MAY 29 1990

MEMORANDUM FOR: Those on Attached List

FROM: Robert M. Bernero, Director
Office of Nuclear Material Safety
and Safeguards

OFFICIAL USE ONLY

SUBJECT: NMSS INFORMATION FOR SENIOR MANAGEMENT MEETING, JUNE 12-13, 1990

Pre-Decisional

Enclosed are the agenda and background material on materials licensees for the portion of the next Senior Management Meeting dealing with NMSS facilities.

015→

If you have any questions about this material, please call me or have your staff call Paul Goldberg on 492-0631.

(Signed) Robert M. Bernero

Robert M. Bernero, Director
Office of Nuclear Material Safety
and Safeguards

Enclosures: As stated

DISTRIBUTION (90-184)
NRC Center File
NMSS r/f
IMNS Central File
IMOB r/f
Dir. Office r/f
CEstep
CJenkins
JFunches
JBlaha
JDyer
TGody
PGoldberg
RWilde
JHickey JKlein
GSjoblom C Haughney

See Enclosure for summary of 6/2-/90 Comm meeting

CE Wilson - S.ll #2
Process Tech - S.ll #2
ARC - 2 of 3

OFC	:IMOB	:IMOB	:IMOB	:IMNS	:IMNS	:PMDA	:NMSS	:NMSS
NAME	:PGoldberg/ll	:RWilde	:JHickey	:GSjoblom	:RECunningham	:JFunches	:GArlotto	:RBernero
DATE	:5/29/90	:5/29/90	:5/29/90	:5/29/90	:5/29/90	:5/29/90	:5/29/90	:05/29/90

OFFICIAL RECORD COPY
BACKGROUND FOR SMM-6/90

9006040060 XA

I/30

ADDRESSEES FOR MEMORANDUM DATED: _____

SUBJECT: NMSS INFORMATION FOR SENIOR MANAGEMENT MEETING, JUNE 12-13, 1990

J. Taylor, EDO
H. L. Thompson, EDO
J. Sniezek, EDO
T. Murley, NRR
F. Miraglia, NRR
W. Russell, NRR
J. Partlow, NRR
D. Crutchfield, NRR
E. Jordan, AEOD
E. Beckjord, RES
J. Scinto, OGC
B. Hayes, OI
J. Lieberman, OE
T. Martin, RI
S. Ebneter, RII
A. Davis, RIII
R. Martin, RIV
J. Martin, RV

PREDECISIONAL

"Priority" Facilities

NMSS FACILITIES

I. CURRENT FACILITIES (approximately 10 minutes each)

Facility	Category	Speaker
Region I		
Process Technology North Jersey	2 KEEP #2	T. Martin

outside scope

II.

ENCLOSURE

June 13, 1990 Wednesday

8:00 a.m. NMSS Problem Licensees (including a discussion of site decontamination and decommissioning)

PREDECISIONAL

BACKGROUND INFORMATION
ON
PROCESS TECHNOLOGY NEW JERSEY,
A SUBSIDIARY OF RTI, INCORPORATED

Facility:	Process Technology New Jersey (PTNJ), formally Radiation Technology, Incorporated, now a subsidiary of RTI, Incorporated (RTI)
Location:	108 Denmark Road, Rockaway, New Jersey
Docket No.:	030-07022
License No.:	29-13613-02
Type of Facility:	Large Service Irradiator, Wet Storage, 1.2 Million Curies, Cobalt-60
Operational Date:	November 1970
NRC Responsible Region:	Region I, King of Prussia, Pennsylvania Thomas T. Martin, Regional Administrator Malcolm R. Knapp, Director Division of Radiation Safety and Safeguards (FTS 346-5283) Lee H. Bettenhausen, Chief Nuclear Materials Safety Branch (FTS 346-5251) John R. White, Chief Nuclear Materials Safety Section C (FTS 346-5102)

Management Personnel (RTI and PTNJ)

Jonn Scandalios, Chief Executive Officer and President, RTI; President, PTNJ

Paul Shapiro, Vice-President, Quality; Corporate Radiation Safety Officer (RSO), RTI

