



STATE OF RHODE ISLAND
Rhode Island Atomic Energy Commission
16 Reactor Road
Narragansett, RI 02882-1165
Telephone # 401-874-2600

July 14, 2021
Docket No. 50-193
Document Control Desk
U.S. Nuclear Regulatory Commission (NRC)
11555 Rockville Pike
Rockville, Maryland 20852

Attn: Mr. Patrick Boyle, Project Manager

Dear Mr. Boyle:

This letter and the enclosures constitute the annual report required by the RINSC Technical Specifications (Section 6.7.1). Enclosure 1 provides reactor operating statistics. Enclosure 2 provides information pertaining to unscheduled reactor shutdowns or scrams. Enclosure 3 discusses maintenance operations performed during the reporting period. Enclosure 4 describes changes to the facility carried out under the conditions of Section 50.59 of Chapter 10 of the Code of Federal Regulations. Lastly, Enclosure 5 summarizes the radiological controls information. If there are any questions regarding this information, please call me at 401-874-9437.

Sincerely,

Dr. Cameron Goodwin
Director, RINSC

Enclosures (5)

Copy to:

Mr. Craig Bassett, USNRC
Dr. John J. Breen, Chairman, NRSC
Dr. Clinton Chichester, Chairman, RIAEC
Dr. Nancy Breen, RIAEC
Mr. Howard Chun, RIAEC
Dr. Yana K. Reshetnyak, RIAEC

Enclosure 1

Reactor Operating Statistics Technical Specification Section 6.7.1.1

Month	Year	Operating Hours	MWH of Operation
July	2020	11.02	13.30
August	2020	8.05	3.80
September	2020	21.35	14.44
October	2020	23.22	21.80
November	2020	3.98	0.74
December	2020	0.0	0.0
January	2021	15.40	11.12
February	2021	40.12	53.17
March	2021	17.22	14.38
April	2021	26.75	30.09
May	2021	17.20	13.16
June	2021	16.62	18.12
Total	FY2021	200.93	194.12 MWH or 8.09 MWD

Total Energy Output Since Initial Criticality
68,303.68 MWH or 2845.99 MWD

ENCLOSURE 2

UNSCHEDULED SHUTDOWNS OR SCRAMS

Technical Specification Section 6.7.1.2

Page 1 of 1

The following is a list of the unscheduled shutdowns or scrams that occurred during the 2020-2021 reporting period:

Date	Run No.	Log book	Page	Cause	Description
8/7/20	9627	65	134	Power Level Selector Switch	Power level selector switch was not fully engaged at 2 MW. Reactor scrammed during start-up at 100 kW.
8/20/20	9628	65	135	WR CH2 Range Selector	Momentary loss of range selector for WR channel 2
2/16/21	9657	66	15	Short period scram	Short period scram due to noise while raising SS#2. Reactor was not yet critical.
6/30/21	9688	66	48	Instrument Noise	Momentary instrument noise caused scram during start-up.

ENCLOSURE 3

MAINTENANCE OPERATIONS

Technical Specification 6.7.1.3 requires a listing of the major maintenance operations performed in the 2020-2021 reporting period including their impact upon the safe operation of the reactor and the reasons for the corrective maintenance.

During a start-up on October 23, 2020, it was noticed that CIC #1 could no longer be compensated properly. After several days of troubleshooting, the detector was removed from the pool and tested. The CIC was internally shorted and needed to be replaced. The CIC detector was replaced along with all of the wiring between the detector and drawer. A 50.59 evaluation was conducted and the reactor was restarted on January 13, 2021.

ENCLOSURE 4
FACILITY CHANGES – 10CFR50.59 REVIEW

Technical Specification 6.7.1.4 requires that we provide a listing and description of any 10 CFR 50.59 evaluations conducted during the 2020-2021 reporting period.

One 10 CFR 50.59 evaluation was performed in this reporting period. The evaluation addressed the failure and subsequent replacement of the CIC #1 which had internally shorted. The evaluation was reviewed by the Nuclear Reactor Safety Committee prior to resumption of operation.

ENCLOSURE 5
RADIOLOGICAL CONTROLS

1. Environmental Surveys outside the Facility – Technical Specification 6.7.1.6

Quarterly TLD¹ badges are deployed outside the reactor building in three separate locations. The quarterly doses in units of mrem are shown in the table below. The second quarter of year 2021 reports are not available yet due to the vendor's reports delay affected by COVID-19.

LOCATION	2nd QTR 2020	3rd QTR 2020	4th QTR 2020	1st QTR 2021	2nd QTR 2021
Northeast Wall	11	13	7	18	No data
Demineralizer Door	28	17	12	58	No data
Heat Exchanger Door	36	5	11	42	No data

The general public does not frequent these locations and therefore occupancy factors may be used to approximate annual dose. The allowable annual external dose for whole body must be below 100 mrem per year. Assuming that the maximum time that a member of the general public would be present in one of these locations is 10 minutes per day, an occupancy factor of 0.025 can be used to obtain the annual dose that would be received by a member of the general public, in any of these areas.

The annual dose at the Northeast Wall, Demineralizer and Heat Exchanger Doors is dependent on the operations schedule of the reactor. Ignoring the fact that the dose rate is not present 24 hours per day, and applying the occupancy factor of 0.025², the annual dose that would be received by an individual in the demineralizer room would be 2.875 mrem. The dose received at the Heat Exchanger Door would be 2.351 mrem. The annual dose received at the Northeast wall would be 1.225 mrem. The variations from quarter to quarter and from previous reports are also due in part to movements of items within the reactor building during the fiscal year and varying use of the different irradiation facilities.

