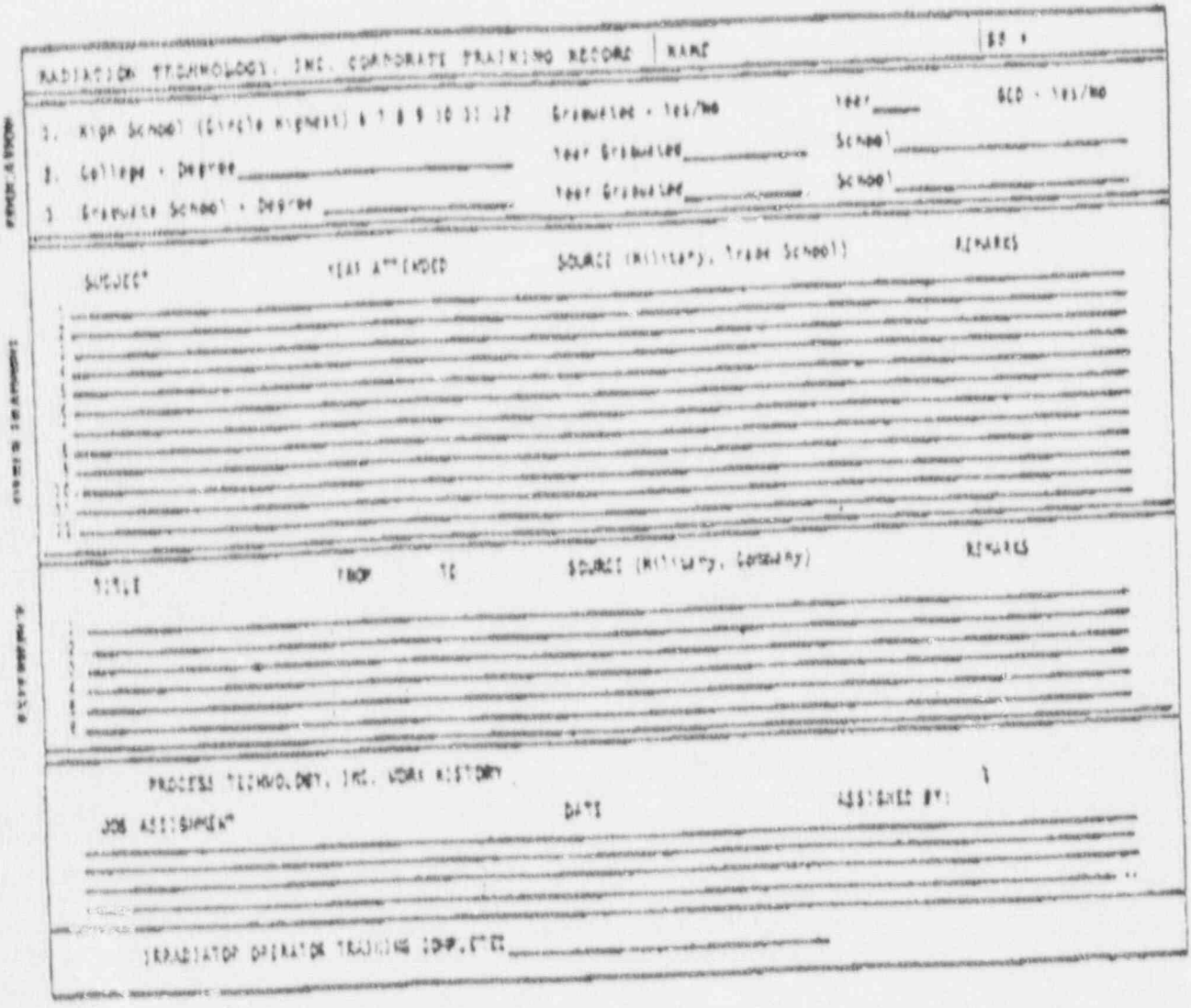
7.5 When an operator trainee is designated, the Manger of Operations shall cause a training folder to be initiated. The training folder shall include a corporate training record (Exhibit A), the start and ending dates for OJT, documentation of forty (40) hours formal training to include date of examination and score. The folder shall also include start and ending date of Provisional Operator Qualification and the trainee's completed Operator Qualification Card. The Radiation Safety Officer shall review the examination score and completed Operator Qualification Card to ensure documentation of training is complete. The final operator certification shall then be signed by the Radiation Safety Officer.

NOTE: Training records will be maintained for three (3) years following termination of the employee.

8.0 EXHIBITS

A - Corporate Training Record
B - Irradiator Operator Training Program
C - Operator Qualification Card

EXHIBIT A



RADIATION TECHNOLOGY, INC. CORPORATE TRAINING RECORD | NAME | SS #

1. High School (Circle Highest) 6 7 8 9 10 11 12 Graduate - Yes/No Year ____ GED - Yes/No
2. College - Degree ____ Year Graduated ____ School ____
3. Graduate School - Degree ____ Year Graduated ____ School ____

SUBJECT	YEAR ATTENDED	SOURCE (Military, Trade School)	REMARKS

SUBJECT	FROM	TO	SOURCE (Military, Company)	REMARKS

PROCESS TECHNOLOGY, INC. WORK HISTORY

JOB ASSIGNMENT	DATE	ASSIGNED BY:

IRRADIATOR OPERATOR TRAINING COMPLETED ____

EXHIBIT A

page 2 of 2

RTI SUPPLEMENTAL TRAINING

SUBJECT	INSTRUCTOR	DATE

EXHIBIT B

Progress Card (cont)

		Date	Initials
5.	RADIATION MONITORING DEVICES (4 hours)		
	(a) Portable survey instruments operation		
	(b) Counter-scaler operation		
	(c) Area monitor operation		
6.	RADIOACTIVE CONTAMINATION (4 hours)		
	(a) Loose surface contamination		
	(b) Fixed contamination		
	(c) Waterborne contamination		
	(d) Contamination control		
7.	PTI FACILITIES REVIEW (8 hours)		
	(a) Irradiator construction and operation		
	(b) Demineralizer plant construction and operation		
	(c) Effects of radiation on materials		
	(d) Irradiation techniques		
	(e) Radiation dosimetry systems		
	(f) Production irradiation		
	(g) Nuclear component testing		
8.	PTI OPERATING PROCEDURES REVIEW (8 hours)		
	(a) PTI by-products license review		
	(b) Operating instructions		
	(c) PTI emergency procedures review		

B. WRITTEN EXAMINATION Date _____ Score _____

C. PRACTICAL QUALIFICATION (32 days) Started _____

Completed _____

(a) Operator qualification card completed and filed

D. CERTIFICATION

QUALIFIED FOR OPERATIONS: _____
Radiation Safety Officer

DATE _____

EXHIBIT C

OPERATOR
PTI (NC)

QUALIFICATION CARD

Hockaway Dual Cars is in preparation.

The practical factors listed below must be satisfactorily demonstrated to and signed off by one of the following instructors: Les Ross, Mike Doyle or Howard Overson.

BASIC RADIATION THEORY/APPLICATION

1. Demonstrate a practical knowledge of radiation theory and prescribed limits (Federal, State, as well as company action limits). _____

2. Demonstrate the ability to accurately use the Co^{60} Decay Table to update dwell times for customer protocol. _____

3. Demonstrate the ability to battery check and operate both radiac survey instruments including correct interpretation of readings at all scales. _____

4. Demonstrate Swipe Technique. _____

5. Demonstrate the ability to read and explain the maze area monitor. _____

6. Demonstrate the ability to survey the cell and record in irradiator log. _____

OPERATIONAL RESPONSIBILITIES

1. Demonstrate the ability to take and record water temperature readings, check pool water level and fill when necessary. _____

2. Demonstrate the ability to take and record deionizer readings. _____

3. Demonstrate the proper setting up of exit plates for L/S operations. _____

EXHIBIT C

OPERATIONAL RESPONSIBILITY CONTINUED

4. Demonstrate shutting up the Log _____
5. Demonstrate the ability to correctly perform an irradiator startup in all modes (auto, manual and static). _____
6. Demonstrate the ability to perform daily interlock testing and properly record. _____
7. Demonstrate the ability to explain all functions of the computer main menu. _____
   1. Utility Functions _____
   2. Graphic Overview _____
   3. Create Certification Header _____
   4. Create Customer File _____
   5. Certification Print-Out _____
   6. Static Program _____
   7. Status Screen _____
   8. Customer File Print-Out _____
8. Demonstrate the ability to correctly fill out the run log. _____
9. Demonstrate the ability to correctly fill out the irradiator log. _____
10. Demonstrate the ability to correctly fill out the operator key log. _____
11. Demonstrate the ability to correctly fill out the security log. _____
12. Demonstrate the ability to print out a certification print out. _____
13. Demonstrate the ability to correctly fill out a product description sheet. _____

EXHIBIT C

OPERATIONAL RESPONSIBILITIES CONTINUED

14. Demonstrate proficiency at the following calculations: cu/ft, density, let car out run time. _____

15. Demonstrate a familiarity with military time and julian date. _____

16. Demonstrate the ability to set up and process customer protocols. _____

17. Demonstrate an understanding of definitions dealing with Dose Mapping techniques. _____

18. Demonstrate the ability to determine dwell times, top-off dwell, dose range, and max/min ratio. _____

19. Demonstrate the ability to retrieve and issue secondary dosimetry for various protocols. _____

20. Demonstrate a working knowledge of the factors involved in protocol configuration. _____

21. Demonstrate the ability to configure a product for a Phase II. _____

22. Demonstrate the ability to set up a Dose Mapping Grid on a product. _____

23. Demonstrate knowledge of the components contained in the PLC-2 Systems. (Function) (Location) _____

24. Demonstrate the ability to use the industrial terminal to correct malfunctions or assist in routine maintenance. _____

Facility: NORTH JERSEY	Department: MAINTENANCE	Page 1 of 13
Subject: PREVENTIVE MAINTENANCE SYSTEM		Section/Number/Revision 12.100. ORIGINAL
		Effective Date: OCTOBER 31, 1988
Prepared By: J. RUSSEN	Approved Technically: T. VARAKLIS	Approved By Quality: P.O. SHAPIRO

1.0 PURPOSE

Describe the preventive maintenance (PM) system.

2.0 SCOPE

Applies to all personnel who perform preventive maintenance at the North Jersey facility.