John Schlecht, Plant Manager and Plant RSO, PTNJ

Release 6

RADIATION TECHNOLOGY INCORPORATED
DISCREPANCIES

ISSUE: REPAIR OF DOOR HANDLE

INSPECTION: AYERS stated the cell door knob came loose about 1 to 2 weeks prior to week of 2/5/89. The knob was tightened and appeared to be fixed. During the week of 2/5/89 the door knob again came loose. The knob was tightened again. AYERS stated that he saw that the inside door knob had been damaged and that both sides were turning at the same time. This caused the latch not to connect properly with the solenoid in the door jamb which allowed the cell to be opened without the use of the key. AYERS stated that he identified the malfunctioning door problem to SHAPIRO during the 2/14/89 audit. SHAPIRO suspended operations until a new knob was placed on the door.

AYERS INTERVIEW: AYERS was not sure if it was 1 or 2 weeks prior to the audit when he noticed that the door knob was loose. AYERS told SINGLETON & RUSSEN of the problem. AYERS & RUSSEN tightened the faceplate around the knob. This corrected the problem. A couple of days later AYERS noticed that the knob was loose again. AYERS informed SINGLETON & RUSSEN again of the problem. AYERS & RUSSEN tightened the screws inside the door knob. This corrected the problem. Again in a couple of days AYERS noticed that the knob was loose and that the entire knob could be turned. AYERS informed SINGLETON & RUSSEN of this problem. AYERS stated that RUSSEN told him to fix it. So AYERS tightened the screws in the faceplate and in the knob like they (he & RUSSEN) did before. AYERS stated that the same problem occurred at least 1 more time prior to the audit. On that occassion AYERS did not notify RUSSEN of the problem because he thought that RUSSEN would just tell him to fix it. AYERS fixed the knob by tightening the screws in the faceplate and in the knob. During the 2/14/89 audit SHAPIRO asked AYERS what would happen if he (SHAPIRO) tried to open the cell door. AYERS informed SHAPIRO that the knob was not functioning properly and that the door could be opened. SHAPIRO tested the door and was able to open it without using the required key. Operations were immediately suspended. RUSSEN checked the door knob and suspended operations until the handle was fixed. AYERS stated that the knob had to be cut from the door which took about 2 hours. AYERS also stated that before a new lock was purchased the knob from the back door of Bldg. 62 was removed and tried on the cell door. This did not work since the latch was not long enough to trip the solenoid. FRANK GIACANO (Material Handler) went to the store to buy a new door knob which would work on the cell door. This took several hours.

I/21

Release

ENFORCEMENT CONFERENCE:

VARAKLIS & RUSSEN stated that only the faceplate of the knod was loose and this was brought to RUSSEN's attention the week of 2/5/89 by only 1 operator (AYERS). This was tightened by RUSSEN & AYERS. This was the first time the problem was brought to their attention. During 2/14/89 audit SHAPIRO was able to open cell door, after exerting great force, without using the key. Operations were suspended immediately. A Materials Handler was sent to buy a new handle. A new door handle was installed and operations resumed within 2 hours.

ISSUE: RECORD OF DOOR HANDLE NOT FUNCTIONING

INSPECTION: Operator (AYERS) that reported the problem stated that he did not document it in the Operator's Log Book as he should have. In 2/14/89 audit SHAPIRO informed AYERS that all problems are to be documented in the log book.

AYERS INTERVIEW: He did not document any of the instances with the malfunctioning door handle. He stated that he was reprimanded by SHAPIRO during his 2/14/89 audit for not documenting the incidents with the door handle.

ENFORCEMENT CONFERENCE: VARAKLIS, SHAPIRO, & RUSSEN stated that there are no records other than those on 2/14/89 indicating that there was a problem with the door handle prior to that date.

ISSUE: ENTRY INTO THE CELL WITHOUT USING THE REQUIRED KEY

INSPECTION: Information not known at time of the inspection.

AYERS INTERVIEW: AYERS stated that after the inspection he was told by someone that 2 operators (SMITH & KEIM) had entered the cell without using the irradiator key because they had left the survey meter with the attached key inside the cell. The entries occurred on two seperate occassions during the period of time from 2/5/89 to 2/14/89. This was the period of time in which the door handle was malfunctioning. AYERS immediately told RUSSEN what he had heard regarding the operators entries into the cell.