2. Annual Exposures Exceeding 500 mrem for facility members, 100 mrem for non-staff members or 10 mrem for members of the general public – Technical Specification 6.7.1.7

Two facility member exposures were greater than 500 mrems of extremity shallow dose due to the handling of experiment samples.

¹Thermoluminescent Dosimeter; Mirion Technology reads the dosimeters at minimum of 1 mrem.

² Occupancy factor of 0.025 was used, from NCRP 147 for Outdoors, unattended parking lots, attics, stairways, unattended elevators, janitor's closets.

3. Radioactive Effluents – Technical Specification 6.7.1.5

A. Individual gaseous effluent concentrations for each reactor operation are recorded on the Monthly Information Sheets (Form NSC-78). The concentration of radioactive materials in the effluent released from the facility exhaust stacks shall not exceed $1E+05$ times concentrations specified in 10CFR20, Appendix B, Table 2, when averaged over time periods permitted by 10CFR20.³

Gamma spectroscopy of stack gas samples has shown that the principal gaseous effluent is Argon-41. The maximum concentration for this principle contaminant permitted under Technical Specifications is $1E-8 \mu\text{Ci}/\text{cc} \times 1E+5 = 1E-3 \mu\text{Ci}/\text{cc}$. Average concentrations released during the year were $3.75E-5 \mu\text{Ci}/\text{cc}$ and 0.0375 of the limit.

The total Argon-41 release during the reporting period was 52.52 curies. The calculated effective dose equivalent for this release is 2.2 mrem/year (COMPLY Code). The Comply Code report is attached.

B. Liquid effluent concentrations released to the environment are documented on the Sewer Discharge Report (NSC-09). Each release was approved prior to discharge with its pH being within the acceptable range and with the sum of the fractions of the respective radioisotopes per month being below the discharge limit of 1. For the reporting period, the total volume of discharge was $6.237E6$ ml. The isotopes and their relative activities discharged are given below.

Radioisotope	Total Activity Discharged (microcuries)
H-3	11388.762
C-14	58.94
Pb-214	10.56
Bi-214	15.555
K-40	2.21

³ Technical Specifications, Section 3.7.2.1



COMPLY: V1.7.

7/12/2021 3:12

40 CFR Part 61
National Emission Standards
for Hazardous Air Pollutants

REPORT ON COMPLIANCE WITH
THE CLEAN AIR ACT LIMITS FOR RADIONUCLIDE EMISSIONS
FROM THE COMPLY CODE - V1.7.

Prepared by:

RI Atomic Energy Commission
RI Nuclear Science Center
16 Reactor Road, Narragansett, RI 02882

Sangho Nam
401-874-9439

Prepared for:

U.S. Environmental Protection Agency
Office of Radiation and Indoor Air
Washington, DC 20460

2021 Ar-41 release



COMPLY: V1.7.

7/12/2021 3:12

2021 Ar-41 release report

SCREENING LEVEL 3

DATA ENTERED:

Nuclide	Release Rate (curies/YEAR)
AR-41	5.252E+01

Release height 35 meters.

Building height 18 meters.

The source and receptor are not on the same building.

Distance from the source to the receptor is 100 meters.

Building width 18 meters.

Default mean wind speed used (2.0 m/sec).

Distance from the SOURCE to the FARM producing
VEGETABLES is 155 meters.

Distance from the SOURCE to the FARM producing
MILK and MEAT is 100 meters.

NOTES:

2021 Ar-41 release
Input parameters outside the "normal" range:

None.

RESULTS:

Effective dose equivalent: 2.2 mrem/yr.

*** Comply at level 3.



COMPLY: V1.7.

7/12/2021 3:12

2021 Ar-41 release report

SCREENING LEVEL 4

DATA ENTERED:

Building length 20 meters.

STACK DISTANCES, FILE: stack data 100.dat

DIR	Distance (meters)
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N	100.0
NNE	100.0
NE	100.0
ENE	100.0
E	100.0
ESE	100.0
SE	100.0
SSE	100.0
S	100.0
SSW	100.0
SW	100.0
WSW	100.0
W	100.0
WNW	100.0
NW	100.0
NNW	100.0



COMPLY: V1.7.

7/12/2021 3:12

WINDROSE DATA, FILE: 2016 windrose data 2m.dat

Source of wind rose data: 2016 Windrose data
Dates of coverage: 1954-1994
Wind rose location: Narragansett, RI
Distance to facility: 155 m

Percent calm: 0.05

Wind FROM	Frequency	Speed (meters/s)
N	0.062	2.00
NNE	0.058	2.00
NE	0.044	2.00
ENE	0.013	2.00
E	0.012	2.00
ESE	0.013	2.00
SE	0.058	2.00
SSE	0.049	2.00
S	0.058	2.00
SSW	0.084	2.00
SW	0.105	2.00
WSW	0.064	2.00
W	0.068	2.00
WNW	0.095	2.00
NW	0.104	2.00
NNW	0.068	2.00

Distance from the SOURCE to the FARM producing MILK is 100 meters.

Distance from the SOURCE to the FARM producing MEAT is 100 meters.

NOTES:

The receptor exposed to the highest concentration is located 100. meters from the source in the NE sector.

He gets his VEGETABLES from a farm located

2021 Ar-41 release

155. meters from the source in the NE sector.

He gets his MEAT from a farm located
100. meters from the source in the NE sector.

He gets his MILK from a farm located
100. meters from the source in the NE sector.

Input parameters outside the "normal" range:

Windrose wind frequency is unusually LOW.

↑

COMPLY: V1.7.

7/12/2021 3:12

RESULTS:

Effective dose equivalent: 1.1 mrem/yr.

*** Comply at level 4.

This facility is in COMPLIANCE.

It may or may not be EXEMPT from reporting to the EPA.

You may contact your regional EPA office for more information.

***** END OF COMPLIANCE REPORT *****

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