3.0 REFERENCES

3.1 Instruction Manual, Model No. 2102 - B.

3.2 Clarklift Model EC 500-S30 TYPE E Maintenance Manual.

3.3 Clarklift Model EC 500-S30 Maintenance Manual.

3.4 Compressor Operation and Maintenance Manual.

3.5 Instruction Manual for Stored Pressure Fire Extinguisher.

3.6 Eberline Model RMS II Operating Manual.

3.7 Equipment Maintenance Record.

4.0 DEFINITIONS

4.1 Maintenance Instruction Form with instructions for performing a specific maintenance item.

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

5.1 Weekly Preventive Maintenance Schedule.

5.2 Monthly Preventive Maintenance Schedule.

5.3 Quarterly Preventive Maintenance Schedule.

5.4 Yearly Preventive Maintenance Schedule.

5.5 Preventive Maintenance Record.

5.6 Appropriate tools.

6.0 SAFETY REQUIREMENTS

6.1 Unless power is specifically required to perform a particular maintenance item, it shall be turned off or disconnected from the unit, or in the case of the irradiator, the main power switch turned in the off position.

6.2 Common industrial safety practices.

6.3 Common radiological safety practices shall be observed when working in the irradiation chamber or on any of it's associated equipment.

6.4 When working within the irradiator chamber, a sign shall be attached to the main control panel stating that work is in progress.

6.5 The irradiator key shall be in the possession of a certified operator, stored in a secure location during irradiator maintenance operations, or attached by chain to the radiation survey meter.

7.0 PROCEDURE

7.1 The Preventive Maintenance Schedule was developed by listing all maintenance items according to their frequency and due dates.

7.2 Upon completion of a maintenance item, the person performing the maintenance will record the date of completion and sign the schedule. A completed Maintenance Schedule is then considered the Permanent Preventive Maintenance Record. This record is to be reviewed and signed on a weekly basis by the Manager of Operations.

7.0 PROCEDURE (CONT)

7.3 All part replacement and major maintenance activity is to be coordinated by the maintenance supervisor who will assign dates and personnel required. This activity is to be recorded in the item's individual log, (Exhibit A).

7.4 The person assigned to an item will select the proper Maintenance Manual and appropriate tools. The instructions on the Manual must be adhered to.

7.5 All part replacement and major maintenance activity is to be recorded in the item's individual log. (Exhibit A).

8.0 Exhibits

Exhibit - A - Parts Replacement Log Sheet.
Exhibit - B - Weekly Maintenance Schedule.
Exhibit - C - Monthly Maintenance Schedule .
Exhibit - D - Quarterly Maintenance Schedule.
Exhibit - E - Yearly Maintenance Schedule.
Exhibit - F - As - Required Maintenance.

EXHIBIT A

Parts Replacement Log Sheet

Component: _____

_____

Date of Inspection: _____

Parts Replaced/Repaired: _____

_____

Cause of Failure: _____

_____

_____

_____

Remarks: _____

_____

_____

_____

Work Performed By: _____

Date: _____

Work Checked By: _____

Date: _____

EXHIBIT B

WEEKLY MAINTENANCE SCHEDULE

	MONTH _____			
	WEEK			
	1	2	3	4
RADIOLOGICAL				
Record maximum reading of radiation level at air filter bank.				
Record maximum reading of radiation level at carbon filter bed at de-ionizer.				
Record maximum reading of radiation level at resin bed.				
Check for operation of flashing beacon.				
Check for operations of warning light.				
Check audible alarm systems.				
PNEUMATIC SYSTEM				
Check operation and integrity of pneumatic system.				
Check oil level in pneumatic lubricators and add oil if necessary.				
Check moisture traps in pneumatic system and drain if necessary.				
Drain moisture from compressor tank.				
Check solenoid valves for leaks.				
Check airlines for oil and air leaks.				
Check air pressure on gauges.				
Inspect all pulleys in source hoists for wear and abnormal operation.				
Inspect pulley in cell for wear.				
Check source hoist air piston for smooth and proper operation.				

EXHIBIT B 2 of 3

	MONTH _____			
	WEEK			
	1	2	3	4
WATER TREATMENT PLANT				
Check regeneration requirements, chemical levels.				
Check water circulation pump.				
Check water level float switches.				
Check for water leaks.				
Check pressure gauges.				
Record water resistance reading.				
AIR COMPRESSORS				
Record water meter reading.				
Inspect oil level in compressor crankcase.				
Clean air filter.				
Check V - belt for wear and tensions.				
Check output air pressure.				
WAREHOUSE				
Check conditions of forklift battery and change as necessary.				
Check forklifts for:				
. Operations of back-up beeper:				
. Breaks and steering:				
. Hydraulic system for leaks:				
. Fork/up/down/tilt/side-shifts:				
Check stretch-wrapper operation of limit switch and timer:				
Clean stretch-wrapper.				
Check and tighten fasteners on stretch - wrapper.				

EXHIBIT B 3 of 3

	MONTH			
	WEEK			
	1	2	3	4
Check carriers for cleanliness.				
Check for product clearances.				
Check cell and plant lights. Replace lights and bulbs necessary. Destroy burned out bulbs.				

REMARKS: _____

_____

_____

_____

_____

PERFORMED BY: _____

DATE: _____

VERIFIED BY: _____

DATE: _____

EXHIBIT C 1 of 3

MONTHLY MAINTENANCE SCHEDULE	MONTH			
RADIOLOGICAL				
Check emergency pull cable.				
Confirm accuracy of master timer setting.				
Check source hoist pneumatic interlock hose in maze.				
SOURCE PASS MECHANISM				
Refurbish or replace cylinder as required using spare cylinder.				
NOTE: There is at least one spare cylinder for each cylinder in the entire system.				
Check all transfers for proper alignment and lubricate all wheels				
SOURCE HOIST MECHANISM				
Inspect source hoist cable fraying and wear.				
Check guide cables for tension.				
Check travel times (up and down) of source racks (20 -30 seconds).				
CELL VENTILATION SYSTEM				
Check V - belts on exhaust fan motor. Lubricate fan.				
Check air filter manometer pressure drop.				
Check operation of air-flow switch.				

EXHIBIT C

	MONTH			
STORAGE AREA				
Check turn table and end transfer for alignment and smooth operation. Lubricate all wheels.				
Check cylinder speed and adjust as required.				
Check solenoid valves for air leaks and solenoid coil operations.				
Check and adjust switch actuators for proper actuation point. Check photocell and reflector for proper alignment.				
FORKLIFTS				
Check forklift brake-fluid level.				
Inspect fluid level and conditions of hydraulic system.				
Inspect forklift battery connectors.				
Lubricate forklift mast channels.				
Check and lubricate forklift lift chains and adjust parking brake.				
WATER - CHILLER See Manufacturer's Manual.				
Check cooling water flow through condenser.				
Visual check through sight glass for refrigerant and moisture.				
Check crankcase oil level through sight glass.				
Check pressure drop through chiller				
Check chiller and circulating pump for leaks, also motor and pump operation.				
CARRIERS				
Inspect each carrier for structural integrity.				
Check trolley heads for secureness. Lubricate all wheels.				
Check that doors are functioning properly.				

EXHIBIT C 3 of 3

REMARKS: _____

_____

_____

PERFORMED BY: _____

DATE: _____

VERIFIED BY: _____

DATE: _____

EXHIBIT D

QUARTERLY MAINTENANCE SCHEDULE

	YEAR			
	QUARTER			
	1	2	3	4
IRRADIATOR				
Test high temperature switch setting.				
Check cell temperature.				
Check power interruption time delay.				
Check source pass mechanism shaffle time delay.				
Check source hoist time delay.				
Check source hoist low air pressure switch.				
Check safety start-up 90 second delay timer.				
Check roof plug interlock switch.				
MISCELLANEOUS				
Inspect all rails for structural integrity.				
Lubrication of forklift components.				
Check hydraulic pump motor brushes.				
Inspect tilt cylinders for operation and adjustment.				
Check condition of filters in the cell exhaust system.				

REMARKS: _____

_____

_____

PERFORMED BY: _____

DATE: _____

VERIFIED BY: _____

DATE: _____

EXHIBIT E

YEARLY MAINTENANCE SCHEDULE

Check computer control validation. ✓

Check anti-collision device. _____

Check smoke detector. _____

Check sprinkler system. _____

Check all rails for structural integrity, levelness, and alignment. _____

Check all hangers and hanger rods amd nuts for tightness. _____

Check all limit switches for proper operation and adjustment. _____

Inspect forklift chains for equal tension. _____

Inventory supplies, spare parts, and in-use hand tools. _____

REMARKS: _____

_____

_____

_____

_____

PERFORMED BY: _____

DATE: _____

VERIFIED BY: _____

DATE: _____

EXHIBIT F

AS - REQUIRED MAINTENANCE

Inspect forklift tires for wear and damage. _____

Paint cell and warehouse walls. _____

Inspect shipping/receiving docks, overhead doors, and ramps. _____

REMARKS: _____

PERFORMED BY: _____

DATE: _____

VERIFIED BY: _____

DATE: _____

Facility:	Department:	Page
CORPORATE	ENGINEERING	1 of 4

Subject:	Section/Number/Revision
DESIGN CONTROL	13.1 . A
	Effective Date: 10/01/86
Prepared By: R. COCKRELL	Approved Technically: R. COCKRELL / Approved By Quality: P. O. SHAPIRO

1.0 PURPOSE

To establish the quality assurance program for the design of safety related structures, systems and components.

2.0 SCOPE

Includes the review for suitability of application of materials, parts, equipment, and processes that are essential to safety related functions.

3.0 REFERENCES

None

4.0 DEFINITIONS

None

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

None

6.0 SAFETY REQUIREMENTS

None

7.0 PROCEDURE

7.1 Radiation Technology, Inc. (RTI) has the responsibility for design control. Other organizations may be delegated to establish and execute specific parts but RTI retains ultimate responsibility.

7.2 All interface controls for organizations performing safety related design work shall be identified and implemented according to procedure.

7.3 The adequacy of design will be verified to the extent specified. The depth of verification depends upon the importance and complexity of design, the degree of standardization, the state of the art, and similarity with proven designs.

Facility:	Department	Page
CORPORATE	ENGINEERING	1 of 4

Subject:	Section/Number/Revision
DESIGN CONTROL	13.1 . A
	Effective Date: 10/01/86

Prepared By:	Approved Technically:	Approved By Quality:
R. COCKRELL	R. COCKRELL	P. O. SHAPIRO

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None

4.0 DEFINITIONS

None

5.0 EQUIPMENT/MATERIAL REQUIREMENTS

None

6.0 SAFETY REQUIREMENTS

None

7.0 PROCEDURE

7.1 Radiation Technology, Inc. (RTI) has the responsibility for design control. Other organizations may be delegated to establish and execute specific parts but RTI retains ultimate responsibility.

