INL/RPT-24-77525-Revision-0



# Gamma-Ray Emitting Radionuclides Concentrations and Decontamination Factors of ATR Loop Liquid Samples Cycle 172A Revision 0

May 2024

Dani Gene Ottaway, Michael A Reichenberger, Kelly M McCary

Changing the World's Energy Future

Idaho National Laboratory

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**May 2024**

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*INL/ RPT-24-77525*

# *Gamma-Ray Emitting Radionuclides Concentrations and Decontamination Factors of ATR Loop Liquid Samples*

## *Cycle 172A-1 Revision 0*

***D. G. Ottaway, K. M. McCary, and M. A. Reichenberger***

*May 1, 2024*

# ATR FINAL LOOP ACTIVITY REPORT

FOR THE PERIOD

March 2, 2024, to March 20, 2024

CYCLE 172A-1

DATE OF REPORT

May 1, 2024

# GAMMA-RAY EMITTING RADIONUCLIDES CONCENTRATIONS AND DECONTAMINATION FACTORS OF ATR LOOP LIQUID SAMPLES CYCLE 172A-1

This report contains the gamma-ray emitting radionuclides concentration and decontamination factor results from gamma-ray spectrometry measurements of ATR loop liquid samples by the Radiation Measurements Laboratory (RML) for ATR Cycle 172A running March 2, 2024, to March 20, 2024. This report consists of five subsections, one for each loop. Each subsection contains the results for each sampling of the loop along with the date and time of sampling, spectral data identifications, sample type, and reactor power (MW). The results are reported in units of disintegrations per minute per milliliter of sample. The results are obtained with the gamma-ray spectral data analysis routines of the RML computer. Some of this report is also generated by RML data storage and handling routines.

For certain types of samples, no results appear for certain radionuclides because meaningful results for the radionuclides cannot be obtained from the sample type. The nomenclatures of the sample types are listed below.

BIX = water sample before ion exchange
BIX-7= recount after allowing 7 days for decay
AIX = water sample after ion exchange
PIX = pressurized water sample
DFX = decontamination factor for water samples

All radionuclides concentration results have been decay-corrected back to the time of sampling.

The decontamination factor (DFX) calculation consists of the following logic where B = BIX and A = AIX,

If (B > 0 and A > 0), DFX = B/A
If (B > 0 and A = 0), no DFX is reported
If (B > 0 and A is a limit value), DFX = >B/A
If (B is a limit value or B =0), no DFX is reported

In these results a limit value is designated by the < symbol. A limit value is a type of detection limit which is defined in the computer analysis documentation of the RML. The limit value for a given radionuclide will vary from sample to sample because of the detection systems, counting geometry, counting time, the radionuclide mix, and intensity in the samples.

The results in this report have been obtained by use of the RML procedures for ATR loop radionuclide analysis. The results have been reviewed and checked for correctness by the RML staff.

The uncertainties for these results are for the random counting component obtained from the photopeak-fitting procedure. No other components are included.

There is only one PIX sample per cycle for each loop. Therefore, PIX results will be found with one sampling of each loop.

ATR Cycle 172A was a PALM cycle. Due to the short nature of the cycle, only one set of samples was taken and measured for this report.

