Canada's Nuclear Regulator

Report on the Cleanup at Richmond Metals Recycling Inc.

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Report on the Cleanup at Richmond Metals Recycling Inc.
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Executive summary

This report, written by Canadian Nuclear Safety Commission (CNSC) staff for the public, describes the cleanup and decontamination of the Richmond Metals Recycling Inc. (RMR) facility and the results of CNSC staff site-monitoring activities.

RMR was issued a two-year waste nuclear substance licence (WNSL-W2-3770.0/2015) by the CNSC on November 21, 2013, to clean zirconium tubes contaminated with natural uranium. In July 2015, RMR notified the CNSC of its intention to cease operations and seek the release of the facility from CNSC regulatory control. In order to revoke the licence, CNSC staff required RMR to develop a detailed plan for the cleanup and decontamination of the licensed site. CNSC staff reviewed the plan and found it acceptable to ensure that the public, workers and the environment were protected during all cleanup and decontamination activities. In addition, CNSC staff performed independent monitoring to verify that the site was safe for public use.

The final cleanup and decontamination work was planned and carried out under the supervision of a qualified third party (Energy Solutions). CNSC staff conducted independent radiological surveys and sampling at the licensed site to verify that all regulatory requirements and cleanup criteria were met. Based on the information provided in RMR's final report and CNSC staff's independent monitoring and oversight activities, CNSC staff confirmed that all regulatory requirements and cleanup criteria were satisfied and the public and the environment are safe.

As of November 18, 2015, RMR was no longer subject to CNSC regulatory control, and the facility was released for public use. This report describes the cleanup of RMR's licensed site.

1.0 Introduction

On November 18, 2015, the Canadian Nuclear Safety Commission (CNSC) revoked Richmond Metals Recycling Inc.'s (RMR) waste nuclear substance licence (WNSL-W2-3370.0/2015) for its operations located in Mississauga, Ontario. As of November 18, 2015, RMR was no longer subject to the CNSC's regulatory requirements. The waste nuclear substance licence was revoked on request from RMR.

The purpose of this report is to provide information concerning the cleanup of RMR's licensed site. This report is based on information submitted by RMR, and regulatory oversight activities conducted by CNSC staff.

1.1 Background

RMR specialized in recycling zirconium tubes for the nuclear industry. On November 21, 2013, the CNSC issued RMR a waste nuclear substance licence (WNSL-W2-3370.0/2015) authorizing RMR to clean zirconium tubes contaminated with natural uranium. The tubes originated from GE Hitachi Nuclear Energy Canada Inc. (GEH-C), a CNSC-licensed facility. RMR's licensed site was located in an industrial park in Mississauga, Ontario.

Pursuant to paragraph 37(2)(d) of the *Nuclear Safety and Control Act* and CMD 14-M24, (*Request Approval of the List of Designated Officer Positions and Duties*) the Director General, Directorate of Nuclear Cycle and Facilities Regulation is the designated officer for this licence, with authority to issue, amend and revoke this licence on receipt of an application.

RMR decontaminated the zirconium tubes onsite by loading the tubes onto a lathe that contained a metal brush. A picture of the lathe is provided in appendix A (see figure 1). The metal brush slowly rotated and cleaned the inside of the tube. The cleaned zirconium tubes were stored onsite until they were shipped out for recycling. Uranium dust from inside the tubes was owned by GEH-C and it was collected in a pan underneath the lathe and returned to GEH-C. Workers wore dust masks to protect themselves from the potential release of small amounts of uranium dust in the air. An air monitor was used to monitor the amount of uranium dust in the air.

Drums containing the contaminated tubes were stored in the warehouse area within RMR's licensed site. A photograph of the warehouse is provided in appendix A (see figure 2). Radioactive work was restricted to the lathe/processing area (refer to figure 3 in appendix A for the facility layout diagram). Uranium dust and waste from the process were stored temporarily in the storage area at the licensed site until arrangements were made with GEH-C to reclaim the material and transport it to GEH-C's licensed site. RMR's licensed site also included other areas such as a lobby, office area and washroom.