7.2 All interface controls for organizations performing safety related design work shall be identified and implemented according to procedure.

7.3 The adequacy of design will be verified to the extent specified. The depth of verification depends upon the importance and complexity of design, the degree of standardization, the state of the art, and similarity with proven des[illegible]

7.0 PROCEDURE (cont)

7.3.1 Verification shall be by individuals other than those who performed the design.

7.3.2 The originators supervisor may perform the verification provided the supervisor:

7.3.2.1 Did not specify the design approach.

7.3.2.2 Did not rule out certain design considerations.

7.3.2.3 Did not establish the design inputs.

7.3.2.4 Is the only person competent to perform the verification.

7.3.3 Justification for the originators supervisor verifying the design must be documented.

7.3.4 All changes require verification.

7.4 RTI Engineering is responsible for the design, design review, engineering approval of design changes, design evaluation and design control of RTI facilities.

7.4.1 RTI Engineering may delegate activities but retains responsibility for the overall design.

7.4.2 In all cases, final engineering decisions and ultimate design control of safety related structures, systems, and components related to RTI facilities shall be the responsibility of RTI Engineering.

7.5 Design process

7.5.1 Design control measures shall be applied to design analyses, such as thermal, hydraulic and nuclear radiation, compatibility of materials; accessibility for in-service inspection, maintenance, and repair; and delineation of acceptance criteria for inspections and tests.

7.0 PROCEDURE (cont)

7.5.2 Procedures define the RTI method for implementing design control measures. These measures shall require that applicable design requirements, such as design basis, regulatory requirements, codes, and standards are translated into specifications, drawings, procedures, or instructions. All materials, parts, equipment, and processes, including standard "off the shelf" commercial or previously approved items, essential to the safety related functions shall be selected and reviewed for suitability of application. The basis for selection may include industry standards, material and prototype hardware testing programs, and design reviews.

7.6 Design Change Control

7.6.1 Procedures governing design change control during construction, modifications to operating plants, control of discrepant or deficient design conditions, and reported unsatisfactory performance provide for the identification of the need for design changes and a documented method to control these changes. Design and specification changes shall be subject to design control measures commensurate with those applied during the original design.

7.6.2 During the design and construction phases, an independent review and approval of design changes shall be performed by the organization that conducted the original design reviews, unless the originating organization designates another organization to perform this function.

7.0 PROCEDURE (cont)

7.6.3 During the operations phase, proposed safety related design changes/modifications shall be submitted to the operating plant management for processing and review. The proposed plant change/modification (PC/M) shall be submitted to Engineering, following plant review, for final design. Final review and approval of the design change shall be performed by the Radiation Safety Officer for a facility specific change or by the Vice President of Operations and Engineering for a generic design change.

7.7 Design Interface Control

Procedures provide the method for identification of design interfaces, design interface changes, and modifications affecting drawings and documents. Engineering is responsible for review and coordination of design interfaces. Engineering assures that interface problems are resolved and that all design interface changes or modifications are reviewed for interface effects prior to approval.

7.8 Design Verification

Ultimate responsibility for design adequacy and evaluation is retained by Engineering. The depth of a design review shall be commensurate with the significance of the safety function performed by the item, the complexity of the design, experience with the design, and experience with potential suppliers of the item.

8.0 EXHIBITS

None

Process Technology North Jersey

Subsidiary of RTI Inc.

108 LAKE DENMARK ROAD, ROCKAWAY, NJ 07866
(201) 625-8400 • FAX: (201) 625-7820

030-0702

December 12, 1988

Mail Control No. 106655

Docket No. 030-07022
License No. 29-13613-02

Mr. John White, Chief
Nuclear Materials Safety Section C
United States Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, Pennsylvania 19406

Dear Mr. White:

Enclosed please find an application for an amendment to license #29-13613-02. Also enclosed please find the revised PTI procedures 9.102C, 9.100B and 9.500A. These revised procedures reflect the changes made to RTI's Rockaway, NJ facility. These procedures are submitted as per license condition 22 and are currently in the evaluation stage.

We are also requesting that the Ameray Portable Irradiator be removed from it's "Storage Only" status. Procedure 4.115 "Ameray Portable Irradiator Operation" is enclosed for your inspection.

This Amendment replaces the April 8, 1988, May 25, 1988 and June 7, 1988 attachments to amendment 24 of license No. 29-13613-02.

Additionally, we are requesting that license No. 29-13613-03 be discontinued. All items once covered in license No. 29-13613-03 are now covered in license No. 29-13613-02.

Enclosed please find our check for $230.00 to cover this amendment.

If you need any further information regarding this amendment, please contact me. We would appreciate your prompt renewal of this application.

Sincerely,

John Russen
Plant Manager, North Jersey Process Technology Inc.

Enclosures

cc: RTI Corp. Files
RSO File

Application for Amendment
of Materials License

North Jersey Process Technology, Inc.

License No. 29-13613-02

Items 5 through 11

Prepared: December 12, 1988

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Table of Contents (continued)

Item 5 RADIOACTIVE MATERIAL

5.1 Irradiator Source Material

Licensed material will be metallic Cobalt-60 sealed sources doubly encapsulated in stainless steel.

5.2 Manufacturer and Model Number of Irradiator Sources

RTI proposes loading the irradiator with any of the following Cobalt-60 sources:

Neutron Products Models:

12-S-3, NPI 12-C-3, 10-C-3,
10-S-3, 12-C-3, 11-S-2, 11-C-2,
12-CC-5, 24-CC-5,NPI-77-351 thru
NPI-77-358, NPI-77-361 thru NPI-77-364,
353, 752, 853, Model Drawing 200243, Rev. D
NPI-81-01 thru NPI-81-79

Atomic Energy of Canada Models:

C-188, Types 1,2,3,4

General Electric Company Models:

GEP-916, GEPR-183, GE-SR-187

5.3 Source Strength

No single source will exceed thirteeen thousand (13,000) curies in total activity. The total activity in the facility at any one time will not exceed three (3) million curies.

5.4 Manufacturer and Model of Irradiator

The sources will be used in Radiation Technology, Inc. Irradiator Model No. RT-2102-B.

5.5 Miscellaneous Source Material

Additionally RTI will have the following sources available for use in instrument checking and calibration, for special projects or storage:

A. AECL Cobalt-60 sealed source Model C-160
320 Curies

B. Tracerlab Strontium-90 sealed source Model RA-2A
120 milliCuries

C. Victoreen Strontium-90 sealed source Model RA-2A
30 microCuries

D. Tritium contamination on an ion pump
15 Curies

E. Gemstones containing Scandium 46 (with trace activation products), not to exceed 10 milliCuries

F. Cesium 134 rocks
0.1 milliCurie

G. Radium 226 sealed source
5.2 micrograms

H. Cobalt-60, any form
10 millicuries

Item 6 PURPOSES FOR WHICH LICENSED MATERIAL WILL BE USED

6.1 Irradiator Source Material

Licensed material described in Items 5.1 - 5.4 will be used in programs involving the irradiation of medical products, pharmaceuticals and cosmetics for sterilization or microbial reduction; radiation effects studies; and irradiation of other miscellaneous products and foodstuffs. Irradiated foodstuffs shall be done under applicable regulations of the Food and Drug Administration and U.S. Department of Agriculture.

Explosives, flammables and corrosives will not be irradiated.

Flammable means any materials with a flash point at a temperature below the temperature PTI expects irradiated products to reach during irradiation. However, in no case will any material with a flash point below 145 degrees Fahrenheit be irradiated.

Corrosive means any material with pH less than 3.0 or greater than 10.0.

6.2 Miscellaneous Source Material

The source material described in Item 5.5A is in the AMERAY irradiator that is discussed in Item 9.

The source material described in Item 5.5B is enclosed in a wooden case that is stored in a restricted area. It is labelled "storage only".
The source material in Item 5.5C is used in instrument calibrations.

Item 5.5D is wrapped in plastic and stored in a restricted area. It is labelled as contaminated.

Items 5.5E and 5.5F are in plastic containers in a locked safe that is in a storage room. Each container has a radioactive material sticker. A note on the door of the safe states that the safe contains radioactive material, which may not be removed without permission of the Radiation Safety Officer. The safe is seldom opened.

The source material in Item 5.5G is contained inside the lock housing at the entrance to the maze. It is used to check the operability of the radiation survey instrument prior to entering the maze.

Item 5.5H refers to a small quantity of materials contaminated with Cobalt-60 that have resulted at the site during past years. These materials have been packaged, labelled and stored in a restricted area until ultimate disposal at a licensed disposal site.

Item 7 INDIVIDUALS RESPONSIBLE FOR RADIATION SAFETY PROGRAM --THEIR TRAINING AND EXPERIENCE

7.1 Responsible Individuals

Whenever the irradiator is in operation, a responsible individual will be on duty and immediately available in the irradiator facility.

7.2 Appointment of Responsible Individuals

The Radiation Safety Officer may appoint a person as a responsible individual,

if that person has successfully completed a training course of approximately 40 hours in the following topics:

Principles and fundamentals of radiation protection and good safety practices related to the use of radioactive materials.

Radioactivity measurements, use of radiation detection and measuring instruments, and monitoring techniques.