ENFORCEMENT CONFERENCE: VARAKLIS, SHAPIRO, & RUSSEN denied that any operator had gained access into the cell, with the source either in the up or down position, without the use of the irradiator key. They also stated that all entries are recorded on the computor.

ISSUE: FIXING THE CONSOLE KEY SWITCH

INSPECTION: Log entry for 2/1/89 indicates that there was a problem with the console key switch. Other log entries indicated that this problem repeated itself on several other occassions. The operator (AYERS) stated that the console key switch was removed and switched with the 90 second actuation (cell key switch) key switch located in the cell. On 3/9/89 The operator (AYERS) stated that the Startup horn sounded immediately after the cell key switch was activated. The switch was found to be locked in the "on" position. AYERS stated that he contacted RUSSEN. AYERS stated that RUSSEN disconnected the wires to the cell key switch and installed a toggle switch so operations could continue. This procedure was approved in a meeting attended by RUSSEN, SHAPIRO & VARAKLIS. RUSSEN sent a memo dated 3/9/89 documenting the change to all operators. On 3/10/89 the toggle switch was removed and another key switch was installed.

AYERS INTERVIEW: Not addressed

ENFORCEMENT CONFERENCE: RUSSEN stated that he was not around when the problem occurred in 2/89. RUSSEN stated that SINGLETON was on duty when there was a problem in 2/89. RUSSEN stated that SINGLETON was having a problem with the console key switch. SINGLETON talked to JOHN WALLACE in South Carolina regarding how to fix the key switch. WALLACE told SINGLETON to take the switch out and clean it then it should be ok. SINGLETON did this, replaced the switch in the console and found that it operated properly. RUSSEN stated that SINGLETON documented everything in the Supervisor's Log Book. RUSSEN stated that on 3/9/89 there was a problem with the cell key switch. In a meeting attended by Varaklis, SHARPIRO, & RUSSEN it was decided to install a toggle switch in place of the key switch so that operations could continue. A toggle switch was installed on 3/9/89. A new key switch was installed on 3/10/89.

ISSUE: ADDITIONAL PROBLEM WITH THE CELL KEY SWITCH

INSPECTION: Not addressed

AYERS INTERVIEW: AYERS stated that on 4/1//89 there was a problem on D. KEIM's shift with the cell key switch. AYERS stated that KEIM was unable to initiate operations. AYERS stated that KEIM notified both RUSSEN and himself about the problem. AYERS stated that KEIM told RUSSEN that the problem involved the cell key switch. RUSSEN told KEIM that he did not think it was since it was a new switch. AYERS reported to work at approximately 0600 hours and discovered that the plastic cam in the cell key switch had been damaged by the high radiation fields present in the irradiator cell during operations. AYERS gave the damaged cam to RUSSEN. RUSSEN told AYERS that they would continue to have this problem with the cell key switch unless a more durable type was used.

ENFORCEMENT CONFERENCE: RUSSEN stated that there have been no problems with the cell key switch, other than the one that occurred on 3/9/89.

INVESTIGATION STATUS RECORD

Case No.: 1-89-006S Facility: Radiation Technology, Inc

Opened: 90/02/12 Docket No.: 030-07022

Assigned To: Wilson Priority: H

Subject: Determining the Veracity of Statements Made by Licensee Management/ Additional Information

Remarks:

Category: OR

___	SS	(false statement/sworn statement)	___	DR	(drugs)
___	WR	(false statement/written)	___	MA	(misadministration)
___	OM	(false statement/omission)	___	LC	(license conditions)
XXX	OR	(false statement/oral)	___	AE	(Atomic Energy Act)
___	IH	(intimidation & harassment)	___	MS	(miscellaneous)

Status: Page 2

90/02/28: The former RSO was interviewed and corroborated the fact that the CEO/President of RTI was informed, both in writing and orally, that an Irradiator Operator said he had breached the cell access door by forcing it open without utilizing the door latch key; this notice to the CEO/President was prior to the Enforcement Conference (EC). The former RSO, however, reported that the climbing of the cell door by 2 operators did not come up at Pre-EC management meetings, to this best of his recollection. Supplemental report was drafted and is in field office for typing. ECD: 90/03.