Until June 25, 2015, RMR was permitted under its licence to receive and process zirconium tubes contaminated with natural uranium. On June 25, 2015, RMR was issued an order [1] to cease operations due to a failure to adequately respond to the CNSC's repeated requests for information. The order was never closed because on July 13, 2015, RMR notified the CNSC of its intention to permanently cease operations and seek the release of the facility from the CNSC's regulatory control. [2]

Background on RMR's cleanup activities

In August 2015, RMR conducted its first cleanup and decontamination activities at its licensed site in accordance with its CNSC-approved preliminary decommissioning plan. Upon notification by RMR that all cleanup and decontamination activities were completed, CNSC staff inspected the licensed site on September 11, 2015. CNSC staff observed that there were no radioactive wastes or materials remaining at the licensed site. All of RMR's radioactive wastes and materials were returned to GEH-C for management and disposal. CNSC staff reviewed RMR's completed shipping and receipt documentation to confirm that the transfer of wastes and materials from RMR to GEH-C had occurred.

CNSC staff took samples in all rooms at the licensed site to check for the presence of radioactive contamination. Radioactive contamination is the deposition of, or presence of radioactive substances on surfaces where their presence is unintended or undesirable.[3] The samples were sent to the CNSC laboratory and analyzed for contamination. The results of the analyses confirmed that contamination levels met the acceptable cleanup criterion of 0.3 becquerel (Bq)/cm^2. [4]

CNSC staff also measured for uranium contamination directly. A direct check with a contamination survey meter immediately indicates if an area is contaminated or not. CNSC staff found that the contamination levels for some tools, equipment and furniture were higher than levels specified in the cleanup criteria. [4] Consequently, CNSC staff issued an inspector's order [5] to RMR on site. The order prohibited RMR from removing any items, furniture and equipment from the licensed site until they were cleaned, surveyed and deemed to meet the cleanup criteria. The order also required RMR to submit a new decontamination plan and strategy for review and approval by CNSC staff, to decontaminate the licensed site to meet the cleanup criteria and to submit a final report.

In October 2015, cleanup and decontamination work was planned and carried out under the supervision of Energy Solutions, a CNSC-licensed nuclear services company with international expertise in remediation and cleanup. The work was conducted in accordance with the decontamination plan, and reviewed and approved by the CNSC. All items were surveyed for contamination. Any contaminated items were transferred to GEH-C. The floors and walls of the licensed site were defined in grids for each room. The radiological characterization of the site identified more than 35 contaminated areas. All areas were decontaminated to a level below the cleanup criterion of 0.3 Bq/cm^2. RMR submitted a characterization report and revised decommissioning plan to the CNSC. [6] All results submitted to the CNSC indicated that the site was clean and free of contamination in accordance with the cleanup criteria.

In November 2015, CNSC staff inspected the licensed site to verify the effectiveness of RMR's cleanup and decontamination activities. CNSC staff took samples and checked for contamination using a contamination survey instrument and surface swipes. The swipes were sent to the CNSC laboratory for analysis. The results showed that all areas in the licensed site met the cleanup criteria. [7] [appendix A: Table 1] CNSC staff observed that all items had been removed. All areas examined were confirmed to be at background levels. CNSC staff also reviewed shipping documents and followed up with GEH-C to confirm that all radioactive material, waste and uranium dust were transferred to GEH-C. [8, 9 and 10]

2.0 Regulatory requirements

RMR complied with all of the terms and conditions of the order issued on September 15, 2015. All of the cleanup and decontamination work was completed to the satisfaction of CNSC staff. The facility was tested for contamination by CNSC staff and a qualified independent third party. All results demonstrate no risk to the health and safety of the public or the environment.

Due to the fact that RMR ceased operations following the order of June 25, 2016, it is deemed that the conditions of the order have been met.

The CNSC considers 0.3 Bq/cm^2 to be an acceptable criterion for releasing a laboratory or workspace from regulatory control. This value is derived from the International Atomic Energy Agency [12] and is based on an individual person being exposed to a dose no greater than 0.01 millisieverts (mSv) in a year, hence there are no health risks to the public and the environment. The regulatory dose for a member of the public is 1 mSv/year.