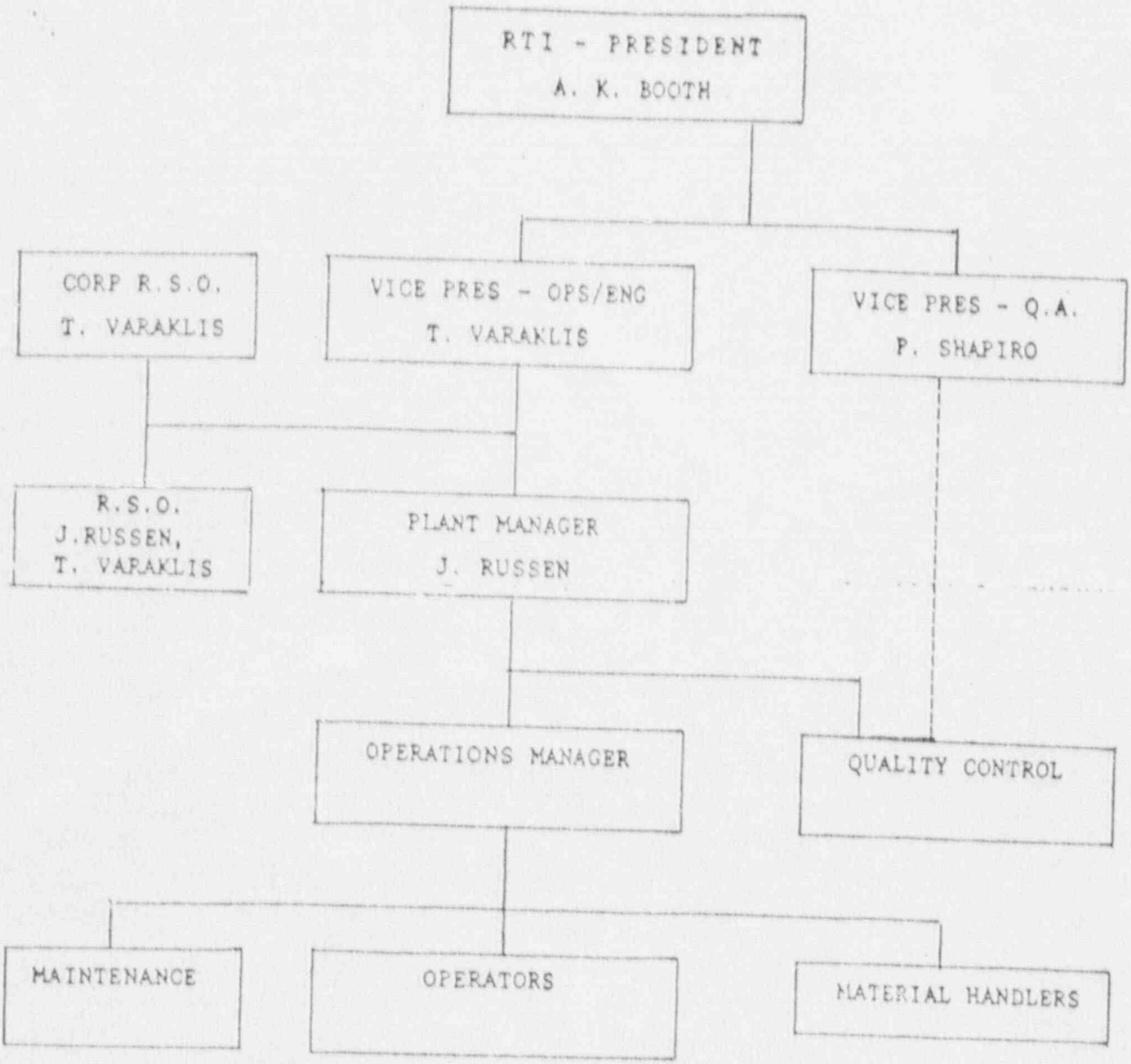
Mathematics and calculations basic to the use and measurement of radioactivity.

Biological effects of radiation.

and if that person has at least 3 months (full-time equivalent) of actual experience in the use of a large commercial panoramic wet-source storage irradiator and in operations associated with irradiator use.

PROCESS TECHNOLOGY, INC. (NORTH JERSEY)

ORGANIZATIONAL CHART



Revised - Oct. 27, 1988

PTI, Rockaway, 29-13613

Item 8 TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS

Training shall be provided to all employees commensurate with the requirements for their positions according to the following categories:

A. General Employee Training (GET)

Required for all employees whose primary work location is at the Rockaway facility. Its purpose is to tell the employees where the Restricted Areas are, what to do in case of an emergency and to advise them about NRC regulations.

B. Radiation Worker Training (RWT)

Required for all employees who may, at times, find it necessary to have unescorted access to a Restricted Area at the Rockaway facility. Its purpose is to inform such employees about the general hazards associated with working around radioactive material, to provide specific guidance about safe work practices when working in Restricted Areas at the Rockaway facility and to advise about NRC regulations.

C. Operator Certification/Responsible Individual Training (OCT)

This training is required for all individuals who will operate the irradiator.

8.1 Training Programs for GET, RWT, AND OCT

A. General Employee Training

GET shall consist of approximately two hours of instruction on the following topics:

Facility layout and arrangement

Potential radiological hazards at the facility

Areas where unescorted access is not permitted

Procedures for fire and radiological emergencies

NRC Regulations - 10CFR 19 and 20

Identification and authority of the Radiation Safety Officer and responsible individuals

The purpose and treatment of Nuclear Regulatory Commission inspectors

B. Radiation Worker Training

In addition to GET, RWT shall consist of at least four hours of instruction on the following topics:

Risks from occupational radiation exposure

Risks from pre-natal radiation exposure (for female radiation workers)

Time, distance, and shielding to minimize radiation exposure

Radioactive contamination and its control

Radiation Monitoring Devices

Worker responsibilities, including policy on drug and alcohol abuse

Successful completion of RWT requires the passing of a written examination with a grade of at least 70 percent. A worker who fails an examination may receive additional training in the area(s) in which the examination demonstrates that the worker's knowledge is deficient. The worker may be given a repeat examination. An individual must pass RWT in order to work in a restricted area.

C. Operator Certification Training

Training outlined in Table 8-1 shall be required for certification. This training program shall provide for 40 hours of instruction. Written examinations shall be given throughout the course of instruction, and a final examination shall be given at the end of the training. A score of 80 percent shall be required to pass an examination on a topical area, and an average of 85 percent overall shall be required to pass the course. A trainee who fails an examination shall receive

additional training in the area(s) which the examination demonstrates that the trainee's knowledge is deficient.

The trainee may be given a repeat examination. At least half of the questions on a repeat examination shall be different from the questions on the original examination. A trainee who has received equivalent training on material outlined in Table 8-1 from an educational institution or another facility may be permitted to take the test without the 40 hours of instruction.

On-the-job-training (OJT) shall consist of supervised operation of an irradiator and radiation safety related equipment covering all aspects of the formal training in a practical setting. Part of the OJT may be taught on a panoramic wet source-storage irradiator other than the Rockaway irradiator, but at least 30 days of OJT shall be on the Rockaway irradiator.

A minimum of three (3) months shall be spent in instruction, practical training, and on-the-job-training. Following successful completion of the Operator Certification Training program, and having passed the practical exam, the operator candidate may be appointed, in writing by the Radiation Safety Officer as a certified operator.

8.2 Course Instructor

A. General Employee Training

The Plant Manager is responsible for providing GET. The course instructor will be appointed by the Plant Manager based on experience and/or training.

B. Radiation Worker Training

The individual who provides Radiation Worker Training:

Shall have a bachelor's degree in Health Physics or a related field, or

Shall have a combination of 3 years applicable experience and/or training.

C. Operator Certification/Responsible Individual Training

The Plant Manager is responsible for the OCT program outlined in Table 8-1. Course instructor(s) will be designated by the Plant Manager based on experience and/or training for the particular course(s).

The Plant Manager is responsible for on-the-job-training. He may be assisted by responsible individuals.

8.3 Records of Training

Records documenting the training of each individual will be maintained at the Rockaway facility. These training records will be updated as additional training is received, and the records will be retained for a period of at least three (3) years following termination of employment.

8.4 Refresher Training

A. General Employee Training

As needed regarding updated NRC Regulations.

B. Radiation Worker Training

Refresher training for radiation workers will be conducted annually for at least two hours.

C. Operator Certification Training

Refresher training for plant operating personnel will be conducted on an annual basis for at least four hours. This training will be conducted by a person designated by the Plant Manager based on experience and/or training. Completion of annual refresher training will be documented in the individual's training file.

TABLE 8-1

OPERATOR TRAINING CURRICULUM

Basic Radiation Theory

- Theory of the Atom
- Radioactive Decay
- Half-life
- Sources of Radiation
- Definitions
- Units of Measurement

Effects of Ionizing Radiation on the Body

- Acute/Chronic Exposure
- Prompt/Delayed Effects
- Radiation Sickness
- Accidents in Irradiation Facilities

Federal/State Regulations

- Standards for Protection Against Radiation (10CFR Part 20)
- Notices, Instructions, Reports and Inspections (10CFR Part 19)

Personnel Radiation Exposure, Control, Techniques and Responsibilities

- Time, Distance & Shielding to Minimize Radiation Exposure
- Shielding Materials
- Exposure Limits
- Radiation Surveys
- Personnel Radiation Monitoring Devices
- Personnel Responsibilities
- Rules of Thumb

Radioactive Contamination

- Loose Surface Contamination
- Fixed Contamination
- Waterborne Contamination
- Contamination Control

Table 8-1 (continued)

Radiation Monitoring Devices

- Portable Survey Instruments
- Area Monitor Operation
- Maze Monitor Operation
- Swipe Technique
- Counter Scaler Operation
- Radiation (quarterly) Survey

Facilities Review

- Irradiator Construction
- System Components (location/function)
- System Design Safety Features
- System Modes of Operation
- Demineralizer Plant Construction & Operation

Laboratory Procedures

- Leak Testing of Sealed Test Sources
- PH Meter
- Resistivity/Conductivity meters

Dosimetry

- Dosimeter - Types and Ranges
- Dosimeter Reading, Calculating Doses and Recording
- Dose Mapping
- Documentation

Administration

- FDA/USDA Considerations
- Good Manufacturing Practice
- Correct Log Entries
- Review of Logs
- Instruction/Use of All Forms for Processing and Documentation
- Product History Records

Table 8-1 (continued)

Operations

Forklift Operation
Loading/Unloading Trucks
Care/Maintenance of Forklift
Warehouse Housekeeping
Product Description (calculations, cu ft/carton, density of containers)
Documentation of Damaged Product
Receiving/Shipping of Customer Product
Demineralizer Monthly Radiation Survey
Water Temperature/Demineralizer Resistivity
Irradiator Pool Water Level
Module Transfer
Loading/Unloading Co60
Safety Interlock Testing
Military Time/Julian Date
Start Irradiator (in all modes of operation)
Updating Customer Dwells
Calculations

License Review

NRC Material License
NRC Defect Reporting (10CFR Part 21)
NRC Notification (10CFR 20.403)
Plant Changes/Modifications

Fire Training

Annual Fire Test
Fire in Radiation Room (emergency)

Preventative Maintenance

Pneumatics:

a) Rebuilding/replacing piston seals
b) Repair of airline fitting
c) Rebuild/replace solenoids

Electrical:

a) Replace radiation room wiring
b) Replace limit switches

Table 8-1 (continued)

Preventative Maintenance (continued)

General Maintenance:

a) Conveyor
b) Grease/lubricate necessary components
c) Air compressor system
d) Change dimineralizer water filters
e) Dimeneralizer regeneration
f) Make-up water treatment system cartridge and resin replacement

Item 9 FACILITIES AND EQUIPMENT

9.1 Basic Facility Design and Construction

A. Layout and Arrangement

RTI Dwg. RT10101110 shows the layout and arrangement of the Rockaway irradiator and its surroundings, drawn to a scale of 1/4 inch = 1 foot. The facility has two pools, an irradiator pool and a storage pool. The pools are connected by a 6 inch diameter stainless steel pipe used to transfer source pencils from one pool to the other (called the "transfer pipe"). The irradiator pool provides wet-storage for the panoramic wet-storage irradiator. The storage pool is for storage only of pencils that are not being used in the irradiator.