90/03/31: Supplemental report completed, reviewed by FOD, and issued report directly to U.S. Attorney's office, Newark, New Jersey. Case closed 03/13/90.

90/04/30: No change.

90/05/31: See entry for original Case No. 1-89-006.

90/06/30: See entry for original Case No. 1-89-006. Received declination letter, dated June 13, 1990.

Closed: 90/03/13 Issued: 90/03/13 Referral: 90/03/13 Statute:

DOJ Action:

___	Evaluation	XXX	Declination (90/06/13)	I/22
___	Prosecution/Grand Jury	___	Prosecution/Plea	
___	Indictment/Pending Trial	___	Indictment/Sealed	
___	Trial	___	Conviction	
___	Acquittal			

ITEM 10 RADIATION PROTECTION PROGRAM

10.1 RESPONSIBILITIES

Radiation Technology, Inc., (RTI), as licensee, is responsible for the conduct of the irradiator program and all actions of employees of RTI. In addition to the requirements set forth in 10 CFR Part 20, the management and workers of RTI 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 Chairman of the Board is responsible for ensuring that the Board is informed about the operating status of RTI with respect to NRC regulations and for ensuring that the Board makes available the resources to operate the RTI Rockaway facility in full compliance with NRC regulations.

B. The Chief Executive Officer and President reports to the Chairman and is responsible for running the corporation in a safe and profitable manner in full compliance with NRC regulations.

C. 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. The Director of Training may act for the Radiation Safety Officer in his absence.

D. 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 Plant.

E. 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.

B. Radiation Worker Training

In addition to GDT, RWT shall consist of at least six 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 shall receive additional training in the area(s) in which the examination demonstrates that the worker's knowledge is deficient. The worker shall be given a repeat examination.

C. Operator Certification Training

For an operator entering the training program after February 28, 1987, the training outlined in Table 8-1 shall be required for certification. This training program shall provide more than 40 hours of classroom instruction. (The estimated length of the training program is 10 weeks.) Written examinations shall be given throughout the course of classroom instruction, and a final examination shall be given at the end of the training. Table 8-2 lists typical examination questions and their answers. A score of 70 percent shall be required to pass an examination on a topical area, and an average of 80 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 shall 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 training on material outlined in Table 8-1 from an educational institution, a

military program, or another facility may be permitted to test out of course material that is not specific to the Rockaway facility.

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 outlined above 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 four (4) months shall be spent in class instruction, practical training, and on-the-job-training. Following successful completion of the Operator Certification Training program, the operator candidate shall be appointed in writing by the Radiation Safety Officer as a certified operator.

8.2 Course Instructor

A. General Employee Training

The Operations Manager is responsible for providing GET. The course instructor may be any responsible individual.

B. Radiation Worker Training

The individual who provides Radiation Worker Training:

Shall have a BS in Nuclear Engineering/Science or a related field, e.g. Health Physics; or

Shall have a minimum of 4 years applicable experience at a nuclear facility, such as a nuclear power plant or a commercial gamma irradiator.

C. Operator Certification Training

The Director of Training is responsible for the OCT program outlined in Table 8-1. Course instructor(s) will be the Director of Training, or his designee(s), qualified by experience and/or training for the particular course(s).

The Plant Superintendent is responsible for on-the-job-training at the Rockaway facility. He may be assisted by responsible individuals.

Any instructor who provides the radiation safety systems portion of the training:

Shall be a certified operator for the facility for which the training is being provided; or

Shall be a certified operator for a similar facility who has passed the written examination for certification on the facility for which he is providing certification training.

Shall have a minimum of six months of practical experience following certification on a commercial gamma irradiator.

8.3 Records of Training

Records documenting the training of each individual will be maintained at the Rockaway facility, except for questions and answers in written examinations. Written examinations will be kept by the Director of Training. These training records will be updated as additional training is received, and the records will be retained for a period of at least three years following termination of employment.