FROM MAR 2, 2024 TO MAR 20, 2024

LOOP 1C-W CYCLE 172A POWER 32.0 MW

| SAMPLE TYPE | | PIX | | BIX | | AIX | | | | BIX-7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | | 030524012 | | 030524011 | | 030524013 | | | | 031224013 | |
| DATE SAMPLED | | 03/05/24 | | 03/05/24 | | 03/05/24 | | | | 03/05/24 | |
| TIME SAMPLED | | 14:40 | | 14:46 | | 14:29 | | | | 14:46 | |
| RADIONUCLIDE | | DPM/ML | %ERR | DPM/ML | %ERR | DPM/ML | %ERR | DFX | %ERR | DPM/ML | %ERR |
| 11 Na | 24 | <7.90E+01 | | 1.79E+01 | 8.5 | <2.00E-01 | | >8.94E+01 | | | |
| 21 Sc | 46 | | | <1.82E+00 | | <2.71E-01 | | Undeterminable | | 3.61E-01 | 37.4 |
| 24 Cr | 51 | | | | | | | | | 3.13E+01 | 1.6 |
| 25 Mn | 54 | | | | | | | | | 2.07E+01 | 1.7 |
| 25 Mn | 56 | | | 7.90E+01 | 5.5 | <1.59E+00 | | >4.96E+01 | | | |
| 26 Fe | 59 | | | | | | | | | 3.82E+00 | 4.6 |
| 27 Co | 58 | | | | | | | | | 2.65E+00 | 3.6 |
| 27 Co | 60 | | | 5.00E+01 | 3.0 | 1.12E+00 | 17.7 | 4.47E+01 | 18.0 | 6.46E+01 | 4.1 |
| 30 Zn | 65 | | | 3.94E+00 | 35.7 | <5.82E-01 | | >6.76E+00 | | 4.85E+00 | 5.0 |
| 37 Rb | 88 | <1.40E+03 | | 6.10E+01 | 24.1 | <1.73E+01 | | >3.52E+00 | | | |
| 37 Rb | 89 | <1.20E+03 | | 1.61E+02 | 5.8 | <6.82E+00 | | >2.36E+01 | | | |
| 38 Sr | 91 | | | 5.12E+00 | 38.3 | <6.56E-01 | | >7.80E+00 | | | |
| 38 Sr | 92 | | | 6.96E+00 | 15.0 | <6.02E-01 | | >1.16E+01 | | | |
| 39 YM | 90 | | | <1.96E+00 | | <1.68E-01 | | Undeterminable | | | |
| 39 Y | 92 | | | <1.48E+01 | | <3.59E+00 | | Undeterminable | | | |
| 39 Y | 93 | | | <2.32E+01 | | <1.83E+00 | | Undeterminable | | | |
| 40 Zr | 95 | | | <2.73E+00 | | <5.86E-01 | | Undeterminable | | 1.25E+00 | 11.1 |
| 40 Zr | 97 | | | 9.03E+01 | 33.0 | <2.03E+01 | | >4.44E+00 | | | |
| 41 Nb | 95 | | | | | | | | | 2.42E+00 | 3.4 |
| 42 Mo | 99 | | | | | | | | | 8.78E+01 | 1.9 |
| 43 TcM | 99 | | | <1.99E+01 | | <2.69E-01 | | Undeterminable | | | |
| 44 Ru | 103 | | | <2.03E+00 | | <3.14E-01 | | Undeterminable | | <1.32E-01 | |
| 45 Rh | 106 | | | | | | | | | <1.32E+00 | |
| 47 AgM | 110 | | | | | | | | | 2.31E-01 | 31.0 |
| 51 Sb | 122 | | | | | | | | | 1.92E+01 | 3.7 |
| 51 Sb | 124 | | | | | | | | | 7.88E+00 | 1.7 |
| 52 Te | 132 | | | | | | | | | <3.48E-01 | |
| 53 I | 131 | | | <4.93E+00 | | <2.44E-01 | | Undeterminable | | 1.75E+00 | 6.7 |
| 53 I | 132 | <1.46E+02 | | 4.94E+01 | 2.9 | <3.63E-01 | | >1.36E+02 | | | |
| 53 I | 133 | | | 2.59E+01 | 6.0 | <1.53E-01 | | >1.69E+02 | | | |
| 53 I | 134 | 2.27E+02 | 30.4 | 2.66E+02 | 2.4 | <6.87E-01 | | >3.88E+02 | | | |
| 53 I | 135 | <2.34E+02 | | 5.92E+01 | 7.1 | <8.89E-01 | | >6.66E+01 | | | |
| 55 Cs | 134 | | | | | | | | | 2.70E-01 | 23.0 |
| 55 Cs | 136 | | | <2.02E+00 | | <6.86E-01 | | Undeterminable | | <3.35E-01 | |
| 55 Cs | 137 | | | | | | | | | 7.49E-01 | 7.7 |
| 55 Cs | 138 | 3.87E+02 | 20.5 | 2.39E+02 | 3.6 | <1.02E+01 | | >2.34E+01 | | | |
| 56 Ba | 140 | | | <4.07E+00 | | <7.24E-01 | | Undeterminable | | <7.75E-01 | |
| 56 Ba | 141 | | | 1.17E+01 | 42.1 | <2.45E+00 | | >4.79E+00 | | | |

FROM MAR 2, 2024 TO MAR 20, 2024

LOOP 1C-W CYCLE 172A POWER 32.0 MW

| SAMPLE TYPE | PIX | | BIX | | AIX | | | | BIX-7 | |
|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | 030524012 | | 030524011 | | 030524013 | | | | 031224013 | |
| DATE SAMPLED | 03/05/24 | | 03/05/24 | | 03/05/24 | | | | 03/05/24 | |
| TIME SAMPLED | 14:40 | | 14:46 | | 14:29 | | | | 14:46 | |
| RADIONUCLIDE | DPM/ML | %ERR | DPM/ML | %ERR | DPM/ML | %ERR | DFX | %ERR | DPM/ML | %ERR |
| 57 La 140 | | | <1.56E+00 | | <3.15E-01 | | Undeterminable | | 6.02E+00 | 12.6 |
| 57 La 142 | | | <7.49E+00 | | <7.83E+00 | | Undeterminable | | | |
| 58 Ce 141 | | | <3.03E+00 | | <5.56E-01 | | Undeterminable | | 1.16E-01 | 34.0 |
| 58 Ce 143 | | | <3.65E+00 | | <3.12E-01 | | Undeterminable | | | |
| 58 Ce 144 | | | | | | | | | <2.77E+00 | |
| 63 EuM 152 | | | <3.03E+01 | | <1.40E+00 | | Undeterminable | | | |
| 63 Eu 152 | | | <5.41E+00 | | <2.18E+00 | | Undeterminable | | <2.90E-01 | |
| 63 Eu 154 | | | <4.12E+00 | | <8.32E-01 | | Undeterminable | | <2.31E-01 | |
| 63 Eu 155 | | | | | | | | | <1.83E-01 | |
| 63 Eu 156 | | | <2.74E+01 | | <3.52E+00 | | Undeterminable | | <1.57E+00 | |
| 68 Er 171 | | | <2.20E+00 | | <2.59E-01 | | Undeterminable | | | |
| 71 Lu 177 | | | <1.67E+01 | | <1.41E+00 | | Undeterminable | | <1.11E+00 | |
| 72 Hf 175 | | | | | | | | | 3.99E-01 | 7.9 |
| 72 Hf 181 | | | 2.28E+00 | 32.3 | <2.73E-01 | | >8.36E+00 | | 1.64E+00 | 4.9 |
| 73 Ta 182 | | | | | | | | | <2.78E-01 | |
| 73 Ta 183 | | | | | | | | | <7.05E-01 | |
| 74 W 187 | | | 1.23E+02 | 2.8 | <1.01E+00 | | >1.22E+02 | | 1.03E+02 | 17.3 |
| 93 Np 239 | | | <9.84E+00 | | <1.24E+00 | | Undeterminable | | <3.55E+00 | |
| 18 Ar 41 | 9.88E+01 | 29.7 | | | | | | | | |
| 36 KrM 85 | 6.87E+01 | 44.5 | | | | | | | | |
| 36 Kr 87 | <2.39E+02 | | | | | | | | | |
| 36 Kr 88 | <3.10E+02 | | | | | | | | | |
| 54 Xe 133 | <6.77E+02 | | | | | | | | | |
| 54 XeM 135 | 3.55E+02 | 44.8 | | | | | | | | |
| 54 Xe 135 | 1.94E+02 | 12.9 | | | | | | | | |
| 54 Xe 138 | <7.96E+02 | | | | | | | | | |