A 6 inch diameter stainless steel pipe connects the storage pool to a dry pool in Building 62, adjacent to the storage pool room. The dry pool was backfilled with granular fill and covered with an eight (8) inch concrete slab in the Spring of 1988.

To the left of the radiation room maze is the equipment room that houses the Ventilation System. To the right of the radiation room maze is the storage pool room that houses the storage pool, the Water Treatment System, and the retention tank. The control room is near the maze entrance/exit. The remaining floor space is taken up by the warehouse.

B. Biological Shield and Irradiator Pool Structure

The RTI Model 2102-B irradiator is surrounded by a concrete biological shield. The facility is constructed of ordinary reinforced concrete having a density of 147 lb/cu ft.

The dimensions of the radiation room biological shield are shown in RTI Dwg. RT10101110. The shield is attached to the warehouse and is designed to reduce the average radiation level to less than 1.0 mrem/hr on all accessible surfaces (excepting the roof) when utilizing the maximum licensed quantity of radioactive material. The roof will be labelled either "Radiation Area" or "High Radiation Area" as appropriate. In addition, shielding will be utilized on the roof to keep exposures ALARA.

The roof of the radiation room is shown in Section A-A of RTI Dwg. RT10101110. A steel reinforced concrete plug is installed in the roof of the radiation room above the cell pool. The roof plug can be removed by a yard crane to allow access for radioactive source shipping casks.

The irradiator pool is rectangular. The pool dimensions are shown in RTI Dwg. RT10101110. The irradiator pool is constructed of ordinary reinforced concrete with a density of 147 lb./cu. ft. The interior pool walls are lined with industrial tile. The exterior pool walls are covered with a waterproof membrane to prevent seepage of pool water into the surrounding earth.

C. Storage Pool Structure

The storage pool is a circular cylinder, 8 feet in diameter by 19 feet deep. The pool liner is 3/16 inch thick, type 304 stainless steel, butt welded inside and outside. The ground condition around the pool liner is solid rock. The hole into which the liner was placed was created by blasting. After the liner was installed, the hole was backfilled with lean concrete and compact soil.

D. Points of Access into Radiation Room

As shown in RTI Dwg. RT10101110 , there is a single access way into the radiation room maze that leads to the radiation room. This access way is blocked by an interlocked personnel door. Another possible access is

by removal of the shield plug that is in the roof of the radiation room. The location and physical size of the radiation room shield plug prevents its unplanned, inadvertent, or clandestine removal. The plug is in the roof and weighs approximately seven tons.

E. Access Control Devices

1. Maze Access Control - The interlocked personnel access door at the entrance to the maze is electrically interlocked with the source racks and maze monitor. Violation of the interlock systems will immediately shut down the irradiator.

   The maze personnel access door interlock system consists of the following:

   a. A switch that prevents irradiator startup, if the door is not closed.

   b. An electric latch that locks the door shut while the irradiator is in operation. The irradiator key will not unlock the door if the maze radiation monitor detects a high radiation field in the maze. It would still be possible to open the door from the inside, however read c., next point.

   c. A microswitch mounted at the top of the door will automatically shut down the irradiator, if the door is opened during irradiator operation.

   d. A mechanical lock that must be opened with the same key that is required for operation of the irradiator.

   e. A pneumatic coupling is located in the direct pneumatic line to the source hoist. When the pneumatic line is separated by disconnecting the coupling, it cuts off the air pressure to the source hoist Consequently, the source cannot be lifted from its shielded position at the bottom of the irradiator pool. The pneumatic line that contains the coupling crosses the mazeway just beyond the personnel access door at about waist high. Failure to disconnect this line when entering the maze must be intentional. Since the disconnection of this line is safe and easy to accomplish, there is no incentive to duck under or to climb over it.

The irradiator key is required to open the door from the outside, but a key is not required to open the door from the inside. This feature satisfies the requirements of Section 20.203(c)(6)(i) of 10CFR20.

2. Radiation Maze Monitor System - This system indicates radiation levels in the maze and controls personnel access to the maze. This system is operational at all times.

   An RMS II Maze Monitor is located in the control room connected to an Eberline G-M detector mounted on the wall at the first turn of the maze entry.

   The RMS II system will give an indication if the radiation level in the maze is excessive (>1.0 mRem/hr) when the source plaque is in the "fully-shielded" position. This would indicate that a sealed source may have been released from the source plaque or that a significant contamination problem may exist. If the radiation level in the maze is >1.0 mRem/hr, the RMS II system will keep the maze personnel access door locked.

   The RMS II system low set point is 1.0 mRem/hr. Following the initiation of an irradiator shutdown, once the low set point is reached, a time delay is activated. At the end of the time delay, the maze personnel access door may be unlocked.

F. Irradiator Control Devices

The irradiator control system provides the following control devices, alarms, and signals:

1. Start Switch - A key operated switch that is used to raise the source plaque for "normal" operation. When the start switch is turned to the off position, the source plaque will be lowered automatically to the fully shielded position.

2. Stop Button - A red pushbutton on the control console that activates the safety circuit and causes the source hoist to automatically lower the source plaque to the fully shielded position.

3. Emergency Cable - A stainless steel cable along the walls of the radiation room at shoulder height. The cable is connected to the safety circuit. When the cable is pulled the source plaque is lowered to the fully shielded position. A startup will not be allowed until the emergency cable is reset and the Master Control Relay is reset by pressing the Reset button on the control panel.

G. Irradiator Control Signals

1. Machine Ready - A message on the control monitor that is on when the irradiator is ready for start-up. An irradiator start-up cannot be initiated without this indication.

2. Machine On - A message on the control monitor that is on when the irradiator is in normal operation.

3. Source Up - A message on the control monitor that is on when the source plaque is in the unshielded, fully raised position. For this message to come on, each source plaque must actuate a limit switch mounted on the guide cable.

4. Source Down - A message on the control monitor that is on when the source plaque is in the fully shielded position. This message will be on when the source hoist cylinder is in the discharge position and has actuated a limit switch mounted on the source hoist frame.

5. Index Interrupt - A message on the control monitor that is on when the source pass mechanism fails to complete one full cycle of shuffles within a preset time. This causes the source plaque to automatically lower to the fully shielded position.

6. Exhaust Fan - A message on the control monitor that is on when the exhaust fan is on.

7. Filtration Pump Running - A message on the control monitor that is on when the water filtration pump is running.

8. High Temperature - A message on the control monitor that turns on if the temperature in the radiation room reaches 125 degrees F. This will automatically cause the irradiator to shut down immediately.

H. Irradiator Control Alarms

1. Source-in-Motion Alarm - This feature causes a distinctive alarm to be sounded inside and outside of the radiation room at any time that the source plaque is in motion. Once initiated, the alarm continues to sound until the source plaque is in the fully (up) unshielded position or in the fully (down) shielded position. The alarm warns anyone in the radiation room that the source is in motion and allows time for the emergency cable switch to be pulled. This feature complies with the requirements of Section 20.203(c)(6)(iv) of 10 CFR 20. This alarm is audible in the radiation room, control room and the warehouse.

2. Radiation Alert - A yellow light on the RMS II monitor in the control room warns personnel that the radiation in the maze is above a preset low level value. The personnel maze access door cannot be unlocked from the outside when the yellow light is on. When the source plaque is raised, the yellow light comes on and stays on while the source plaque is up.

3. High Radiation from Storage Pool - An area radiation monitor that is mounted approximately 2 feet over the storage pool will sound an audible alarm in the event of a high radiation level. The

alarm in the event of a high radiation level. The 19-foot deep pool would tightly restrict the spread of the direct radiation from the radioactive source material stored at the bottom of the pool such that even the loss of all pool water would not be hazardous to persons working in the warehouse. This Alarm is audible in the control room and the warehouse.

4. Pool Water Level - A monitor connected to a float system in the storage pool will cause a fault alarm to sound if the water level reaches the "high" or "low-low" level settings. The system will automatically shutdown the irradiator and lower the source to the fully shielded position when this occurs. This alarm is audible in the control room, the storage pool room and the warehouse.

I. Other Irradiator Control Safety Features

1. Source Hoist Timer - This feature requires the source plaque to travel from the fully down (shielded) position to the fully up (unshielded) position within a preset time. If the source plaque does not travel the distance within the preset time, a shutdown signal is generated, and the source plaque is lowered to its fully shielded position. The operator is provided with an indication of the problem so appropriate corrective action may be taken.

2 Startup Safety Delay Switch - This is a switch that is mounted on the far wall of the radiation room. Each time the source plaque is raised, the operator must:

(a) Unlock the personnel access door using the irradiator key.
(b) Enter the maze, walk to the far wall of the radiation room, and turn on the startup safety delay switch using the irradiator key. (This starts a 90 second timer.)
(c) Connect the Source Hoist Air Hose.
(d) Exit the maze.
(e) Close and lock the personnel access door.
(f) Insert the irradiator key into the switch and start the irradiator.

If this sequence is not completed in 90 seconds, the source plaque will not be raised. The purpose of this startup sequence is to ensure that the operator has entered the radiation room for a physical inspection and to be certain that nobody is in the radiation room or maze. This feature complies with the requirements of Section 20.203(6)(v) of 10 CFR 20.

3. Source Hoist Control - This control is inherent to the irradiator design and function. The source plaque will lower to the fully shielded position by its own weight, if air pressure is not supplied through the source hoist control valve to the source hoist. The source hoist control valve must be continuously energized with electric power to accomplish this. Therefore, loss of electric power or air pressure will automatically lower the source to its fully shielded position.