8.4 Refresher Training

A. General Employee Training

Refresher training for employees, except responsible individuals, will be conducted annually for at least two hours.

B. Radiation Worker Training

Refresher training for radiation workers will be conducted annually for at least four hours. Successful completion shall require passing a written examination with a grade of at least 70 percent.

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 the Director of Training or his designee. Following refresher training, a written examination will be administered.

Areas where a trainee's examination identifies deficiencies will be discussed with the individual.

Successful 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
- Notices, Instructions, Reports and Inspections

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
- Thumb Rules

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 Equipment

Use, Care and Calibration of:

- Spectrophotometer
- Counter Scaler
- pH Meter
- Conductivity Meter
- Scales
- Thermometers

Laboratory Procedures

- pH Determination
- Radioactivity Analysis of Water/Sludge
- Swipe Analysis
- Leak Testing of Sealed Test Sources
- Ozone Quarterly Survey

Dosimetry

- Dosimeter - Types and Ranges
- Primary Dosimetry Reading, Calculating Doses and Recording
- Definitions - Dose Mapping Techniques
- Factors Involved in Protocol Configuration
- Configuration of Customer Product for Phase II Dosimeter Placement Grid
- Documentation (phase II printouts/protocol sheet)
- Secondary Dosimetry Issue, Placement, Reading,

Table 8-1 (continued)

Dosimetry (continued)

Evaluation, Recording to Provide Product History
Calculations Related to Dosimetry (log plot regression analysis, static exposure times, dwell times, top-off dwell times, min/max ratio)

Administration

FDA/USDA Considerations
Good Manufacturing Protocols
Correct Log Entries
Review of Logs
Instruction/Use of All Forms for Processing and Documentation

Operations

Forklift Operation
Loading/Unloading Trucks
Care/Maintenance of Forklift
Warehouse Housekeeping
Product Description (calculations, cuft/carton, density of containers)
Documentation of Damaged Product
Receiving/Shipping of Customer Product
Demineralizer Weekly Radiation Survey
Water Temperature/Demineralizer Resistivity
Irradiator Pool Water Level
Module Transfer
Loading/Unloading Co^{60}
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
NRC Notification
Plant Changes/Modifications

Fire Training

Annual Fire Test
Fire in Radiation Room (emergency)

Table 8-1 (continued)

Industrial Safety

Preventive Maintenance

Preventive Maintenance Program
Pneumatics
a) Rebuilding/replacing pistons
b) Repair of airline fitting (sweat or ferrule)
c) Rebuild/replace solenoids

Electrical
a) Replace radiation room wiring
b) Replace limit switches
c) Read/use voltmeter

General Maintenance
a) Conveyor
b) Grease/lubricate necessary components-source hoist pulley, air compressor, limit switch heads
c) Air compressor system - checking oil, filters, belts, safety valves and water traps
d) Change demineralizer water filters
e) Demineralizer regeneration
f) Makeup Water Treatment System cartridge and resin replacement

Table 8-2

TYPICAL FINAL EXAMINATION
FOR OPERATOR CERTIFICATION

1. Name the three common atomic particles of which atoms are composed. (proton, neutron, electron)

2. In the term Cobalt-60 the 60 is the atomic _____. (weight)

3. Name the three most common types of radioactive decay emissions. (alpha, beta, gamma)

4. Cobalt-60, a radioisotope of cobalt, emits highly penetrating _____ radiation. (gamma)

5. The radiation from Cobalt-60 (Check all correct answers).

   (a) can cause exposed materials to become radioactive.
   (b) can cause damage to human beings.
   (c) will not penetrate human skin.
   (d) can be turned off when not in use.
   ((b))

6. The time it takes radioactive material to be reduced to half of its activity is know as its _____. (half life)

7. If I have a million Curies of Cobalt-60 now, how much will I have 10 1/2 years from now? (250,000)

8. If the water in the irradiator pool becomes contaminated, you will become contaminated if you get the water on you? True or False, circle one (true)

9. The plant area limited to "authorized employees only" is called the _____. (protected area)

10. An accessible area where the major portion of the body can receive greater than 100 millirems in five days is called a _____. (radiation area)