FROM MAR 2, 2024 TO MAR 20, 2024

LOOP 1D-N CYCLE 172A POWER 32.0 MW

| SAMPLE TYPE | PIX | | BIX | | AIX | | | | BIX-7 | |
|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | 030624009 | | 030624008 | | 030624010 | | | | 031324003 | |
| DATE SAMPLED | 03/06/24 | | 03/06/24 | | 03/06/24 | | | | 03/06/24 | |
| TIME SAMPLED | 14:47 | | 14:53 | | 14:33 | | | | 14:53 | |
| RADIONUCLIDE | DPM/ML | %ERR | DPM/ML | %ERR | DPM/ML | %ERR | DFX | %ERR | DPM/ML | %ERR |
| 11 Na 24 | <1.10E+02 | | 2.69E+01 | 4.6 | <6.04E-01 | | >4.46E+01 | | | |
| 21 Sc 46 | | | <1.36E+00 | | <2.00E-01 | | Undeterminable | | <2.18E-01 | |
| 24 Cr 51 | | | | | | | | | 2.27E+00 | 13.2 |
| 25 Mn 54 | | | | | | | | | 4.68E+01 | 0.9 |
| 25 Mn 56 | | | 7.23E+01 | 6.3 | <2.04E+00 | | >3.55E+01 | | | |
| 26 Fe 59 | | | | | | | | | 1.27E+01 | 2.3 |
| 27 Co 58 | | | | | | | | | 6.80E+00 | 1.7 |
| 27 Co 60 | | | 1.74E+02 | 1.6 | 2.75E+00 | 10.5 | 6.32E+01 | 10.6 | 1.77E+02 | 1.8 |
| 30 Zn 65 | | | <3.51E+00 | | <3.98E-01 | | Undeterminable | | 5.26E-01 | 33.5 |
| 37 Rb 88 | <1.32E+03 | | <2.45E+01 | | <1.66E+01 | | Undeterminable | | | |
| 37 Rb 89 | <4.23E+02 | | <3.23E+01 | | <5.60E+00 | | Undeterminable | | | |
| 38 Sr 91 | | | <4.96E+00 | | <5.93E-01 | | Undeterminable | | | |
| 38 Sr 92 | | | 1.71E+00 | 27.8 | <3.63E-01 | | >4.71E+00 | | | |
| 39 YM 90 | | | <1.31E+00 | | <1.43E-01 | | Undeterminable | | | |
| 39 Y 92 | | | <1.37E+01 | | <2.36E+00 | | Undeterminable | | | |
| 39 Y 93 | | | <1.69E+01 | | <1.09E+00 | | Undeterminable | | | |
| 40 Zr 95 | | | <2.61E+00 | | <2.84E-01 | | Undeterminable | | 3.97E-01 | 39.4 |
| 40 Zr 97 | | | <5.20E+01 | | <8.25E+00 | | Undeterminable | | | |
| 41 Nb 95 | | | | | | | | | 5.31E-01 | 14.8 |
| 42 Mo 99 | | | | | | | | | 2.47E+01 | 1.6 |
| 43 TcM 99 | | | 2.97E+00 | 13.8 | <1.81E-01 | | >1.64E+01 | | | |
| 44 Ru 103 | | | <1.40E+00 | | <1.09E-01 | | Undeterminable | | <1.51E-01 | |
| 45 Rh 106 | | | | | | | | | <1.15E+00 | |
| 47 AgM 110 | | | | | | | | | <9.35E-02 | |
| 51 Sb 122 | | | | | | | | | <8.85E-01 | |
| 51 Sb 124 | | | | | | | | | 1.76E-01 | 28.9 |
| 52 Te 132 | | | | | | | | | <3.23E-01 | |
| 53 I 131 | | | <1.40E+00 | | <1.16E-01 | | Undeterminable | | <2.40E-01 | |
| 53 I 132 | <5.08E+01 | | <1.73E+00 | | <2.46E-01 | | Undeterminable | | | |
| 53 I 133 | | | 1.50E+00 | 40.7 | <1.20E-01 | | >1.24E+01 | | | |
| 53 I 134 | <1.72E+02 | | 9.31E+00 | 24.0 | <5.57E-01 | | >1.67E+01 | | | |
| 53 I 135 | <1.19E+02 | | <5.51E+00 | | <8.84E-01 | | Undeterminable | | | |
| 55 Cs 134 | | | | | | | | | <1.85E-01 | |
| 55 Cs 136 | | | <3.11E+00 | | <2.87E-01 | | Undeterminable | | <5.42E-01 | |
| 55 Cs 137 | | | | | | | | | 1.41E+00 | 5.3 |
| 55 Cs 138 | <1.33E+02 | | 1.24E+01 | 19.0 | <2.39E+00 | | >5.18E+00 | | | |
| 56 Ba 140 | | | <6.24E+00 | | <4.20E-01 | | Undeterminable | | <5.91E-01 | |
| 56 Ba 141 | | | <8.95E+00 | | <1.43E+00 | | Undeterminable | | | |