CNSC staff assured the cleanup of the RMR site met all applicable regulatory requirements for the protection of human health and the environment before recommending to the designated officer that the licence be revoked as requested by RMR. The designated officer revoked the licence on November 18, 2015. As of this date, the site is no longer subject to CNSC regulatory control.

3.0 Summary of cleanup activities

RMR conducted planning, cleanup and decontamination activities in a three-phased approach, as described below. Detailed planning ensured the public, workers and the environment were protected during all activities.

Phase 1 – Planning

This phase consisted of the development of a work plan by a qualified third party (i.e., Energy Solutions). The plan included categorization of material and the cleanup criteria.

Phase 2 – Cleanup and decontamination

All the work conducted during cleanup and decontamination activities was performed according to the health and safety measures defined in the detailed work plans. The following activities were completed during this phase:

- A survey was performed of all miscellaneous items stored in RMR's licensed site for contamination.
- Any contaminated items were transferred to GEH-C for management.
- A complete radiological characterization of the site was performed.
- Areas in the site found to be contaminated were decontaminated and resurveyed as required.

Phase 3 – Final report

The last phase consisted of preparing the final closure report. [6] The report included the final monitoring results.

3.1 Waste management

Waste was generated from activities performed onsite throughout the cleanup. In accordance with the CNSC approved decommissioning plan, all radioactive material was removed from the site and any item found to be contaminated with uranium (e.g., tools, equipment and clothing) was packaged and picked up for disposal by GEH-C.

3.2 CNSC monitoring and verification of cleanup activities

CNSC staff reviewed the decommissioning plans to carry out cleanup and decontamination activities. Doing so ensured RMR made adequate provisions for the protection of the environment, and the health and safety of workers and the public.

CNSC staff reviewed the results of Energy Solutions, which conducted sampling of the licensed site to verify the effectiveness of the decontamination activities. [13]

CNSC inspectors then inspected the site after decontamination to perform independent sampling and verification.

A CNSC sample analysis report [7] provides all the analyses of the samples taken. The results and a diagram showing the location of each sample taken can be obtained by sending an email to the CNSC.

4.0 Future site use

RMR's licensed facility at 7385 Torbram Road, Unit #2, in Mississauga, Ontario has been released for public use. CNSC staff have confirmed through independent radiological surveys and sampling at the licensed site that all regulatory requirements and the acceptable cleanup criteria were met.

5.0 Conclusion

CNSC staff confirmed that there are no nuclear substances remaining at RMR's licensed site and that all surfaces meet the cleanup criteria. Based on CNSC staff's independent monitoring, and staff review of submissions from RMR and its third-party service providers, CNSC staff conclude that RMR made adequate provisions for the protection of the environment, and the health and safety of persons. RMR's waste nuclear substance licence was therefore revoked and the facility is fit for use by the public.

6.0 References

1. Order RMR June 25, 2015 (e-Doc 4788956).

2. D. Sharpe Sr. (RMR) to A. McLay (CNSC), request to revoke licence, July 13, 2015 (e-Doc 4801166).

3. *IAEA Safety Glossary, Terminology Used in Nuclear Safety and Radiation Protection 2007 Edition* (ISBN 92-0-100707-8).

4. Trip Report RMR, September 11/November 5, 2015 (e-Doc 4870767).

5. Order #2 RMR, September 15, 2015 (e-Doc 4839530).

6. S. Fawcett (RMR) to A. McLay (CNSC), RMR Decommissioning Report Addendum, October 27, 2015 (e-Doc 4870874).

7. *Sample Analysis Report*, RMR, November 17, 2015 (e-Doc 4879151).

8. P. Desiri (GEH-C) to A. McLay (CNSC), shipment of pellets: Richmond Metals Recycling, August 5, 2015 (e-Doc 4813181).

9. S. Fawcett (RMR) to A. McLay (CNSC), emailing RM-04 ICD, August 28, 2015 (e-Doc 4830613).

10. S. Quinlan (GEH-C) to A. McLay, Drum Pick up, November 3, 2015 (e-Doc 4874720).

11. *RMR Designated Officer Document*, November 2015 (e-Doc 4873626).