4. Maze Monitor Failure - If the RMS II system fails, the irradiator will automatically shutdown and prevent entry to the maze by keeping the personnel access door locked.

5. Safety System Power - Electrical power is supplied to the radiation monitors under normal plant conditions, including times when power is not supplied to the operating console.

9.2 Other Safety Considerations

A. Water Treatment System

The Water Treatment System (WTS) consists of a recirculation pump, a carbon filter, an anion exchange resin bed, and a cation exchange resin bed in series. The inlet and outlet to the WTS is monitored by an in-line resistivity meter. The WTS draws water from the top of the irradiator pool and returns it to the top of the storage pool at a flow rate of two to five gallons per minute. [The RSO and NRC Region I shall immediately be notified by telephone if the flow rate is below 2 gpm for five consecutive days.] Neither the inlet pipe nor the outlet pipe extends more than two feet below the normal surface of the pool. The transfer pipe provides the circulation path between the two pools.

Water PH and Resistivity measurements will be taken monthly and recorded.

The WTS is capable of keeping the water clean; the lower resistivity limit is 100,000 Ohm-cm. The resistivity meter is routinely monitored. When the resistivity of the water from the WTS reaches 100,000 Ohm-cm, the resin beds shall be regenerated. (The RSO and NRC Region I shall immediately be notified by telephone if the irradiator pool resistivity is out of specification for more than 10 days out of 30 days.)

Regeneration shall be performed as per RTI Procedure No. 9.502 current revision.

The water level in the pools shall be continuously monitored. A signal generated at a low level actuates automatic makeup of pool water. Makeup water shall be added through the Makeup Water Treatment System that is described in Item 9.2.B. A signal generated at a "Low-Low" set point (15" below normal) will cause automatic shutdown of the irradiator. An inspection will be made to determine whether the water depletion is from normal means or from a major leak.

The WTS shall be monitored continuously for radioactive contamination by using a low range, fixed radiation survey meter. The radiation monitor is fixed against the charcoal bed demineralizer. Any increase in waterborne radioactivity above 2X background will cause automatic shutdown of the irradiator and lower the source to it's fully shielded position.

The in-line resistivity instrument used at the Rockaway facility measures the resistivity of process water. If the water temperature is 25 degrees C, the bridge will indicate directly the resistivity of the water. If the water temperature differs from 25 degrees C, a thermistor mounted in thermal contact with the water will cause the bridge sensitivity to change. The temperature co-efficient of the thermistor and associated resistor network is the same as that of the water and causes the bridge reading to be independent of water temperature and dependent upon the ionic concentration of the water.

The resistivity meter is a solid state device that is relatively free of maintenance problems. However, to ensure proper performance of the meter, the meter will be checked semi-annually by taking samples from

locations upstream and downstream of the meter. Also, to check for stratification of low resistivity water near the bottom of the pools, a sample will be taken from the bottom of each of the pools semi-annually. These samples will be checked with a laboratory conductance meter.

In the event that measurements from the two meters do not agree within an allowable tolerance, then the discrepancy will be reconcilled.

In the event that sample measurements from the bottom of the pools do not agree within an allowable tolerance with measurements made with the in-line resistivity instrument, then the discrepancy will be corrected.

The water samples taken from the bottom of the pools semi-annually will be analyzed for radioactivity to ensure that leakage from the sources is not stratifying near the bottom of the pools.

B. Makeup Water Treatment System

The Makeup Water Treatment System (MWTS) is located in the storage pool room. The MWTS consists of a cartridge type prefilter, a mixed resin bed demineralizer and a cartridge type postfilter. When makeup water is needed, it is pumped into the retention tank from a well on the plant site, or backwash from a previous WTS regeneration is used. The retention tank is then temporarily connected to the MWTS with hoses, and the water is circulated through the MWTS until the resistivity of the water on the discharge side of the MWTS is greater than 100,000 Ohm-cm. The clean makeup water is added to the storage pool via the hose from the discharge side of the MWTS.

The Rockaway facility does not use municipal water. Nevertheless, to prevent possible contamination of the well from which makeup water is drawn, the water line has a backflow double check valve installed to prevent the migration of pool water back into this line.

C. Radiation Room Ventilation System

The radiation room is equipped with a ventilation system that is capable of a maximum air turnover rate of 20 times per hour. If the ventillation system malfunctions, the source will automatically lower to it's fully shielded position. If the ventillation system is not functioning the irradiator cannot be operated. This system is designed to maintain ozone levels below OSHA limits at all times when the irradiation room is accessible to personnel. Ozone concentrations shall be measured quarterly to verify actual concentrations.

D. Radiation Room Fire Protection

The radiation room is equipped with a heat sensing device that would automatically sound an alarm, give a message indication in the control room, and lower the source to it's fully shielded position.

The maze is equipped with a smoke detector that would sound an alarm and automatically lower the source to it's fully shielded position room in the event of a fire.

A manually operated sprinkler system is provided. A manually operated system provides more flexibility than an automatic system in handling the types of fires that might occur without the possible damage of large quantities of product.

E. Source Plaque Protection

Products for irradiation are loaded into carriers which are conveyed into the irradiator. Neither the carriers nor the products ever touch the source. As an added protection, the source plaque is protected by a collision device. This device consists of a spring loaded switch mounted at each end of the source pass to detect any obstruction on a carrier which would interfere with the source plaque and might otherwise prevent the source from lowering to it's fully shielded position. When activated, the cylinder moving the carrier will automatically return to it's original position, the source will lower to it's fully shielded position, and the appropriate fault indicator will be displayed on the console.

9.3 Ameray Portable Irradiator

This irradiator is a portable lead shielded unit with the upper unit containing the Cobalt-60 source and the lower unit containing the irradiation chamber. Irradiation of various materials is conducted by placing the material in the chamber and locking the chamber doors. The source cannot be removed from its shielded position during operations but may be manually lowered with the proper use of keys. This lowering operation can only occur when the chamber shield door is in the irradiate position.

The upper storage section of the irradiator is designed to serve as a shipping container. A special shipping cover and skid is provided. External dose rates are in compliance with the Federal shipping regulations for radioactive sealed sources.

The Ameray Portable Irradiator is located in a restricted area. This irradiator is for dosimetric calibrations. Procedure 4.115 will be used for safe operation of this irradiator.

Item 10 RADIATION PROTECTION PROGRAM

10.1 Responsibilities

North Jersey Process Technology Inc. (PTI), as licensee, is responsible for the conduct of the irradiator program and all actions of employees of PTI. In addition to the requirements set forth in 10 CFR Part 20, the management and workers of PTI shall make every reasonable effort to maintain radiation exposures, and releases of radioactive materials in effluents to unrestricted areas, as low as is reasonably achievable (ALARA). The responsibility for ensuring performance of the corporation in satisfying licensee commitments, agreements and responsibilities is delegated to those positions as delineated in the following items. Refer to Figure 7.1 for the organization hierarchy.

A. The President is responsible for running the corporation in a safe and profitable manner in full compliance with NRC regulations.

B. The Corporate Radiation Safety Officer reports to the President and has corporate responsibility for ensuring full compliance with all elements of the Radiation Protection Program.

C. The Plant Radiation Safety Officer reports to the Corporate RSO and has responsibility for ensuring full compliance with all elements of the Radiation Protection Program for the facility.

D. The Plant Manager reports to the Vice President Operations/Engineering and is in charge of all operations of the RTI Rockaway facility. In matters of radiation safety, the Plant Manager is subordinate to the Radiation Safety Officer.

E. The Operations Manager reports to the Plant Manager on administrative matters and to the Radiation Safety Officer on technical matters. He is the Radiation Safety Supervisor and acts with full authority in routine radiation matters in the absence of the Radiation Safety Officer. Only a responsible individual, as defined in Item 7, or RSO may act for the Operations Manager in his absence.

The Operations Manager shall have training consistent with that of the Operator/ Supervisor, outlined in Item 8, and at least one year of experience at operating a large commercial gamma irradiator.

The Operations Manager has the authority to shut down the facility if he believes that continued operation would be in violation of NRC regulations or license commitments. He is directly responsible for the safe performance of the Operator/Supervisors and Material Handlers.

F. When the irradiator is in operation, there shall be a responsible individual on duty and available to the facility. The responsible individual shall ensure that operations are conducted in a safe manner including strict adherence to the radiation safety procedures and the license commitments.

G. The person in charge of Quality reports to the President and is responsible for implementing a Quality Assurance program based on the applicable criteria of 10 CFR Part 50 Appendix B.

H. The person in charge of Engineering reports to the President and is responsible for ensuring that:

A safety review is performed on design and installation of plant changes and modifications that may impact safe operation of the irradiator.

The operating procedures are adequate for safe operation of the facility and for full compliance with NRC requirements.

10.2 Radiation Protection Program Specifications

A. General Rules of Radiation Safety

1. The Radiation Safety Officer, or his designee, is responsible for all operations involving radioactive sealed sources.

2. All operations are to be conducted in strict compliance with the "Standards for Protection Against Radiation", 10 CFR Part 20.

3. Personnel working in restricted areas shall be instructed as to the nature of radiation hazards, the functions and use of safety devices, and general rules of radiation safety.

4. Personnel shall be instructed to report any unsafe conditions to their supervisor. They shall be informed of the reporting procedures through training and by the posting of 10 CFR Part 19.

5. Personnel who routinely work in a restricted area shall be assigned a film badge. The film badge shall be worn at all times while in the restricted area.

6. An individual who does not have a permanently assigned film badge and who requires entry into a restricted area will be assigned a self reading pocket dosimeter. Any individual who requires entry into a restricted area for more than 5 days out of any 30 day period will be assigned a film badge.

7. Each individual assigned a film badge shall wear only that particular numbered badge assigned to him.

8. Film badges should not be removed from the facility, except for travel to another PTI facility.

9. The restricted area of the facility shall be surveyed quarterly with a radiation survey instrument. Swipes will be taken on potentially contaminated surfaces. Records of these surveys will be kept for inspection.

10. Pool water shall be sampled for radioactivity monthly. The WTS shall be surveyed monthly with a radiation survey instrument. Records of these activities shall be kept for inspection.

11. A responsible individual shall survey the radiation room with a radiation survey instrument during each irradiator entry. This procedure satisfies the requirements of Section 20.203(c)(6)(vi), 10 CFR Part 20.

12. Radiation warning signs shall be posted in accordance with Section 20.203 "Standards for Protection Against Radiation", 10 CFR Part 20.