11. What sign (wording) must be on all containers or rooms containing licensed quantities of radioactive materials? (Caution Radioactive Material)

12. An area in which a major portion of an individual's body can receive in excess of 100 millirems in one hour is called a _____. (high radiation area)

13. One Curie of radioactivity is defined as _____ disintegrations per second. (3.7×10^{10})

Table 8-2 (continued)

14. Define a rad. (That amount of radiation which will result in the absorption of 100 ergs/gm in any material)

15. According to federal regulations, what is the maximum time period between leak checks on sealed sources? (six months)

16. True or False? For Cobalt-60 gamma radiation, 1 rad equals 1 rem. (true)

17. Your survey meter does not have a thin window on the detector tube. Will you detect the beta radiation from Cobalt-60? (no)

18. Exposure to relatively low levels of ionizing radiation over an extended period is know as _____radiation exposure and is the basis for radiation exposure limits. (chronic)

19. What is the source of the higher background levels found at high altitudes? (cosmic rays)

20. State three generally accepted methods for controlling radiation exposures. (time, distance and shielding)

21. If your hands were in a field of 10 millirem/hour while working, and you estimate that it will take two hours to complete the job, what would be the total exposure to your hands ? (20 millirem)

22. If you perform a swipe survey of an unrestricted area, the company action limit is _____. (90 pCi/100 sq cm)

23. If the dose rate measured at three feet from a point source is 100 rem/hr, what would be the dose at 10 feet? (9rem/hr)

24. A customer would like us to sterilize a load of nitric acid for hospital use. Can we do it? (no!)

25. When must a film badge be worn? (whenever on duty)

26. Will a film badge indicate your exposure to alpha radiation? (no)

27. Federal regulations limit whole body exposure to ionizing radiation in an unrestricted are to _____ rem per year. (0.5)

28. A routine survey of the demineralizer with a portable survey meter indicates a reading of 0.5 millirem/hr above background. Is this significant? Why? (Yes, it may be an indication of a leaking source pencil.)

Table 8-2 (continued)

29. In what range of total doses are ferrous sulphate (Fricke) dosimeters generally useful? (3,000 to 40,000 rads)

30. Federal regulations limit whole body exposure to ionizing radiation in a restricted area to _____ rem per quarter. (1.25)

31. The maximum radiation dose rate allowable in an uncontrolled area is _____ millirem/hr. (2)

32. In what total dose range are red Perspex (Harwell) dosimeters generally useful? (500 krads to 5 megarads)

33. One milliCurie of Cobalt-60 will result in a dose rate approximately _____ millirem at one meter from the point source. (1)

34. Given equal thicknesses of water and steel which would be a better shield for Cobalt-60 radiation? (steel)

35. Who is responsible for your personal exposure to ionizing radiation? (I am)

36. What common plastic is particularly susceptible to the effects of Cobalt-60 radiation? (teflon)

37. What safety precautions must be taken prior to entering the radiation room after completion of a product run? (Check the maze radiation monitor on the console, check that the source down indication is given, perform a maze radiation survey, visually check that the source is down)

38. True or False? Food which has been irradiated is radioactive. (false)

39. One purpose of the irradiator ventilation system is to prevent the spread of any radioactive contamination. The other is to reduce the concentration of _____ formed during the irradiation of air to levels within Federal guidelines. (ozone)

40. What happens if the air compressor fails to provide sufficient air pressure? (The irradiator shuts down.)

41. Under what conditions is it permissable to bypass a safety interlock while the irradiator is in operation? (none)

42. At what pool water resistivity must the demineralizer be regenerated? (100,000 ohm-cm)

Table 8-2 (continued)

43. List all items which will activate the irradiator safety circuits causing the source to automatically lower. (interruption of the input conveyor light screen, interruption of the output conveyor light screen, opening the maze personnel door, conveyor malfunction, emergency stop switch actuation, breaking the maze personnel passage photoeye beam, high radiation level in the maze, low air pressure, source hoist malfunction, fire in the radiation room, loss of power, pulling the trip wire in the radiation room, loss of radiation monitor signal)

44. If the heat sensor indicates a fire in the radiation room, what two things will happen? (The irradiator will shut down, and an alarm will sound.)

