



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

July 13, 2020  
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 401-874-9442.

Sincerely,

Paul W Martin Jr  
Reactor Supervisor

Enclosures (5)

Copy to:

Mr. Michael Takacs , 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  
Dr. Nitin Padture, RIAEC

## Enclosure 1

### **Reactor Operating Statistics** Technical Specification Section 6.7.1.1

<b>Month</b>	<b>Year</b>	<b>Operating Hours</b>	<b>MWH of Operation</b>
<b>July</b>	2019	16.68	13.05
<b>August</b>	2019	17.53	8.32
<b>September</b>	2019	5.33	5.83
<b>October</b>	2019	10.18	9.45
<b>November</b>	2019	47.57	70.97
<b>December</b>	2019	24.82	19.63
<b>January</b>	2020	19.50	22.59
<b>February</b>	2020	29.32	24.32
<b>March</b>	2020	7.73	4.40
<b>April</b>	2020	21.07	18.80
<b>May</b>	2020	6.45	5.84
<b>June</b>	2020	44.73	65.58
<b>Total</b>	<b>FY2020</b>	250.91	268.78 MWH or 12.2 MWD

**Total Energy Output Since Initial Criticality**  
**68,109.55 MWH or 2837.90 MWD**

## ENCLOSURE 2

### UNSCHEDULED SHUTDOWNS OR SCRAMS

Technical Specification Section 6.7.1.2

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The following is a list of the unscheduled shutdowns or scrams that occurred during the 2019-2020 reporting period:

<b>Date</b>	<b>Run No.</b>	<b>Log book</b>	<b>Page</b>	<b>Cause</b>	<b>Description</b>
7/1/19	9551	65	43	WR ch 1 Range selector	Momentary loss of range selector for WR channel 1
7/16/19	9554	65	46	Watchdog Scram	Momentary circuit communication loss caused watchdog protection to activate
8/20/19	9561	65	53	WR ch 1 Range selector	Momentary loss of range selector for WR channel 1
10/24/19	9567	65	62	Short period scram	Moved PuBe source too quickly causing Neutron Flux Monitor channel to see rapid change in flux/power
11/7/19	9572	65	67	Watchdog Scram	Momentary circuit communication loss caused watchdog protection to activate
6/4/20	9619	65	123	Watchdog Scram	Momentary circuit communication loss caused watchdog protection to activate

## **ENCLOSURE 3**

### **MAINTENANCE OPERATIONS**

Technical Specification 6.7.1.3 requires a listing of the major maintenance operations performed in the 2018-2019 reporting period including their impact upon the safe operation of the reactor and the reasons for the corrective maintenance.

No major maintenance has been performed in this reporting period.

**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 2018-2019 reporting period.

No 10 CFR 50.59 evaluations were performed in this reporting period.

**ENCLOSURE 5**  
**RADIOLOGICAL CONTROLS**

1. Environmental Surveys outside the Facility – Technical Specification 6.7.1.6

Quarterly TLD<sup>1</sup> 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 2020 reports are not available yet due to the delay on completion of the vendor's reports affected by the COVID-19 pandemic.

<b>LOCATION</b>	<b>3<sup>rd</sup> QTR 2019</b>	<b>4<sup>th</sup> QTR 2019</b>	<b>1<sup>st</sup> QTR 2020</b>	<b>2<sup>nd</sup> QTR 2020</b>
Northeast Wall	2	6	6	No data
Demineralizer Door	11	37	25	No data
Heat Exchanger Door	16	19	31	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 0.025<sup>2</sup>, the annual dose that would be received by an individual in the demineralizer room would be 1.83 mrem. The dose received at the Heat Exchanger Door would be 1.65 mrem. The annual dose received at the Northeast wall would be 0.35 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

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<sup>1</sup>Thermoluminescent Dosimeter; Mirion Technology reads the dosimeters at minimum of 1 mrem.

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

There were no personnel exposures greater than Technical Specification 6.7.1.7 requirements.

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.<sup>3</sup>

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  $1E-8 \mu\text{Ci/cc} \times 1E+5 = 1E-3 \mu\text{Ci/cc}$ .

Average concentrations released during the year were  $4.62E-5 \mu\text{Ci/cc}$  and 0.0462 of the limit.

The total Argon-41 release during the reporting period was 59.49 curies. The calculated effective dose equivalent for this release is 1.2 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  $1.1E7$  ml. The isotopes and their relative activities discharged are given below.

<b>Radioisotope</b>	<b>Total Activity Discharged (microcuries)</b>
H-3	4223.2
C-14	500
Sb-124	0.1812
I-124	0.3007
Pb-214	7.726
Bi-214	8.579
K-40	0.009562
Na-24	6.486

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<sup>3</sup> Technical Specifications, Section 3.7.2.1



COMPLY: V1.7.

7/10/2020 1:41

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  
401-874-2600

Prepared for:

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



2020 Ar-41 Release



COMPLY: V1.7.

7/10/2020 1:41

2020 AR-41 release

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SCREENING LEVEL 4  
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DATA ENTERED:  
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Nuclide	Release Rate (curies/YEAR)
AR-41	5.949E+01

Release height 35 meters.

Building height 18 meters.

The source and receptor are not on the same building.

Building width 18 meters.

Building length 20 meters.

STACK DISTANCES, FILE: Stack data 100.dat

DIR	Distance (meters)
N	100.0
NNE	100.0
NE	100.0
ENE	100.0
E	100.0
ESE	100.0
SE	100.0

2020 Ar-41 Release

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.

7/10/2020 1:41

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 VEGETABLES is 100 meters.

Distance from the SOURCE to the FARM producing

2020 Ar-41 Release

MILK is 100 meters.

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

NOTES:

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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  
100. 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:



COMPLY: V1.7.

7/10/2020 1:41

Windrose wind frequency is unusually LOW.

RESULTS:

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Effective dose equivalent: 1.2 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 \*\*\*\*\*