12. Clearance *l*evels for *r*adionuclides in solid *m*aterials*: Application of exemption principles, 1996* (IAEA-TECDOC-8S5).

13. *RMR Facility Characterization Report*, Energy Solutions, October 27, 2015 (e-Doc 4870874).

Applicable regulations

Radiation Protection Regulations
General Nuclear Safety and Control Regulations
Nuclear Substance and Radiation Devices Regulations

Appendix A

Figure 1: Lathe used to clean the inside of zirconium tubes contaminated with natural uranium

Figure 2: RMR warehouse after decontamination

Figure 3: RMR facility layout (not to scale)

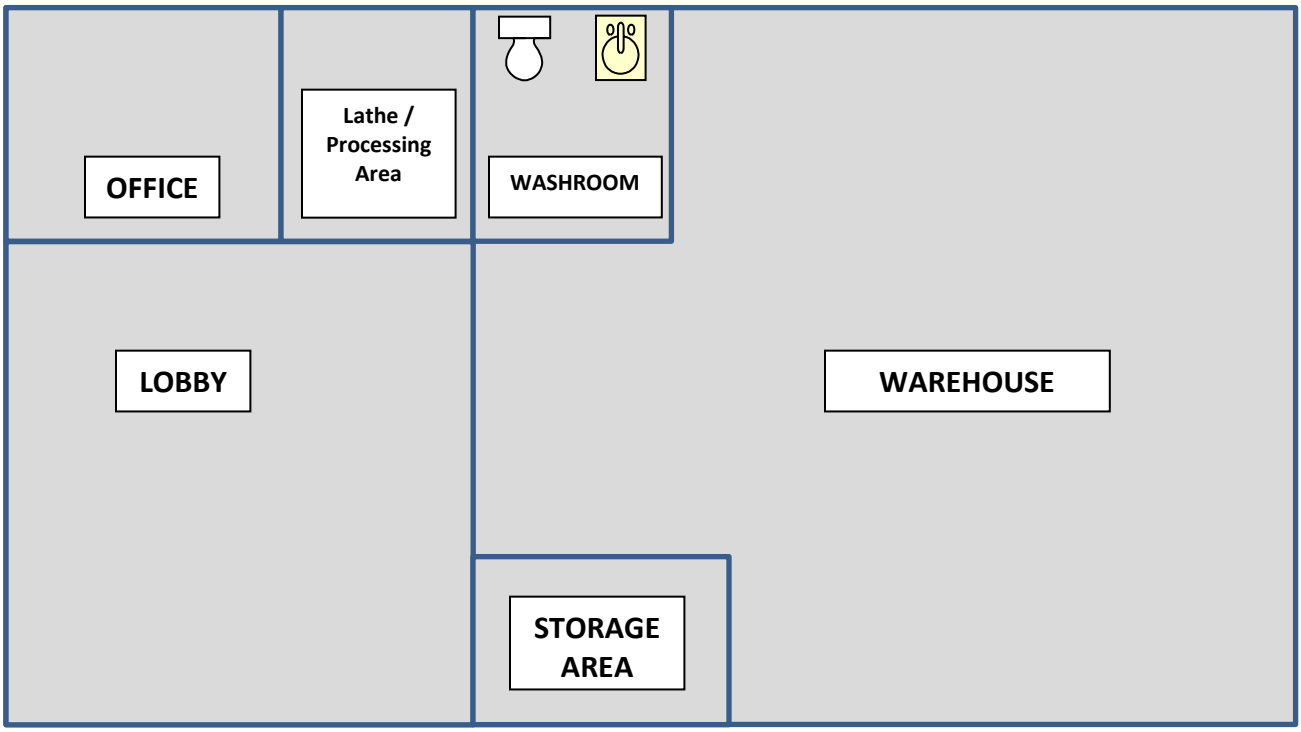

Table 1: Analysis Results for LR-SA-2015-00067
CNSC Final Wipe Results : November 5, 15

