INL/EXT-18-45035
Revision 0

Baseline Radiological Conditions for the Transient Reactor Test (TREAT) Restart

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April 2018

The INL is a U.S. Department of Energy National Laboratory
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Radiological Control

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SUMMARY AND ACKNOWLEDGEMENTS

The Transient Reactor Test (TREAT) facility, located on the Idaho National Laboratory (INL), northwest of the Materials and Fuels Complex (MFC), has been in programmatic shutdown for more than twenty-three years. Construction of TREAT by the Teller Construction Co., Portland, Oregon, was started in February, 1958, and completed in early November, 1958. The reactor first achieved criticality on February 23, 1959. Operations continued until April 28, 1994, when the reactor was shut down due to the lack of a programmatic mission.

Recently, the U.S. Department of Energy (DOE) identified a need to resume transient testing of new reactor fuels. The Resumption of Transient Testing Program (RTTP) has readied the TREAT facility to resume transient testing operations. The first reactor criticality since the shut down in 1994 was achieved on November 14, 2017.

This report details the radiological measurements taken in the TREAT Reactor Building and the surrounding environment prior to and just after its restart in order to characterize the radiological conditions that existed prior to and during the initial restart operations.

The authors would like to acknowledge the support from RTTP Management and the TREAT Operations staff for allowing the extensive radiological surveys, as well as the health physics technicians from the INL Radiological Control organization who performed many of the measurements referenced in this report.

CONTENTS

FIGURES

TABLES

ACRONYMS

ATR	Advanced Test Reactor
AVID	Advanced Visualization and Integration of Data
BEA	Battelle Energy Alliance
CAM	Continuous Air Monitor
DDE	deep dose equivalent
DOE	U.S. Department of Energy
DOELAP	U.S. Department of Energy Laboratory Accreditation Program
EPA	U.S. Environmental Protection Agency
HEPA	high efficiency particulate air
HFEF	Hot Fuel Examination Facility
INL	Idaho National Laboratory
LHM	Loop Handling Machine
MCP	Management Control Procedure
MFC	Materials and Fuels Complex
Mj	megajoule
NNSA	National Nuclear Security Administration
NORM	naturally occurring radioactive material
NRAD	Neutron Radiography Reactor
RTTP	Resumption of Transient Testing Program
SLSF	Sodium Loop Safety Facility
TENORM	technically enhanced naturally occurring radioactive material
TREAT	Transient Reactor Test
VSDS	Visual Survey Data System

Baseline Radiological Conditions for the Transient Reactor Test (TREAT) Restart

1. INTRODUCTION

The U.S. Department of Energy's (DOE) Resumption of Transient Testing Program (RTTP) has re-established transient test capability at the Transient Reactor Test (TREAT) facility, thus enabling the U.S. to maintain a global leadership role in advancing safe and secure nuclear energy technology. The TREAT reactor operated for more than 35 years from February 23, 1959, to April 28, 1994. Since then, the reactor had been in programmatic shutdown for more than 23 years. This report examines the baseline radiological conditions of the reactor, the reactor building, and the surrounding environment prior to its restart and during initial restart operations.

In May 2017, the "TREAT Reactor Survey Start-Up Radiological Survey Plan" (PLN-5350) was created to specify the instructions for determination of the baseline radiological conditions of the reactor building prior to its restart, at various reactor power levels during the reactor restart process, and after the reactor has operated at its normal steady state power level and has been shut-down. In addition to the information required by the plan, this report examines the baseline radiological conditions of the reactor, the reactor building, and the surrounding environment prior to its restart and during initial restart operations.

1.1 Description

TREAT is located at Idaho National Laboratory (INL), approximately 0.8 mile (1.3 km) northwest of the Materials and Fuels Complex (MFC), and is operated by Battelle Energy Alliance (BEA), the management and operating contractor of INL for DOE.

The TREAT reactor, a graphite-moderated thermal reactor, was designed primarily for operation in the transient or pulsed mode for destructive testing of prototypical reactor fuels and cladding. Transient testing involves the application of controlled, short-term bursts of intense neutrons directed toward a test specimen in order to study fuel and material performance under off-normal operational conditions and hypothetical accident scenarios. In TREAT, nuclear fuel or material test samples are placed into the reactor core center and then subjected to quick, intense power bursts. After a transient test experiment is completed, the fuel or material is then analyzed at a post-irradiation examination facility utilizing very high-fidelity inspection equipment.

TREAT was designed conservatively to produce a pulse with a thermal neutron fluence of 3.5×10^{15} neutrons per square centimeter averaged over the core. This design pulse produced a peak TREAT fuel temperature of 400°C for a core energy deposition of 1000 megajoule (Mj). After extensive operating experience, the core temperature limit was raised to 600°C, corresponding to 2100 Mj in the reactor core. The limiting factor is the increasingly rapid oxidation rate of zircaloy clad-heated to high temperatures in air. Flexibility in the core configuration allowed the reactor to accommodate a variety of experiments.

The primary purpose of the experiments conducted at TREAT during its 35 years of operation have been to validate various analytical tools, such as the SAS series of fast breeder reactor safety codes that were under development in the U.S. Fast Reactor Program. Severe conditions, including transient overpower and loss-of-cooling, which might result from malfunctions in either the reactivity control systems or core cooling systems of liquid metal fast breeder reactors and light water reactors, have been simulated in TREAT experiments, and the consequences observed and analyzed.

2. PRE-RESTART RADIOLOGICAL CONDITIONS

2.1 Direct Radiation Survey in TREAT Reactor Building

During the period of October 10–12, 2017, an extensive direct radiation survey of the TREAT reactor building was conducted. Most areas surveyed at the TREAT Reactor building were at the ambient radiation level, which is typically seen in Idaho's upper Snake River plain of 0.015 to 0.025 millirem/hr. However, areas with elevated radiations were noted at the following locations:

1. Control rod followers located near the ceiling of the Sub-Pile Room.
2. Fuel storage hole are near the north-west corner of the reactor.
3. North side of the Radiography Stand.
4. South reactor high-bay due to the Loop Handling Machine.
5. South reactor high-bay over the loaded Storage Hole.
6. Second level mezzanine radioactive material storage area.

Control rods are operated from the Sub-Pile Room below the TREAT reactor (see Figure 1). The reactor is started up by raising the rods into the core and shut down by lowering the rods from the core. While the rods are inserted into the reactor, the control rod followers are subjected to neutron radiation such that the metals become activated. After 23 years of decay from the last operation of the reactor, the rod followers still read up to 2.0 millirem/hr at the ceiling of the Sub-Pile Room (see Appendix A, Map M-20171010-25, Pages A-1 to A-5).

Figure 1. A view of the TREAT Sub-Pile Room ceiling.

Fuel storage holes, as shown in Figure 2, are provided for the storage of additional TREAT fueled assemblies, dummy assemblies, and other experimental assemblies. Elevated radiation has been noted over areas in the fuels storage holes where the spare fuel rods for the Hot Fuel Examination Facility's (HFEF) Neutron Radiography Reactors (NRAD) spare fuel assemblies are stored. The maximum dose rates over the fuel storage areas were 0.233 millirem/hr at contact with the deck plating and 0.099 millirem/hr at 30 cm. A more detailed survey of the assemblies in the fuel storage holes is provided in Section 2.3.

Figure 2. Fuel storage hole areas looking north from the reactor top.

The north side of the Radiography Stand (see Figure 3) is the location of the slot for the radiography foils drive system. The slot for the radiography foils creates a significant hole in the shielding of the stand and is protected from radiation streaming with a depleted uranium shield door. The door opens and closes to allow for the insertion or removal of the radiography foils. The dose rates on the shield door are 2.5 millirem/hr at contact and 0.4 millirem/hr at 30 cm. Dose rate values were taken from the radiological control label on the shield door.

On the south end of the reactor building high-bay is a dedicated stand to house the Loop Handling Machine (LHM), which is a large depleted uranium shielded cask used to transport the Sodium Loop Safety Facility (SLSF) experiment from the Advanced Test Reactor (ATR) to HFEF. Following completion of the experimental program, the LHM was stored on its transport trailer. With the completion of the TREAT high-bay expansion, an indoor storage location was created for the cask. Figure 4 is a photo of the LHM in its stand in the TREAT south high-bay.

The LHM reads 2.0 millirem/hr at contact and 1.2 millirem/hr at 30 cm. Dose rate values were taken from the radiological control label on the cask.

Figure 3. A view of the north side of the Radiography Stand.

Figure 4. LHM in the TREAT south high-bay.

During the programmatic stand-down that occurred at TREAT from 1994 to 2017, the facility was used for various other projects. One project required the use of a container of irradiated material to simulate spent nuclear fuel for training purposes. That container is stored in an in-floor storage hole in the south high-bay (see Figure 5). The dose rates over the storage hole are 6.0 millirem/hr at contact and 2.0 millirem/hr at 30 cm.

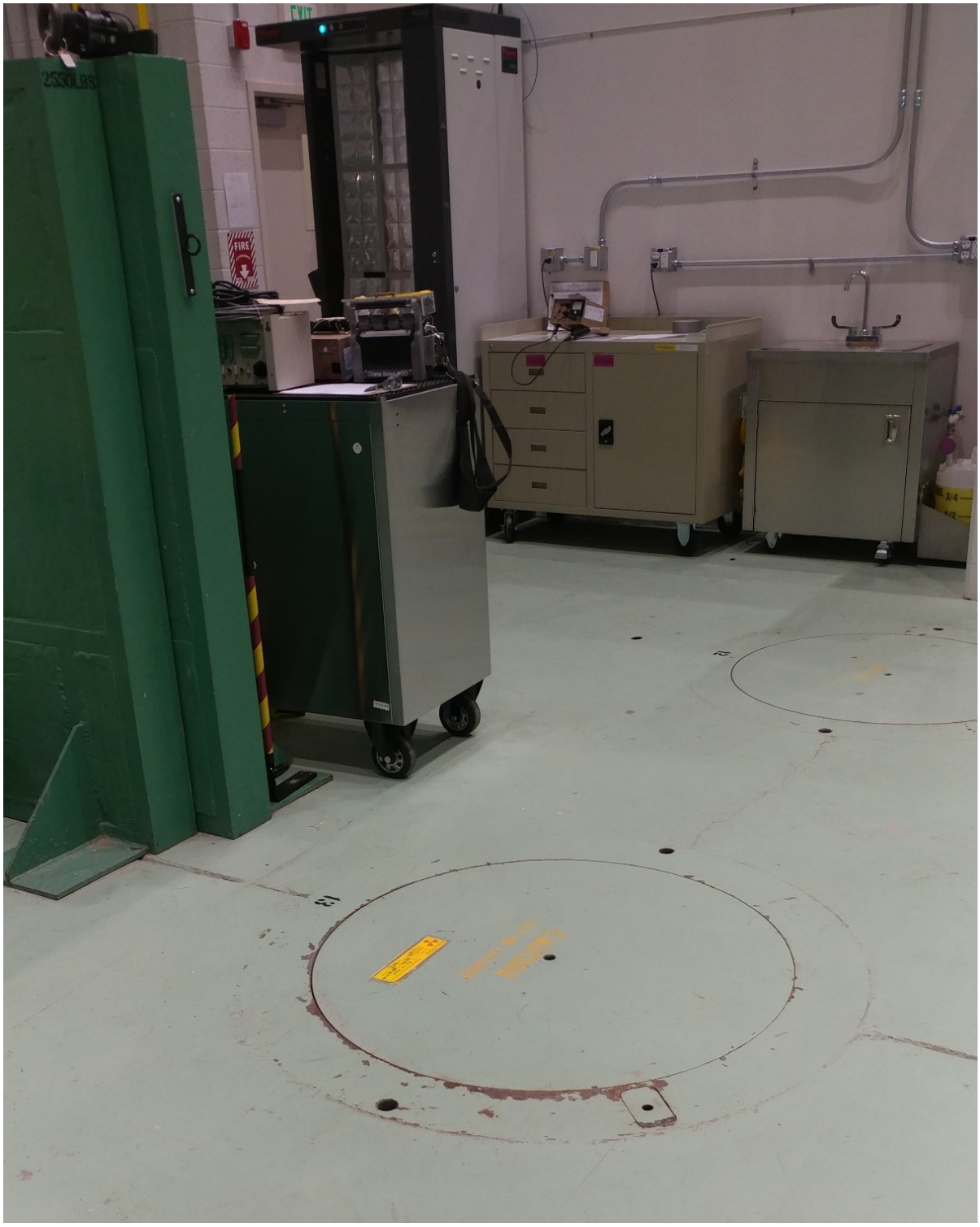


Figure 5. Loaded Storage Hole No. 13 in the TREAT south high-bay.

Storage of irradiated components and low-level waste is in a designated storage area in the second mezzanine level of the reactor (see Figure 6). An extensive campaign was conducted to clean up the legacy radioactive material that was stored in the area. The area had several boxes of waste removed and combustible loading in the area was also reduced.

Figure 6. View of the Radioactive Storage Area on the TREAT second mezzanine.

Radiological surveys conducted from October 10–12, 2017, were in accordance with INL's Management Control Procedure (MCP)-139, "Radiological Surveys," by qualified health physics technicians and documented in the Visual Survey Data System (VSDS). The surveys utilized a ThermoFisher Scientific RadEye B20-ER Multi-Purpose Survey Meter, which has a range of 0.020 millirem/hr to 10,000 millirem/hr for photons between 17 keV and 3.0 MeV when used in dose rate mode; a Mirion Technologies TelePole II Telescopic Meter, which has a range of 0.010 millirem/hr to 1,000,000 millirem/hr for photons between 65 keV and 2.0 MeV; and a ThermoFisher Scientific NRD 9-in. Neutron Ball with a ThermoFisher Scientific E-600 Multipurpose Survey Meter for neutron dose rate detection. A neutron dose rate less than 1 millirem/hr was obtained by integrating the dose rate over a one minute count with the E-600.

Detailed direct radiation survey maps of the facility are presented in Appendix A.

2.2 Radiation Survey of the Fuel Storage Holes and Reactor

One of RTTP's goals was to inspect a portion of the TREAT fueled assemblies to ensure cladding integrity prior to the use of those fuels in restarting the reactor. This inspection required a visual inspection of the fuel and the dose rates that might be encountered were not well known. In order to measure the dose rates prior to the inspection, surveys of the fueled assemblies were conducted while leaving the assemblies in place. The area surrounding a fueled assembly in a storage hole in the floor was sufficient to allow the survey of the assembly by lowering a detector of a Mirion AMP-100 (see Figure 7 down the side of the assembly in the storage hole.

The survey of the TREAT assemblies, both fueled and dummy assemblies, stored in the fuel storage holes was conducted on May 22, 2014. Detailed information of the results of this survey are contained on VSDS survey map M-20140522-47. The radiation levels measured during the survey are provided in Figure 8 and Figure 9. All readings are in millirem/hr.

Figure 7. Mirion AMP-100 radiation detector system.

It should be noted that the amount of shielding between the storage holes is minimal and the dose rate measured in a hole can be influenced by the material stored in the hole, as well as the material stored in the adjoining holes. The maximum dose rate measured during the survey of the fuel storage holes was 9.3 R/hr (e.g., Location G-10) with many holes reading background levels as well. The storage hole with the highest radiation level corresponded with the highest levels of radiation previously noted on the cover of the fuel storage holes.

The survey of the assemblies in the reactor introduced a unique problem as the air flow channels, which run from the top to the bottom of the core, provide only a hole that is approximately ½-in. square. Figure 10 provides a close-up photo of the top of the reactor core. A special small detector was obtained and attached to a cable that could be lowered down the air flow channels from the top of the reactor, as shown in Figure 11. The detector was connected to an Eberline E-600 instrument with a 30 foot cable. The system was calibrated for the range of 0.2 R/hr to 20 R/hr with Cs-137 gammas.

	13	14	15	16	17	18	19	20	21	22
A	0 mR/hr	0 mR/hr	1 mR/hr	1 mR/hr		200 mR/hr				700 mR/hr
B	0 mR/hr	0 mR/hr	10 mR/hr	34 mR/hr						
C	0 mR/hr	0 mR/hr	20 mR/hr	1500 mR/hr						
D	1 mR/hr			1300 mR/hr						
E	0 mR/hr			30 mR/hr						
F		1 mR/hr		3 mR/hr						
G	1 mR/hr	10 mR/hr	250 mR/hr	4 mR/hr					200 mR/hr	
H	2 mR/hr	310 mR/hr	5 mR/hr							
I	1 mR/hr	76 mR/hr	3 mR/hr	5 mR/hr	100 mR/hr					
J	1 mR/hr	5 mR/hr	20 mR/hr	150 mR/hr						
K	4 mR/hr	210 mR/hr	375 mR/hr	6 mR/hr						
L		410 mR/hr	400 mR/hr	350 mR/hr						

NORTH →

Figure 8. North fuel storage hole survey results.

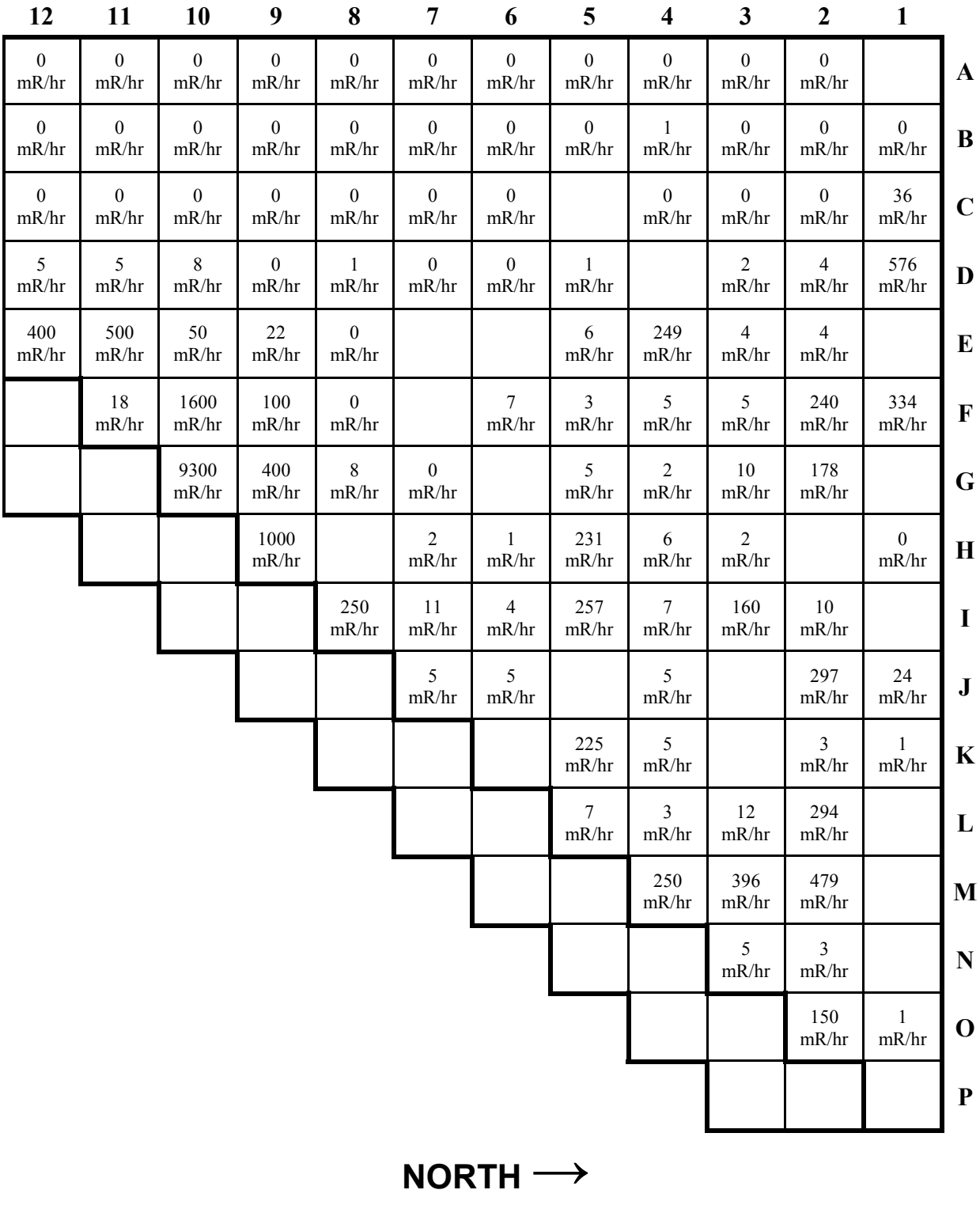


Figure 9. South fuel storage hole survey results.

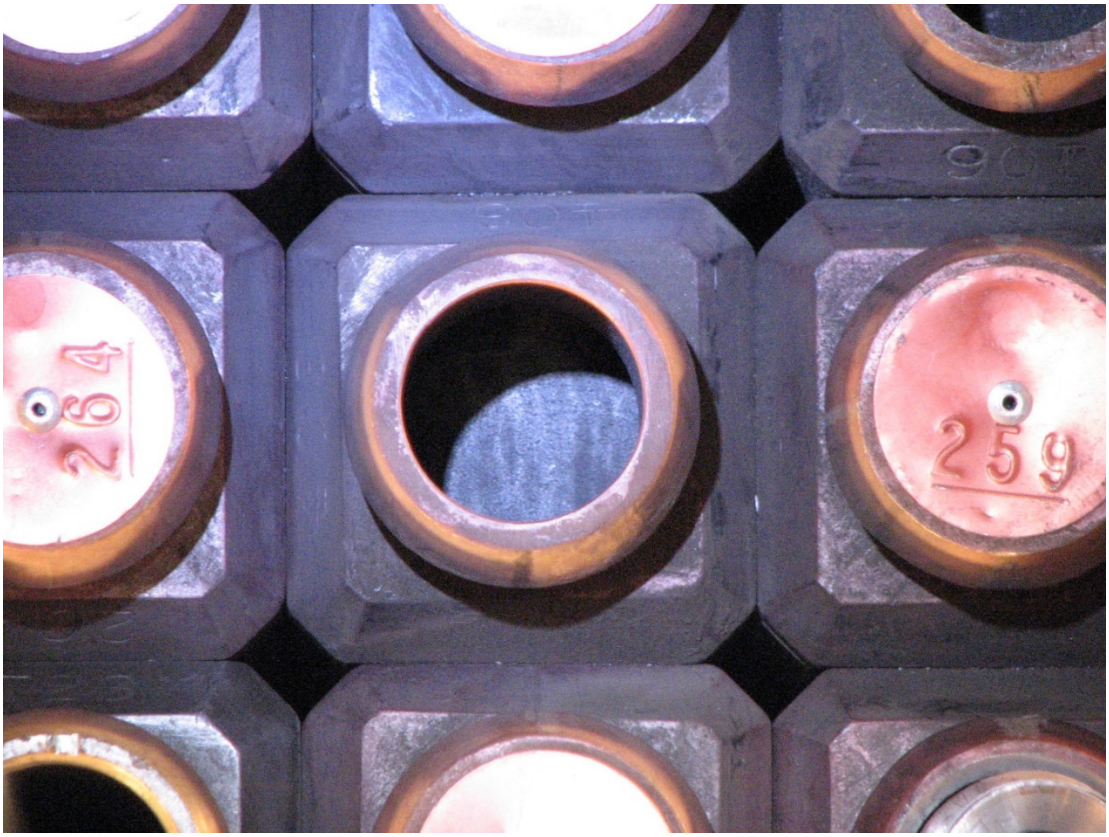


Figure 10. Close-op of the top of the reactor core showing air flow holes.

Figure 11. Special detector to monitor dose rates in the core.

2.3 Radiological Survey of Fueled Assemblies

The survey of the dose rates in the reactor was conducted on February 9, 2015. Near the center of the core, the dose rate at the top of the rotating shield over the open slot was 1.0 mR/hr, while the dose rate at the bottom of the rotating shield in the open slot was 3.0 mR/hr. Dose rates were measured at a position near the core center with the special probe. The maximum dose rate measured was 12.5 R/hr near the center of the reactor, while the lowest dose rate was 5.5 R/hr on the north side of the reactor near the Hodoscope slot. See Figure 12 for a map of the dose rates. Detailed information of the results of this survey are contained on VSDS survey map M-201500209-43.

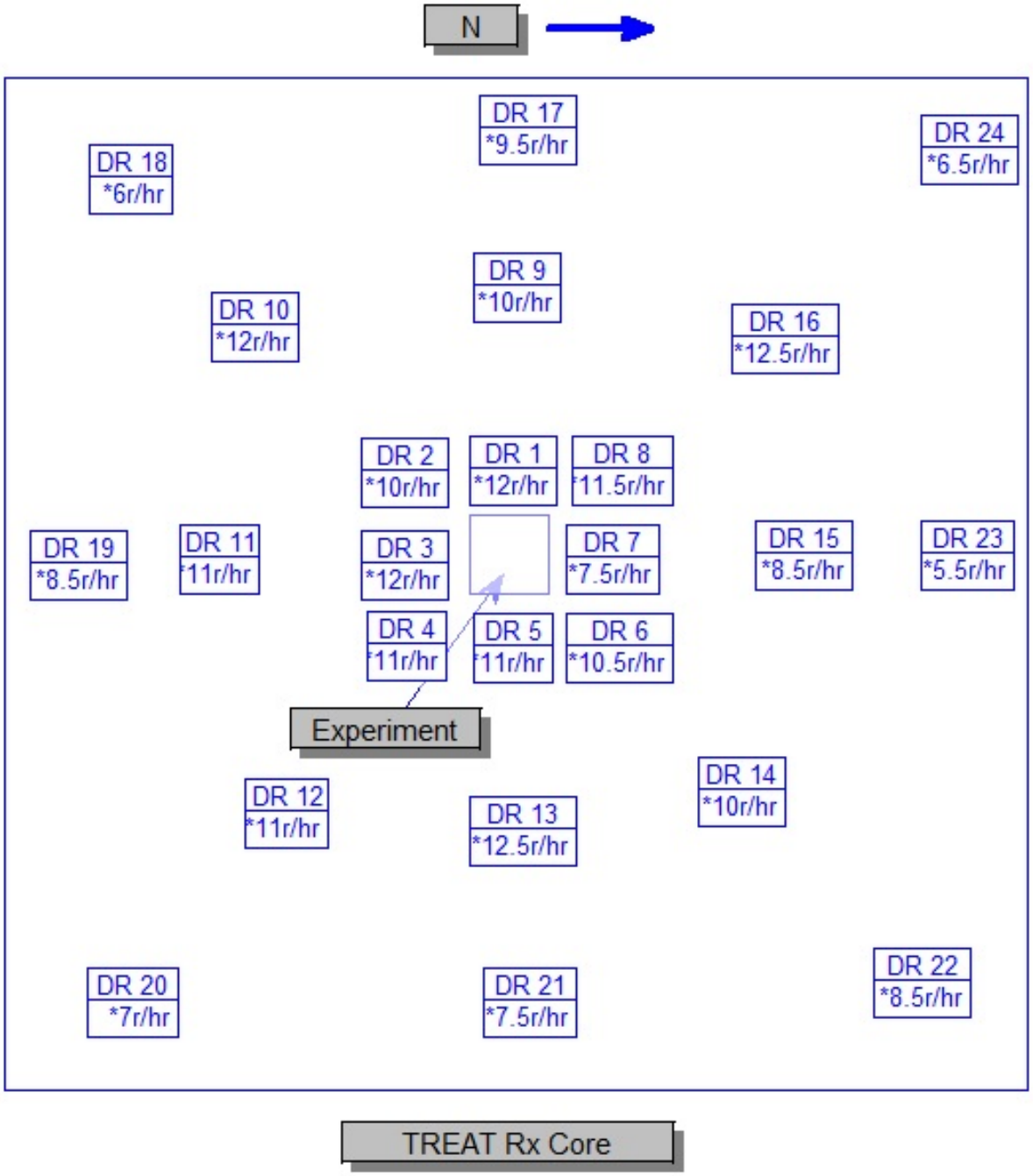


Figure 12. Dose rate survey of the TREAT reactor core on February 9, 2015.