FROM MAR 2, 2024 TO MAR 20, 2024

LOOP 1D-N CYCLE 172A POWER 32.0 MW

| SAMPLE TYPE | PIX | | BIX | | AIX | | | | BIX-7 | |
|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | 030624009 | | 030624008 | | 030624010 | | | | 031324003 | |
| DATE SAMPLED | 03/06/24 | | 03/06/24 | | 03/06/24 | | | | 03/06/24 | |
| TIME SAMPLED | 14:47 | | 14:53 | | 14:33 | | | | 14:53 | |
| RADIONUCLIDE | DPM/ML | %ERR | DPM/ML | %ERR | DPM/ML | %ERR | DFX | %ERR | DPM/ML | %ERR |
| 57 La 140 | | | <4.42E-01 | | <3.16E-01 | | Undeterminable | | <2.10E+00 | |
| 57 La 142 | | | <1.02E+01 | | <7.32E+00 | | Undeterminable | | | |
| 58 Ce 141 | | | <1.58E+00 | | <1.13E-01 | | Undeterminable | | <9.96E-02 | |
| 58 Ce 143 | | | <2.87E+00 | | <2.20E-01 | | Undeterminable | | | |
| 58 Ce 144 | | | | | | | | | <5.76E-01 | |
| 63 EuM 152 | | | <5.27E+00 | | <2.30E+00 | | Undeterminable | | | |
| 63 Eu 152 | | | <2.50E+00 | | 1.32E+00 | 37.7 | Undeterminable | | <3.21E-01 | |
| 63 Eu 154 | | | <3.19E+00 | | <9.99E-01 | | Undeterminable | | <2.43E-01 | |
| 63 Eu 155 | | | | | | | | | <1.97E-01 | |
| 63 Eu 156 | | | <1.53E+01 | | <3.63E+00 | | Undeterminable | | <1.91E+00 | |
| 68 Er 171 | | | <1.78E+00 | | <1.76E-01 | | Undeterminable | | | |
| 71 Lu 177 | | | <9.12E+00 | | <9.21E-01 | | Undeterminable | | <9.39E-01 | |
| 72 Hf 175 | | | | | | | | | <1.23E-01 | |
| 72 Hf 181 | | | <1.51E+00 | | <9.82E-02 | | Undeterminable | | <1.51E-01 | |
| 73 Ta 182 | | | | | | | | | 7.93E-01 | 9.4 |
| 73 Ta 183 | | | | | | | | | <9.05E-01 | |
| 74 W 187 | | | 1.05E+02 | 3.2 | <1.03E+00 | | >1.03E+02 | | <7.26E+01 | |
| 93 Np 239 | | | <8.10E+00 | | <5.53E-01 | | Undeterminable | | <3.16E+00 | |
| 18 Ar 41 | 7.82E+01 | 38.1 | | | | | | | | |
| 36 KrM 85 | <3.69E+01 | | | | | | | | | |
| 36 Kr 87 | <9.43E+01 | | | | | | | | | |
| 36 Kr 88 | <2.59E+02 | | | | | | | | | |
| 54 Xe 133 | <4.98E+02 | | | | | | | | | |
| 54 XeM 135 | <3.10E+02 | | | | | | | | | |
| 54 Xe 135 | <2.79E+01 | | | | | | | | | |
| 54 Xe 138 | <6.40E+02 | | | | | | | | | |

FROM MAR 2, 2024 TO MAR 20, 2024

LOOP 2B-SE CYCLE 172A POWER 32.0 MW

| SAMPLE TYPE | | PIX | | BIX | | AIX | | | | BIX-7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | | 030724007 | | 030724006 | | 030724008 | | | | 031424002 | |
| DATE SAMPLED | | 03/07/24 | | 03/07/24 | | 03/07/24 | | | | 03/07/24 | |
| TIME SAMPLED | | 14:42 | | 14:49 | | 14:27 | | | | 14:49 | |
| RADIONUCLIDE | | DPM/ML | %ERR | DPM/ML | %ERR | DPM/ML | %ERR | DFX | %ERR | DPM/ML | %ERR |
| 11 Na | 24 | <8.31E+01 | | 1.57E+01 | 13.3 | 7.03E-01 | 34.5 | 2.23E+01 | 37.0 | | |
| 21 Sc | 46 | | | <5.62E+00 | | <8.63E-01 | | Undeterminable | | 1.09E-01 | 46.0 |
| 24 Cr | 51 | | | | | | | | | <7.20E-01 | |
| 25 Mn | 54 | | | | | | | | | 3.08E+01 | 1.7 |
| 25 Mn | 56 | | | 8.39E+01 | 13.2 | <4.09E+00 | | >2.05E+01 | | | |
| 26 Fe | 59 | | | | | | | | | 1.11E+00 | 10.6 |
| 27 Co | 58 | | | | | | | | | 2.38E+00 | 5.0 |
| 27 Co | 60 | | | 4.33E+01 | 8.1 | 2.10E+01 | 7.0 | 2.06E+00 | 10.7 | 4.90E+01 | 1.4 |
| 30 Zn | 65 | | | <1.24E+01 | | <1.60E+00 | | Undeterminable | | <3.79E-01 | |
| 37 Rb | 88 | <6.94E+03 | | 5.24E+02 | 16.3 | 1.75E+02 | 36.3 | 2.99E+00 | 39.8 | | |
| 37 Rb | 89 | 2.08E+03 | 34.1 | 1.52E+03 | 3.1 | <7.12E+01 | | >2.13E+01 | | | |
| 38 Sr | 91 | | | 2.88E+01 | 31.0 | <3.18E+00 | | >9.05E+00 | | | |
| 38 Sr | 92 | | | 3.42E+01 | 10.6 | <1.46E+00 | | >2.34E+01 | | | |
| 39 YM | 90 | | | <4.18E+00 | | <1.19E+00 | | Undeterminable | | | |
| 39 Y | 92 | | | <4.24E+01 | | <9.61E+00 | | Undeterminable | | | |
| 39 Y | 93 | | | <8.18E+01 | | <8.09E+00 | | Undeterminable | | | |
| 40 Zr | 95 | | | <7.22E+00 | | <1.59E+00 | | Undeterminable | | 1.74E+00 | 8.8 |
| 40 Zr | 97 | | | 3.84E+02 | 33.5 | <6.60E+01 | | >5.82E+00 | | | |
| 41 Nb | 95 | | | | | | | | | 3.23E+00 | 2.5 |
| 42 Mo | 99 | | | | | | | | | 7.69E+01 | 1.5 |
| 43 TcM | 99 | | | <4.64E+01 | | <6.24E-01 | | Undeterminable | | | |
| 44 Ru | 103 | | | <9.85E+00 | | <7.23E-01 | | Undeterminable | | <1.17E-01 | |
| 45 Rh | 106 | | | | | | | | | <7.42E-01 | |
| 47 AgM | 110 | | | | | | | | | <7.44E-02 | |
| 51 Sb | 122 | | | | | | | | | 1.23E+00 | 36.4 |
| 51 Sb | 124 | | | | | | | | | <1.65E-01 | |
| 52 Te | 132 | | | | | | | | | <3.01E-01 | |
| 53 I | 131 | | | <7.36E+00 | | <5.75E-01 | | Undeterminable | | 5.67E+00 | 1.8 |
| 53 I | 132 | 2.31E+02 | 19.7 | 2.89E+02 | 1.9 | <1.01E+00 | | >2.87E+02 | | | |
| 53 I | 133 | | | 1.09E+02 | 3.9 | <6.61E-01 | | >1.66E+02 | | | |
| 53 I | 134 | 1.38E+03 | 9.3 | 1.35E+03 | 1.8 | <4.59E+00 | | >2.95E+02 | | | |
| 53 I | 135 | <1.63E+02 | | 2.90E+02 | 4.3 | <2.63E+00 | | >1.10E+02 | | | |
| 55 Cs | 134 | | | | | | | | | <1.48E-01 | |
| 55 Cs | 136 | | | <8.45E+00 | | <1.27E+00 | | Undeterminable | | <4.24E-01 | |
| 55 Cs | 137 | | | | | | | | | 2.65E+00 | 2.9 |
| 55 Cs | 138 | <1.86E+03 | | 1.49E+03 | 2.7 | 3.37E+01 | 44.9 | 4.44E+01 | 45.0 | | |
| 56 Ba | 140 | | | <2.01E+01 | | <3.59E+00 | | Undeterminable | | 3.26E+00 | 7.9 |
| 56 Ba | 141 | | | <4.17E+01 | | <1.22E+01 | | Undeterminable | | | |