13. Eating, drinking or smoking [illegible] be permitted within a restricted area.

14. Operations involving irradiator source receipt or shipment shall be under the direct personal supervision of the Radiation Safety Officer or his designee.

15. Maintenance or repair of any equipment or controls that involve radiation safety shall be authorized and approved by the Radiation Safety Officer or the Radiation Safety Supervisor.

16. Facility physical changes that may impact the safe operation of the irradiator shall conform to this license and be approved in advance by the Radiation Safety Officer and the Design Review Committee.

17. Changes in facility operations shall be according to procedures that have been reviewed and approved by the PTI management.

18. An item that has been in contact with radioactive material(s) shall be stored in the restricted area of the facility until it has been surveyed. If the item is determined to be contaminated, it shall be decontaminated and removed from the restricted area, or it shall be stored for disposal at a licensed burial site.

19. Safety interlock tests of entry control devices shall be performed when the source plaque is initially raised to it's irradiate position. On any one day in which the source has been lowered to the shielded position, a safety interlock test

shall be performed. One day is defined as 12:01 AM to 11:59 PM. Records shall be kept of the dates, times, and results of these tests.

B. ALARA Program

1. The ALARA program is a commitment on the part of PTI to limit personnel exposure to ionizing radiation to as low as reasonably achievable for operation of the facility. The ALARA program also applies to the company's commitment to limit the radioactivity released in effluents at ALARA levels.

2. The design of the facility is such that the whole body direct radiation dose received by employees should be extremely low, and no radioactive material should be released from the facility. The likelihood of source capsule failure is very small so the operation of the irradiator will provide a clean and safe operation.

3. Monitoring of the ALARA program shall be the responsibility of the Radiation Safety Officer. All employees are responsible for the ALARA program at NJPTI.

C. Protected and Restricted Areas

1. A protected area has been established at the boundaries of the perimeter fence enclosing the facilities and surrounding property for security purposes. The fence is closed except for necessary access points, which provide limited access points to the property. The perimeter fence access points are closed and locked when the facility is not staffed. Located within the protected area are restricted areas for which access is controlled for radiological purposes. Restricted areas are the fenced area in the storage pool room, the fenced area in Building 62, the roof over the radiation room, and the radiation room including the maze.

2. The personnel access points to the restricted areas are within the PTI Protected area. Entrance into the PTI restricted areas is limited to PTI employees and escorted visitors. The entrances to the PTI protected area are maintained locked against entry except as necessary for plant operations. The PTI protected area shall be locked when not occupied by operations personnel.

D. Radiation and Contamination Limits

1. Radiation exposure limits shall be in accordance with Section 20.101 of "Standards for Protection Against Radiation", 10 CFR Part 20. Company action limits shall be established as follows:

   a. Any person receiving 200 mRem or more whole body exposure in any one month will not be allowed to enter a restricted area for the remainder of that calender quarter. A thorough investigation will be made to determine the cause of the exposure and to reduce such exposures in the future.

   b. No personnel will be allowed to receive more than 600 mRem whole body exposure in any calender quarter.

   c. Any person receiving 40 mRem or more whole body exposure in any one month will have their activities for that month investigated in order to determine the cause of the exposure. Actions will be taken to maintain future exposures ALARA.

2. Loose surface contamination limits shall not exceed 1000 dpm/100 square cm. in restricted areas. Company action limits shall be established at 200 dpm/100 square cm. If the company action limit is exceeded, the Radiation Safety Officer shall review the findings with appropriate company personnel. If the maximum contamination level is exceeded, procedures and equipment shall be changed, if necessary, to ensure that contamination levels are returned to ALARA conditions.

3. Maximum water borne concentration of Cobalt-60 shall be in accordance with Section 20.106, 10 CFR Part 20 in restricted and in unrestricted areas. Company action limits for Cobalt-60 in water have been established at 5 pCi/ml in restricted and in unrestricted areas.

4. Maximum airborne concentrations of Cobalt-60 shall be in accordance with Section 20.106, 10 CFR Part 20 in restricted and in unrestricted areas. The company does not anticipate any airborne radioactivity based on its limits for loose surface and waterborne radioactivity.

E. Routine Radiation and Contamination Surveys

1. During initial entry into the radiation room after irradiator operation, a radiation survey shall be conducted by a responsible individual with a low range gamma survey instrument. The purpose of this survey is to verify that the source plaque is in the fully shielded position and that a high radiation area no longer exists. This survey need not be recorded.

2. Prior to removal of any material from the shielded volume of the irradiator pool or storage pool that has been in close proximity to sealed sources, a radiation survey shall be conducted by a responsible individual to verify that source material or contamination is not being removed from the pool. This survey need not be recorded.

3. A monthly check of the proper functioning of the WTS radiation monitoring system will be conducted using a portable survey instrument. Records of these surveys will be kept for inspection.

4. A quarterly radiation and contamination survey shall be conducted of the restricted areas of the facility and areas adjacent to the restricted areas. This procedure shall also be done at times when there is an increased potential for contamination. The survey shall consist of approximately twenty (20) swipe samples taken randomly throughout the restricted area and areas adjacent to the restricted area that may be likely to concentrate loose surface contamination. Particular attention shall be concentrated on access and exit traffic areas to the restricted area. Swipes shall be taken over a 100 square cm. area where possible. Radiation surveys shall be conducted within the radiation room with the irradiator shut down and external to the irradiator shield including the roof area with the irradiator in operation. Swipe samples shall be analyzed with a counter scaler and its associated detector. Survey results shall be recorded on an appropriate survey form and retained on file.

F. Notification of Personnel and Posting of Restricted Areas

1. Notices, instructions and reports to workers shall be in accordance with 10 CFR Part 19, "Notices, Instructions and Reports to Workers; Inspections".

2. Posting of restricted areas shall be in accordance with Section 20.203, "Standards for Protection Against Radiation", 10 CFR Part 20.

G. Personnel Monitoring

1. Personnel monitoring shall be conducted in accordance with Section 20.202, 10 CFR Part 20, utilizing film badges.

2. Film badge and dosimetry issue shall be controlled by the Radiation Safety Supervisor, or his designee.

3. Records of personnel exposure to ionizing radiation shall be maintained by the Radiation Safety Officer, or his designee, in accordance with Sections 20.401(a) and (c)(1), 10 CFR Part 20.

4. Self-reading personnel dosimeters shall be available at the facility for monitoring during an accident situation or during non-routine operations where there is potential for acute exposure to radiation, such as during the loading of Cobalt-60 into the irradiator.

10.3 Personnel Monitoring Equipment

Film badges shall be assigned to personnel who routinely work in a restricted area. The film badges shall be changed once a month and sent to a qualified independent laboratory for analysis and reporting. Presently, film badge dosimetry services for NJPTI are being provided by R.S. Landauer Company Jr. & Co., Division of Tech/OPS, Inc., 2 Science Road, Glenwood, Illinois 60425-1586.

10.4 Radiation Detection Instruments

At least one calibrated, operable radiation survey instrument with a range up to at least 1 R/hr should be available at all times and shall be available when the source plaque is in the fully unshielded position. All instruments used for radiation surveys shall be calibrated

so that readings that are at least plus or minus 10 percent of the actual values over the range of the instrument are attainable. Each such instrument shall have a calibration label attached that shows the date of the last calibration and the due date of the next calibration. All such instruments shall be calibrated at intervals not to exceed 12 months and/or after servicing. Battery changes are not considered servicing. The calibration records shall be kept for a minimum of 2 years. The instruments will be calibrated by a service authorized by the NRC or Agreement State to provide such service or by RTI, Inc. Presently, NJPTI is using GP Instrument Services, Inc. to calibrate the radiation measuring instruments.

10.5 Leak Testing

The sealed source array will be leak tested by continuous monitoring of the Water Treatment System with the radiation monitor. If radioactivity is detected 2X above background, the facility shall be shut down. The source modules shall be wipe tested to determine which module may contain a leaking [illegible]ncil.

[illegible]on-exempt dry storage sealed sources , except the Cobalt 60 that is in the Ameray Portable Irradiator, shall be leak tested semi-annually by taking a 100 sq cm swipe sample and analyzing it in accordance with Procedure 9.301, "Calibration and Use of the Counter Scaler". ["Non-exempt" refers to quantities and concentrations of radioisotopes that exceed the limits specified in Schedules A and B of 10 CFR Part 30.]

The sealed source that is in the Ameray Portable Irradiator shall be leak tested semi-annually by taking a 100 sq cm swipe sample and analyzing the sample in accordance with Procedure 9.301. The sample is taken by placing the filter paper on the platform of the target area in the Irradiation Chamber when the source is in the shielded position. After the chamber is closed and safely secured, the source is released from its dry storage position and lowered into the Irradiation Chamber to the area on the platform where the filter paper is located. The source is then rotated at least 360 degrees to ensure that all surfaces of the source contact the filter paper. The source is withdrawn into the shielded position. All safety devices are checked and released. The Chamber is opened, and the filter paper is removed and analyzed.

10.6 Operating and Emergency Procedures

In Appendix A, there is a list of the procedures that are available to each certified operator and responsible

individual. The procedures provide instructions for personnel monitoring, loading/unloading of Cobalt-60, startup, shutdown and precautions to be taken before startup. Instruction in performing radiation surveys to ensure compliance with the provisions of Section 20.203(c)(6) of 10 CFR Part 20 are given in both the training program and the procedures. Instruction in what emergencies to expect and what actions to take are included both in the training program and the procedures.

The instruction stresses that the Radiation Safety Officer and/or Radiation Safety Supervisor are to be notified immediately in case of an emergency. Instruction is also provided to operators in associated irradiator operations both in the training and the procedures. Copies of the operating and emergency procedures shall be distributed and properly implemented by all applicable PTI personnel.

10.7 Hospital Arrangements

For radiation overexposures, arrangements have been made at St. Barnabas Hospital in Livingston, New Jersey. A letter of commitment from the hospital's management is in Appendix B.

Item 11 WASTE MANAGEMENT

Disposal of the licensed material will be in accordance with Section 20.301(a) of 10 CFR 20. Packaging and transfer of radioactive waste for transport and disposal will be in accordance with applicable regulations in 10 CFR Parts 20, 30, 61 and 71; and 49 CFR Parts 170 through 189.