The dose rate measured at a flow channel is the sum of the four adjacent fuel assemblies with minor additions from the assemblies even further out.

The radiation surveys of the fuel storage holes and the reactor core provided an indication that the fueled assemblies could be visually inspected. During inspections of selected fueled assemblies, the assembly would be slowly lifted from the reactor core, as shown in Figure 13, or the storage hole, as shown in Figure 14, and a visual inspection and radiation measurement was completed. The radiation level and contamination levels of each element was obtained.

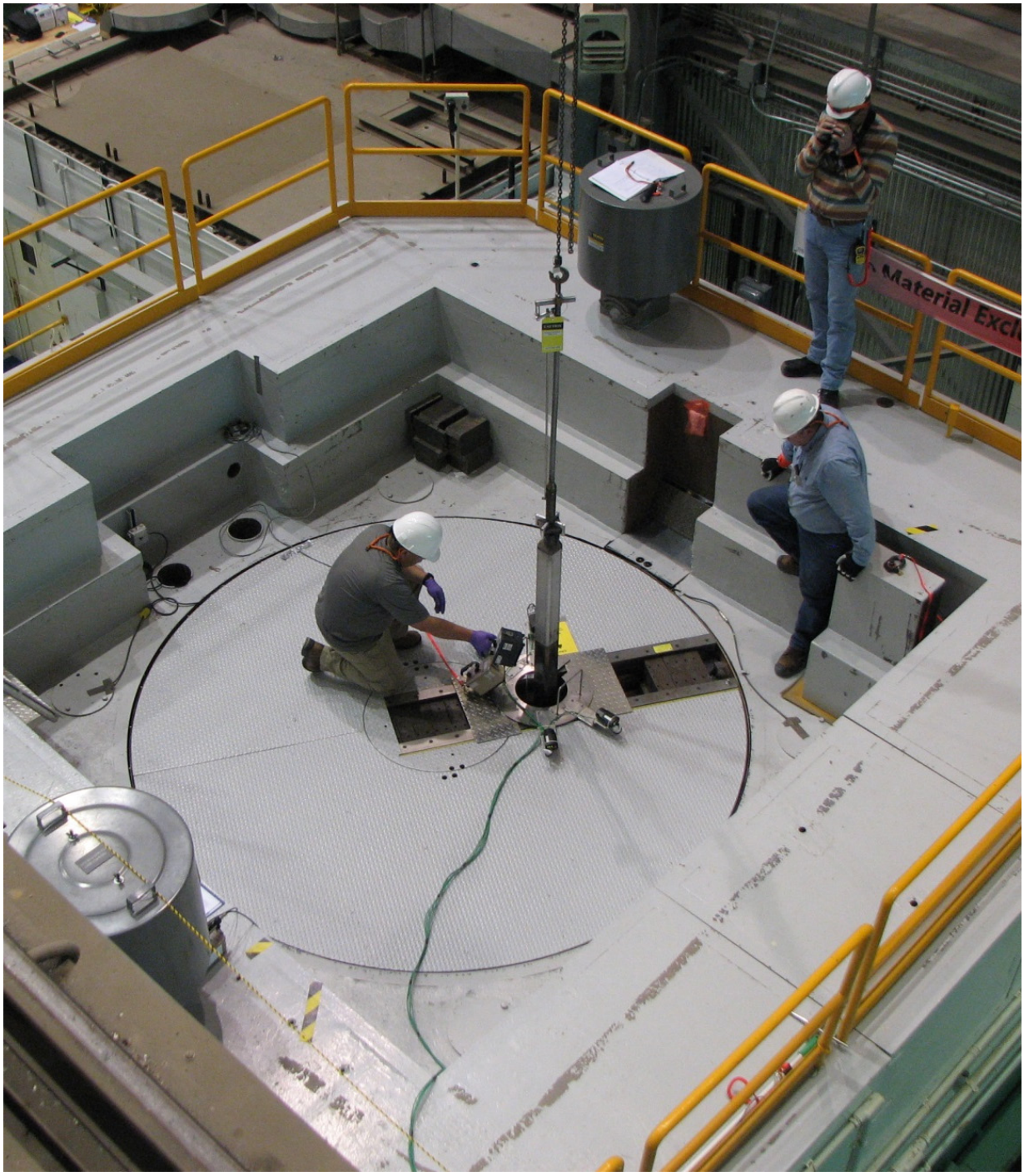


Figure 13. Fueled assembly being lifted from the TREAT reactor.

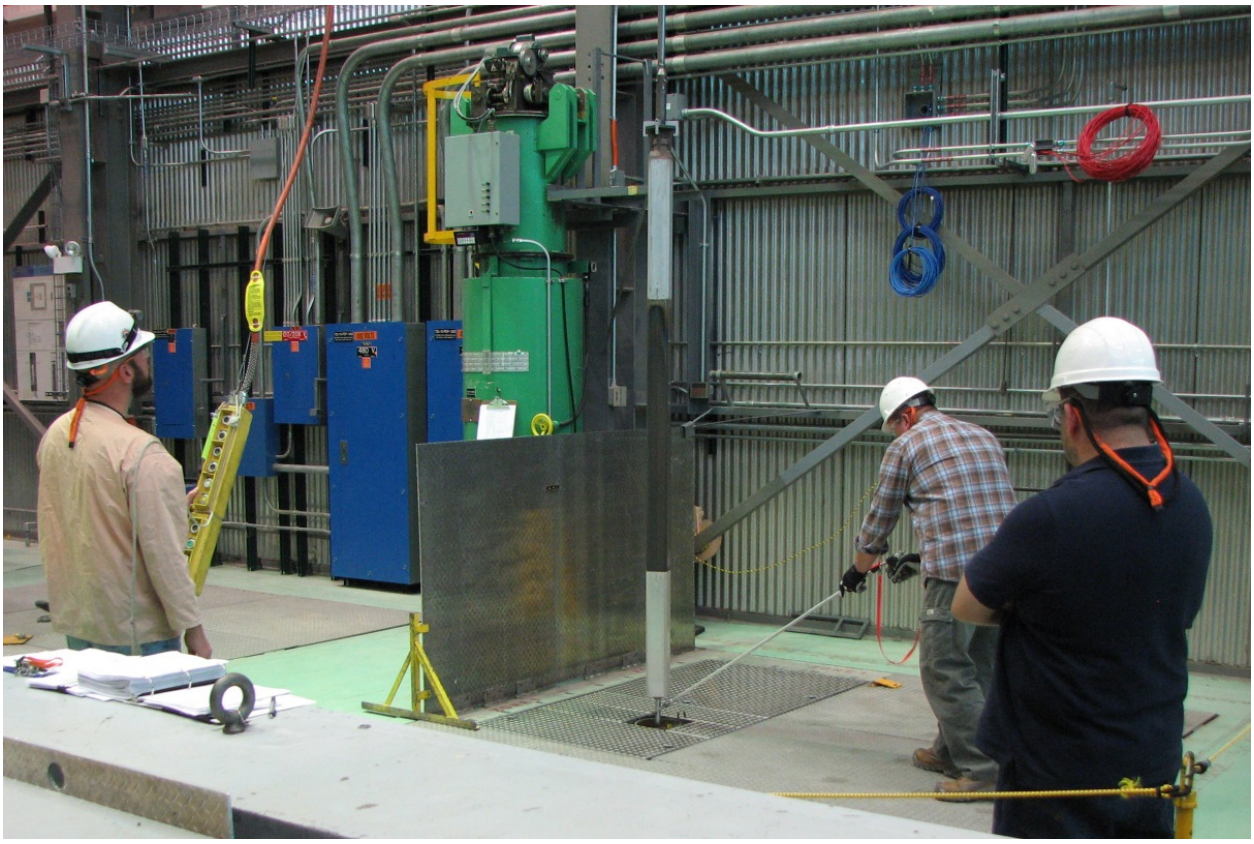


Figure 14. Fueled assembly being lowered in the fuel storage hole.

Low levels of removable beta-gamma contamination were detected on most of the fueled assemblies. The levels varied from 0 to 850 dpm beta-gamma/100 cm^2, with an average contamination level of 350 dpm beta-gamma/100 cm^2. Three technical smears were sent to the Analytical Laboratory at MFC to determine the radionuclide content of the removable activity. Analytical Log No. 98929 provides the results of that analysis. Two radionuclides were identified on the smears—Europium-152 (Eu-152), which has a half-life of 13.54 years, and Cobalt-60 (Co-60), which has a half-life of 5.271 years. The ratio of Eu-152 to Co-60 was approximately 2.7 Eu-152 to 1 Co-60.

Fueled assembly 158 was noted to have a hole in the zircaloy cladding surrounding the fueled graphite blocks making up the assembly. Removable contamination was detected to 90,000 dpm beta-gamma/100 cm^2 and 400 dpm alpha/100 cm^2. Gamma spectroscopic analysis of the smear indicated the major radionuclide was Cesium-137 (Cs-137), with minor amounts of Eu-152 and Co-60 present as well.

Another significant beta emitter was counted on the smear and was assumed to be Strontium-90 (Sr-90) and Yttrium-90 (Y-90). All known assemblies that had been in contact with fueled assembly 158 were tested for contamination. Those that were found to have transfer contamination were decontaminated.

The dose rate readings on the inspected fueled assemblies were obtained with a Thermo Scientific air ion chamber, Model RO-20. Values were taken with the instrument at near contact with the assembly (i.e., the chamber center would be approximately 2-in. from the surface, as well as a reading at 30 cm. Table 1 provides a listing of the fueled assemblies and their dose rates.

Table 1. Fueled Assembly Measured Dose Rates.

Date	Core Position	Assembly No.	Contact (mR/hr)	30 cm (mR/hr)
9/1/2015	L-8	343	460	120
9/2/2015	M-7	269	1000	180
9/2/2015	R-2	367	470	120
9/3/2015	O-3	142	1000	180
9/3/2015	O-1	271	450	100
9/3/2015	M-2	285	1100	200
9/8/2015	H-2	213	1200	250
9/8/2015	H-5	138	500	160
9/8/2015	F-1	324	350	80
9/9/2015	J-8	114	800	150
9/9/2015	H-7	136	900	190
9/9/2015	F-3	244	1000	180
9/9/2015	D-2	391	500	80
9/9/2015	E-4	389	400	90
9/9/2015	C-2	305	400	90
9/9/2015	B-4	298	450	100
9/9/2015	C-6	226	800	170
9/10/2015	E-8	121	1000	230
9/10/2015	A-6	155	600	140
9/10/2015	B-8	141	800	180
9/10/2015	A-10	347	500	120
9/10/2015	C-10	113	800	140
9/10/2015	B-12	397	700	120
9/14/2015	A-14	318	600	90
9/14/2015	B-16	415	400	100
9/14/2015	G-13	330	1400	290
9/14/2015	C-18	308	400	100
9/15/2015	E-16	111	800	160
9/15/2015	D-18	365	500	100
9/15/2015	J-12	185	700	140
9/15/2015	F-17	146	1000	190
9/15/2015	F-19	337	600	120

Table 1. (cont.)

Date	Core Position	Assembly No.	Contact (mR/hr)	30 cm (mR/hr)
9/15/2015	H-18	181	1400	240
9/15/2015	K-16	301	400	90
9/15/2015	K-19	251	1000	200
9/16/2015	L-17	150	1300	300
9/16/2015	M-18	218	1300	220
9/16/2015	L-14	122	1000	200
9/16/2015	O-19	345	600	150
9/16/2015	L-12	209	1000	180
9/16/2015	O-17	225	1000	200
9/16/2015	R-18	374	400	90
9/17/2015	N-13	416	700	110
9/17/2015	T-16	124	900	200
9/17/2015	S-14	357	800	200
9/17/2015	T-12	413	800	180
9/17/2015	S-10	310	500	100
9/17/2015	T-8	407	800	180
9/17/2015	U-6	362	500	130
9/21/2015	P-4	127	1000	200
9/21/2015	S-2	196	1300	230
9/21/2015	R-8	172	1300	210
9/21/2015	S-6	263	1000	200
9/21/2015	P-16	100	1300	230
9/21/2015	U-14	333	700	130
10/05/2015	N-J	302	1500	250
10/06/2015	P-7	156	1500	350
10/06/2015	N-9	309	600	170
10/06/2015	P-9	403	1200	300
11/3/2015	P-11	202	1300	240
11/3/2015	N-11	372	600	150
11/3/2015	P-13	265	1200	240
11/3/2015	N-15	199	1300	260
11/3/2015	G-15	144	1200	260

Table 1. (cont.)

Date	Core Position	Assembly No.	Contact (mR/hr)	30 cm (mR/hr)
11/3/2015	E-13	323	600	110
11/4/2015	J-7	149	1300	400
11/4/2015	K-4	H-04	0.7	0.7
11/4/2015	P-5	120	1100	310
11/4/2015	5-3	346	800	180
11/4/2015	R-9	300	1300	300
11/4/2015	S-9	157	1200	300
11/4/2015	K-12	153	1100	260
11/4/2015	K-14	528	1300	330
11/05/2015	E-11	190	1500	430
11/05/2015	E-9	377	700	170
11/05/2015	G-9	206	1300	320
11/05/2015	E-7	317	800	150
11/05/2015	G-5	249	1400	330
1/11/2016	C-14	240	1000	200
1/11/2016	T-4	284	500	100
1/11/2016	B-1	012	<0.5	<0.5
1/11/2016	U-2	019	0.6	<0.5
1/11/2016	A-19	022	0.6	<0.5
1/12/2016	U-10	414	600	130
1/12/2016	S-18	235	700	120
1/13/2016	C-19	191	1000	300
1/13/2016	C-17	379	400	100
1/14/2016	L-5	173	800	300
1/14/2016	L-6	214	800	200
1/14/2016	R-1	366	600	150
1/18/2016	T-6	381	500	100
1/18/2016	T-10	306	800	200
1/18/2016	U-12	355	700	140
1/18/2016	S-13	246	900	200
1/18/2016	S-19	325	900	250
1/18/2016	L-15	223	1000	350

Table 1. (cont.)

Date	Core Position	Assembly No.	Contact (mR/hr)	30 cm (mR/hr)
1/19/2016	M-5	344	650	125
1-19-2016	C-1	108	900	200
1-19-2016	D-1	398	600	120
1-19-2016	N-6	341	900	180
1-25-2016	N-14	101	1300	250
1-25-2016	M-15	370	800	150
1-26-2016	R-13	237	1300	240
1-26-2016	C-9	157	1300	370
1-26-2016	P-9	400	800	150
10-3-2017	N/A	259	900	250
10-3-2017	N/A	529	1000	270
10-3-2017	N/A	282	1000	300
10-3-2017	N/A	523	1000	300
10-3-2017	N/A	531	500	120
10-3-2017	N/A	104	1000	250
10-4-2017	N/A	525	900	200
10-4-2017	N/A	233	800	200
10-4-2017	N/A	500	1100	300
10-4-2017	N/A	223	1000	250
10-4-2017	N/A	520	1000	250
10-4-2017	N/A	122	900	210
10-5-2017	N/A	158	1000	250
10-11-2017	N/A	356	500	100
10-11-2017	N/A	137	1000	150
10-11-2017	N/A	241	1000	200
10-11-2017	N/A	118	900	150
10-16-2017	N/A	521	1000	250
10-16-2017	N/A	185	700	140
10-16-2017	N/A	501	1100	300
10-16-2017	N/A	502	1000	300
10-23-2017	N/A	527	1000	250
10-23-2017	N/A	340	60	12

2.4 TREAT Road Way Surface Radiation Survey

INL's Regulatory & Monitoring Services organization conducts an annual radiation survey of the roads and perimeters of various nuclear facilities located at INL. This is completed to fulfill obligations related to Contract Data Requirements List F.11. It has been noted that several spots of higher radiation levels are being observed in the surveys of the road between the TREAT Reactor Area and the TREAT Control Building. Figure 15 provides the results of the MFC Perimeter Survey Report for 2015.

On September 13, 2016, the INL's mobile platform for performing surface radiation surveys was used to perform a detailed investigation of the elevated radiation levels noted on the TREAT access roadway.

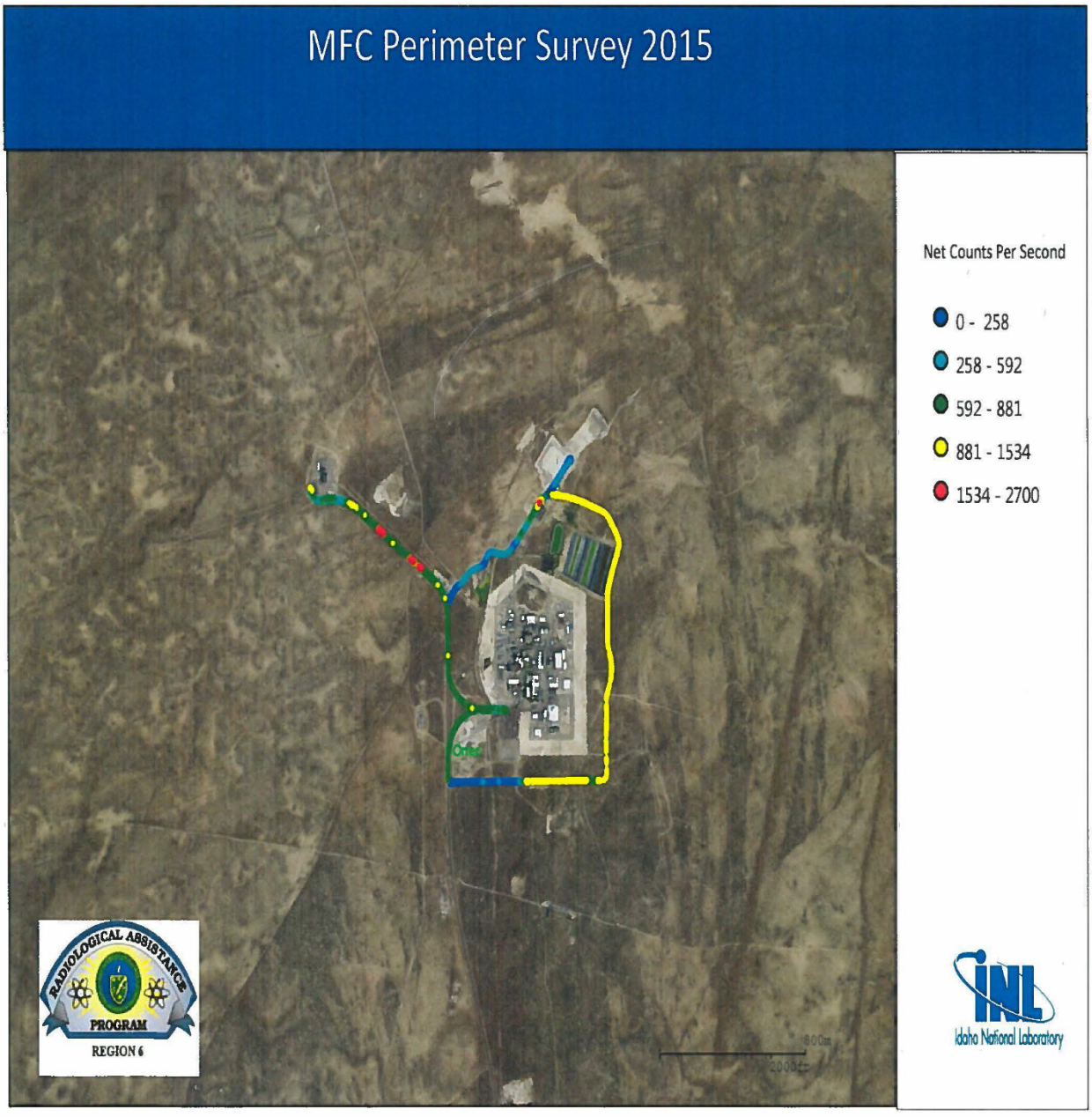


Figure 15. MFC 2015 Perimeter Survey Report.

The monitoring vehicle consists of a Jeep Rubicon four-door model with two detector enclosures mounted on the front bumper. These enclosures contain ORTEC 4-in. × 4-in. × 16-in. sodium iodide scintillation detectors connected to ORTEC DigiBASEs, which are small self-contained detector pre-amplifiers with a high voltage supply and a multi-channel analyzer powering the scintillation detector using a 5 VDC power supply from a universal serial bus connected to a personal computer. The data is accessed through a Microsoft® Windows PC running Advanced Visualization and Integration of Data (AVID) software developed by DOE's National Nuclear Security Administration (NNSA) and is used by the Radiological Assistance Program. The detectors are approximately 18-in. above the surface of the roadway.

The results of the survey are visually represented in Figure 16. Blue signifies the lowest radiation levels encountered, while red signifies the highest radiation levels encountered. The three red locations on the access roadway to TREAT were twice as radioactive as the rest of the roadway. The increased radiation was noted across both lanes of the road and started and ended abruptly. A survey of the shoulder of the north side of the roadway on the two spots of elevated radiation nearest the TREAT Control Building did not have the corresponding elevated radiation levels.

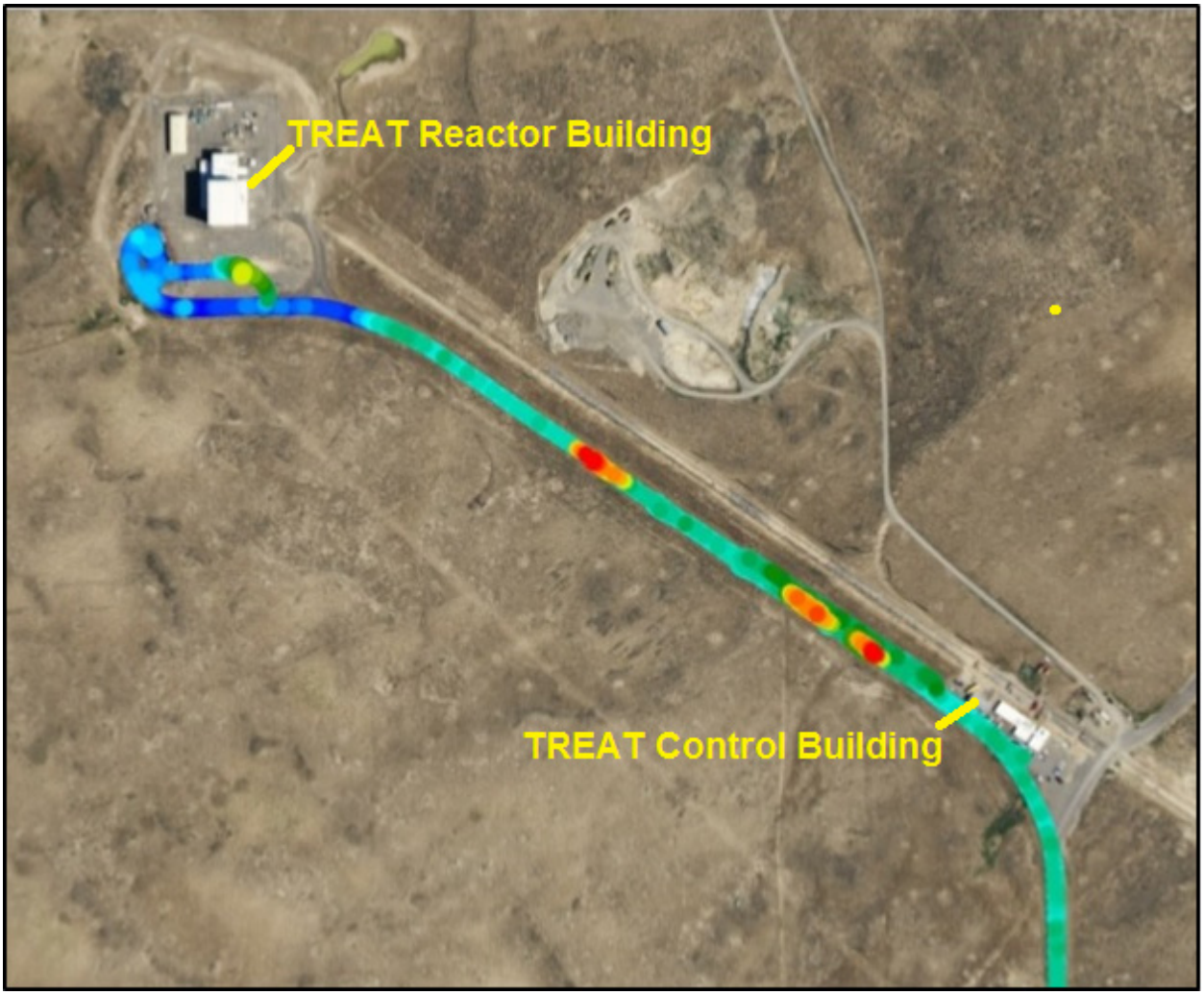


Figure 16. Detailed survey map of TREAT road survey results.

The survey vehicle was stopped on the elevated radiation level locations and the spectral information was collected and compared to the spectral data from the areas with lower levels of radiation. The resulting spectrum is provided in Figure 17. Only naturally occurring radioactive materials (NORM) were identified in the spectrum of the elevated radiation levels on the TREAT access roadway. There was no difference in the spectrums from the areas with elevated radiation and normal radiation level roadways.

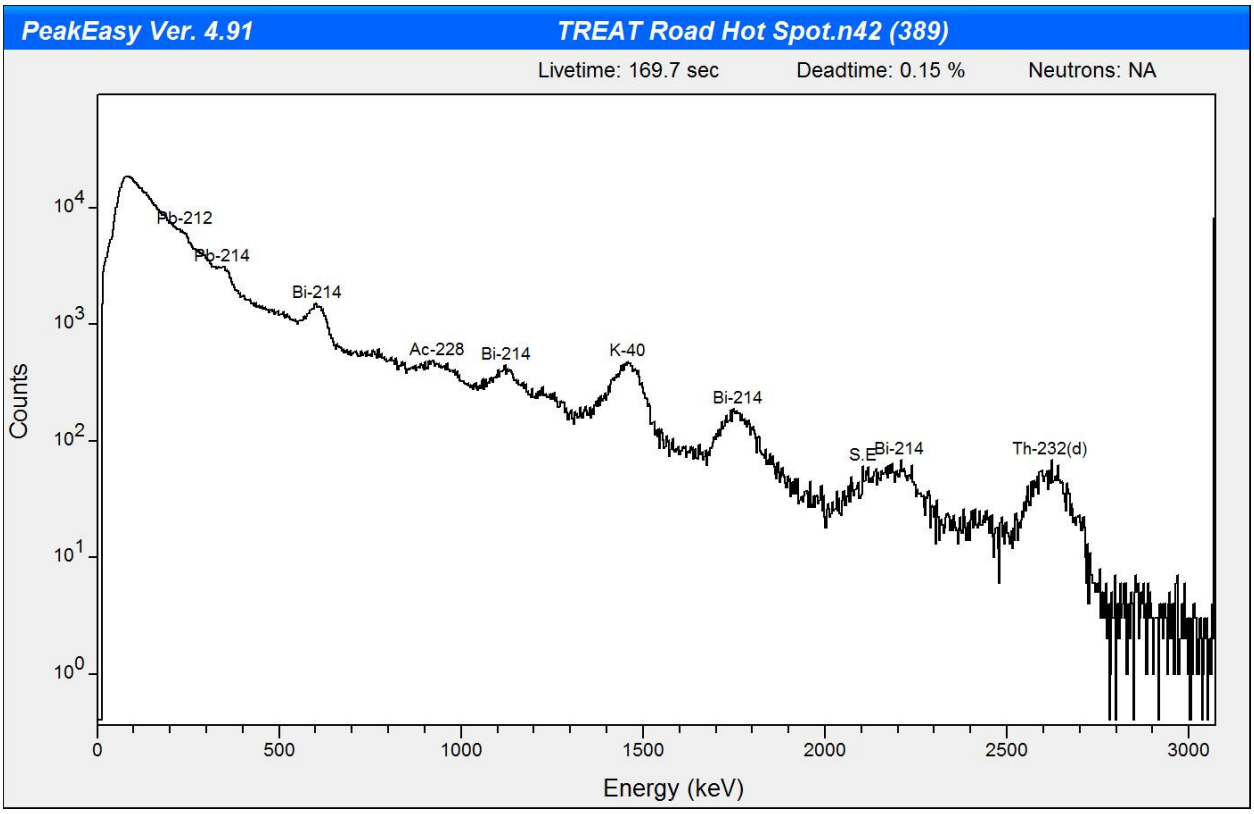


Figure 17. Gamma spectrum of TREAT road elevated radiation areas.