FROM MAR 2, 2024 TO MAR 20, 2024

LOOP 2B-SE CYCLE 172A POWER 32.0 MW

| SAMPLE TYPE | PIX | | BIX | | AIX | | | | BIX-7 | |
|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | 030724007 | | 030724006 | | 030724008 | | | | 031424002 | |
| DATE SAMPLED | 03/07/24 | | 03/07/24 | | 03/07/24 | | | | 03/07/24 | |
| TIME SAMPLED | 14:42 | | 14:49 | | 14:27 | | | | 14:49 | |
| RADIONUCLIDE | DPM/ML | %ERR | DPM/ML | %ERR | DPM/ML | %ERR | DFX | %ERR | DPM/ML | %ERR |
| 57 La 140 | | | <7.46E+00 | | <8.53E-01 | | Undeterminable | | <7.80E+00 | |
| 57 La 142 | | | <3.65E+01 | | <1.15E+01 | | Undeterminable | | | |
| 58 Ce 141 | | | <9.49E+00 | | <1.38E+00 | | Undeterminable | | <7.22E-02 | |
| 58 Ce 143 | | | <8.83E+00 | | <9.44E-01 | | Undeterminable | | | |
| 58 Ce 144 | | | | | | | | | <6.16E-01 | |
| 63 EuM 152 | | | <5.57E+01 | | <3.65E+00 | | Undeterminable | | | |
| 63 Eu 152 | | | <2.87E+01 | | <2.64E+00 | | Undeterminable | | <2.86E-01 | |
| 63 Eu 154 | | | <8.07E+00 | | <1.32E+00 | | Undeterminable | | <1.40E-01 | |
| 63 Eu 155 | | | | | | | | | <2.60E-01 | |
| 63 Eu 156 | | | <6.74E+01 | | <7.86E+00 | | Undeterminable | | <1.60E+00 | |
| 68 Er 171 | | | <5.73E+00 | | <7.26E-01 | | Undeterminable | | | |
| 71 Lu 177 | | | <3.15E+01 | | <4.08E+00 | | Undeterminable | | <7.63E-01 | |
| 72 Hf 175 | | | | | | | | | <6.79E-02 | |
| 72 Hf 181 | | | <3.83E+00 | | <4.98E-01 | | Undeterminable | | 1.22E-01 | 27.5 |
| 73 Ta 182 | | | | | | | | | <7.96E-01 | |
| 73 Ta 183 | | | | | | | | | <7.16E-01 | |
| 74 W 187 | | | 6.19E+02 | 1.9 | <3.78E+00 | | >1.64E+02 | | 5.25E+02 | 7.4 |
| 93 Np 239 | | | <2.71E+01 | | <3.72E+00 | | Undeterminable | | <3.11E+00 | |
| 18 Ar 41 | 6.19E+02 | 11.9 | | | | | | | | |
| 36 KrM 85 | 2.02E+02 | 17.4 | | | | | | | | |
| 36 Kr 87 | 6.66E+02 | 18.5 | | | | | | | | |
| 36 Kr 88 | 4.30E+02 | 35.3 | | | | | | | | |
| 54 Xe 133 | <9.19E+02 | | | | | | | | | |
| 54 XeM 135 | <7.33E+02 | | | | | | | | | |
| 54 Xe 135 | 6.17E+02 | 5.9 | | | | | | | | |
| 54 Xe 138 | 2.91E+03 | 29.1 | | | | | | | | |