Radiation Technology, Inc.
Process Technology Subsidiaries

Procedure

Facility:	Department:	Page
North Jersey	Quality Assurance	1 of 3
Subject: Ameray Portable Irradiator Operation		Section/Number/Revision: 4.115 original
		Effective Date: October 3, 1988
Prepared By: John D. Schlecht	Approved Technically: John D. Schlecht	Approved By Quality: Paul O. Shapiro

1.0 PURPOSE

To outline the operation of the Ameray Irradiator.

2.0 SCOPE

Applies to all persons operating the Ameray Irradiator.

3.0 REFERENCES

10CFR20

4.0 DEFINITIONS

None.

5.0 EQUIPMENT/ MATERIAL REQUIREMENTS

5.1 Portable Ion Chamber with Range from 1 mR/hr to 1000 R/hr.

6.0 SAFETY REQUIREMENTS

6.1 At least two people must be present at all times during operation of the Ameray Irradiator. One of the persons present shall be the V.P. of Quality ,the Corporate Physicist, the RSO, or an individual trained and certified by one of the former. All people present must have film badges, and at least one person will have a pocket dosimeter.

7.0 PROCEDURES

7.1 Turn portable survey instrument on and ensure that it is functioning properly.

7.2 When approaching the Ameray Irradiator ensure that survey meter remains below 2 mR/hr. If dose rates exceed 2mR/hr, leave the area and notify RSO immediately.

7.3 Monitor the external surfaces of the irradiator with the survey meter. If meter registers greater than 10 mR/hr, leave area and immediately notify RSO.

7.0 PROCEDURES (CONT)

7.4 Enter your name, date, time and reason for using the irradiator into the Ameray irradiator log book. Initial your entry.

7.5 Ensure that key "D" is in the lock of the right hand door.

7.6 Place keys "A" and "B" in their proper places on doors.

7.7 Turn keys "A" and "B" to unlock doors.

NOTE: Key "B" will not turn unless "D" is in place.

7.8 Open doors slowly while using survey meter to monitor radiation levels. Immediately close door if radiation level is greater than 100 mR/hr and leave area. Immediately notify RSO of situation.

7.9 Place object(s) to be irradiated in the irradiation chamber. Be sure that 2" diameter red disc on chamber floor is not obstructed by any items.

7.10 Close doors and turn keys "A" and "B" to lock.

NOTE: Keys will not lock unless door is in the closed position.

7.11 Remove keys "A" and "B" and insert them into their places in the Master Lock.

7.12 Place key "C" in the Master Lock.

7.13 Turn key "A" to release lock on rotating disc. Keys "A", "B", and "C" will become secured in place.

7.14 Rotate disc 90 to open position. Red light will illuminate.

7.15 From a position opposite the doors, manually adjust the vertical position of source with preset collar.

7.16 At end of exposure time, pull up drive rod until red line is showing. Lock in place by tightening collar.

7.0 PROCEDURES (CONT)

7.17 Rotate disc 90 to closed position. Red light will extinguish.

7.18 Lock position of disc with key "A".

7.19 Remove keys "A", "B", and "C".

7.20 Unlock doors with keys "A", "B", and "D".

7.21 Open doors slowly while using survey meter to monitor radiation levels. Immediately close door if radiation level is greater than 100 mR/hr and leave area. Immediately notify RSO of situation.

7.22 Remove irradiated items from source chamber.

7.23 Close doors and turn keys "A" and "B" to lock.

7.24 Enter time and initial Ameray irradiator log book.

7.25 Monitor radiation levels at external surfaces of irradiator. If radiation level exceeds 10 mR/hr, immediately notify RSO.

8.0 EXHIBITS

None.

7.0 PROCEDURE (CONT)

7.3 All part replacement and major maintenance activity is to be coordinated by the maintenance supervisor who will assign dates and personnel required. This activity is to be recorded in the item's individual log, (Exhibit A).

7.4 The person assigned to an item will select the proper Maintenance Manual and appropriate tools. The instructions on the Manual must be adhered to.

7.5 All part replacement and major maintenance activity is to be recorded in the item's individual log. (Exhibit A).

8.0 Exhibits

Exhibit - A - Parts Replacement Log Sheet.
Exhibit - B - Weekly Maintenance Schedule.
Exhibit - C - Monthly Maintenance Schedule .
Exhibit - D - Quarterly Maintenance Schedule.
Exhibit - E - Yearly Maintenance Schedule.
Exhibit - F - As - Required Maintenance.

EXHIBIT A

Parts Replacement Log Sheet

Component: _____

_____

Date of Inspection: _____

Parts Replaced/Repaired: _____

_____

Cause of Failure: _____

_____

_____

_____

Remarks: _____

_____

_____

_____

Work Performed By: _____

Date: _____

Work Checked By: _____

Date: _____

EXHIBIT B

WEEKLY MAINTENANCE SCHEDULE

RADIOLOGICAL

Record maximum reading of radiation level at air filter bank.

Record maximum reading of radiation level at carbon filter bed at de-ionizer.

Record maximum reading of radiation level at resin bed.

Check for operation of flashing beacon.

Check for operations of warning light.

Check audible alarm systems.

PNEUMATIC SYSTEM

Check operation and integrity of pneumatic system.

Check oil level in pneumatic lubricators and add oil if necessary.

Check moisture traps in pneumatic system and drain if necessary.

Drain moisture from compressor tank.

Check solenoid valves for leaks.

Check airlines for oil and air leaks.

Check air pressure on gauges.

Inspect all pulleys in source hoists for wear and abnormal operation.

Inspect pulley in cell for wear.

Check source hoist air piston for smooth and proper operation.

MONTH _____			
WEEK			
1	2	3	4

EXHIBIT B

	MONTH _____			
	WEEK			
	1	2	3	4
WATER TREATMENT PLANT				
Check regeneration requirements, chemical levels.				
Check water circulation pump.				
Check water level float switches.				
Check for water leaks.				
Check pressure gauges.				
Record water resistance reading.				
AIR COMPRESSORS				
Record water meter reading.				
Inspect oil level in compressor crankcase.				
Clean air filter.				
Check V - belt for wear and tensions.				
Check output air pressure.				
WAREHOUSE				
Check conditions of forklift battery and change as necessary.				
Check forklifts for:				
. Operations of back-up beeper:				
. Breaks and steering:				
. Hydraulic system for leaks:				
. Fork/up/down/tilt/side-shifts:				
Check stretch-wrapper operation of limit switch and timer:				
Clean stretch-wrapper.				
Check and tighten fasteners on stretch - wrapper.				

EXHIBIT B

	MONTH			
	WEEK			
	1	2	3	4
Check carriers for cleanliness.				
Check for product clearances.				
Check cell and plant lights. Replace lights and bulbs necessary. Destroy burned out bulbs.				

REMARKS: _____

PERFORMED BY: _____

DATE: _____

VERIFIED BY: _____

DATE: _____

EXHIBIT C

MONTHLY MAINTENANCE SCHEDULE

	MONTH			
RADIOLOGICAL				
Check emergency pull cable.				
Confirm accuracy of master timer setting.				
Check source hoist pneumatic interlock hose in maze.				
SOURCE PASS MECHANISM				
Refurbish or replace cylinder as required using spare cylinder.				
NOTE: There is at least one spare cylinder for each cylinder in the entire system.				
Check all transfers for proper alignment and lubricate all wheels				
SOURCE HOIST MECHANISM				
Inspect source hoist cable fraying and wear.				
Check guide cables for tension.				
Check travel times (up and down) of source racks (20 -30 seconds).				
CELL VENTILATION SYSTEM				
Check V - belts on exhaust fan motor. Lubricate fan.				
Check air filter manometer pressure drop.				
Check operation of air-flow switch.				

EXHIBIT C 2 of 3

	MONTH			
STORAGE AREA				
Check turn table and end transfer for alignment and smooth operation. Lubricate all wheels.				
Check cylinder speed and adjust as required.				
Check solenoid valves for air leaks and solenoid coil operations.				
Check and adjust switch actuators for proper actuation point. Check photocell and reflector for proper alignment.				
FORKLIFTS				
Check forklift brake-fluid level.				
Inspect fluid level and conditions of hydraulic system.				
Inspect forklift battery connectors.				
Lubricate forklift mast channels.				
Check and lubricate forklift lift chains and adjust parking brake.				
WATER - CHILLER See Manufacturer's Manual.				
Check cooling water flow through condenser.				
Visual check through sight glass for refrigerant and moisture.				
Check crankcase oil level through sight glass.				
Check pressure drop through chiller				
Check chiller and circulating pump for leaks, also motor and pump operation.				
CARRIERS				
Inspect each carrier for structural integrity.				
Check trolley heads for secureness. Lubricate all wheels.				
Check that doors are functioning properly.				

EXHIBIT C 3 of 3

REMARKS: _____

_____

_____

PERFORMED BY: _____

DATE: _____

VERIFIED BY: _____

DATE: _____

EXHIBIT D

QUARTERLY MAINTENANCE SCHEDULE

	YEAR			
	QUARTER			
	1	2	3	4
IRRADIATOR				
Test high temperature switch setting.				
Check cell temperature.				
Check power interruption time delay.				
Check source pass mechanism shaffle time delay.				
Check source hoist time delay.				
Check source hoist low air pressure switch.				
Check safety start-up 90 second delay timer				
Check roof plug interlock switch.				
MISCELLANEOUS				
Inspect all rails for structural integrity.				
Lubrication of forklift components.				
Check hydraulic pump motor brushes.				
Inspect tilt cylinders for operation and adjustment.				
Check condition of filters in the cell exhaust system.				

REMARKS: _____

_____

_____

PERFORMED BY: _____

DATE: _____

VERIFIED BY: _____

DATE: _____

EXHIBIT E

YEARLY MAINTENANCE SCHEDULE

Check computer control validation. ✓____

Check anti-collision device. ____

Check smoke detector. ____

Check sprinkler system. ____

Check all rails for structural integrity, levelness, and alignment. ____

Check all hangers and hanger rods amd nuts for tightness. ____

Check all limit switches for proper operation and adjustment. ____

Inspect forklift chains for equal tension. ____

Inventory supplies, spare parts, and in-use hand tools. ____

REMARXS: _____

_____

_____

_____

_____

PERFORMED BY: _____

DATE: _____

VERIFIED BY: _____

DATE: _____

EXHIBIT F

AS - REQUIRED MAINTENANCE

Inspect forklift tires for wear and damage. ____

Paint cell and warehouse walls. ____

Inspect shipping/receiving docks, overhead doors, and ramps. _____

REMARKS: _____

_____

_____

_____

PERFORMED BY: _____

DATE: _____

VERIFIED BY: _____

DATE: _____