The elevated radiation levels noted in the annual surface radiation surveys of the TREAT access roadway by INL's Regulatory & Monitoring Services are most likely due to road repair patches using base materials containing higher levels of NORM than that in the normal roadway base. The radiation spectrum information indicates that the increased radiation is from NORM. The elevated radiation levels start and end at the same locations on the road for both the east-bound and west-bound lanes. No elevated radiation was noted on the undisturbed dirt that makes up the shoulder of the road. The elevated radiation levels are generally below the detection thresholds for most portable radiation instruments used at INL and pose no radiation hazard to INL workers or the general public.

2.5 Airborne Radioactivity Measurements

2.5.1 Radon/Thoron Measurements

In 1989–1990, a long term radon study was conducted at MFC. The TREAT basement auxiliary room had the highest level of radon at MFC with a level of 2.9 picocuries per liter. This level was below the U.S. Environmental Protection Agency's (EPA) action level of 4.0 picocuries per liter. Appendix B provides the results of the 1989–1990 study. As part of the RTTP, long-term radon/thoron detectors were placed in the TREAT Reactor Building (MFC-720) and the TREAT Security Building to measure the airborne radon/thoron levels throughout TREAT.

2.5.1.1 Terrestrial NORM

NORM is part of regular background radiation, unless it has been increased from concentrations that are normally found in the environment; then it is considered to be technologically enhanced naturally occurring radioactive material (TENORM). As part of the background radiation, NORM is excluded from the requirements of 10 CFR 835, "Occupational Radiation Protection," as specified in 10 CFR §835.1(b)(5).

Terrestrial NORM is radioactive material that is from the earth and has been present since the formation of the earth. It mainly consists of natural uranium, thorium, and potassium-40. Of these radionuclides, the uranium and thorium decay chains starting with uranium-238 (U-238) and thorium-232 (Th-232) are the most significant as they generate the radioactive noble gases radon (Rn-222) and thoron (Rn-220). As noble gases, radon and thoron are mobile in the environment and provide a challenge to DOE radiological control programs. A spectrum of the alpha particle energy versus an abundance from a typical air sample taken at TREAT displays this issue, as shown in Figure 18. The most commonly found daughter products of radon and thoron are displayed in Figure 19 and Figure 20, respectively.

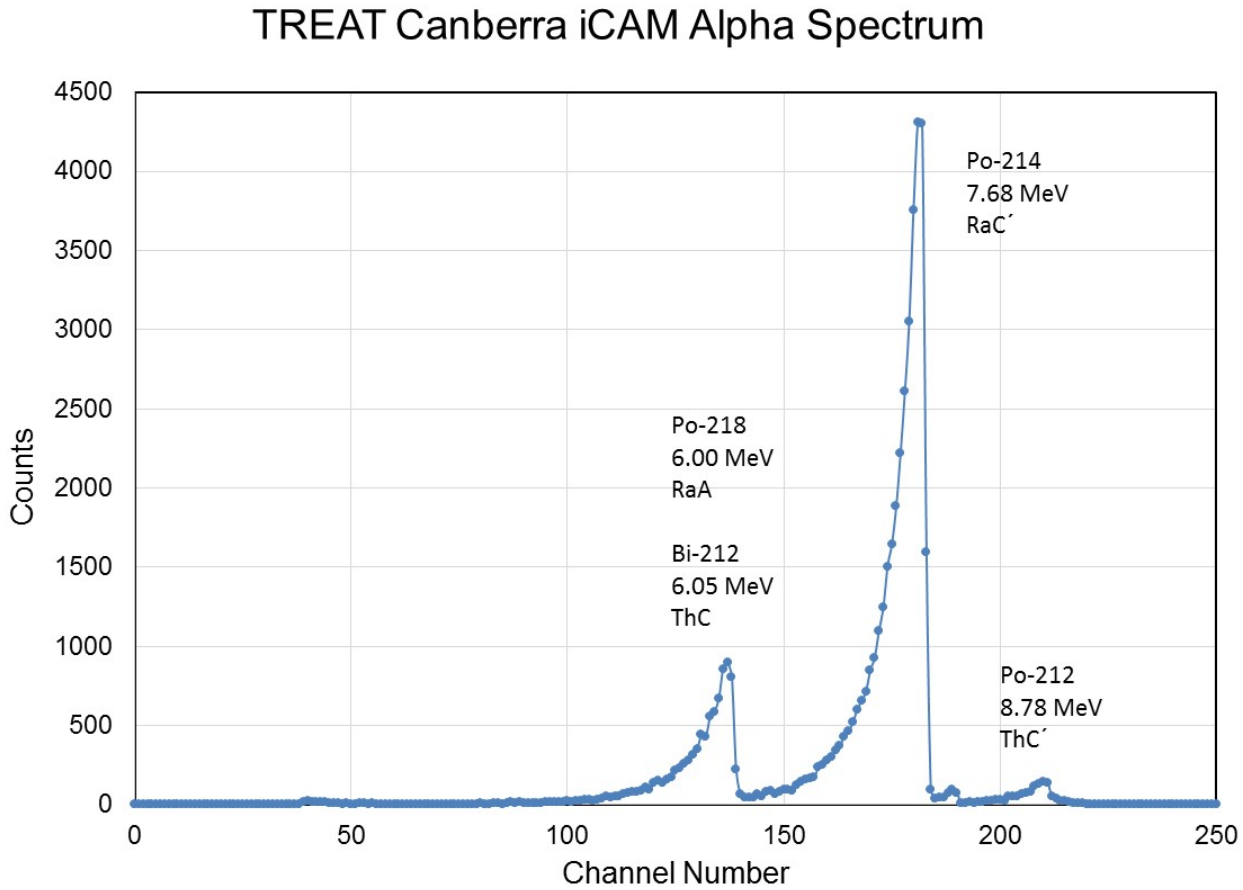


Figure 18. Typical air activity alpha spectrum.

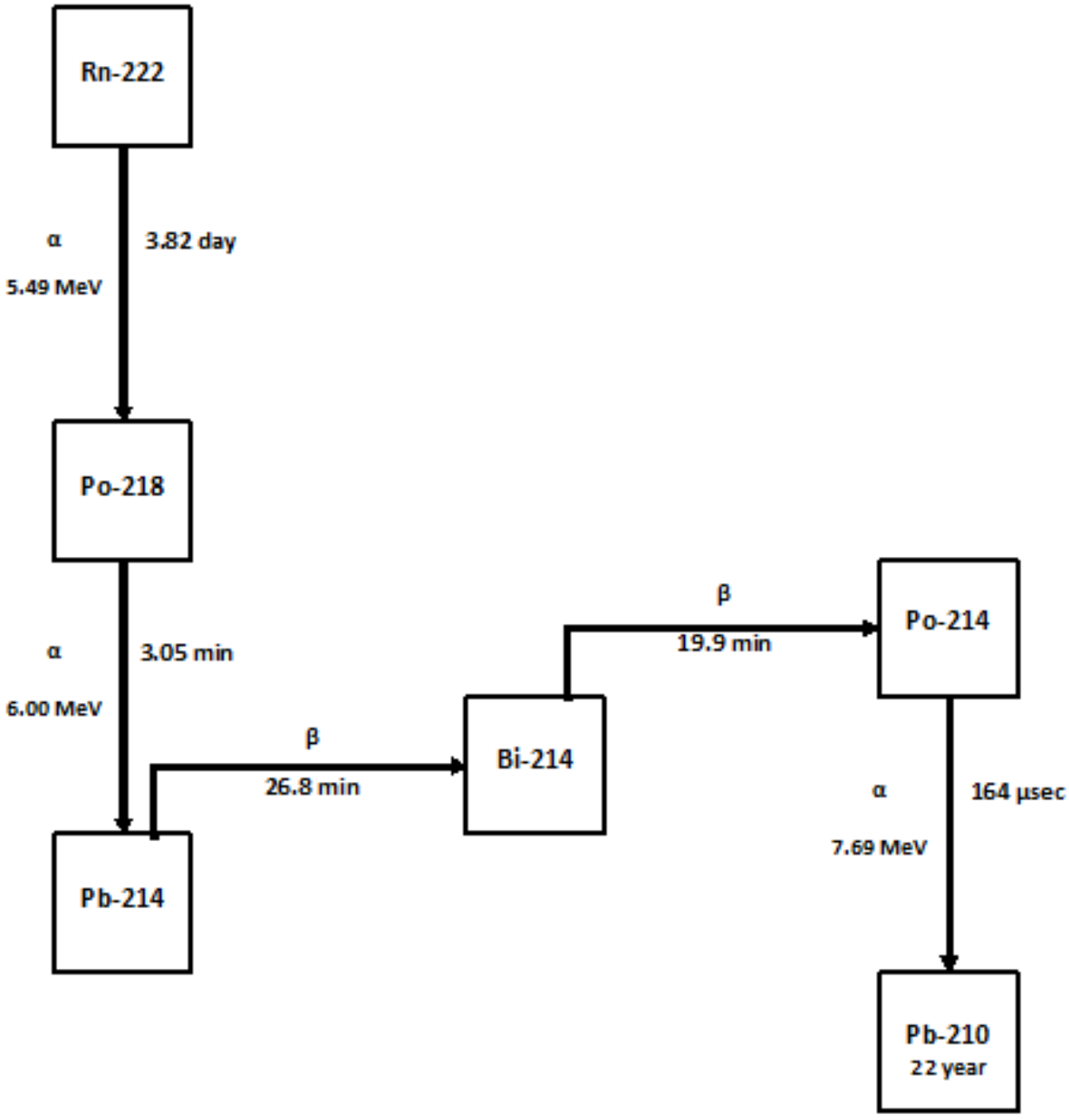


Figure 19. Radon decay chain (partial).

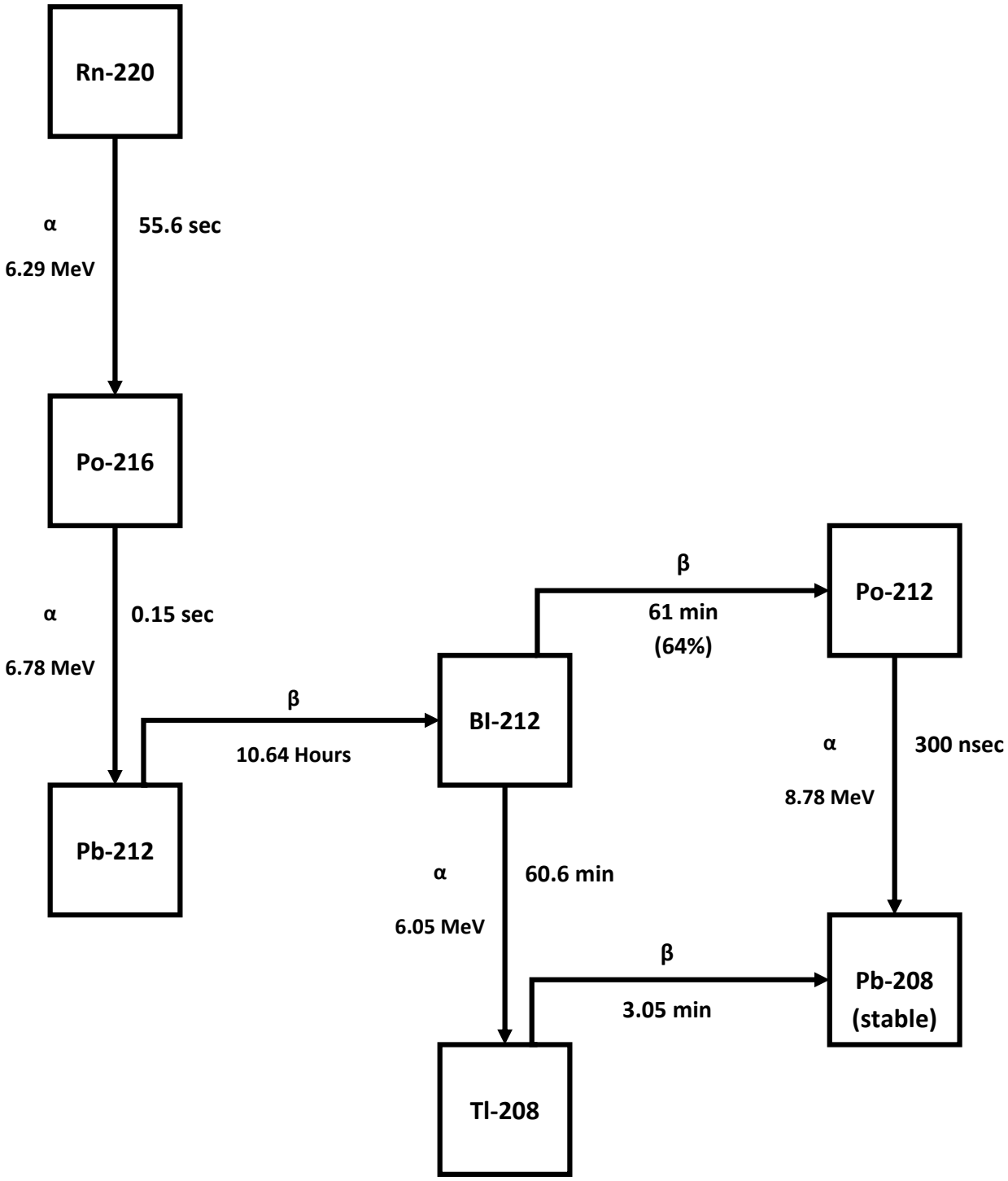


Figure 20. Thoron decay chain.

2.5.1.2 Radon/Thoron Dosimetry

The radon/thoron dosimeters used for this study contained a passive alpha track dosimeter made of a plastic polymer, allyl diglycol carbonate (commonly known as Columbia Resin No. 39 or CR-39). As alpha particles interact with the polymer, they leave a path of broken chemical bonds as they ionize the molecules. The polymer is processed by submerging it in a caustic solution, usually sodium hydroxide. The caustic interacts faster with the damaged molecules than with the undamaged polymer, which reveal pathways or tracks in the plastic proportional in length to incident energy in the charged radioactive particle.

Two different dosimeters were used for Type DRNT (Type DRNM - Outside Variant) for the measurement of the combined radon/thoron levels and Type DRN (Type DRNF - Outside Variant), which has a membrane that delays transmission of the gas into the detector such that the thoron gas (Rn-220 – 55-sec. half-life) decays away and the dosimeter only measures radon gas levels. Thirty separate locations were chosen to place the dosimeters and one of each type was placed at each location. A pair of dosimeters were located outside on the security fence near the MFC-722. The dosimeters were placed on February 11–12, 2015, and removed on May 18, 2015. Table 2 provides the results ranked by their radon/thoron concentration. The location maps are found in Figure 21, Figure 22, Figure 23, Figure 24, and Figure 25, respectively. The detailed results sheets are provided in Appendix C, while a radon dosimeter specification sheet is provided in Appendix D.

The highest levels of measured radon/thoron was 7.6 picocuries per liter in the Experimental Equipment Room (Room 124), while the only other level greater than the EPA's action level was the Sub-Pile Room, which was at 4.3 picocuries per liter. Of note was that the Basement Auxiliary Room had 2.7 picocuries per liter, which compared closely with the results of the 1989–1990 radon measurement of 2.9 picocuries per liter. Since these measurements were taken, the Experimental Equipment Room underwent major renovation to reinforce the walls and replace the roof. The ventilation system was also upgraded; as such, the levels in the room will need to be re-evaluated.

Table 2. Radon/Thoron Dosimeter Results Ranked by Concentration.

Location	Field Data/Comments	Average Radon + Thoron Conc. (pCi/l)	Average Radon Conc. (pCi/l)
19	Experimental Equipment Room - Rm 124	7.6	6.9
26	Sub-Pile Room	4.3	3.9
27	Basement Auxiliary Room	2.7	2.7
6	Electronics Shop West Wall - Rm 109	1.8	1.8
15	Mechanical Equipment Room - Rm 115	1.8	1.4
5	I&C Control Room West Wall - Rm 108	1.4	1.1
28	Basement Stair Well	1.3	1.3
7	Electric Shop East Wall - Rm 110	1.0	1.9
10	Electrical Equipment Room - Rm 111	0.7	0.6
8	Retention Tank Room - Rm 123	0.6	1.0
13	Hodoscope I&C Room - Rm 120	0.6	0.7
9	Diesel Generator Room - Rm 112	0.5	0.5
14	Filtration/Cooling Fan Room - Rm 113	0.5	0.3
30	TREAT Security Building - MFC 722	0.4	0.7
11	Work Shop South Wall - Rm 121	0.3	0.8
3	Women's Restroom - Rm 105	0.3	0.7
17	South Caged Storage Area - Rm 117	0.3	0.6
4	Entrance Hallway - Rm 101	0.3	0.4
1	Radiological Control Office - Rm 100	0.3	0.3
2	Men's Restroom - Rm 103	0.3	0.3
12	Work Shop North Wall - Rm 122	0.3	0.3
16	North Caged Storage Area - Rm 116	0.3	0.3
18	South High Bay Near LHM Tower - Rm 118	0.3	0.3
20	South High Bay Near Reactor - Rm 118	0.3	0.3
21	North Low Bay near Work Shop - Rm 118	0.3	0.3
22	North Low Bay near North Wall - Rm 118	0.3	0.3
23	Reactor Top South East Corner - Rm 201	0.3	0.3
24	1st Mezzanine East Wall - Rm 201	0.3	0.3
25	2nd Mezzanine East Wall	0.3	0.3
29	Exterior Monitor near MFC 722	0.3	0.3

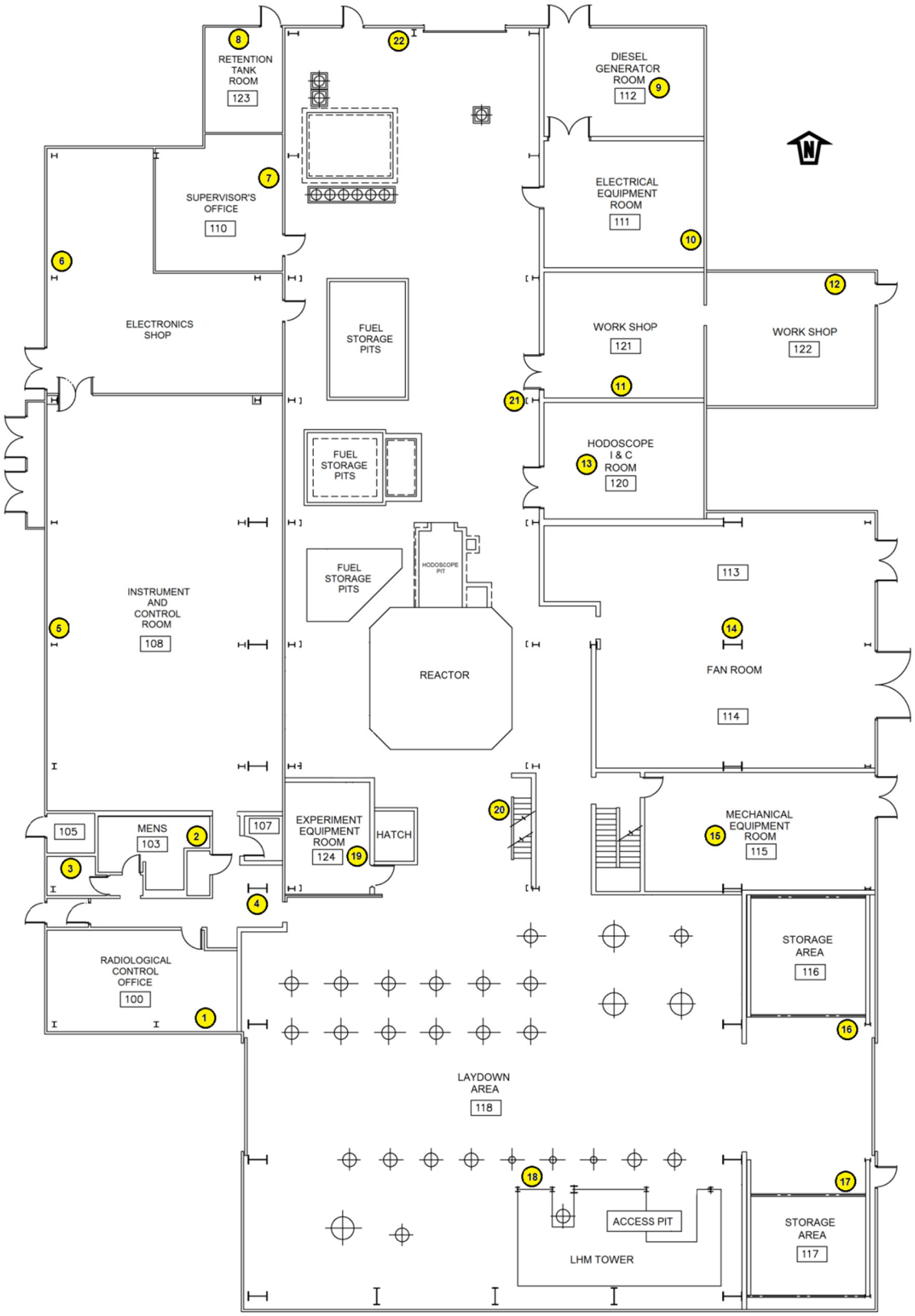


Figure 21. TREAT main floor radon dosimeter locations.

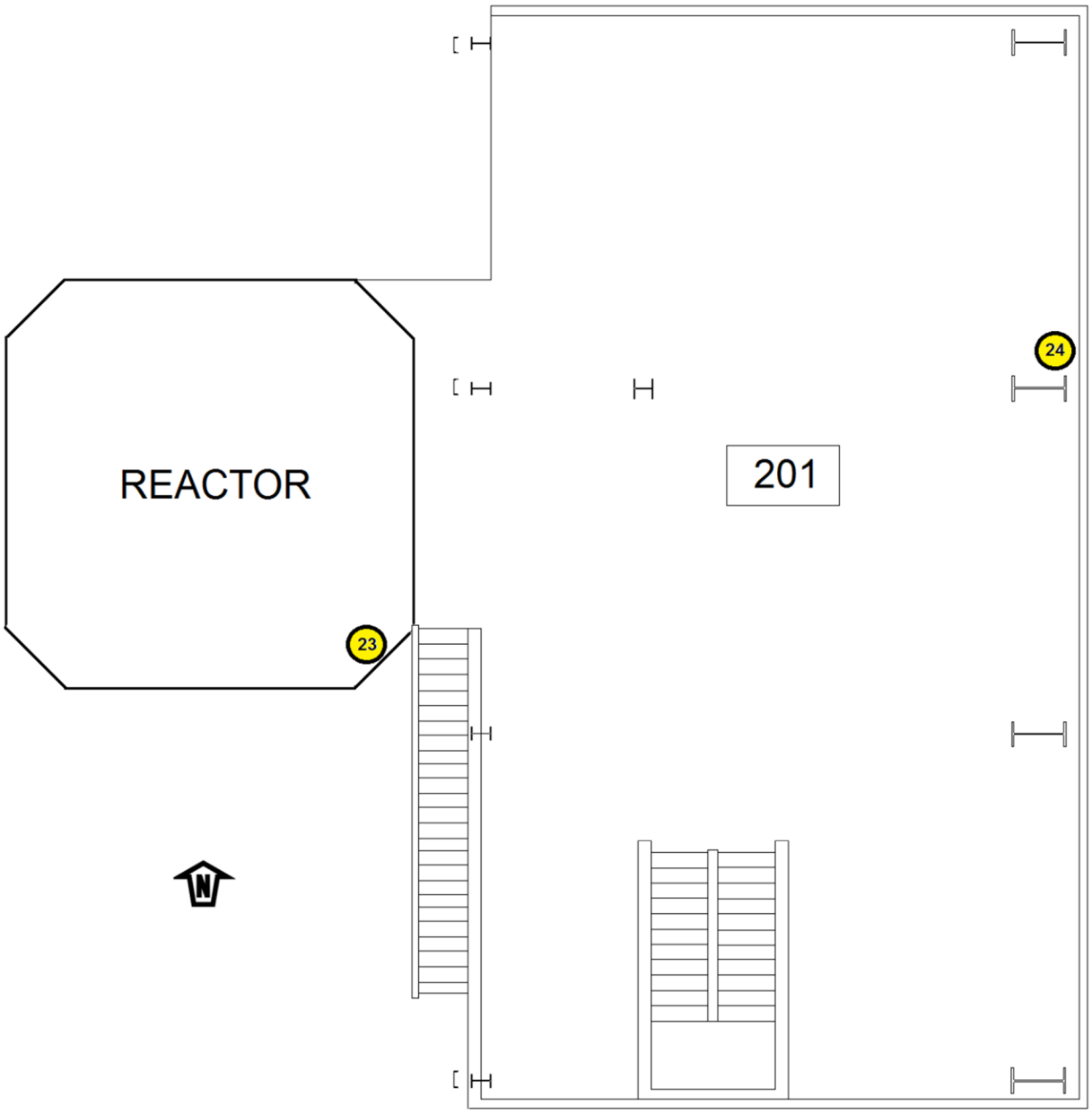


Figure 22. TREAT first floor mezzanine radon dosimeter locations.