FROM MAR 2, 2024 TO MAR 20, 2024

LOOP 2D-SW CYCLE 172A POWER 112.0 MW

| SAMPLE TYPE | | PIX | | BIX | | AIX | | | | BIX-7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | | 031124010 | | 031124009 | | 031124011 | | | | 031824009 | |
| DATE SAMPLED | | 03/11/24 | | 03/11/24 | | 03/11/24 | | | | 03/11/24 | |
| TIME SAMPLED | | 14:28 | | 14:38 | | 14:13 | | | | 14:38 | |
| RADIONUCLIDE | | DPM/ML | %ERR | DPM/ML | %ERR | DPM/ML | %ERR | DFX | %ERR | DPM/ML | %ERR |
| 11 Na | 24 | 1.55E+02 | 31.8 | 8.98E+01 | 10.9 | <1.04E+00 | | >8.62E+01 | | | |
| 21 Sc | 46 | | | <1.89E+01 | | <2.35E+00 | | Undeterminable | | <1.60E-01 | |
| 24 Cr | 51 | | | | | | | | | 2.60E+00 | 15.3 |
| 25 Mn | 54 | | | | | | | | | 2.58E+01 | 1.5 |
| 25 Mn | 56 | | | 1.96E+02 | 14.1 | <9.39E+00 | | >2.09E+01 | | | |
| 26 Fe | 59 | | | | | | | | | 3.62E+00 | 4.1 |
| 27 Co | 58 | | | | | | | | | 1.08E+01 | 1.7 |
| 27 Co | 60 | | | 5.12E+01 | 16.0 | 5.93E+01 | 2.2 | 8.64E-01 | 16.2 | 4.91E+01 | 1.5 |
| 30 Zn | 65 | | | <2.32E+01 | | <2.83E+00 | | Undeterminable | | 3.48E-01 | 39.3 |
| 37 Rb | 88 | <8.24E+03 | | 3.11E+03 | 11.5 | <8.82E+02 | | >3.53E+00 | | | |
| 37 Rb | 89 | <9.52E+03 | | 4.02E+03 | 5.3 | <1.71E+02 | | >2.35E+01 | | | |
| 38 Sr | 91 | | | 1.02E+02 | 24.4 | <5.75E+00 | | >1.77E+01 | | | |
| 38 Sr | 92 | | | 1.50E+02 | 8.0 | 4.09E+00 | 21.3 | 3.68E+01 | 22.8 | | |
| 39 YM | 90 | | | <1.48E+01 | | <1.02E+00 | | Undeterminable | | | |
| 39 Y | 92 | | | <2.03E+02 | | <1.23E+01 | | Undeterminable | | | |
| 39 Y | 93 | | | 2.36E+02 | 34.0 | <1.27E+01 | | >1.86E+01 | | | |
| 40 Zr | 95 | | | <2.08E+01 | | <4.32E+00 | | Undeterminable | | 2.02E+00 | 6.0 |
| 40 Zr | 97 | | | 6.69E+02 | 41.3 | <1.47E+02 | | >4.54E+00 | | | |
| 41 Nb | 95 | | | | | | | | | 5.85E+00 | 2.2 |
| 42 Mo | 99 | | | | | | | | | 1.32E+02 | 3.2 |
| 43 TcM | 99 | | | <2.81E+01 | | <1.09E+00 | | Undeterminable | | | |
| 44 Ru | 103 | | | <2.91E+01 | | <1.45E+00 | | Undeterminable | | <1.34E-01 | |
| 45 Rh | 106 | | | | | | | | | <8.06E-01 | |
| 47 AgM | 110 | | | | | | | | | <8.06E-02 | |
| 51 Sb | 122 | | | | | | | | | <1.10E+00 | |
| 51 Sb | 124 | | | | | | | | | <1.11E-01 | |
| 52 Te | 132 | | | | | | | | | <5.38E-01 | |
| 53 I | 131 | | | <1.68E+01 | | <1.21E+00 | | Undeterminable | | 1.77E+01 | 1.1 |
| 53 I | 132 | 9.53E+02 | 7.7 | 9.93E+02 | 1.8 | <1.93E+00 | | >5.13E+02 | | | |
| 53 I | 133 | | | 3.36E+02 | 3.4 | <1.07E+00 | | >3.13E+02 | | | |
| 53 I | 134 | 4.28E+03 | 4.2 | 4.37E+03 | 1.8 | <6.83E+00 | | >6.40E+02 | | | |
| 53 I | 135 | 4.28E+02 | 30.2 | 8.37E+02 | 7.2 | <1.23E+01 | | >6.79E+01 | | | |
| 55 Cs | 134 | | | | | | | | | <1.31E-01 | |
| 55 Cs | 136 | | | <3.09E+01 | | <2.87E+00 | | Undeterminable | | <3.48E-01 | |
| 55 Cs | 137 | | | | | | | | | 2.13E-01 | 27.3 |
| 55 Cs | 138 | 4.00E+03 | 24.9 | 4.67E+03 | 2.6 | 1.12E+02 | 25.1 | 4.16E+01 | 25.2 | | |
| 56 Ba | 140 | | | <7.25E+01 | | <3.13E+00 | | Undeterminable | | 1.60E+01 | 3.7 |
| 56 Ba | 141 | | | <1.14E+02 | | <2.94E+01 | | Undeterminable | | | |