Sender's number	Analysis	Activity (Bq/Sample)
1-warehouse	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
2-warehouse	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
3-warehouse	Gross Alpha	0.13
	Gross Beta	0.21
	Gross Gamma	< MDA[3]
4-warehouse	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
5-warehouse	Gross Alpha	0.10
	Gross Beta	0.27
	Gross Gamma	< MDA[3]
6-warehouse	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
7-warehouse	Gross Alpha	0.31
	Gross Beta	0.89
	Gross Gamma	< MDA[3]
8-warehouse	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
9-warehouse	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
10-warehouse	Gross Alpha	0.21
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
11-warehouse	Gross Alpha	< MDA[1]
	Gross Beta	0.2
	Gross Gamma	< MDA[3]
12-warehouse	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
13-warehouse	Gross Alpha	0.44
	Gross Beta	1.22
	Gross Gamma	< MDA[3]
14-warehouse	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]

Sender's number	Analysis	Activity (Bq/Sample)
15-warehouse	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
16-warehouse	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
17-warehouse	Gross Alpha	0.12
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
18-warehouse	Gross Alpha	0.24
	Gross Beta	0.46
	Gross Gamma	< MDA[3]
19-warehouse	Gross Alpha	0.13
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
20-warehouse	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
21-warehouse	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
22-warehouse	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
23-warehouse	Gross Alpha	0.39
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
24-warehouse	Gross Alpha	0.16
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
25-warehouse	Gross Alpha	0.17
	Gross Beta	0.21
	Gross Gamma	< MDA[3]
26-warehouse	Gross Alpha	0.1
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
27-warehouse	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
28-warehouse	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
29-warehouse	Gross Alpha	0.27
	Gross Beta	0.21
	Gross Gamma	< MDA[3]

Sender's number	Analysis	Activity (Bq/Sample)
30-warehouse	Gross Alpha	0.23
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
31-warehouse	Gross Alpha	0.15
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
32-warehouse	Gross Alpha	0.24
	Gross Beta	0.64
	Gross Gamma	< MDA[3]
33-warehouse	Gross Alpha	0.14
	Gross Beta	0.40
	Gross Gamma	< MDA[3]
34-warehouse	Gross Alpha	0.13
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
35-warehouse	Gross Alpha	0.16
	Gross Beta	0.26
	Gross Gamma	< MDA[3]
36-warehouse	Gross Alpha	0.19
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
37-warehouse	Gross Alpha	0.18
	Gross Beta	0.22
	Gross Gamma	< MDA[3]
38-warehouse	Gross Alpha	0.26
	Gross Beta	0.37
	Gross Gamma	< MDA[3]
39-warehouse	Gross Alpha	0.17
	Gross Beta	0.27
	Gross Gamma	< MDA[3]
40-warehouse	Gross Alpha	0.12
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
41-warehouse	Gross Alpha	0.11
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
42-warehouse	Gross Alpha	0.25
	Gross Beta	0.38
	Gross Gamma	< MDA[3]
43-warehouse	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
44-storage room	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]

Sender's number	Analysis	Activity (Bq/Sample)
45-storage room	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
46-storage room	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
47-storage room	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
48-storage room	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
49-storage room	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
50-washroom	Gross Alpha	0.11
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
51-washroom	Gross Alpha	0.11
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
52-washroom	Gross Alpha	0.13
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
53-washroom	Gross Alpha	0.14
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
54-washroom	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
55-washroom	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
56-front lobby	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
57 front lobby	Gross Alpha	0.11
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
58 front	Gross Alpha	0.1

Sender's number	Analysis	Activity (Bq/Sample)
lobby	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
59 front lobby	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
60 front lobby	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
61 front lobby	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
62-processing	Gross Alpha	0.11
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
63-processing	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
64-processing	Gross Alpha	0.12
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
65-processing	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
66-processing	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
67-front office	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
68-front office	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
69-front office	Gross Alpha	0.12
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
70-front office	Gross Alpha	0.12
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]

Sender's number	Analysis	Activity (Bq/Sample)
71-front office	Gross Alpha	< MDA[1]
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]
72- front lobby	Gross Alpha	0.17
	Gross Beta	< MDA[2]
	Gross Gamma	< MDA[3]

MDA[1] (gross alpha) =0.1 Bq/sample

MDA[2] (gross beta) =0.2 Bq/sample

MDA[3] (gross gamma) = 0.8 Bq/sample