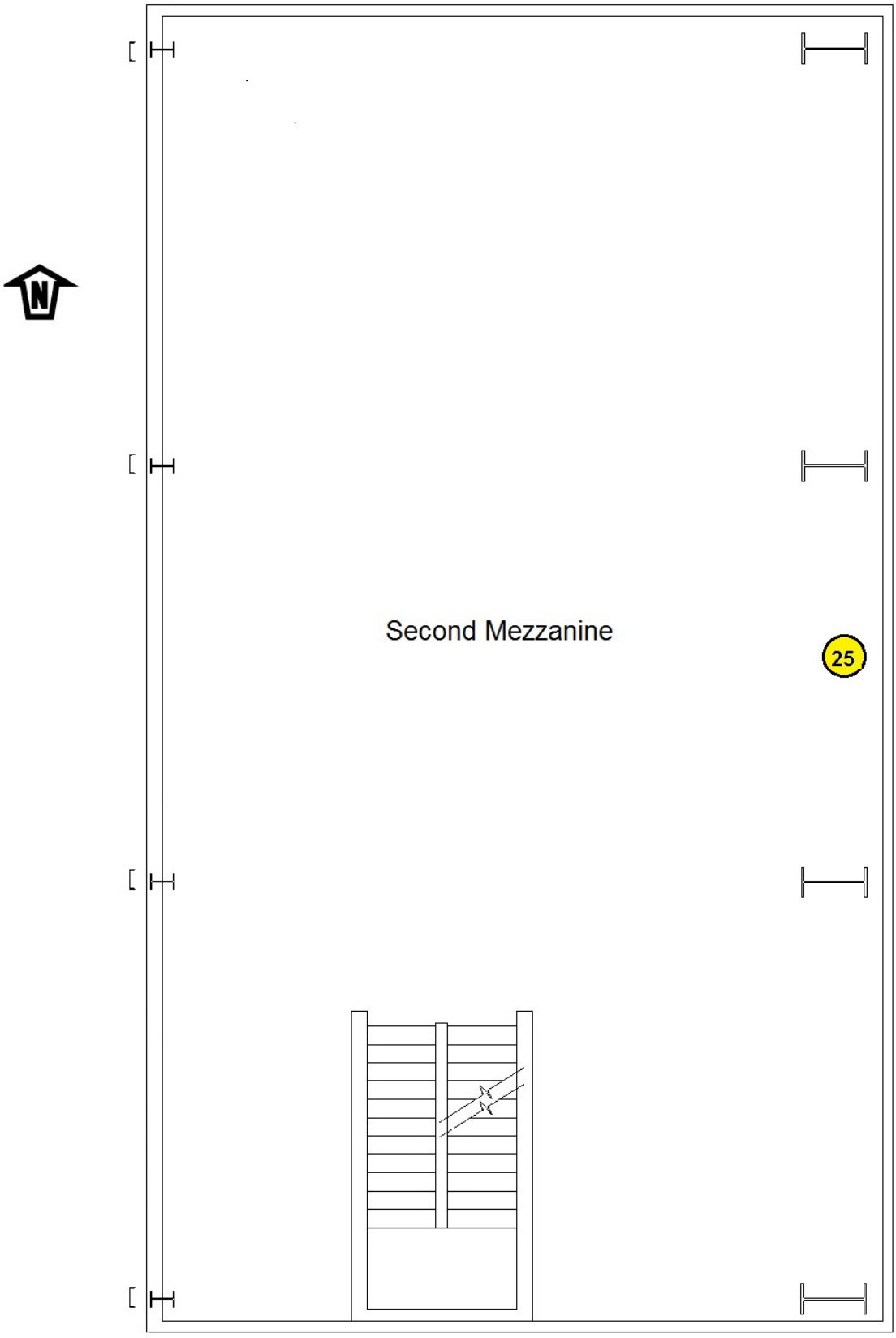


Figure 23. TREAT second floor mezzanine radon dosimeter location.

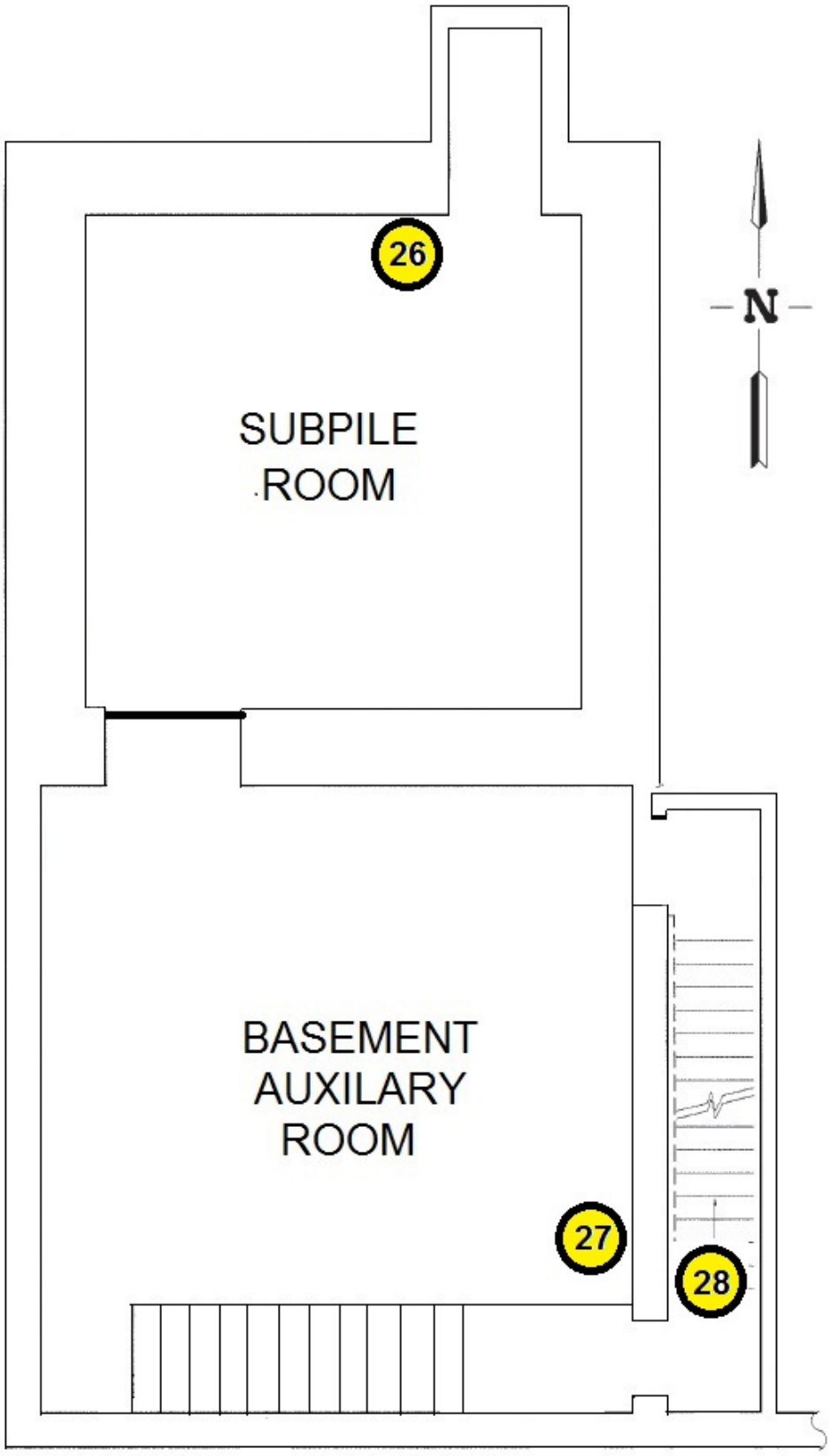


Figure 24. TREAT basement level radon dosimeter locations.

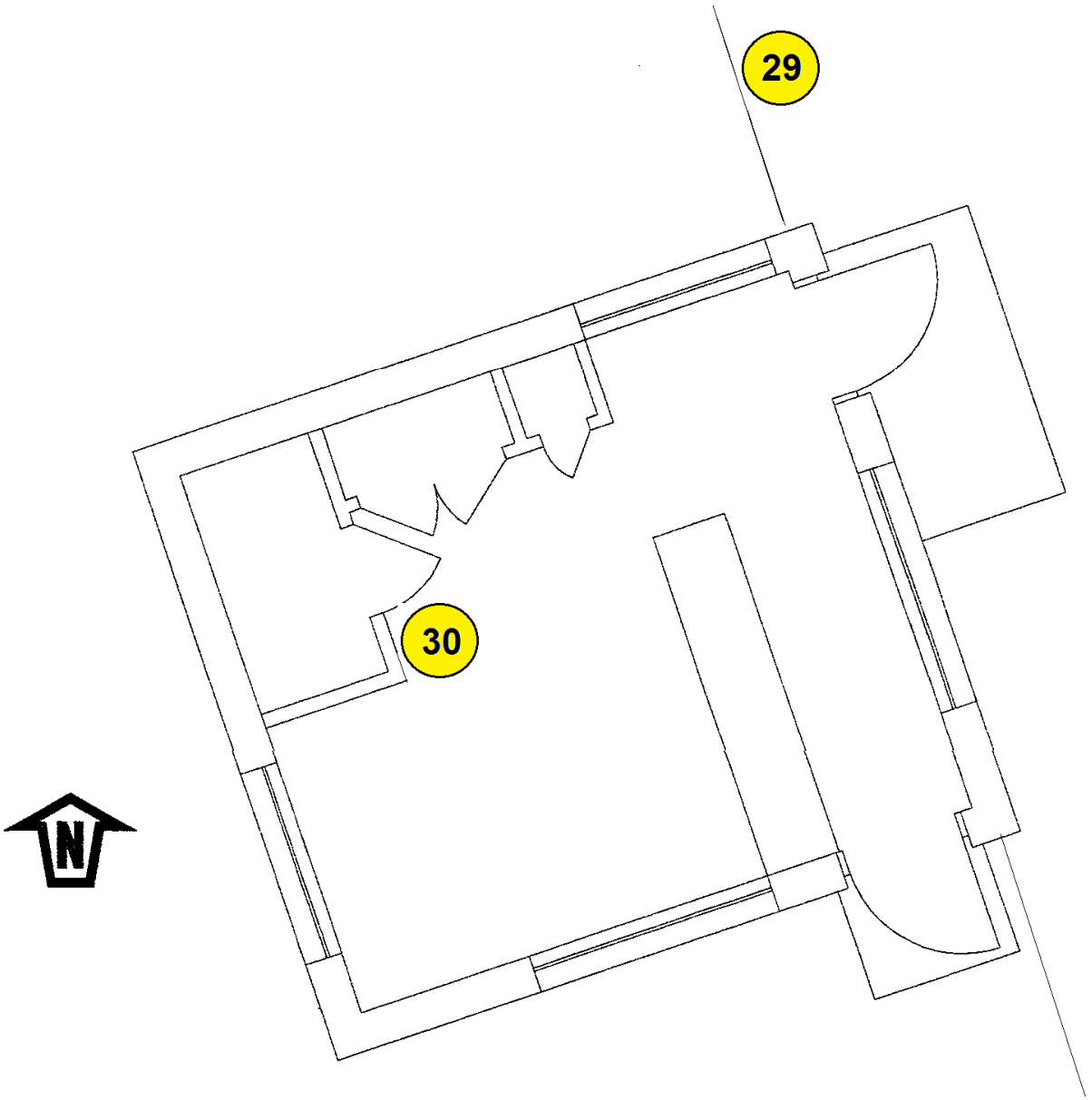


Figure 25. MFC-722 radon dosimeter locations.

2.5.2 Airborne Particulate Monitoring

Airborne particulate monitoring at TREAT over the years prior to the reactor restart was performed by three sets of particulate continuous air monitors (CAMs). TREAT had a CAM from its previous operational period that was still in use and functioning. It was a Nuclear Measurements Corporation beta particulate CAM. The RTTP purchased Mirion Canberra's intelligent CAMs, Model: iCAM, as a replacement existing CAM at TREAT.

Initially, two portable CAMs were deployed on January 18, 2016. One was located at the TREAT reactor high-bay east of the reactor, while the other was positioned on the reactor first floor mezzanine. The existing Nuclear Measurements Corporation CAM was allowed to run concurrently until December 19, 2016, when it was taken out of service. The portable iCAMs were operated until permanent facility CAMs could be installed that would provide remote indication of the airborne radioactivity levels to the TREAT Radiological Control Field Office and the TREAT Control Room (MFC-724).

The facility CAMs were located on the top of the reactor, as shown in Figure 26, and by the fuel storage holes, as shown in Figure 27, and commenced operation on March 13, 2017. The portable CAMs were then secured from continuous operation a month later on April 13, 2017.

The CAMs provide a near real-time indication of the airborne activity level, as well as providing alarm indications if preset alarm levels are exceeded. Additionally, the filters are changed twice a week, decayed for seven days to allow short-lived radon and thoron daughter products to decay, and then counted to provide an accurate indication of the average long-lived airborne radioactivity level in the sampled area. Results of these delayed counts are provided in Figure 28, Figure 29, Figure 30, Figure 31, and Figure 32, respectively.

For reference purposes, the most restrictive derived airborne concentration for radionuclides found at TREAT are 7.0E-09 μCi/ml for Sr-90 (beta emitter) and 5.0E-12 μCi/ml for Pu-239 (alpha emitter). The slightly elevated beta levels on the TREAT Nuclear Measurements Corporation CAM during October and November 2016 were due to increased NORM at TREAT due to securing the building supply fans when the heating circuits failed.

Figure 26. Reactor top iCAM location.

Figure 27. Fuel storage area iCAM location.

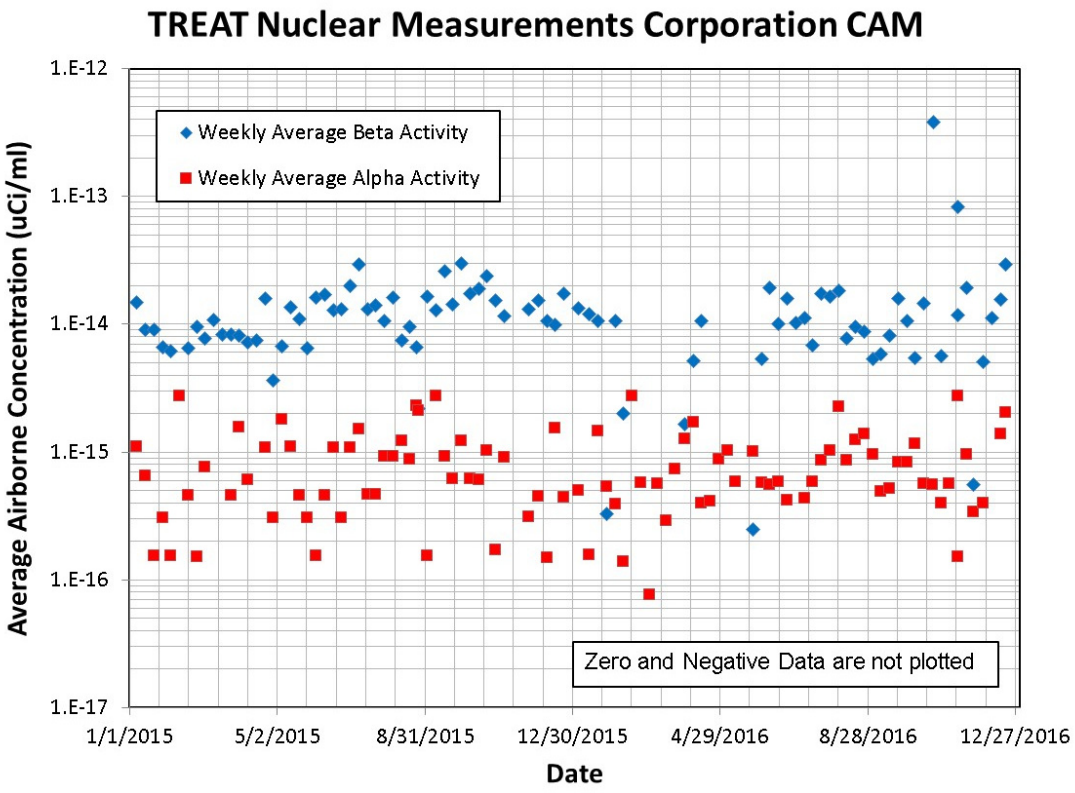


Figure 28. TREAT CAM sample data.

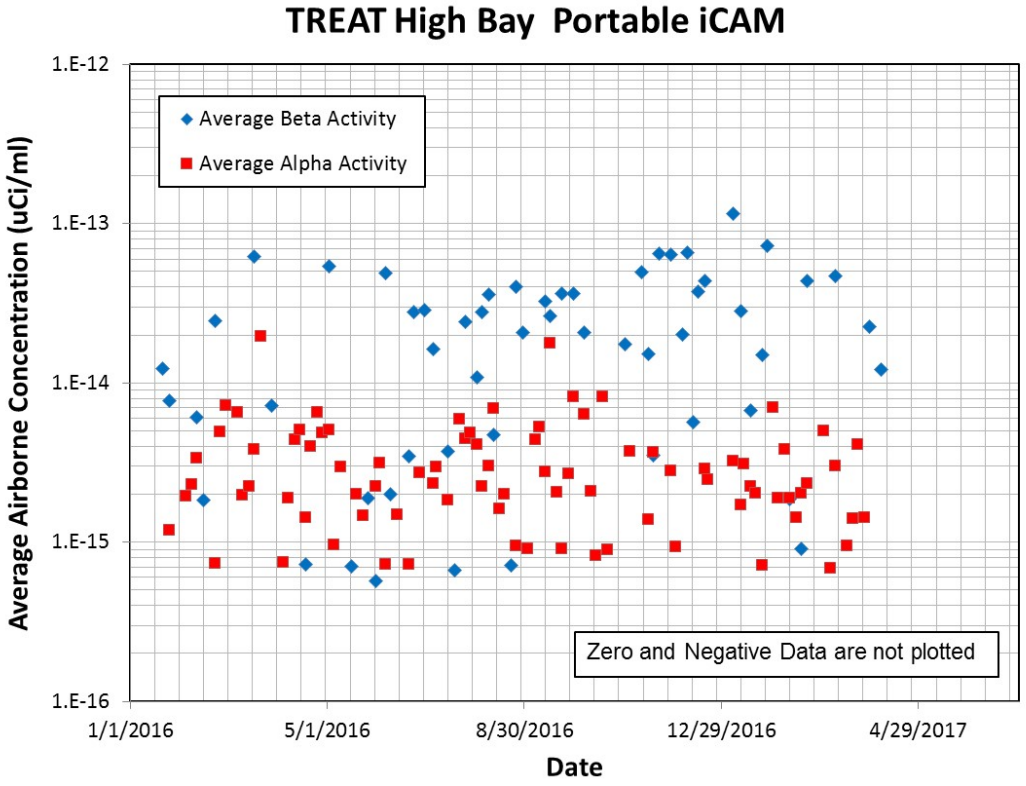


Figure 29. TREAT high-bay portable iCAM sample data.

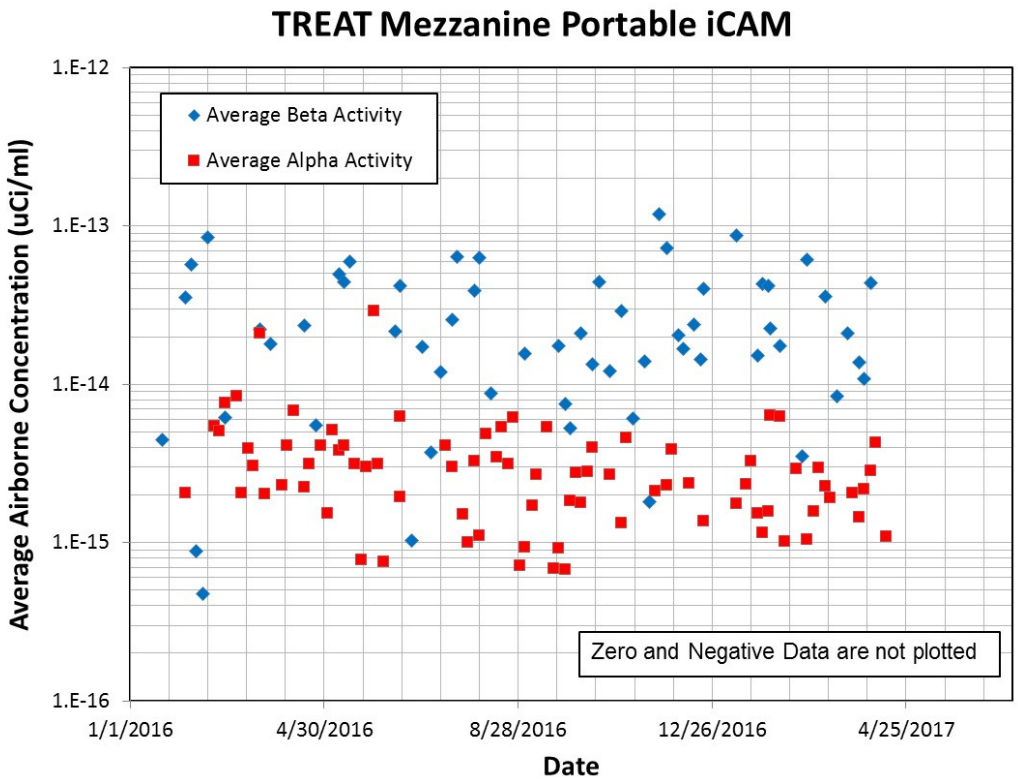


Figure 30. TREAT mezzanine portable iCAM sample data.

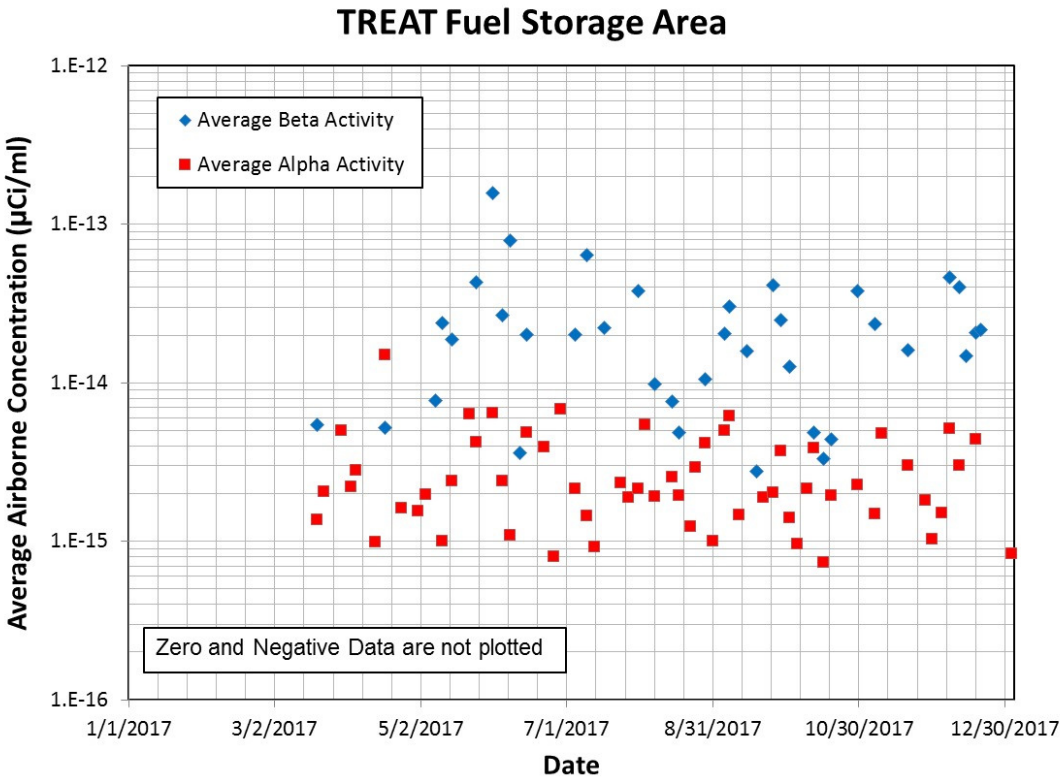


Figure 31. TREAT fuel storage area iCAM sample data.

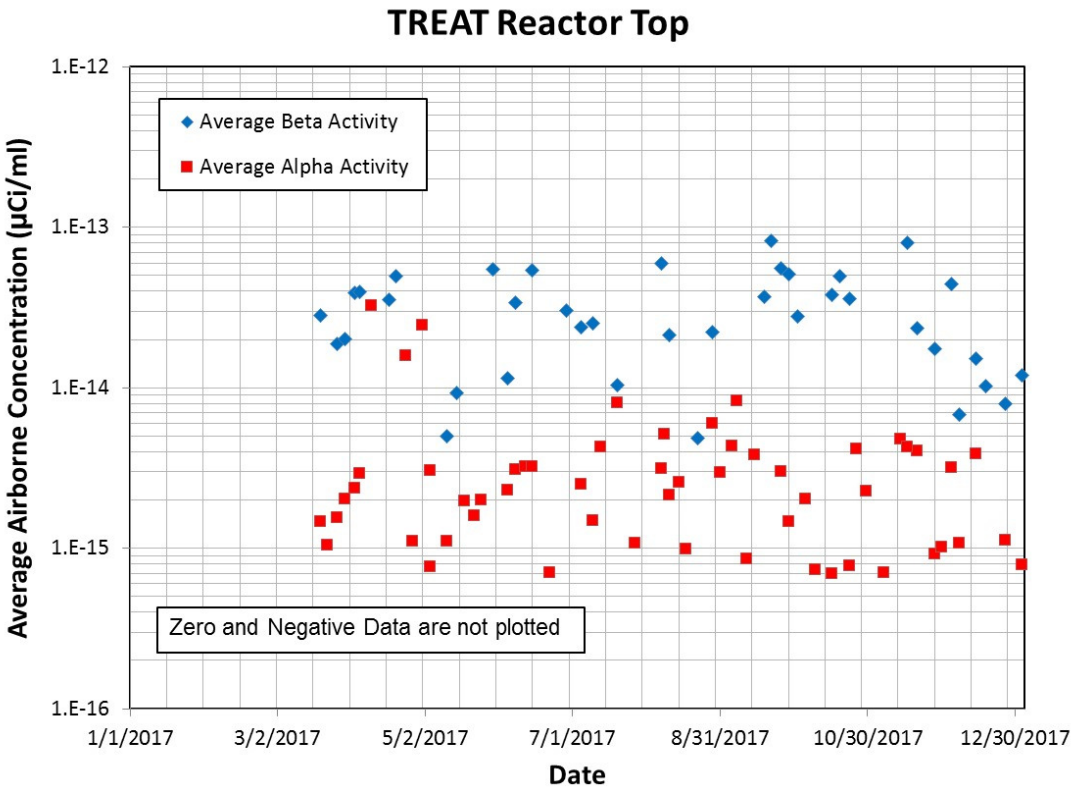


Figure 32. TREAT reactor top iCAM sample data.

2.6 Area Dosimeters

An extensive program of area monitoring dosimeters was established in the last quarter of calendar year 2015. TREAT has been monitored since that time with 22 area dosimeters. The dosimeters outside the TREAT Reactor Building (MFC-720) are considered to be Area Monitoring Dosimeters, while those in the TREAT Reactor Building are considered to be Passive Monitoring Dosimeters.

Area monitoring dosimeters are part of the INL dosimetry program, which justifies the areas requiring the issuance of personnel dosimeters, demonstrates that doses outside radiological areas are negligible, and monitors the ambient radiation levels in and around areas surrounding projects or facilities that involve the use of radioactive materials or radiation generating devices.

Passive area monitoring dosimeters are used in support of routine radiological surveys. These passive area monitoring dosimeters are placed in controlled areas to detect changes in radiological conditions detect the gradual buildup of radioactive material and provide information in the event of an emergency.

INL's external dosimetry is provided under subcontract to Landauer, Inc. The dosimeters described herein constitute the types of dosimetry provided to BEA and documented under INL documents. Accreditation by the DOE Laboratory Accreditation Program (DOELAP) is maintained by the Health Physics Dosimetry Laboratory within INL.

TREAT uses the InLight LDR Model 2T (with CR-39) for its area dosimeters. The CR-39 solid state nuclear track-etch dosimeter is for neutron detection only and is contained within the InLight holder; it is not used as a stand-alone dosimeter.

Table 3 lists the area dosimeter locations and the deep dose equivalent (DDE) for photons in 2016 and 2017 for the TREAT area, while Figure 33, Figure 34, Figure 35, Figure 36, and Figure 37, respectively, show the maps of the various dosimeter locations.

High-dose rates in the north and south storage areas, as well as the upper mezzanine, were due to the collection of legacy radioactive material that was shipped from the facility during the third quarter of 2017, just prior to the reactor restart.

Table 3. TREAT Area Dosimeter Results.