FROM MAR 2, 2024 TO MAR 20, 2024

LOOP 2D-SW CYCLE 172A POWER 112.0 MW

| SAMPLE TYPE | PIX | | BIX | | AIX | | | | BIX-7 | |
|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | 031124010 | | 031124009 | | 031124011 | | | | 031824009 | |
| DATE SAMPLED | 03/11/24 | | 03/11/24 | | 03/11/24 | | | | 03/11/24 | |
| TIME SAMPLED | 14:28 | | 14:38 | | 14:13 | | | | 14:38 | |
| RADIONUCLIDE | DPM/ML | %ERR | DPM/ML | %ERR | DPM/ML | %ERR | DFX | %ERR | DPM/ML | %ERR |
| 57 La 140 | | | <1.24E+01 | | <1.60E+00 | | Undeterminable | | 2.34E+02 | 1.4 |
| 57 La 142 | | | <1.05E+02 | | <9.56E+00 | | Undeterminable | | | |
| 58 Ce 141 | | | <2.38E+01 | | <2.36E+00 | | Undeterminable | | <1.10E-01 | |
| 58 Ce 143 | | | <5.17E+01 | | 1.66E+00 | 45.9 | Undeterminable | | | |
| 58 Ce 144 | | | | | | | | | <8.12E+00 | |
| 63 EuM 152 | | | <1.16E+02 | | <8.41E+00 | | Undeterminable | | | |
| 63 Eu 152 | | | <4.62E+01 | | <7.81E+00 | | Undeterminable | | <3.29E-01 | |
| 63 Eu 154 | | | <3.95E+01 | | <2.96E+00 | | Undeterminable | | <2.75E-01 | |
| 63 Eu 155 | | | | | | | | | <2.90E-01 | |
| 63 Eu 156 | | | <1.31E+02 | | <2.32E+01 | | Undeterminable | | <1.51E+00 | |
| 68 Er 171 | | | <2.46E+01 | | <1.59E+00 | | Undeterminable | | | |
| 71 Lu 177 | | | <1.46E+02 | | <7.06E+00 | | Undeterminable | | <9.26E-01 | |
| 72 Hf 175 | | | | | | | | | 8.72E-01 | 4.3 |
| 72 Hf 181 | | | <1.30E+01 | | 4.69E+00 | 12.6 | Undeterminable | | 6.04E+00 | 1.5 |
| 73 Ta 182 | | | | | | | | | <5.47E-01 | |
| 73 Ta 183 | | | | | | | | | <1.23E+00 | |
| 74 W 187 | | | 1.78E+03 | 2.0 | <3.81E+00 | | >4.67E+02 | | 1.60E+03 | 2.0 |
| 93 Np 239 | | | <1.47E+02 | | <4.81E+00 | | Undeterminable | | <6.91E+00 | |
| 18 Ar 41 | 9.91E+03 | 2.6 | | | | | | | | |
| 36 KrM 85 | 9.43E+02 | 7.0 | | | | | | | | |
| 36 Kr 87 | 2.28E+03 | 8.3 | | | | | | | | |
| 36 Kr 88 | 2.71E+03 | 7.9 | | | | | | | | |
| 54 Xe 133 | 1.67E+03 | 38.8 | | | | | | | | |
| 54 XeM 135 | 2.48E+03 | 28.6 | | | | | | | | |
| 54 Xe 135 | 3.66E+03 | 2.6 | | | | | | | | |
| 54 Xe 138 | 5.53E+03 | 27.2 | | | | | | | | |

FROM MAR 2, 2024 TO MAR 20, 2024

LOOP 2E-NW CYCLE 172A POWER 115.0 MW

| SAMPLE TYPE | | PIX | | BIX | | AIX | | | | BIX-7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | | 031224011 | | 031224010 | | 031224012 | | | | 031924016 | |
| DATE SAMPLED | | 03/12/24 | | 03/12/24 | | 03/12/24 | | | | 03/12/24 | |
| TIME SAMPLED | | 14:28 | | 14:33 | | 14:17 | | | | 14:33 | |
| RADIONUCLIDE | | DPM/ML | %ERR | DPM/ML | %ERR | DPM/ML | %ERR | DFX | %ERR | DPM/ML | %ERR |
| 11 Na | 24 | <1.41E+02 | | 1.41E+02 | 6.6 | <7.04E-01 | | >2.01E+02 | | | |
| 21 Sc | 46 | | | <1.10E+01 | | <8.24E-01 | | Undeterminable | | <1.25E-01 | |
| 24 Cr | 51 | | | | | | | | | 2.23E+01 | 2.2 |
| 25 Mn | 54 | | | | | | | | | 6.15E+01 | 1.6 |
| 25 Mn | 56 | | | 3.01E+03 | 1.9 | 7.98E+00 | 18.6 | 3.77E+02 | 18.7 | | |
| 26 Fe | 59 | | | | | | | | | 2.43E+01 | 1.4 |
| 27 Co | 58 | | | | | | | | | 1.37E+01 | 1.2 |
| 27 Co | 60 | | | 1.49E+01 | 31.2 | 1.91E+01 | 4.4 | 7.78E-01 | 31.5 | 2.06E+01 | 1.4 |
| 30 Zn | 65 | | | <3.22E+01 | | <2.45E+00 | | Undeterminable | | <2.13E-01 | |
| 37 Rb | 88 | <2.54E+03 | | 3.40E+02 | 48.9 | <8.07E+01 | | >4.21E+00 | | | |
| 37 Rb | 89 | <2.10E+03 | | 9.38E+02 | 6.2 | 2.60E+01 | 43.3 | 3.60E+01 | 43.7 | | |
| 38 Sr | 91 | | | <5.64E+01 | | <2.83E+00 | | Undeterminable | | | |
| 38 Sr | 92 | | | 3.64E+01 | 25.2 | <7.46E-01 | | >4.88E+01 | | | |
| 39 YM | 90 | | | <1.74E+01 | | <7.71E-01 | | Undeterminable | | | |
| 39 Y | 92 | | | <1.33E+02 | | <6.49E+00 | | Undeterminable | | | |
| 39 Y | 93 | | | <2.33E+02 | | <5.32E+00 | | Undeterminable | | | |
| 40 Zr | 95 | | | <1.92E+01 | | <1.31E+00 | | Undeterminable | | 1.37E+00 | 9.0 |
| 40 Zr | 97 | | | <3.64E+02 | | <5.03E+01 | | Undeterminable | | | |
| 41 Nb | 95 | | | | | | | | | 5.51E-01 | 9.1 |
| 42 Mo | 99 | | | | | | | | | 2.76E+02 | 1.6 |
| 43 TcM | 99 | | | <1.12E+02 | | <6.29E-01 | | Undeterminable | | | |
| 44 Ru | 103 | | | <1.53E+01 | | <8.19E-01 | | Undeterminable | | <1.98E-01 | |
| 45 Rh | 106 | | | | | | | | | <2.10E+00 | |
| 47 AgM | 110 | | | | | | | | | <1.82E-01 | |
| 51 Sb | 122 | | | | | | | | | 2.78E+00 | 18.7 |
| 51 Sb | 124 | | | | | | | | | 1.29E-01 | 37.2 |
| 52 Te | 132 | | | | | | | | | <4.57E-01 | |
| 53 I | 131 | | | <1.75E+01 | | <4.70E-01 | | Undeterminable | | 7.64E+00 | 8.3 |
| 53 I | 132 | 2.71E+02 | 35.1 | 2.96E+02 | 3.9 | <2.01E+00 | | >1.47E+02 | | | |
| 53 I | 133 | | | 1.31E+02 | 6.0 | <5.86E-01 | | >2.23E+02 | | | |
| 53 I | 134 | 1.02E+03 | 22.2 | 1.30E+03 | 2.5 | 3.13E+00 | 42.8 | 4.16E+02 | 42.9 | | |
| 53 I | 135 | 3.80E+02 | 34.5 | 2.85E+02 | 9.2 | <1.99E+00 | | >1.43E+02 | | | |
| 55 Cs | 134 | | | | | | | | | <1.29E-01 | |
| 55 Cs | 136 | | | <1.34E+01 | | <2.54E+00 | | Undeterminable | | <2.19E-01 | |
| 55 Cs | 137 | | | | | | | | | <2.28E-01 | |
| 55 Cs | 138 | <1.06E+03 | | 1.34E+03 | 2.7 | 2.39E+01 | 24.7 | 5.60E+01 | 24.9 | | |
| 56 Ba | 140 | | | <3.36E+01 | | <1.72E+00 | | Undeterminable | | 4.49E+00 | 7.0 |
| 56 Ba | 141 | | | <1.03E+02 | | <5.35E+00 | | Undeterminable | | | |