45. Loss of power during irradiator operation will cause what effect on the irradiator? (The product conveyor will stop, and the source plaque will be automatically lowered to the fully shielded position.)

46. What are two major reasons for demineralizing and filtering the pool water? (To prevent corrosion and to promote optical clarity for remote operations)

47. Why is the startup safety switch in the radiation room located at the farthest point from the radiation room exit? (To insure that the operator knows that all personnel are out of the radiation room prior to startup)

48. The lab has measured the activity of a water sample as 5×10^{-6} microcurie/ml. Who should be notified? (RSO)

49. If a person receives a radiation exposure at which level might he experience nausea and fatigue: 25 rem, 100 rem, 1000 rem (circle one) (100 rem)

50. If you were 25 years old at your last birthday, what is the maximum whole body accumulated dose to which you are limited? (35 rem)

I/24 EPW Initials by CMG versus in person I/24

	DELIVERY RECEIPT No.	FROM	TO	DATE RECEIVED	DELIVERED TO
P	474178121	USDOL	D. Holody	5.5.89	D. Holody
P	554590119	D. Blanch	J. Holmes	5.5-89	J. Holmes
P	135950504	RTA Inc.	M. Knapp	5-8-89	M Knapp
P	340956931	KDE	H Russell	5-8-89	H Russell
P	135950505	RTA Inc	J N White	5-8-89	J N White
	551332	Curtis Prz. Inc	NRC	5-8-89	NRC
P	137734312	BGE & G	NRC	5-10-89	NRC
P	870859544	Germagian	J Costello	5-12-89	J Costello
P	802747448	Mt Patton	Sher Reynolds	5-12-89	S Reynolds
P	870859545	Germagian	J Costello	5-15-89	J Costello
P	090060576	Dayton Elec	H Russell	5-15-89	H Russell
P	340956957	Rochester Gas	H Russell	5-15-89	H Russell
P	682602237	Dir Dynamics	NRC	5-15-89	NRC
P	171070218	D. Hogg	Jan Kottan	5-15-89	J Kottan
P	090060578	Dayton Ed	H. Russell	5/17/89	H. Russell
P	096192396	Northeast Hosp	Appl Research	5/17/89	Appl Research
P	474178129	US Dept Labor	Dan Holody	5/17/89	D. Holody
P	869032601	Jackson Prod	NRC	5/18/89	NRC
P	028072774	Valley Forge Inc	NRC	5/18/89	NRC
	548618	NRC		5/18/89	
P	135950512	RTA Inc	J N White	5/18/89	J N White
P	135950511	Drone Tech	J White	5/18/89	J White
P	903736096	Riverview	J Costello	5/18/89	J Costello
P	065019440	B. Hess	Reg Admin	5/18/89	Reg Admin
P	019277981	AT & G.	NRC	5/19/89	NRC
P	610297663	Allegheny	J Davis	5/19/89	J Davis
P	807106659	Teton	NRC	5/22/89	NRC
P	340956939	Rochester Gas	N Lazarus	5/22/89	N Lazarus
P	090060577	Pilgrim	RA Xi	5.23.89 I/24	RA

RECEIPT OF CORRESPONDENCE

On May 8, 1989, John R. WHITE, Chief, Nuclear Materials Safety Section C, Division of Radiation Safety and Safeguards (DRSS), NRC, provided the reporting Investigator with a copy of a two page letter dated both May 4, 1989 (front page) and May 2, 1989 (back page) from the RSO of RTI, John RUSSEN, which was processed through the NRC mail room, Region I, on May 8, 1989 at 4:43 p.m.. The letter, addressed to Malcolm R. KNAPP, Director, DRSS, documents RTI's response to the question asked of them at the Enforcement Conference regarding the cell maze door entry computer printouts and their efforts to validate their response after the fact. The letter notes they were unable to validate their response. A copy of the RTI letter is hereto appended.

Attachment:
RTI, letter dated on front page as May 4, 1989.

Ernest P. Wilson, Investigator
Office of Investigations
Field Office, Region I

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Case No. 1-89-006

Release