Location No.	Location	2016 - 2017 DDE Photon (millirem)					
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr
MFC-I-0010	724 TREAT Control Room South Wall	30	35	36	37	35	31
MFC-I-0151	722 TREAT Security Building East Wall	32	45	50	50	45	51
MFC-I-0153	720 Rad Control Office East Wall	38	55	49	52	46	44
MFC-I-0154	720 I&C Room Far East Wall	26	30	42	36	38	33
MFC-I-0155	720 I&C Room West Wall	29	34	40	38	34	31
MFC-I-0156	720 Electronics Shop East Wall	29	31	33	38	36	32
MFC-I-0157	720 Electric Shop East Wall	33	35	38	39	36	32
MFC-I-0158	720 Reactor High Bay North Wall	36	39	42	37	37	33
MFC-I-0159	720 Electrical Equipment Room West Wall	41	47	47	47	50	48
MFC-I-0160	720 East Work Shop West Wall	29	32	35	30	38	30
MFC-I-0161	720 Hodoscope I&C Room West Wall	40	64	55	55	53	49
MFC-I-0162	720 Filtration/Cooling Room West Wall	41	46	49	59	52	62
MFC-I-0163	720 Mechanical Room South Wall	30	39	41	47	37	43
MFC-I-0164	720 North Storage Area West Wall	90	115	109	125	95	48
MFC-I-0165	720 South Storage Area West Wall	259	346	332	358	224	66
MFC-I-0166	720 Reactor High Bay South Wall	41	52	46	47	46	40
MFC-I-0167	720 Reactor Mezzanine West Pillar	35	33	32	35	35	50
MFC-I-0168	720 Upper Mezzanine East Wall	146	166	103	126	367	1472
MFC-O-0046	TREAT Security Fence North	42	38	42	45	35	40
MFC-O-0047	TREAT Security Fence East	29	41	43	43	37	38
MFC-O-0048	TREAT Security Fence South	53	53	51	51	45	37
MFC-O-0049	TREAT Security Fence West	43	37	41	36	34	36

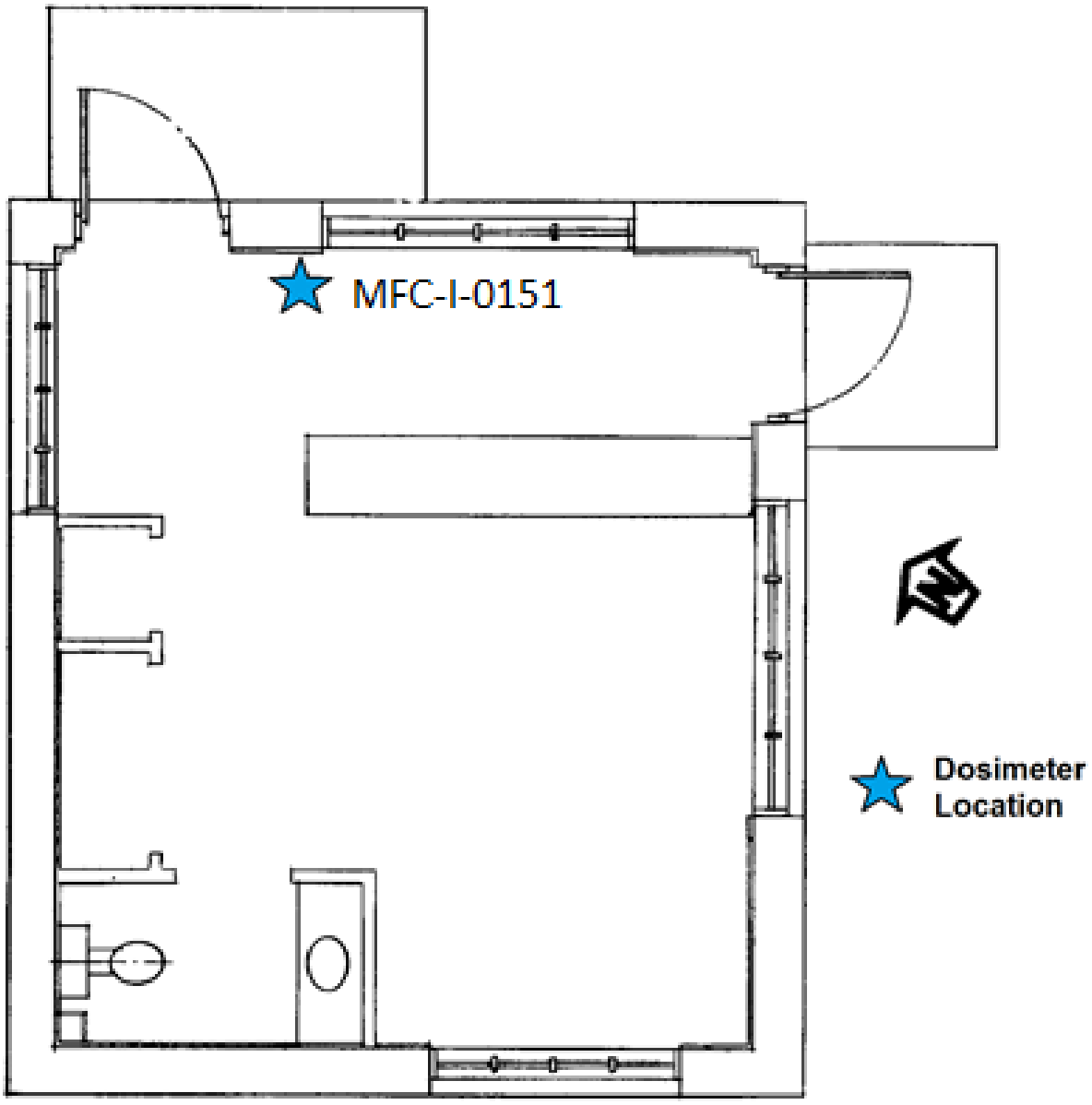


Figure 33. TREAT area dosimeter location in MFC-722.

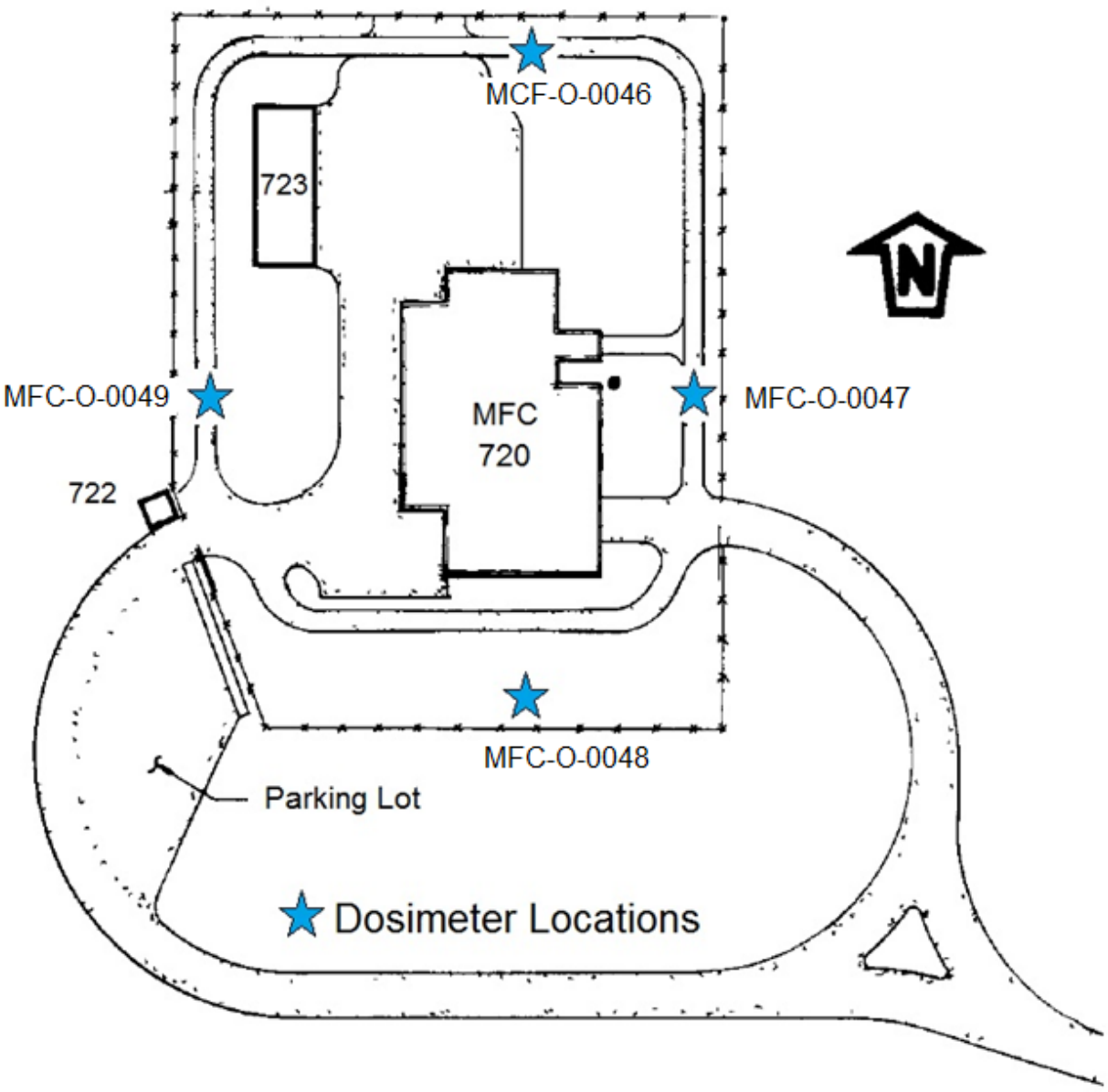


Figure 34. TREAT security fence area dosimeter location.

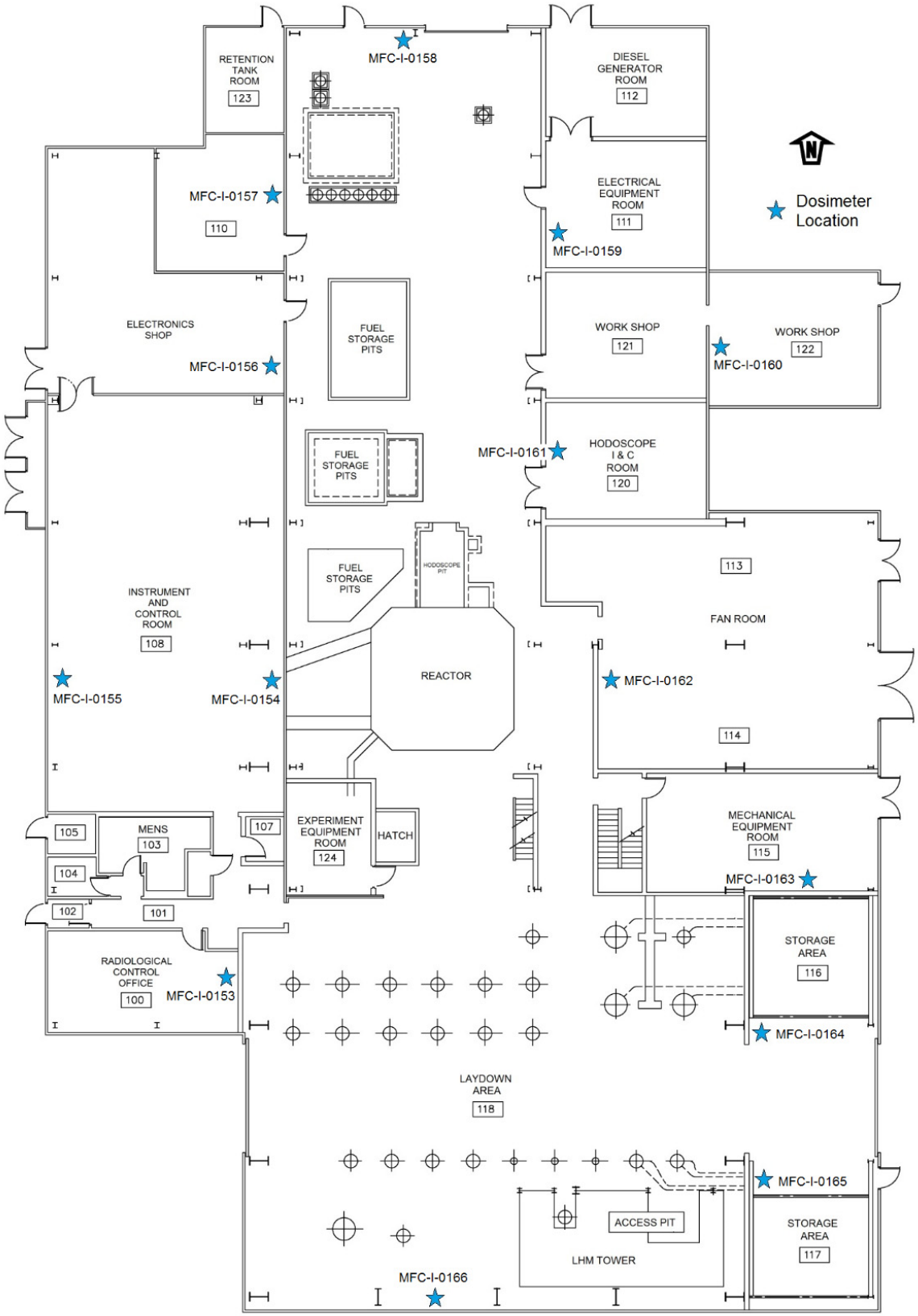


Figure 35. TREAT area dosimeter locations.

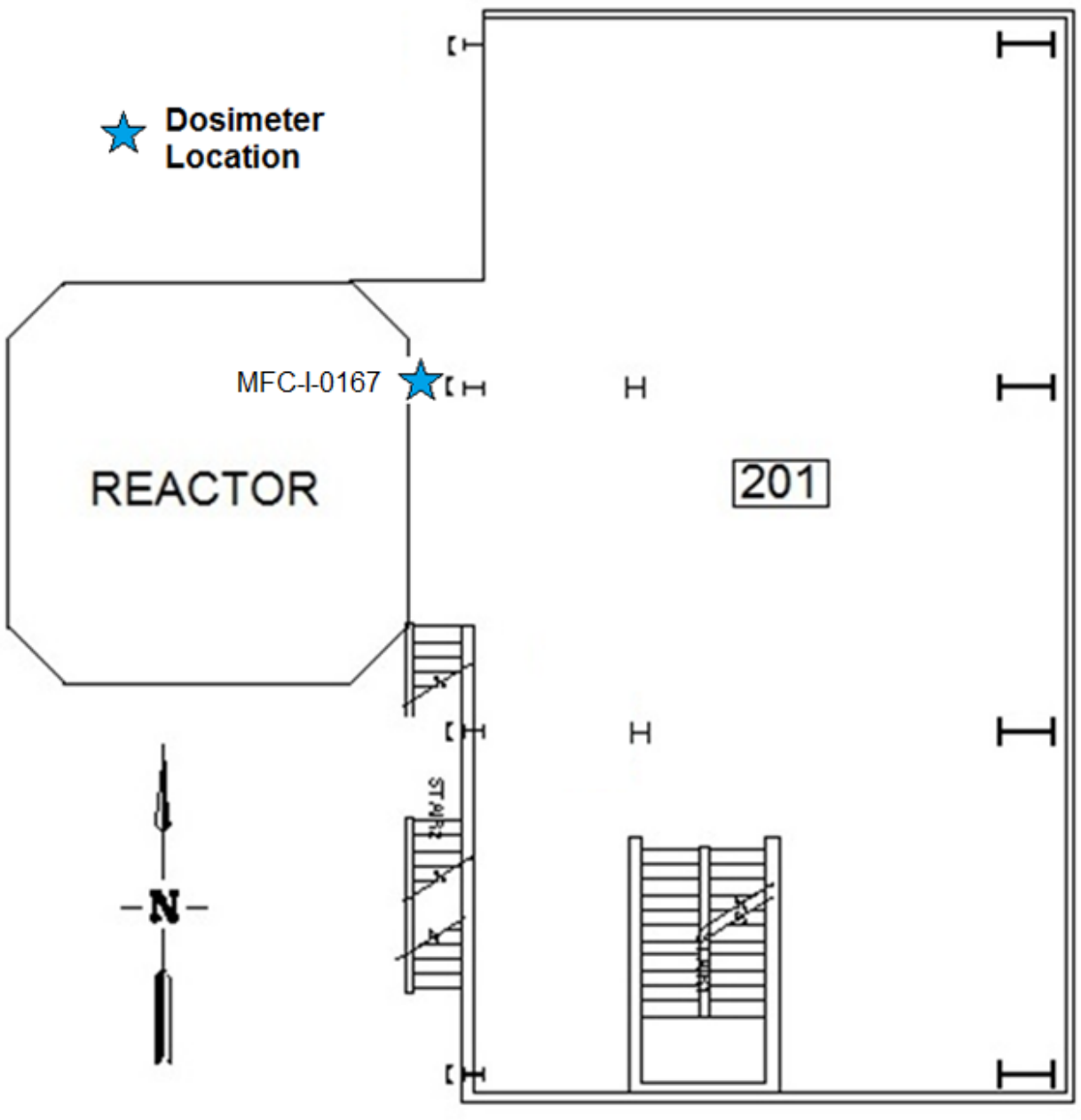


Figure 36. TREAT area dosimeter locations on reactor mezzanine.

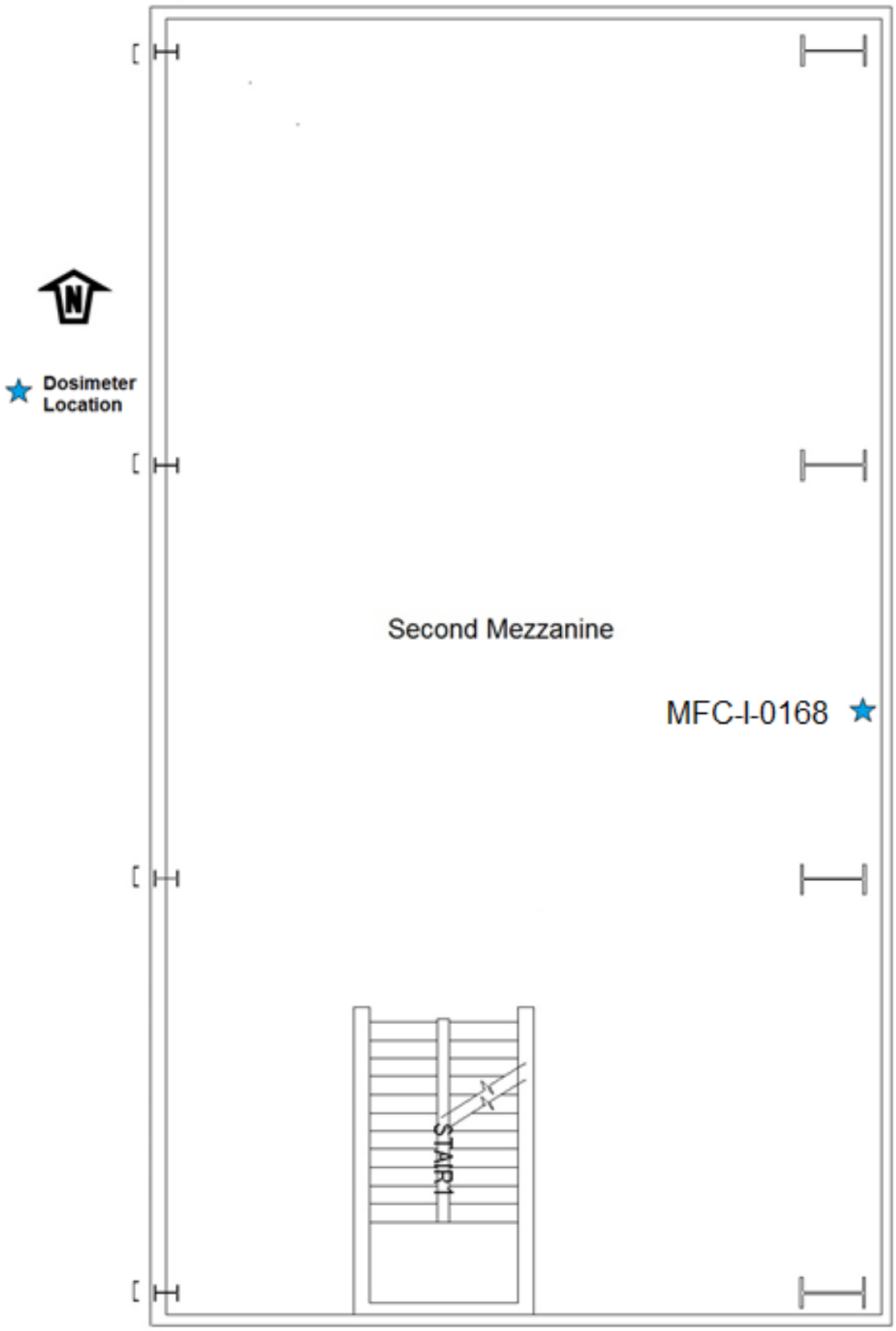


Figure 37. TREAT area dosimeter location in second floor mezzanine.

3. POST-RESTART RADIOLOGICAL CONDITIONS

3.1 TREAT Initial Criticality

The initial criticality of the TREAT reactor following its extended period of programmatic stand-down occurred on November 14, 2017. The reactor was raised to an indicated power level of approximately 10,000 counts per second. This power level was maintained for a short period of time prior to shutting down the reactor. Surveys were conducted on the Reactor Top, the Sub-Pile Room, the Filtration Cooling Room, and the Reactor High-Bay around the TREAT Reactor. The survey results were consistent with the levels when the reactor was shut-down. Appendix E provides the log entries of these surveys.

3.2 TREAT Reactor at Normal Steady State Power (80 kilowatts)

On November 16, 2017, the TREAT Reactor achieved its normal steady-state power level of 80 kilowatts for a short period. Several radiological surveys were completed around the reactor at that time, though a detailed survey of the radiological conditions would have to wait until November 28, 2016, when the reactor was scheduled to remain at 80 kilowatts for several hours. Detailed survey maps of the results of these surveys are contained in Appendix F.

3.2.1 Reactor Top Radiation Levels

The dose rate on top of the reactor varies based on the positioning of the shield blocks.

During the initial operation at 80 kilowatts on November 18, 2017, the slot in the rotating shield was filled and the flux wire plug hole in shield block No. 1 was open and rotated to the south edge of the reactor. In this configuration, the dose rate over the open flux wire plug hole was 900 millirem/hr gamma and 4,000 millirem/hr neutron at the floor level and 200 millirem/hr gamma and 250 millirem/hr neutron at 30 cm above the floor. The dose rate over the center of the reactor was 500 millirem/hr gamma and 370 millirem/hr neutron at the floor level and 300 millirem/hr gamma and 250 millirem/hr neutron at 30 cm above the floor level.

Subsequently, the flux wire plug was placed in the hole in shield block No. 1, while shield block No. 1 was rotated to the position with the flux wire plug over the center of the reactor. In this configuration, the dose rate at the center of the reactor as measured on November 28, 2017, was 700 millirem/hr gamma and 325 millirem/hr neutron at floor level, and 350 millirem/hr gamma and 140 millirem/hr neutron at 30 cm above floor level. These values were obtained at the edge of the flux wire plug as the flux wire plug appears to provide better shielding than shield block No. 1.

The final configuration that was measured for this report was the dose rates over the reactor top with the center steel plug removed from the slot in the rotating shield plug. This configuration simulates an experiment with flux wire access needed. The shield block No. 1 was positioned so that the flux wire plug was over the center of the reactor and the plug was installed. The dose rates were measured during reactor operation on February 13, 2018, and the dose rates over the center of the reactor were 4,000 millirem/hr gamma and 2,500 millirem/hr neutron at floor level, and 1,500 millirem/hr gamma and 750 millirem/hr neutron at 30 cm above floor level. The dose rates were also taken with the small plug in the flux wire plug removed and removing the small plug increased the radiation levels to 6,000 millirem/hr gamma and 5,500 millirem/hr neutron at the floor level.

3.2.2 Reactor Top Radiation Levels

A grid survey was conducted on the north, east, south, and west sides of the reactor. The gamma and neutron levels were obtained on the floor level grids, while the upper grids were only measured for gamma radiation due to the weight of the neutron survey instrument.

The east face of the reactor is dominated by a large rolling shield. Radiation leaks around the edges of this shield where it interfaces with the east wall of the reactor. The highest radiation streaming out of this edge was the top of the shield where the dose rate was 130 millirem/hr gamma at the interface and 95 millirem/hr gamma at 30 cm away. The center of the rolling shield read 10 millirem/hr gamma and 13 millirem/hr neutron at the surface of the plug with 7 millirem/hr gamma and 8 millirem /hr neutron at 30 cm from the plug.

The north face of the reactor is where the Hodoscope penetrates the reactor shielding. Also near the north face is the emergency escape hatch from the Sub-Pile Room. The highest dose rates on the north face were above the Hodoscope at the reactor wall, which read 200 millirem/hr gamma and 200 millirem/hr neutron at the wall and 38 millirem/hr gamma and 90 millirem/hr neutron at 30 cm away. The radiation streaming up from the Sub-Pile Room escape hatch influenced the dose rates measured to the east of the Hodoscope with that grid reading 6 millirem/hr gamma and 65 millirem/hr neutron at the face of the reactor and 5 millirem/hr and 37 millirem/hr neutron at 30 cm away.

The west face of the reactor is where the Radiography Stand is situated. There was radiation leaking from the Radiography Stand and reactor face interface, as well as the hole in the top of the Radiography Stand. The highest levels noted were at the top of the Radiography Stand near the reactor west wall. The dose rates were 50 millirem/hr gamma and 12 millirem/hr neutron at the wall and 20 millirem/hr gamma and 5 millirem/hr neutron at 30 cm away. The measured levels over the hole in the top of the Radiography Stand were 30 millirem/hr gamma and 3 millirem/hr neutron.

The south face of the reactor has a large recessed wheeled shield plug in the lower center. This shield, as well as the nuclear instrument penetration directly west of the shield, were the two main sources of radiation streaming from the south face of the reactor. The edge of the shield plug read 40 millirem/hr gamma and 10 millirem/hr neutron at the wall and 25 millirem/hr gamma and 6 millirem/hr neutron at 30 cm away. The nuclear instrument penetration directly west of the shield read 42 millirem/hr gamma and 25 millirem/hr neutron at the wall and 25 millirem/hr gamma and 12 millirem/hr neutron at 30 cm away.

3.2.3 Reactor Sub-Pile Room Radiation Levels

The radiations in the Reactor Sub-Pile Room emanate from the ceiling. The highest measured value on the ceiling was 27,000 millirem/hr gamma at the south side of the central depleted uranium shield plug and 5,000 millirem/hr at 30 cm away. Whole body dose rates were also measured in the Sub-Pile Room with the highest level measured in the south-east corner reading 150 millirem/hr gamma and 580 millirem/hr neutron at waist level. The radiation levels at the door of the Sub-Pile Room were 10 millirem/hr gamma and 140 millirem/hr neutron.

3.2.4 Filtration Cooling System Room Radiation Levels

During reactor operation, air that is used to cool the reactor becomes activated and is exhausted through a two-stage high efficiency particulate air (HEPA) filtration system before being exhausted out the TREAT stack. At 80 kilowatts, the amount of radiation from the activation products versus increases in the ambient background in the room is difficult to separate. The dose rate on the exhaust duct as it enters the filtration cooling room reads 1 millirem/hr gamma and 0.6 millirem/hr neutron on the duct piping and 0.7 millirem/hr gamma and 0.48 millirem/hr neutron at 30 cm away from the piping. The HEPA filter bank reads 0.8 millirem/hr gamma and 0.12 millirem/hr neutron at the surface of the housing. The neutron radiation are all due to scatter from the many leakage points on the reactor and are not from the air in the exhaust system. Likewise much of the gamma radiation is also scattered from other sources.

3.2.5 Filtration Cooling System Room Radiation Levels

The other areas that are impacted with elevated levels of radiation during reactor operations at 80 kilowatts are included in the survey maps in Appendix F.