FROM MAR 2, 2024 TO MAR 20, 2024

LOOP 2E-NW CYCLE 172A POWER 115.0 MW

| SAMPLE TYPE | PIX | | BIX | | AIX | | | | BIX-7 | |
|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | 031224011 | | 031224010 | | 031224012 | | | | 031924016 | |
| DATE SAMPLED | 03/12/24 | | 03/12/24 | | 03/12/24 | | | | 03/12/24 | |
| TIME SAMPLED | 14:28 | | 14:33 | | 14:17 | | | | 14:33 | |
| RADIONUCLIDE | DPM/ML | %ERR | DPM/ML | %ERR | DPM/ML | %ERR | DFX | %ERR | DPM/ML | %ERR |
| 57 La 140 | | | <1.01E+01 | | <3.23E-01 | | Undeterminable | | 5.63E+01 | 2.8 |
| 57 La 142 | | | <7.62E+01 | | <9.50E+00 | | Undeterminable | | | |
| 58 Ce 141 | | | <2.80E+01 | | <8.21E-01 | | Undeterminable | | <8.73E-02 | |
| 58 Ce 143 | | | <3.91E+01 | | <8.05E-01 | | Undeterminable | | | |
| 58 Ce 144 | | | | | | | | | <1.55E+00 | |
| 63 EuM 152 | | | <1.03E+02 | | <6.64E+00 | | Undeterminable | | | |
| 63 Eu 152 | | | <3.47E+01 | | <2.48E+00 | | Undeterminable | | <2.27E-01 | |
| 63 Eu 154 | | | <4.87E+01 | | <1.57E+00 | | Undeterminable | | <1.60E-01 | |
| 63 Eu 155 | | | | | | | | | <4.43E-01 | |
| 63 Eu 156 | | | <2.81E+02 | | <8.91E+00 | | Undeterminable | | <1.15E+00 | |
| 68 Er 171 | | | <2.24E+01 | | <8.05E-01 | | Undeterminable | | | |
| 71 Lu 177 | | | <2.50E+02 | | <3.71E+00 | | Undeterminable | | <1.39E+00 | |
| 72 Hf 175 | | | | | | | | | <1.18E-01 | |
| 72 Hf 181 | | | <1.30E+01 | | <4.24E-01 | | Undeterminable | | 6.07E-01 | 12.0 |
| 73 Ta 182 | | | | | | | | | <4.20E-01 | |
| 73 Ta 183 | | | | | | | | | 1.87E+00 | 13.0 |
| 74 W 187 | | | 5.04E+03 | 1.1 | <3.89E+00 | | >1.30E+03 | | 4.65E+03 | 1.4 |
| 93 Np 239 | | | <1.45E+02 | | <2.41E+00 | | Undeterminable | | <3.14E+00 | |
| 18 Ar 41 | 7.18E+03 | 5.1 | | | | | | | | |
| 36 KrM 85 | <2.31E+02 | | | | | | | | | |
| 36 Kr 87 | 6.66E+02 | 18.3 | | | | | | | | |
| 36 Kr 88 | 3.78E+02 | 30.9 | | | | | | | | |
| 54 Xe 133 | <1.62E+03 | | | | | | | | | |
| 54 XeM 135 | <1.66E+03 | | | | | | | | | |
| 54 Xe 135 | 6.46E+02 | 7.5 | | | | | | | | |
| 54 Xe 138 | 2.69E+03 | 27.6 | | | | | | | | |