3.3 TREAT Reactor Post Transient Operations

The radiation levels encountered after transient reactor operations are highly dependent on several factors—the most important of which is the total power of the transient. On January 30, 2018, TREAT shot a temperature limited transient (Transient No. 2888T) that was 10,000 Megawatts in total power.

During a transient, a significant burst of gamma and neutron radiation are able to escape the biological shielding of the TREAT Reactor. It is typical for all of the radiation area monitors to alarm during the transient. Radiation levels in the Reactor Building are closely monitored and the radiation levels at five minutes post transient are recorded and compared to graphs of previous transients and expected normal/abnormal radiation readings.

During re-entry into the TREAT Reactor Building following a transient, the area radiation levels are recorded and the lack of removable contamination or airborne radioactivity are confirmed. All of this data is recorded by the Radiological Control Organization on Form FRM-1778, "TREAT Transient Radiological Data Sheet." Appendix G gives the FRM-1778 for Transient No. 2888T.

In addition to normal surveys for re-entry, a detailed survey was completed following the re-entry for Transient No. 2888T in support of PLN-5350, "TREAT Reactor Survey Start-Up Radiological Survey Plan." Detailed survey maps are included in Appendix H.

3.3.1 Reactor Top Radiation Levels

A detailed grid survey was conducted at the top of the reactor. The maximum dose rate observed at the top of the reactor was at the center where the floor level read 1.0 millirem/hr gamma, while 30 cm above the floor level read 0.747 millirem/hr gamma. No neutron radiation was detected.

3.3.2 Reactor Side Radiation Levels

A grid survey was conducted on the north, east, south, and west sides of the reactor. The gamma and neutron levels were obtained on the floor level grids, while the upper grids were only measured for gamma radiation due to the weight of the neutron survey instrument.

The east face of the reactor read 0.050 millirem/hr gamma at the center line of the reactor. This level was higher than the other three sides for these grids. The additional radiation may have been added due to streaming gamma radiation from the top edge of the large rolling shield on the east side with an added contribution from the Filtration Cooling Room. No neutron radiation was detected.

The north face of the reactor is where the Hodoscope penetrates the reactor shielding. Also near the north face is the Sub-Pile Room emergency escape hatch. The highest dose rates on the north face were at the center line of the reactor, which read 0.040 millirem/hr gamma. No neutron radiation was detected.

The west face of the reactor is where the Radiography Stand is situated. There was radiation leaking from the Radiography Stand and reactor face interface where the dose rates were 0.190 millirem/hr gamma at contact and 0.042 millirem/hr gamma 30 cm away. No neutron radiation was detected.

The south face of the reactor highest levels were at the nuclear instrument penetration directly west of a large recessed wheeled shield plug in the center of wall. The nuclear instrument penetration directly west of the shield read 0.837 millirem/hr gamma and 0.304 millirem/hr gamma 30 cm away. No neutron radiation was detected.

3.3.3 Reactor Sub-Pile Room Radiation Levels

The Sub-Pile Room was not entered post-transient. The radiation level at the door to the Sub-Pile Room during post-transient re-entry and detailed survey was 150 millirem/hr gamma and 45 millirem/hr gamma at 30 cm from the door. The dose rates in the basement auxiliary room were elevated due to radiation streaming out of the door to the Sub-Pile Room. No neutron radiation was detected.

3.3.4 Filtration Cooling System Room Radiation Levels

During reactor operation, it is difficult to determine the level of radiation emanating from the HEPA filters and the ambient background from reactor leakage. This is no longer the case post-transient as the ambient background is substantially lower than the levels on the HEPA filter bank, which reads 1.0 millirem/hr gamma at the surface of the housing. No neutron radiation was detected.

3.4 TREAT Neutron Radiography Operations

On February 13, 2018, the TREAT Reactor was operated to obtain radiation levels with the neutron radiography shutter in the open position. See Appendix I for detailed survey maps of these radiation levels. Questions to be resolved included the quality and quantity of radiation in the radiography beam inside the Radiography Stand to aid in a possible future Radiography Stand redesign and to determine the extent and level of the worker radiation hazard in surrounding areas.

The quality of the gamma radiation in the radiography beam was measured with an ORTEC High Purity Germanium detector, Model: Detective EX-100, Identification No. 4045. It was positioned above the Radiography Stand as the device was too large to be lowered into the beam. The quantity of the gamma radiation was measured with a Mirion Radiation Area Monitoring System, Model AMP-100. The quality and quantity of the neutron radiation in the radiography beam was determined with a Health Physics Instruments Neutron Survey Instrument, Model REM-500B, Serial No. 321, while the detector for the AMP-100 and the REM-500B were positioned directly in the radiography beam. The configuration of the detectors are shown in Figure 38 and Figure 39. Figure 38 is a digital image looking to the south at the top of the Radiography Stand, while Figure 39 is a digital image of the top of the Radiography Stand looking down with the top of the photo being the reactor side of the stand. The top of the figure is east and the direction to the reactor.

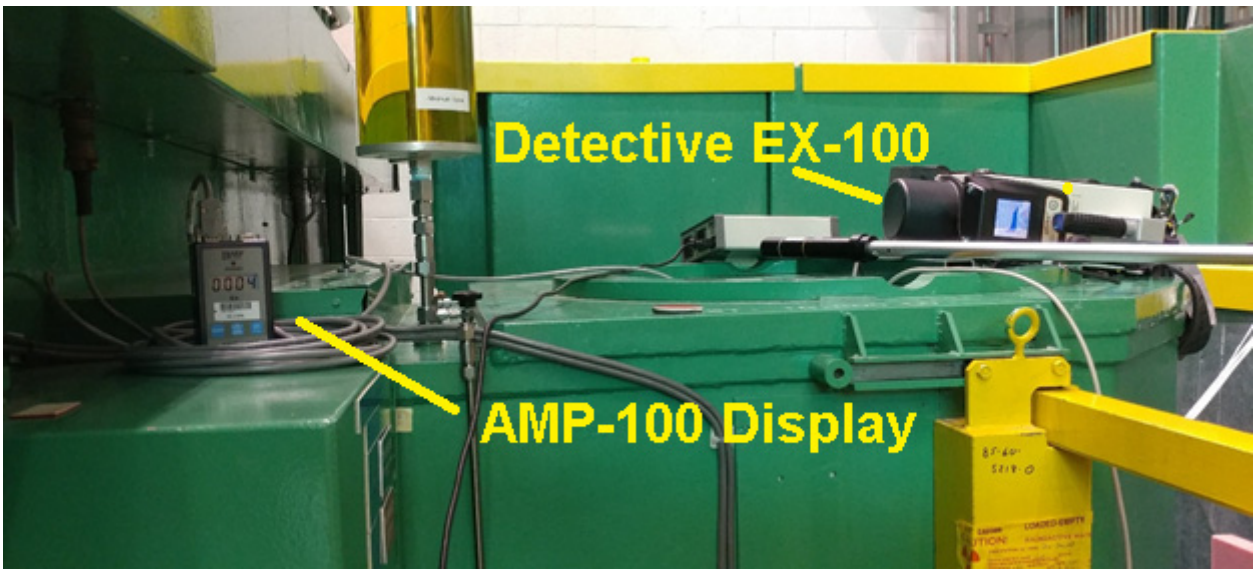


Figure 38. Side view of the radiation detector position.

Figure 39. Looking down at the position of the radiation detector in the Radiography Stand.

At a reactor power level of 50,000 counts per second, the dose rates measured in the Radiography Stand were 5.0 millirem/hr gamma and 0.461 millirem/hr neutrons. No spectral information was obtained at this power level.

At a reactor power level of 50 watts, the dose rates measured in the Radiography Stand were 55 millirem/hr gamma and 249 millirem/hr neutrons. A gamma spectrum was obtained. A clock count time of 877.74 seconds was made with an 11.98% dead time. This resulted in a live time count of 772.60 seconds. This Detective EX-100 is equipped with a neutron detector and the neutron count rate was 398.04 counts per second, which reported the following radionuclides: Neutrons CR + Neutrons on Hydrogen + Neutrons on Fe + Be-7 + Co-57 (shielded) + Ba-133.

The spectrum was subsequently analyzed and Be-7, Co-57, and Ba-133 were not present in the spectral information. Figure 40 is a plot of the gamma spectrum. Identified photo peaks include Al-28, H(n,γ), B(n,α)Li, Fe(n,γ), Al(n, γ), and Ge(n,γ).

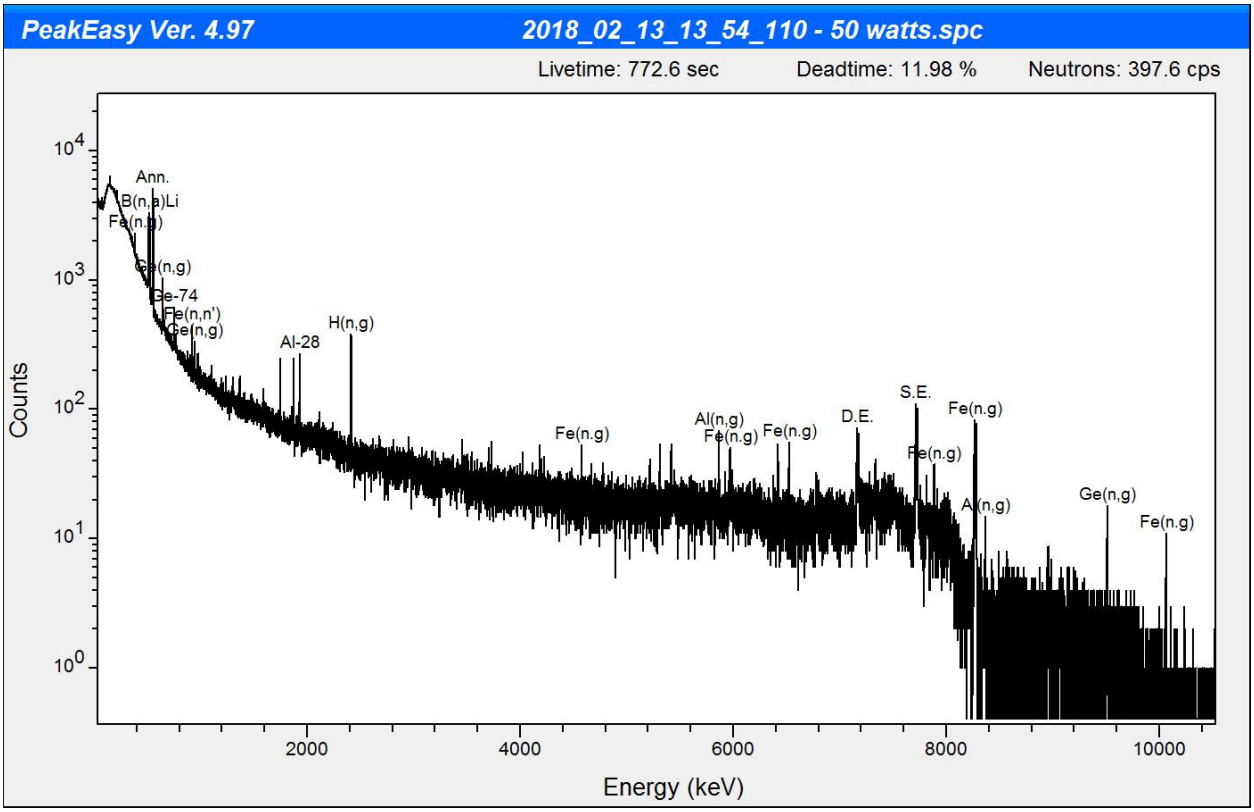


Figure 40. Gamma spectrum of the radiography beam.

At a reactor power level of 80 kilowatts, the dose rates measured in the Radiography Stand were 56,000 millirem/hr gamma and 72,000 millirem/hr neutrons. The REM-500B was used to collect multichannel analyzer data of the linear energy transfer due to neutron radiations in the radiography beam. A count of 180 seconds was made, which resulted in an integrated absorbed dose of 204.38 millirad neutrons. Figure 41 is a plot of the neutron multichannel analyzer data.

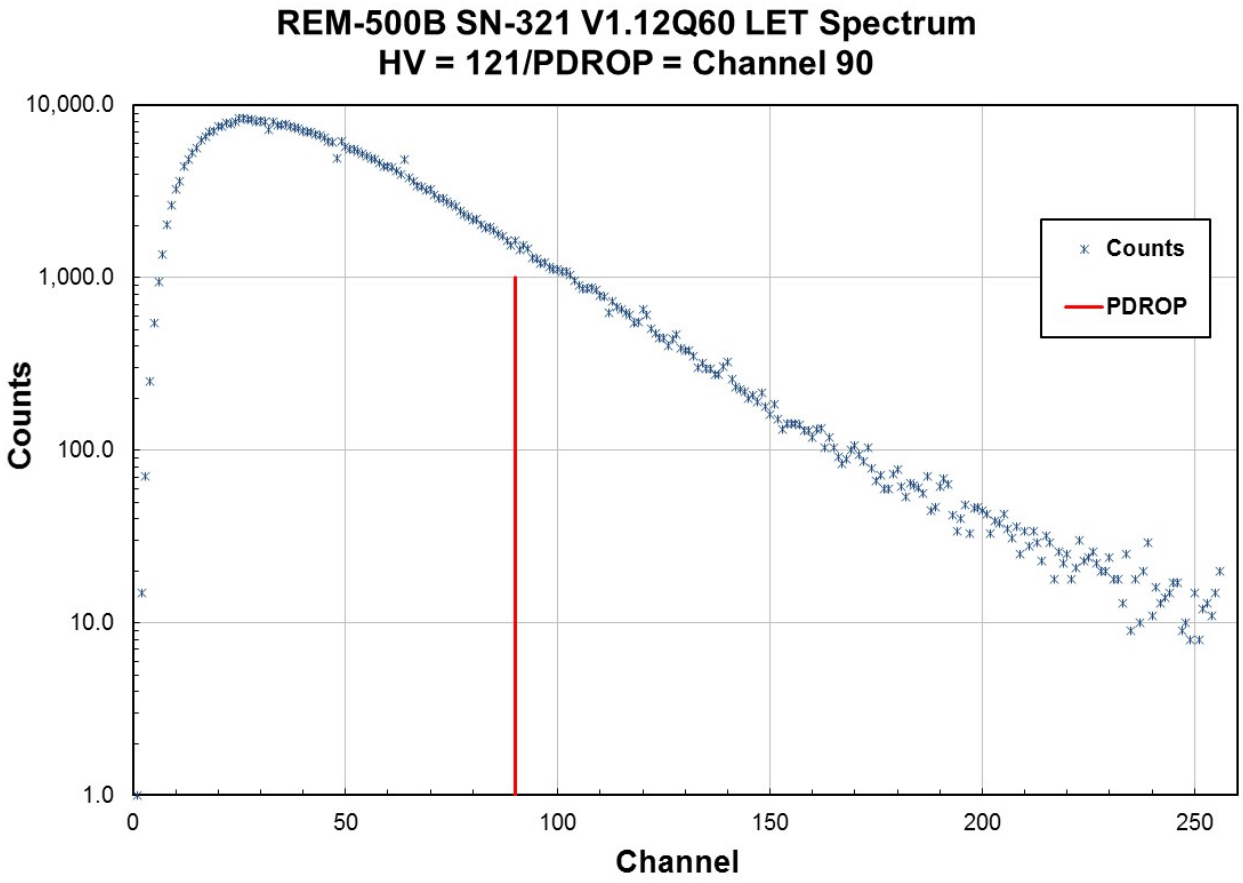


Figure 41. Neutron LET Spectrum of radiography beam.

3.5 TREAT Sub-Pile Room Radiation Investigation

The TREAT Reactor Sub-Pile room is a radiation area after reactor operations, but usually the levels are returned to normal after an overnight decay period. TREAT Operations requested a determination of the activation products that are responsible for the radiation in the Sub-Pile Room.

On February 13, 2018, the TREAT Reactor was operated at a power level of 80 kilowatts for a short period of time (< 30 minutes) to allow measurement of the radiation levels with the radiography shutter open and on the top of the reactor with the center shield plug from the rotating shield removed. This short reactor run was utilized to obtain a gamma spectrum of the photons from the Sub-Pile Room after the reactor was shut down. Figure 42 shows the positioning of the high purity germanium detector that was used to obtain the spectrum outside the Sub-Pile Room door in the basement auxiliary room.

A count for a clock time of 724.64 seconds (i.e., dead time percentage was 18.94% for a live time of 589.76 seconds) was made with an ORTEC High Purity Germanium Detector, Model Detective EX-100, Identification No. 4045. The ORTEC Detective identified the radiation as emanating from manganese-56 (Mn-56). The spectrum was analyzed to verify the results and to determine if any less significant radionuclides could be identified. As a result of the analysis, several background NORMs were identified, but no other man-made activation products were noted. The gamma spectrum is provided in Figure 43.

Figure 42. Detector location within the basement auxiliary room.

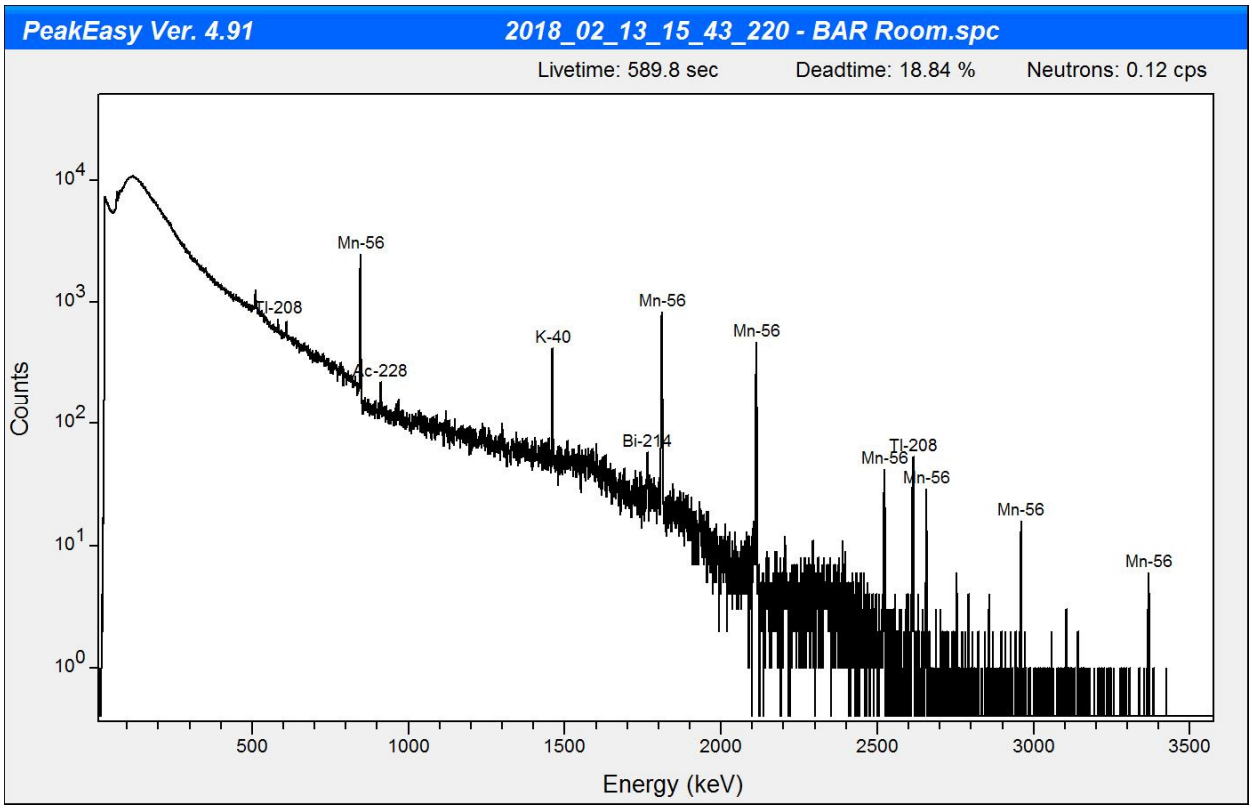


Figure 43. Gamma ray spectrum in the Sub-Pile Room.

Manganese-56 is a relatively short-lived activation product (e.g., the half-life is 2.5789 hours) that most likely is being generated from the only stable isotope of manganese, which is Mn-55. The interaction is:

Mn-55 (n, γ) Mn-56.

4. DOSE SUMMARY

Radiological surveys were conducted by qualified health physics technicians with the support of TREAT Operations personnel. Most of the surveys were conducted in background or low dose level areas. Surveys conducted during and post reactor operations did result in a dose to the survey personnel and those that were supporting the surveys. Table 4 provides a listing of the electronic dosimeter doses measured for the radiological surveys where a dose was received. The total dose received for the surveys was 278.5 millirem.

Table 4. Survey Dose Summary.

Date	Event	Personnel Involved	Total Dose (millirem)
11/14/2017	Initial Reactor Criticality Survey	13	3.0
11/16/2017	Initial Reactor Steady State (80 kilowatts)	11	63.9
11/28/2017	Reactor Steady State (80 kilowatts) Extensive Survey	13	141.3
1/30/2018	Post Transient Extensive Survey	12	2.8
2/13/2018	Radiography Extensive Survey	20	67.5
		Total Dose:	**278.5**

Appendix A —
TREAT Pre-Start Radiation Survey Maps

VSDS Standard Map Survey Report

Survey M-20171010-25

General Information

Title:	BOFTREAT Start-up Bar/ subpile		
Survey Date/Time:	10/10/2017 10:24	Lead Surveyor:	Bryan King
Survey Type:	Other - Start-up Radiation	Work Order/Task #:	PLN-5350
Counted By:		KCN:	54625
RWP and Task#:	N/A		
Status:	Approved by: Blaine Case, 11/15/2017 14:31:55		KCN: 54562
	Ready for Review by: Bryan King, 11/7/2017 15:32:00		KCN: 54625

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

RBA=Radiological Buffer Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency		
				β/γ	β	α
1	TelePole 2	854459	D	N/A	N/A	N/A
2	E-600 w/Remball	802087	D	N/A	N/A	N/A
3	B20-ER	803201	D	N/A	N/A	N/A

Instruments Used - Notes

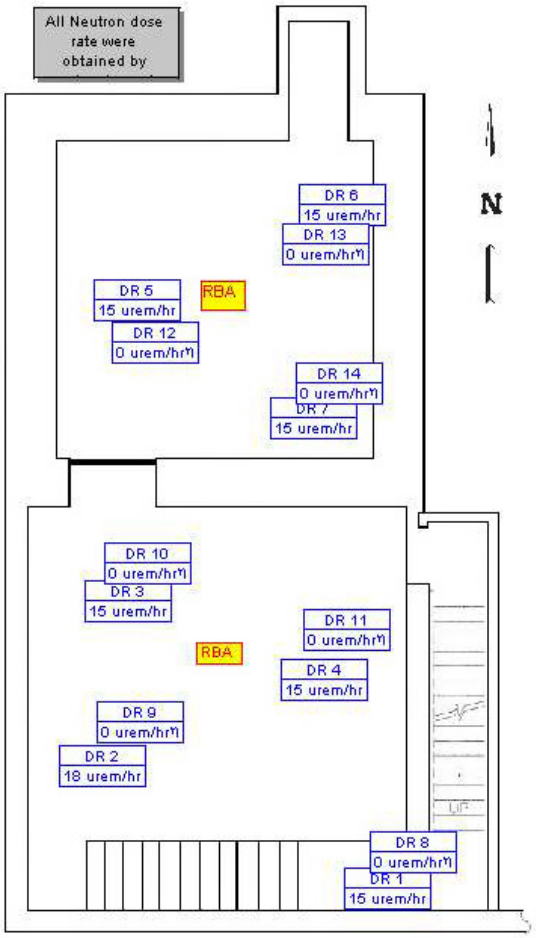
#	Notes
1	N/A
2	N/A
3	N/A

Log #: 348830
Notes:: N/A - 0 pages
Survey #: M-20171010-25 - Printed On: 12/11/2017 13:41

Page 1 of 5

VSDS Standard Map Survey Report

Map: 1	TREAT SUB-PILE ROOM	Survey #: M-20171010-25	Date/Time: 10/10/2017 10:24



Comments:

Summary of Highest Readings (All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start-up Radiation

RWP and Task#: N/A

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area
HS-50 Hot Spot
RCA Posting
Drip Bag
15 Smear 15 Air Sample 15 Direct 15 Wipe

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Blaine Case, 11/15/2017 14:31:55
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 348830

Image File: BOF\TREAT\TREAT Sub-Pile Room

Notes: N/A - 0 pages

Survey #: M-20171010-25 - Printed On: 12/11/2017 13:41

Page 2 of 5

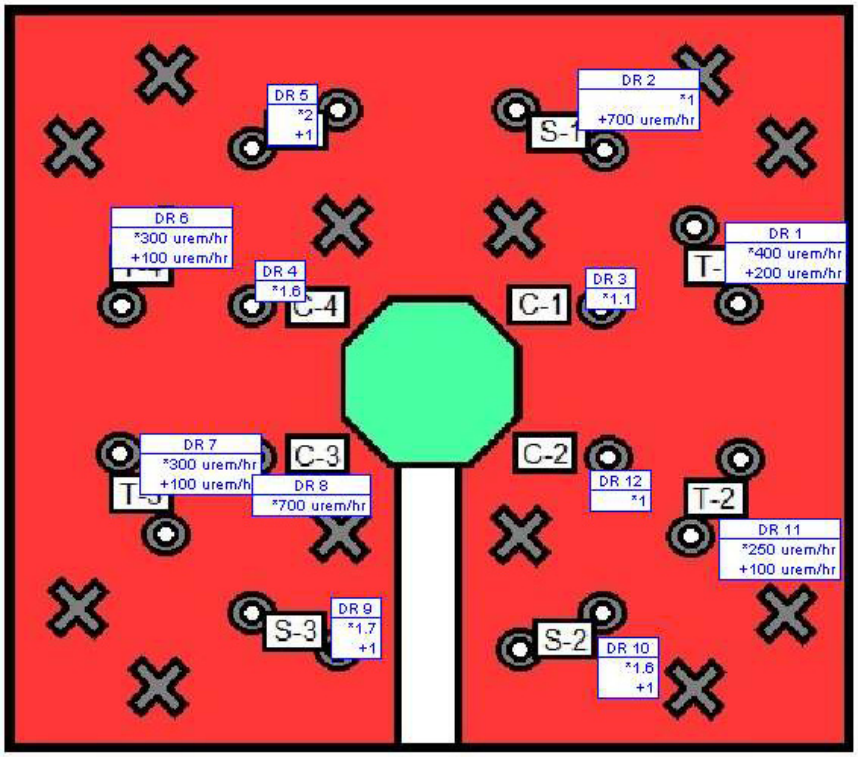
VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171010-25
Map: 1 - TREAT SUB-PILE ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	3	15	urem/hr		
2	DR γ	3	18	urem/hr		
3	DR γ	3	15	urem/hr		
4	DR γ	3	15	urem/hr		
5	DR γ	3	15	urem/hr		
6	DR γ	3	15	urem/hr		
7	DR γ	3	15	urem/hr		
8	DR Neutron	2	0 η	urem/hr		
9	DR Neutron	2	0 η	urem/hr		
10	DR Neutron	2	0 η	urem/hr		
11	DR Neutron	2	0 η	urem/hr		
12	DR Neutron	2	0 η	urem/hr		
13	DR Neutron	2	0 η	urem/hr		
14	DR Neutron	2	0 η	urem/hr		
	Note					All Neutron dose rate were obtained by performing a 1 minute static count.
	Posting		RBA			
	Posting		RBA			

VSDS Standard Map Survey Report

Map: 2	TREAT CONTROL ROD FOLLOWERS	Survey #: M-20171010-25	Date/Time: 10/10/2017 10:24



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start-up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: N/A

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Blaine Case, 11/15/2017 14:31:55
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 348830
Image File: BOF\TREAT\TREAT Control Rod Followers
Notes: N/A - 0 pages
Survey #: M-20171010-25 - Printed On: 12/11/2017 13:41
Page 4 of 5

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171010-25

Map: 2 - TREAT SUB-PILE ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	* 400	urem/hr	T-1	
		1	+ 200	urem/hr		
2	DR γ	1	* 1	mrem/hr	S-1	
		1	+ 700	urem/hr		
3	DR γ	1	* 1.1	mrem/hr	C-1	
4	DR γ	1	* 1.6	mrem/hr	C-4	
5	DR γ	1	* 2	mrem/hr	S-4	
		1	+ 1	mrem/hr		
6	DR γ	1	* 300	urem/hr	T-4	
		1	+ 100	urem/hr		
7	DR γ	1	* 300	urem/hr	T-3	
		1	+ 100	urem/hr		
8	DR γ	1	* 700	urem/hr	C-3	
9	DR γ	1	* 1.7	mrem/hr	S-3	
		1	+ 1	mrem/hr		
10	DR γ	1	* 1.6	mrem/hr	S-2	
		1	+ 1	mrem/hr		
11	DR γ	1	* 250	urem/hr	T-2	
		1	+ 100	urem/hr		
12	DR γ	1	* 1	mrem/hr	C-2	

Log #: 348830

Image File: BOF\TREAT\TREAT Control Rod Followers

Notes:: N/A - 0 pages

Survey #: M-20171010-25 - Printed On: 12/11/2017 13:41

Page 5 of 5

VSDS Standard Map Survey Report

Survey M-20171012-29

General Information

Title: BOFTREAT Start-up Mezzanine/ High bay

Survey Date/Time: 10/12/2017 11:27
Lead Surveyor: Bryan King

Survey Type: Other - Start up Radiation
Work Order/Task #: PLN-5350

Counted By:
KCN: 54625

RWP and Task#: N/A

Status: Approved by: Blaine Case, 11/15/2017 14:33:53
KCN: 54562

Ready for Review by: Bryan King, 11/7/2017 15:31:07
KCN: 54625

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

RBA=Radiological Buffer Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency		
				β/γ	β	α
1	B20-ER	803201	D	N/A	N/A	N/A
2	E-600 w/Remball	802087	D	N/A	N/A	N/A

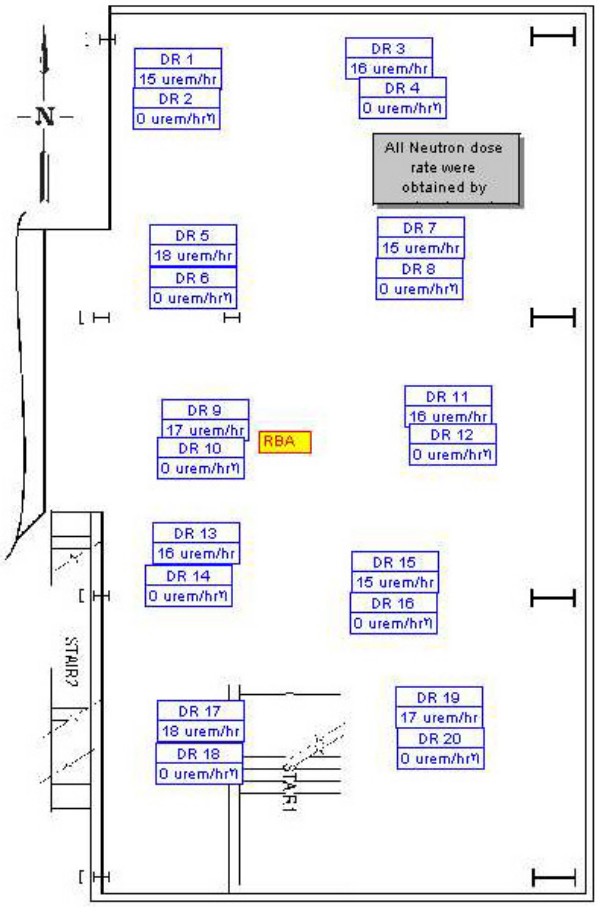
Instruments Used - Notes

#	Notes
1	N/A
2	N/A

Log #: 348830
Notes:: N/A - 0 pages
Survey #: M-20171012-29 - Printed On: 12/11/2017 09:05

VSDS Standard Map Survey Report

Map: 1	TREAT FLOOR PLAN SECOND FLOOR	Survey #: M-20171012-29	Date/Time: 10/12/2017 11:27



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

RWP and Task #: N/A

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Blaine Case, 11/15/2017 14:33:53
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 348830
Image File: BOF\TREAT\TREAT Floor Plan Second Floor
Notes: N/A - 0 pages
Survey #: M-20171012-29 - Printed On: 12/11/2017 09:05
Page 2 of 5

VSDS Standard Map Survey Report

Data Point Details

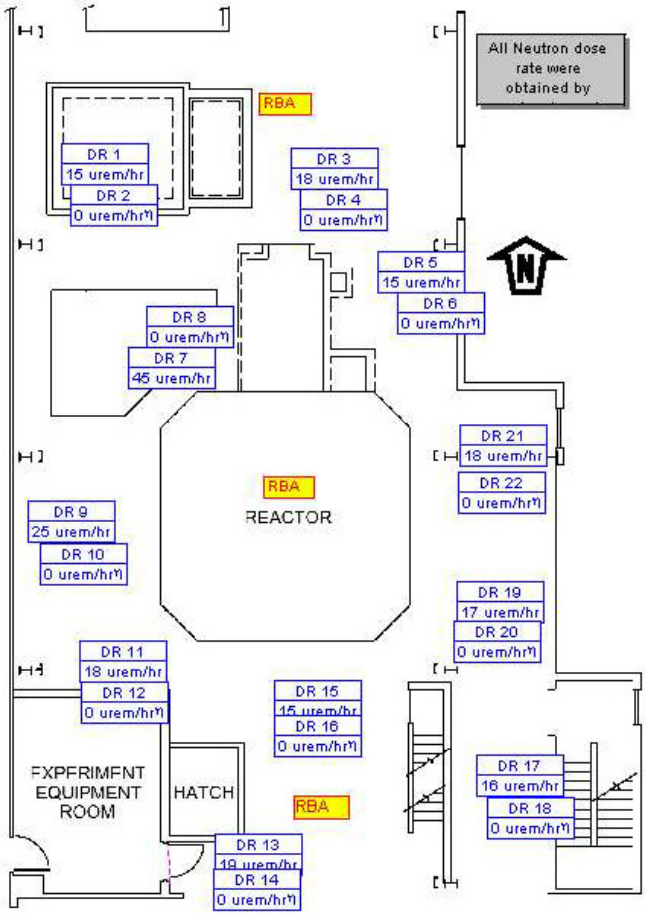
Survey #: M-20171012-29

Map: 1 - TREAT FLOOR PLAN SECOND FLOOR

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	15	urem/hr		
2	DR Neutron	2	0 η	urem/hr		
3	DR γ	1	16	urem/hr		
4	DR Neutron	2	0 η	urem/hr		
5	DR γ	1	18	urem/hr		
6	DR Neutron	2	0 η	urem/hr		
7	DR γ	1	15	urem/hr		
8	DR Neutron	2	0 η	urem/hr		
9	DR γ	1	17	urem/hr		
10	DR Neutron	2	0 η	urem/hr		
11	DR γ	1	16	urem/hr		
12	DR Neutron	2	0 η	urem/hr		
13	DR γ	1	16	urem/hr		
14	DR Neutron	2	0 η	urem/hr		
15	DR γ	1	15	urem/hr		
16	DR Neutron	2	0 η	urem/hr		
17	DR γ	1	18	urem/hr		
18	DR Neutron	2	0 η	urem/hr		
19	DR γ	1	17	urem/hr		
20	DR Neutron	2	0 η	urem/hr		
	Note					All Neutron dose rate were obtained by performing a 1 minute static count.
	Posting		RBA			

VSDS Standard Map Survey Report

Map: 2	TREAT FLOOR AROUND REACTOR	Survey #: M-20171012-29	Date/Time: 10/12/2017 11:27



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: N/A

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Blaine Case, 11/15/2017 14:33:53
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 348830
Image File: BOF\TREAT\TREAT Floor Around Reactor Survey Map
Notes: N/A - 0 pages
Survey #: M-20171012-29 - Printed On: 12/11/2017 09:05
Page 4 of 5

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171012-29

Map: 2 - TREAT FLOOR PLAN SECOND FLOOR

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	15	urem/hr		
2	DR Neutron	2	0 η	urem/hr		
3	DR γ	1	18	urem/hr		
4	DR Neutron	2	0 η	urem/hr		
5	DR γ	1	15	urem/hr		
6	DR Neutron	2	0 η	urem/hr		
7	DR γ	1	45	urem/hr		
8	DR Neutron	2	0 η	urem/hr		
9	DR γ	1	25	urem/hr		
10	DR Neutron	2	0 η	urem/hr		
11	DR γ	1	18	urem/hr		
12	DR Neutron	2	0 η	urem/hr		
13	DR γ	1	19	urem/hr		
14	DR Neutron	2	0 η	urem/hr		
15	DR γ	1	15	urem/hr		
16	DR Neutron	2	0 η	urem/hr		
17	DR γ	1	16	urem/hr		
18	DR Neutron	2	0 η	urem/hr		
19	DR γ	1	17	urem/hr		
20	DR Neutron	2	0 η	urem/hr		
21	DR γ	1	18	urem/hr		
22	DR Neutron	2	0 η	urem/hr		
	Note					All Neutron dose rate were obtained by performing a 1 minute static count.
	Posting		RBA			
	Posting		RBA			
	Posting		RBA			

Log #: 348830
Notes:: N/A - 0 pages
Survey #: M-20171012-29 - Printed On: 12/11/2017 09:05

Image File: BOF\TREAT\TREAT Floor Around Reactor Survey Map

VSDS Standard Map Survey Report

Survey M-20171012-31

General Information

Title: BOFTREAT RX Grid survey

Survey Date/Time: 10/12/2017 11:29 — Lead Surveyor: Bryan King

Survey Type: Other - Start up Radiation — Work Order/Task #: PLN-5350

Counted By: — KCN: 54625

RWP and Task#: N/A

Status: Approved by: Blaine Case, 11/15/2017 14:37:06 — KCN: 54562

Ready for Review by: Bryan King, 11/7/2017 15:30:33 — KCN: 54625

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

RBA=Radiological Buffer Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency		
				β/γ	β	α
1	B20-ER	803201	D	N/A	N/A	N/A
2	E-600 w/Remball	802087	D	N/A	N/A	N/A
3	TelePole 2	854459	D	N/A	N/A	N/A

Instruments Used - Notes

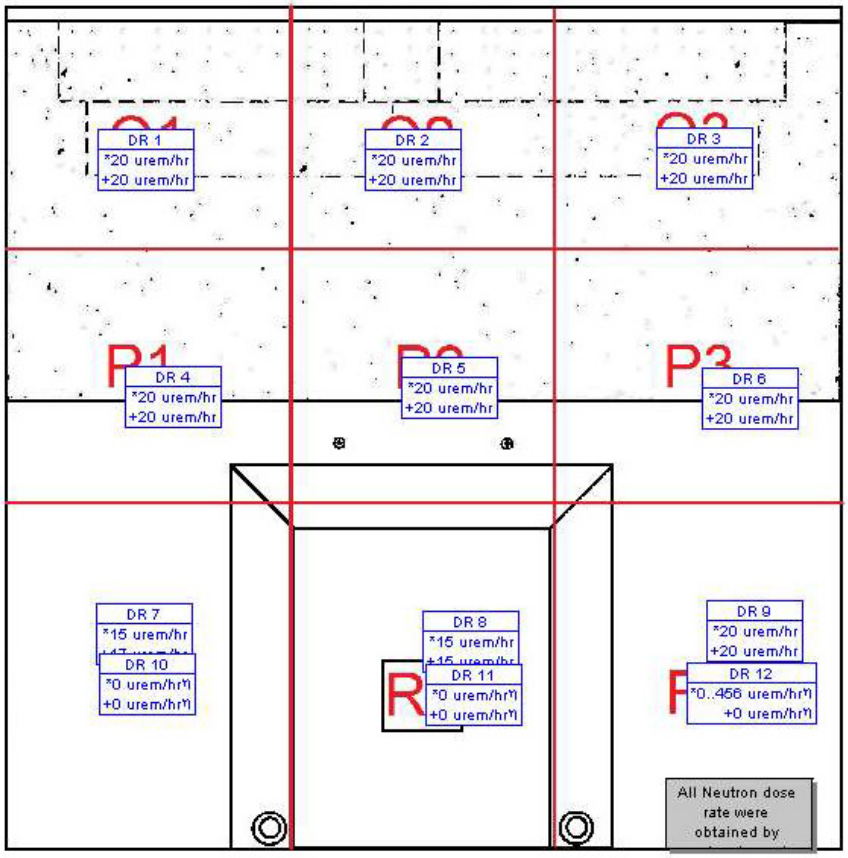
#	Notes
1	N/A
2	N/A
3	N/A

Log #: 348830

Notes:: N/A - 0 pages

VSDS Standard Map Survey Report

Map: 1	TREAT EAST REACTOR FACE SURVEY GRID	Survey #: M-20171012-31	Date/Time: 10/12/2017 11:29



REACTOR EAST FACE

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task#: N/A

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Blaine Case, 11/15/2017 14:37:06
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 348830
Image File: BOF\TREAT\Reactor Grid Surveys\East Reactor Face Survey Grid
Notes: N/A - 0 pages
Survey #: M-20171012-31 - Printed On: 12/11/2017 09:08
Page 2 of 13

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171012-31
Map: 1 - TREAT EAST REACTOR FACE SURVEY GRID

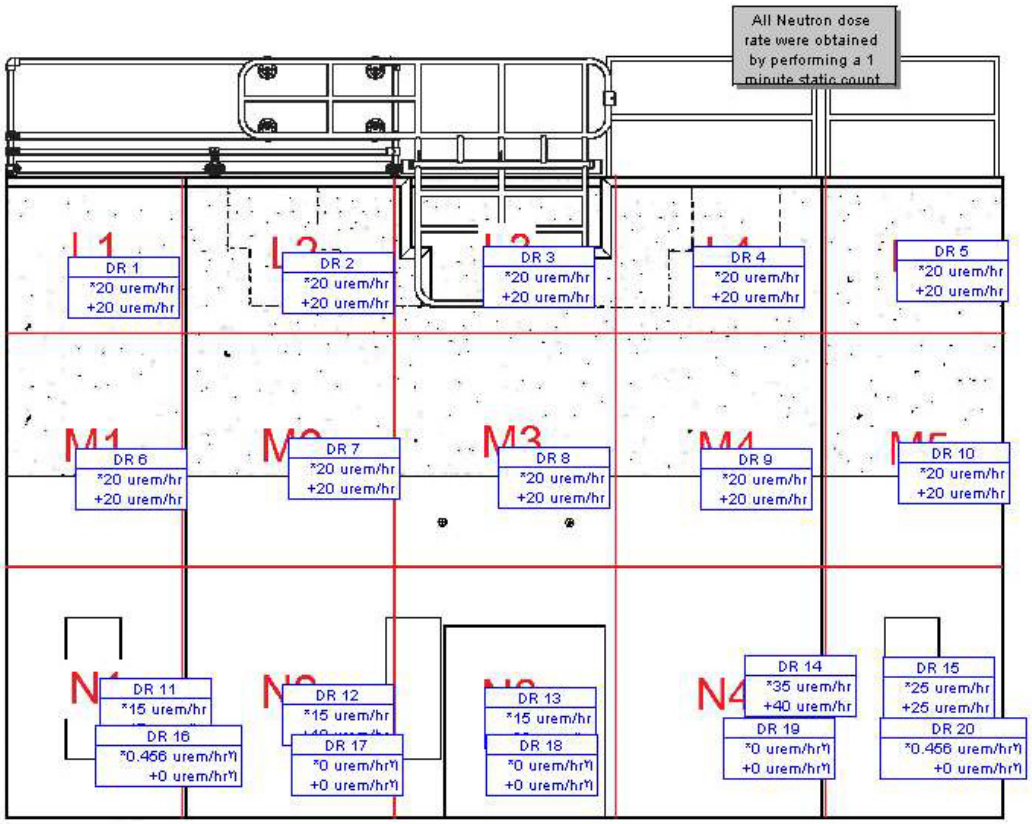
#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	3	* 20	urem/hr	O1	
		3	+ 20	urem/hr		
2	DR γ	3	* 20	urem/hr	O2	
		3	+ 20	urem/hr		
3	DR γ	3	* 20	urem/hr	O3	
		3	+ 20	urem/hr		
4	DR γ	3	* 20	urem/hr	P1	
		3	+ 20	urem/hr		
5	DR γ	3	* 20	urem/hr	P2	
		3	+ 20	urem/hr		
6	DR γ	3	* 20	urem/hr	P3	
		3	+ 20	urem/hr		
7	DR γ	1	* 15	urem/hr	R1	
		1	+ 17	urem/hr		
8	DR γ	1	* 15	urem/hr	R2	
		1	+ 15	urem/hr		
9	DR γ	1	* 20	urem/hr	R3	
		1	+ 20	urem/hr		
10	DR Neutron	2	* 0 η	urem/hr	R1	
		2	+ 0 η	urem/hr		
11	DR Neutron	2	* 0 η	urem/hr	R2	
		2	+ 0 η	urem/hr		
12	DR Neutron	2	* 0..456 η	urem/hr	R3	
		2	+ 0 η	urem/hr		
	Note					All Neutron dose rate were obtained by performing a 1 minute static count.

Log #: 348830
Notes:: N/A - 0 pages
Survey #: M-20171012-31 - Printed On: 12/11/2017 09:08

Image File: BOF\TREAT\Reactor Grid Surveys\East Reactor Face Survey Grid

VSDS Standard Map Survey Report

Map: 2	TREAT NORTH REACTOR FACE SURVEY GRID	Survey #: M-20171012-31	Date/Time: 10/12/2017 11:29



REACTOR NORTH FACE

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+ 75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: N/A

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Blaine Case, 11/15/2017 14:37:06
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 348830
Image File: BOF\TREAT\Reactor Grid Surveys\North Reactor Face Survey Grid
Notes: N/A - 0 pages
Survey #: M-20171012-31 - Printed On: 12/11/2017 09:08
Page 4 of 13

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171012-31

Map: 2 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	3	* 20	urem/hr	L1	
		3	+ 20	urem/hr		
2	DR γ	3	* 20	urem/hr	L2	
		3	+ 20	urem/hr		
3	DR γ	3	* 20	urem/hr	L3	
		3	+ 20	urem/hr		
4	DR γ	3	* 20	urem/hr	L4	
		3	+ 20	urem/hr		
5	DR γ	3	* 20	urem/hr	L5	
		3	+ 20	urem/hr		
6	DR γ	3	* 20	urem/hr	M1	
		3	+ 20	urem/hr		
7	DR γ	3	* 20	urem/hr	M2	
		3	+ 20	urem/hr		
8	DR γ	3	* 20	urem/hr	M3	
		3	+ 20	urem/hr		
9	DR γ	3	* 20	urem/hr	M4	
		3	+ 20	urem/hr		
10	DR γ	3	* 20	urem/hr	M5	
		3	+ 20	urem/hr		
11	DR γ	1	* 15	urem/hr	N1	
		1	+ 17	urem/hr		
12	DR γ	1	* 15	urem/hr	N2	
		1	+ 18	urem/hr		
13	DR γ	1	* 15	urem/hr	N3	
		1	+ 20	urem/hr		
14	DR γ	1	* 35	urem/hr	N4	
		1	+ 40	urem/hr		
15	DR γ	1	* 25	urem/hr	N5	
		1	+ 25	urem/hr		
16	DR Neutron	2	* 0.456 η	urem/hr	N1	
		2	+ 0 η	urem/hr		
17	DR Neutron	2	* 0 η	urem/hr	N2	
		2	+ 0 η	urem/hr		
18	DR Neutron	2	* 0 η	urem/hr	N3	
		2	+ 0 η	urem/hr		
19	DR Neutron	2	* 0 η	urem/hr	N4	
		2	+ 0 η	urem/hr		
20	DR Neutron	2	* 0.456 η	urem/hr	N5	
		2	+ 0 η	urem/hr		
	Note					All Neutron dose rate were obtained by performing a 1 minute static count.

Log #: 348830

Image File: BOF\TREAT\Reactor Grid Surveys\North Reactor Face Survey Grid

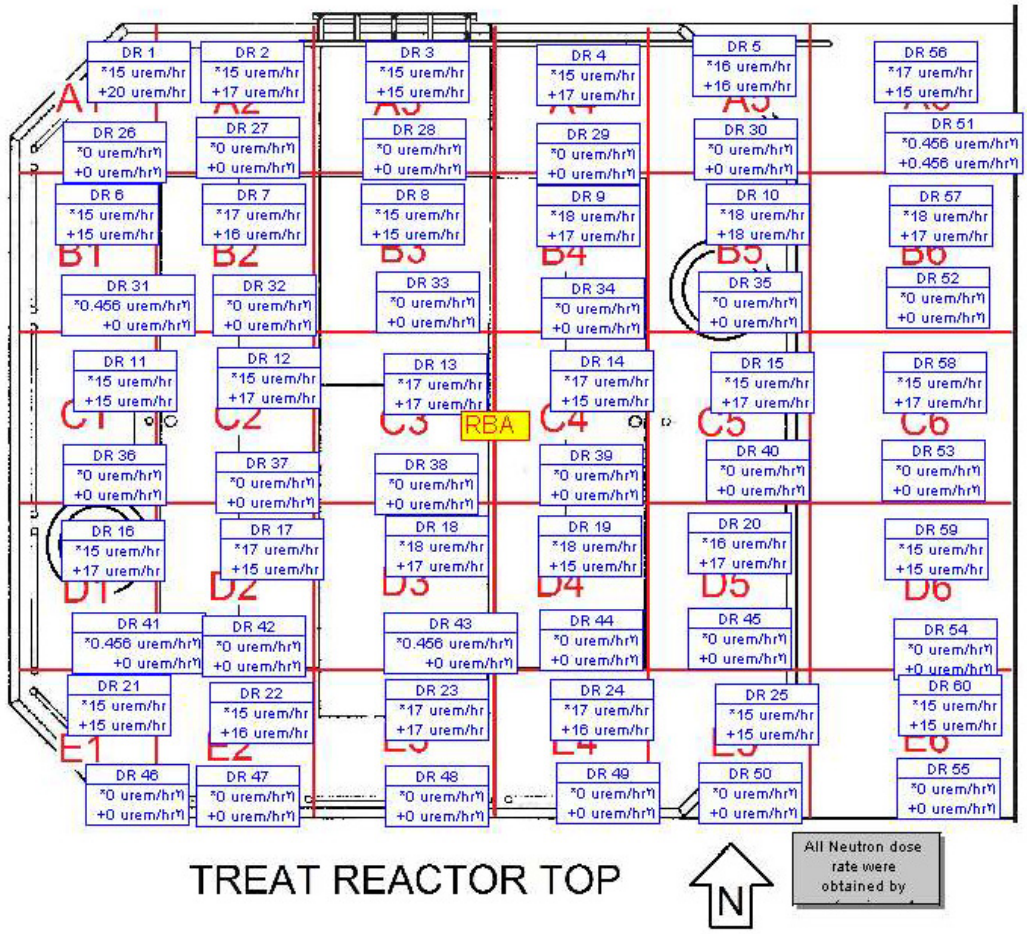
Notes:: N/A - 0 pages

Survey #: M-20171012-31 - Printed On: 12/11/2017 09:08

Page 5 of 13

VSDS Standard Map Survey Report

Map: 3	TREAT REACTOR TOP SURVEY GRID	Survey #: M-20171012-31	Date/Time: 10/12/2017 11:29



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

RWP and Task #: N/A

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Blaine Case, 11/15/2017 14:37:06
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 348830
Image File: BOF\TREAT\Reactor Grid Surveys\Reactor Top Grid Survey Improved
Notes: N/A - 0 pages
Survey #: M-20171012-31 - Printed On: 12/11/2017 09:08
Page 6 of 13

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171012-31

Map: 3 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	* 15	urem/hr	A1	
		1	+ 20	urem/hr		
2	DR γ	1	* 15	urem/hr	A2	
		1	+ 17	urem/hr		
3	DR γ	1	* 15	urem/hr	A3	
		1	+ 15	urem/hr		
4	DR γ	1	* 15	urem/hr	A4	
		1	+ 17	urem/hr		
5	DR γ	1	* 16	urem/hr	A5	
		1	+ 16	urem/hr		
6	DR γ	1	* 15	urem/hr	B1	
		1	+ 15	urem/hr		
7	DR γ	1	* 17	urem/hr	B2	
		1	+ 16	urem/hr		
8	DR γ	1	* 15	urem/hr	B3	
		1	+ 15	urem/hr		
9	DR γ	1	* 18	urem/hr	B4	
		1	+ 17	urem/hr		
10	DR γ	1	* 18	urem/hr	B5	
		1	+ 18	urem/hr		
11	DR γ	1	* 15	urem/hr	C1	
		1	+ 15	urem/hr		
12	DR γ	1	* 15	urem/hr	C2	
		1	+ 17	urem/hr		
13	DR γ	1	* 17	urem/hr	C3	
		1	+ 17	urem/hr		
14	DR γ	1	* 17	urem/hr	C4	
		1	+ 15	urem/hr		
15	DR γ	1	* 15	urem/hr	C5	
		1	+ 17	urem/hr		
16	DR γ	1	* 15	urem/hr	D1	
		1	+ 17	urem/hr		
17	DR γ	1	* 17	urem/hr	D2	
		1	+ 15	urem/hr		
18	DR γ	1	* 18	urem/hr	D3	
		1	+ 17	urem/hr		
19	DR γ	1	* 18	urem/hr	D4	
		1	+ 15	urem/hr		
20	DR γ	1	* 16	urem/hr	D5	
		1	+ 17	urem/hr		
21	DR γ	1	* 15	urem/hr	E1	
		1	+ 15	urem/hr		
22	DR γ	1	* 15	urem/hr	E2	
		1	+ 16	urem/hr		
23	DR γ	1	* 17	urem/hr	E3	
		1	+ 17	urem/hr		
24	DR γ	1	* 17	urem/hr	E4	
		1	+ 16	urem/hr		
25	DR γ	1	* 15	urem/hr	E5	
		1	+ 15	urem/hr		

Log #: 348830 Image File: BOF\TREAT\Reactor Grid Surveys\Reactor Top Grid Survey Improved

Notes:: N/A - 0 pages

Survey #: M-20171012-31 - Printed On: 12/11/2017 09:08 Page 7 of 13

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171012-31

Map: 3 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
26	DR Neutron	2	* 0 η	urem/hr	A1	
		2	+ 0 η	urem/hr		
27	DR Neutron	2	* 0 η	urem/hr	A2	
		2	+ 0 η	urem/hr		
28	DR Neutron	2	* 0 η	urem/hr	A3	
		2	+ 0 η	urem/hr		
29	DR Neutron	2	* 0 η	urem/hr	A4	
		2	+ 0 η	urem/hr		
30	DR Neutron	2	* 0 η	urem/hr	A5	
		2	+ 0 η	urem/hr		
31	DR Neutron	2	* 0.456 η	urem/hr	B1	
		2	+ 0 η	urem/hr		
32	DR Neutron	2	* 0 η	urem/hr	B2	
		2	+ 0 η	urem/hr		
33	DR Neutron	2	* 0 η	urem/hr	B3	
		2	+ 0 η	urem/hr		
34	DR Neutron	2	* 0 η	urem/hr	B4	
		2	+ 0 η	urem/hr		
35	DR Neutron	2	* 0 η	urem/hr	B5	
		2	+ 0 η	urem/hr		
36	DR Neutron	2	* 0 η	urem/hr	C1	
		2	+ 0 η	urem/hr		
37	DR Neutron	2	* 0 η	urem/hr	C2	
		2	+ 0 η	urem/hr		
38	DR Neutron	2	* 0 η	urem/hr	C3	
		2	+ 0 η	urem/hr		
39	DR Neutron	2	* 0 η	urem/hr	C4	
		2	+ 0 η	urem/hr		
40	DR Neutron	2	* 0 η	urem/hr	C5	
		2	+ 0 η	urem/hr		
41	DR Neutron	2	* 0.456 η	urem/hr	D1	
		2	+ 0 η	urem/hr		
42	DR Neutron	2	* 0 η	urem/hr	D2	
		2	+ 0 η	urem/hr		
43	DR Neutron	2	* 0.456 η	urem/hr	D3	
		2	+ 0 η	urem/hr		
44	DR Neutron	2	* 0 η	urem/hr	D4	
		2	+ 0 η	urem/hr		
45	DR Neutron	2	* 0 η	urem/hr	D5	
		2	+ 0 η	urem/hr		
46	DR Neutron	2	* 0 η	urem/hr	E1	
		2	+ 0 η	urem/hr		
47	DR Neutron	2	* 0 η	urem/hr	E2	
		2	+ 0 η	urem/hr		
48	DR Neutron	2	* 0 η	urem/hr	E3	
		2	+ 0 η	urem/hr		
49	DR Neutron	2	* 0 η	urem/hr	E4	
		2	+ 0 η	urem/hr		
50	DR Neutron	2	* 0 η	urem/hr	E5	
		2	+ 0 η	urem/hr		

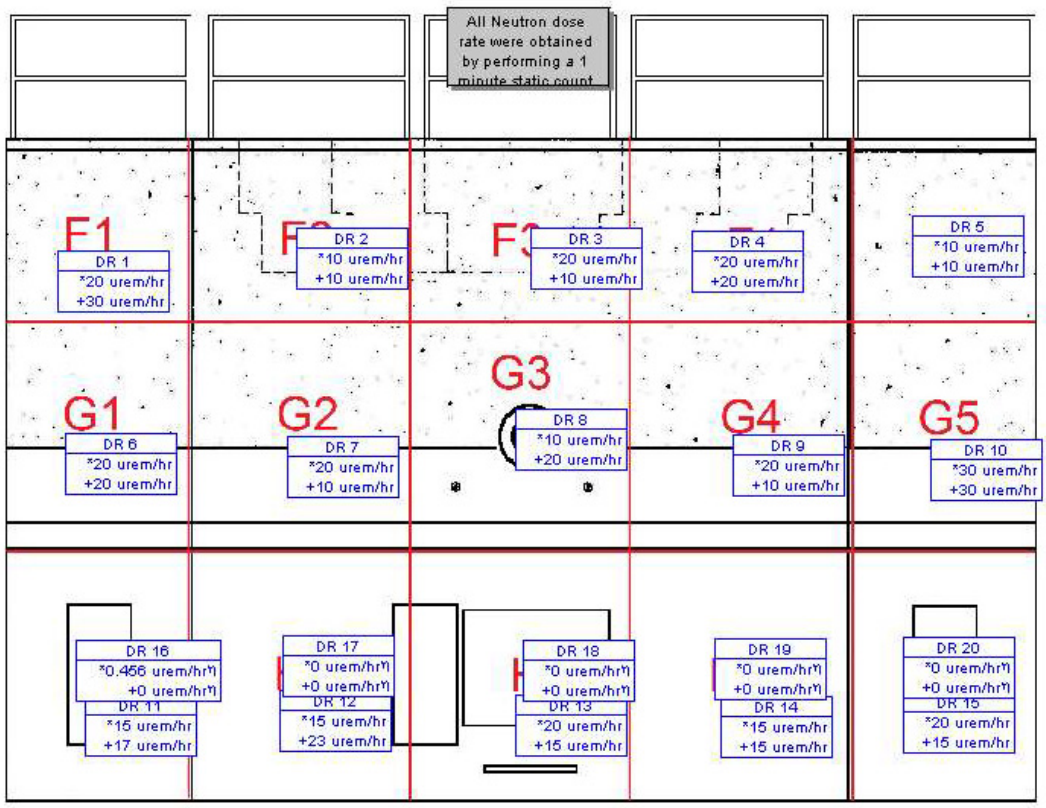
VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171012-31
Map: 3 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
51	DR Neutron	2	* 0.456 η	urem/hr	A6	
		2	+ 0.456 η	urem/hr		
52	DR Neutron	2	* 0 η	urem/hr	B6	
		2	+ 0 η	urem/hr		
53	DR Neutron	2	* 0 η	urem/hr	C6	
		2	+ 0 η	urem/hr		
54	DR Neutron	2	* 0 η	urem/hr	D6	
		2	+ 0 η	urem/hr		
55	DR Neutron	2	* 0 η	urem/hr	E6	
		2	+ 0 η	urem/hr		
56	DR γ	1	* 17	urem/hr	A6	
		1	+ 15	urem/hr		
57	DR γ	1	* 18	urem/hr	B6	
		1	+ 17	urem/hr		
58	DR γ	1	* 15	urem/hr	C6	
		1	+ 17	urem/hr		
59	DR γ	1	* 15	urem/hr	D6	
		1	+ 15	urem/hr		
60	DR γ	1	* 15	urem/hr	E6	
		1	+ 15	urem/hr		
	Note					All Neutron dose rate were obtained by performing a 1 minute static count.
	Posting		RBA			

VSDS Standard Map Survey Report

Map: 4	TREAT SOUTH REACTOR FACE SURVEY GRID	Survey #: M-20171012-31	Date/Time: 10/12/2017 11:29



REACTOR SOUTH FACE

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: N/A

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Blaine Case, 11/15/2017 14:37:06
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 348830
Image File: BOF\TREAT\Reactor Grid Surveys\South Reactor Face Grid Survey
Notes: N/A - 0 pages
Survey #: M-20171012-31 - Printed On: 12/11/2017 09:08
Page 10 of 13

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171012-31

Map: 4 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	3	* 20	urem/hr	F1	
		3	+ 30	urem/hr		
2	DR γ	3	* 10	urem/hr	F2	
		3	+ 10	urem/hr		
3	DR γ	3	* 20	urem/hr	F3	
		3	+ 10	urem/hr		
4	DR γ	3	* 20	urem/hr	F4	
		3	+ 20	urem/hr		
5	DR γ	3	* 10	urem/hr	F5	
		3	+ 10	urem/hr		
6	DR γ	3	* 20	urem/hr	G1	
		3	+ 20	urem/hr		
7	DR γ	3	* 20	urem/hr	G2	
		3	+ 10	urem/hr		
8	DR γ	3	* 10	urem/hr	G3	
		3	+ 20	urem/hr		
9	DR γ	3	* 20	urem/hr	G4	
		3	+ 10	urem/hr		
10	DR γ	1	* 30	urem/hr	G5	
		1	+ 30	urem/hr		
11	DR γ	1	* 15	urem/hr	H1	
		1	+ 17	urem/hr		
12	DR γ	1	* 15	urem/hr	H2	
		1	+ 23	urem/hr		
13	DR γ	1	* 20	urem/hr	H3	
		1	+ 15	urem/hr		
14	DR γ	1	* 15	urem/hr	H4	
		1	+ 15	urem/hr		
15	DR γ	1	* 20	urem/hr	H5	
		1	+ 15	urem/hr		
16	DR Neutron	2	* 0.456 η	urem/hr	H1	
		2	+ 0 η	urem/hr		
17	DR Neutron	2	* 0 η	urem/hr	H2	
		2	+ 0 η	urem/hr		
18	DR Neutron	2	* 0 η	urem/hr	H3	
		2	+ 0 η	urem/hr		
19	DR Neutron	2	* 0 η	urem/hr	H4	
		2	+ 0 η	urem/hr		
20	DR Neutron	2	* 0 η	urem/hr	H5	
		2	+ 0 η	urem/hr		
	Note					All Neutron dose rate were obtained by performing a 1 minute static count.

Log #: 348830

Image File: BOF\TREAT\Reactor Grid Surveys\South Reactor Face Grid Survey

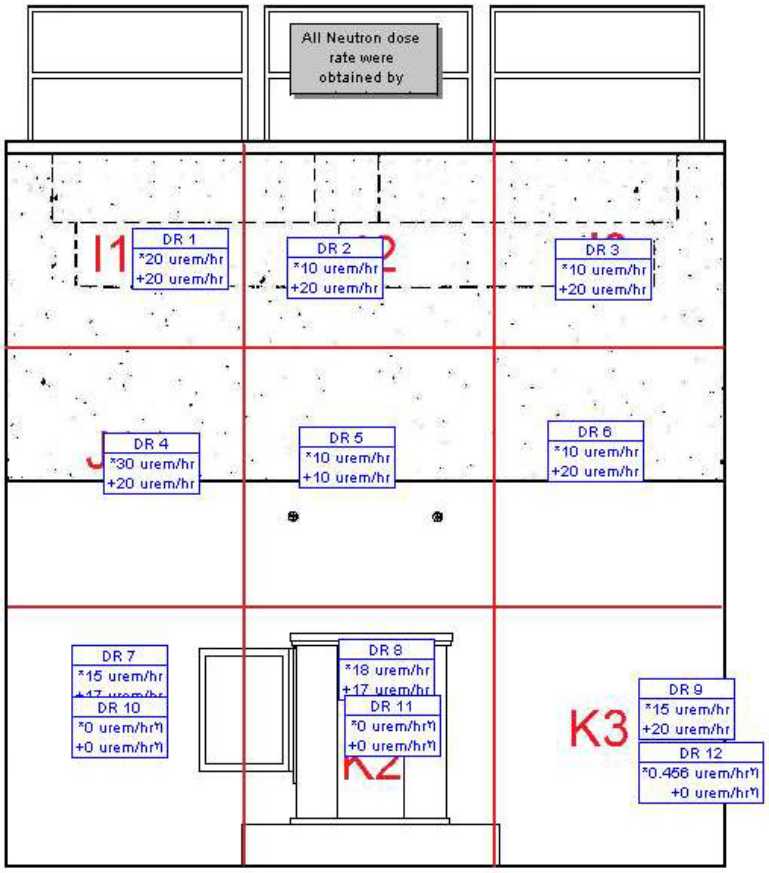
Notes:: N/A - 0 pages

Survey #: M-20171012-31 - Printed On: 12/11/2017 09:08

Page 11 of 13

VSDS Standard Map Survey Report

Map: 5	TREAT WEST REACTOR FACE SURVEY GRID	Survey #: M-20171012-31	Date/Time: 10/12/2017 11:29



REACTOR WEST FACE

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

RWP and Task #: N/A

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+ 75 30 cm Reading
20 General Area
HS-50 Hot Spot
RCA Posting
Drip Bag
15 Smear 15 Air Sample 15 Direct 15 Wipe

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King

Status: Approved by: Blaine Case, 11/15/2017 14:37:06

Location Code: BOF

Bldg/Area Name: TREAT 720

Location Description: TREAT 720

Log #: 348830

Image File: BOF\TREAT\Reactor Grid Surveys\West Reactor Face Survey Grid

Notes: N/A - 0 pages

Survey #: M-20171012-31 - Printed On: 12/11/2017 09:08

Page 12 of 13

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171012-31

Map: 5 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	3	* 20	urem/hr	I1	
		3	+ 20	urem/hr		
2	DR γ	3	* 10	urem/hr	I2	
		3	+ 20	urem/hr		
3	DR γ	3	* 10	urem/hr	I3	
		3	+ 20	urem/hr		
4	DR γ	3	* 30	urem/hr	J1	
		3	+ 20	urem/hr		
5	DR γ	3	* 10	urem/hr	J2	
		3	+ 10	urem/hr		
6	DR γ	3	* 10	urem/hr	J3	
		3	+ 20	urem/hr		
7	DR γ	1	* 15	urem/hr	K1	
		1	+ 17	urem/hr		
8	DR γ	1	* 18	urem/hr	K2	
		1	+ 17	urem/hr		
9	DR γ	1	* 15	urem/hr	K3	
		1	+ 20	urem/hr		
10	DR Neutron	2	* 0 η	urem/hr	K1	
		2	+ 0 η	urem/hr		
11	DR Neutron	2	* 0 η	urem/hr	K2	
		2	+ 0 η	urem/hr		
12	DR Neutron	2	* 0.456 η	urem/hr	K3	
		2	+ 0 η	urem/hr		
	Note					All Neutron dose rate were obtained by performing a 1 minute static count.

Log #: 348830

Image File: BOF\TREAT\Reactor Grid Surveys\West Reactor Face Survey Grid

Notes:: N/A - 0 pages

Survey #: M-20171012-31 - Printed On: 12/11/2017 09:08

Page 13 of 13

VSDS Standard Map Survey Report

Survey M-20171012-32

General Information

Title: BOFTREAT-Startup survey Filtration/ Hodoscope/ Mechanical RM

Survey Date/Time: 10/12/2017 11:31 — Lead Surveyor: Bryan King

Survey Type: Other - Start-up Radiation — Work Order/Task #: PLN-5350

Counted By: — KCN: 54625

RWP and Task#: N/A

Status: Approved by: Blaine Case, 11/15/2017 14:46:42 — KCN: 54562

Ready for Review by: Bryan King, 11/7/2017 15:27:43 — KCN: 54625

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

RBA=Radiological Buffer Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency		
				β/γ	β	α
1	B20-ER	803201	D	N/A	N/A	N/A
2	E-600 w/Remball	802087	D	N/A	N/A	N/A

Instruments Used - Notes

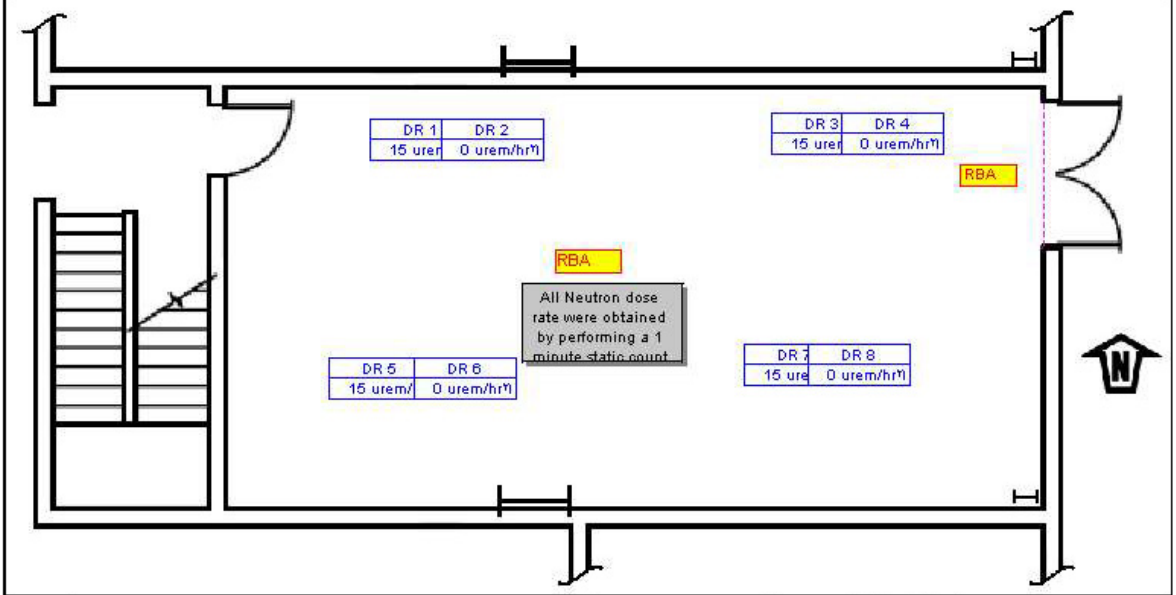
#	Notes
1	N/A
2	N/A

Log #: 348830

Notes:: N/A - 0 pages

VSDS Standard Map Survey Report

Map: 1	TREAT MECHANICAL EQUIPMENT ROOM	Survey #: M-20171012-32	Date/Time: 10/12/2017 11:31



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start-up Radiation

RWP and Task#: N/A

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Blaine Case, 11/15/2017 14:46:42
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 348830
Image File: BOF\TREAT\TREAT Mechanical Equipment Room
Notes: N/A - 0 pages
Survey #: M-20171012-32 - Printed On: 12/11/2017 08:58
Page 2 of 7

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171012-32
Map: 1 - TREAT MECHANICAL EQUIPMENT ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	15	urem/hr		
2	DR Neutron	2	0 η	urem/hr		
3	DR γ	1	15	urem/hr		
4	DR Neutron	2	0 η	urem/hr		
5	DR γ	1	15	urem/hr		
6	DR Neutron	2	0 η	urem/hr		
7	DR γ	1	15	urem/hr		
8	DR Neutron	2	0 η	urem/hr		
	Posting		RBA			
	Posting		RBA			
	Note					All Neutron dose rate were obtained by performing a 1 minute static count.

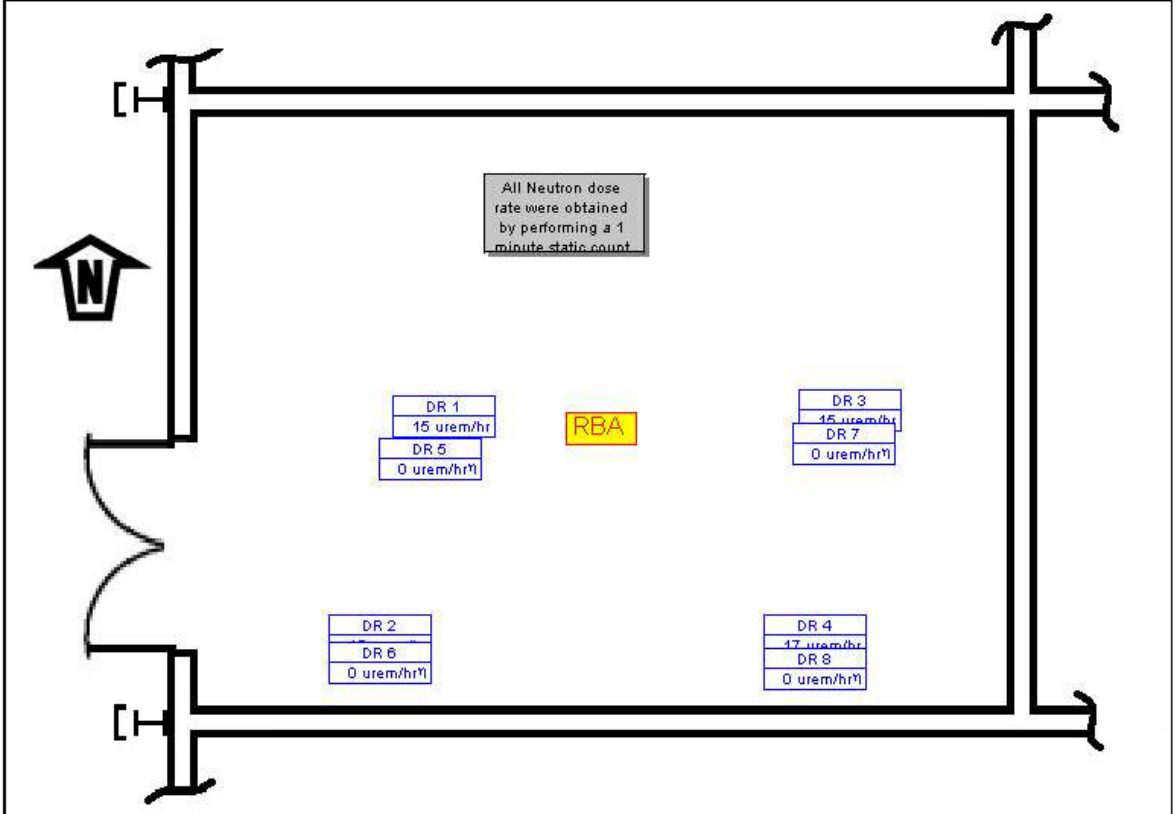
Log #: 348830
Notes:: N/A - 0 pages
Survey #: M-20171012-32 - Printed On: 12/11/2017 08:58

Image File: BOF\TREAT\TREAT Mechanical Equipment Room

Page 3 of 7

VSDS Standard Map Survey Report

Map: 2	TREAT HODOSCOPE ROOM	Survey #: M-20171012-32	Date/Time: 10/12/2017 11:31



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start-up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task#: N/A

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Blaine Case, 11/15/2017 14:46:42
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 348830
Image File: BOF\TREAT\TREAT Hodoscope Room
Notes: N/A - 0 pages
Survey #: M-20171012-32 - Printed On: 12/11/2017 08:58
Page 4 of 7

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171012-32
Map: 2 - TREAT MECHANICAL EQUIPMENT ROOM

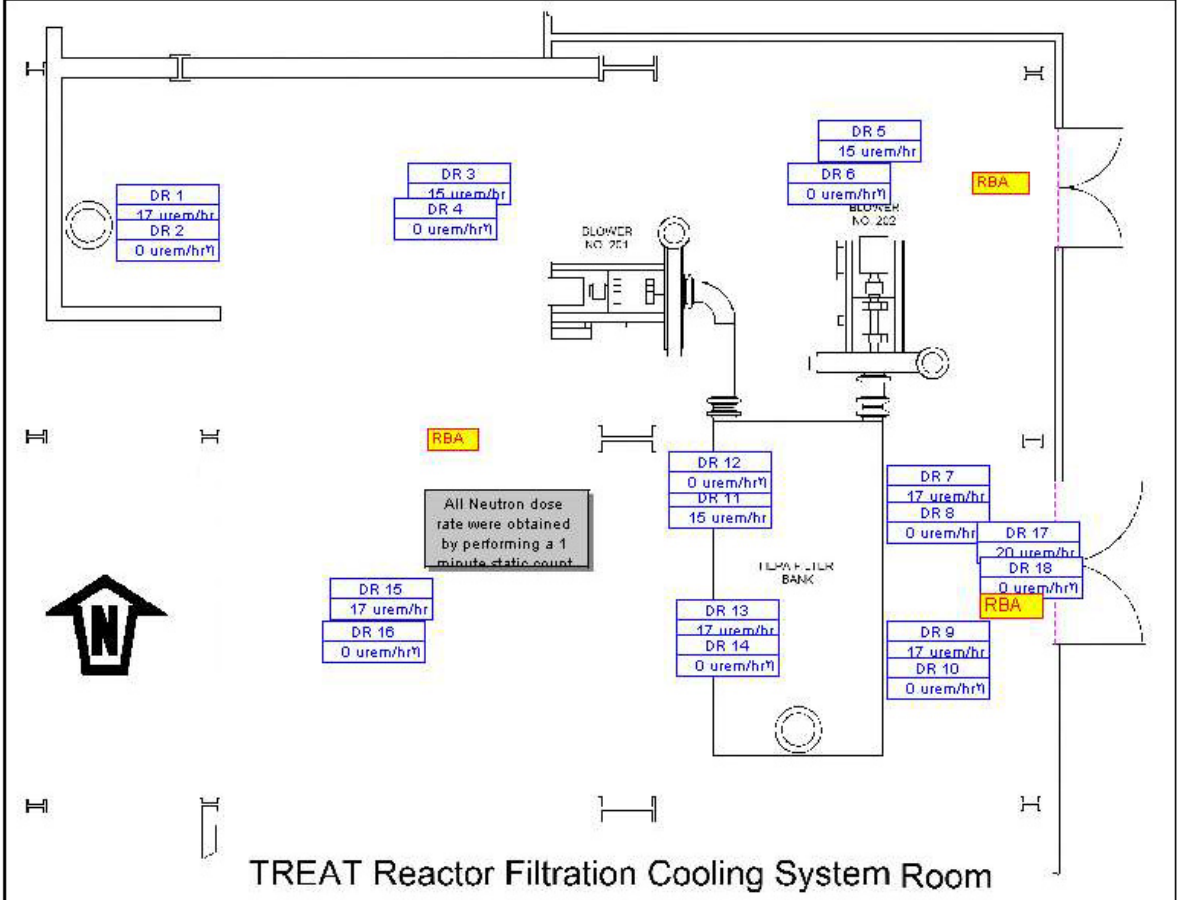
#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	15	urem/hr		
2	DR γ	1	15	urem/hr		
3	DR γ	1	15	urem/hr		
4	DR γ	1	17	urem/hr		
5	DR Neutron	2	0 η	urem/hr		
6	DR Neutron	2	0 η	urem/hr		
7	DR Neutron	2	0 η	urem/hr		
8	DR Neutron	2	0 η	urem/hr		
	Note					All Neutron dose rate were obtained by performing a 1 minute static count.
	Posting		RBA			

Log #: 348830
Notes:: N/A - 0 pages
Survey #: M-20171012-32 - Printed On: 12/11/2017 08:58

Image File: BOF\TREAT\TREAT Hodoscope Room

VSDS Standard Map Survey Report

Map: 3	TREAT REACTOR FILTRATION COOLING SYSTEM ROOM	Survey #: M-20171012-32	Date/Time: 10/12/2017 11:31



TREAT Reactor Filtration Cooling System Room

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start-up Radiation

RWP and Task#: N/A

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Blaine Case, 11/15/2017 14:46:42
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 348830
Image File: BOF\TREAT\TREAT Reactor Filtration Cooling System Room Clean - Plan View
Notes: N/A - 0 pages
Survey #: M-20171012-32 - Printed On: 12/11/2017 08:58
Page 6 of 7

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171012-32

Map: 3 - TREAT MECHANICAL EQUIPMENT ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	17	urem/hr		
2	DR Neutron	2	0 η	urem/hr		
3	DR γ	1	15	urem/hr		
4	DR Neutron	2	0 η	urem/hr		
5	DR γ	1	15	urem/hr		
6	DR Neutron	2	0 η	urem/hr		
7	DR γ	1	17	urem/hr		
8	DR Neutron	2	0 η	urem/hr		
9	DR γ	1	17	urem/hr		
10	DR Neutron	2	0 η	urem/hr		
11	DR γ	1	15	urem/hr		
12	DR Neutron	2	0 η	urem/hr		
13	DR γ	1	17	urem/hr		
14	DR Neutron	2	0 η	urem/hr		
15	DR γ	1	17	urem/hr		
16	DR Neutron	2	0 η	urem/hr		
17	DR γ	1	20	urem/hr		
18	DR Neutron	2	0 η	urem/hr		
	Posting		RBA			
	Posting		RBA			
	Posting		RBA			
	Note					All Neutron dose rate were obtained by performing a 1 minute static count.

Log #: 348830

Image File: BOF\TREAT\TREAT Reactor Filtration Cooling System Room Clean - Plan View

Notes:: N/A - 0 pages

Survey #: M-20171012-32 - Printed On: 12/11/2017 08:58

Page 7 of 7

VSDS Standard Map Survey Report

Survey M-20171012-33

General Information

Title: BOFTREAT Start-up survey- Office areas and building ext.

Survey Date/Time: 10/12/2017 11:33 — Lead Surveyor: Bryan King

Survey Type: Other - Start up Radiation — Work Order/Task #: PLN 5350

Counted By: — KCN: 54625

RWP and Task#: N/A

Status: Approved by: Blaine Case, 11/15/2017 14:48:16 — KCN: 54562

Ready for Review by: Bryan King, 11/7/2017 15:25:37 — KCN: 54625

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

Control-Ar=Controlled Area — RBA=Radiological Buffer Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency β/γ	Efficiency β	Efficiency α
1	B20-ER	803201	D	N/A	N/A	N/A
2	E-600 w/Remball	802087	D	N/A	N/A	N/A

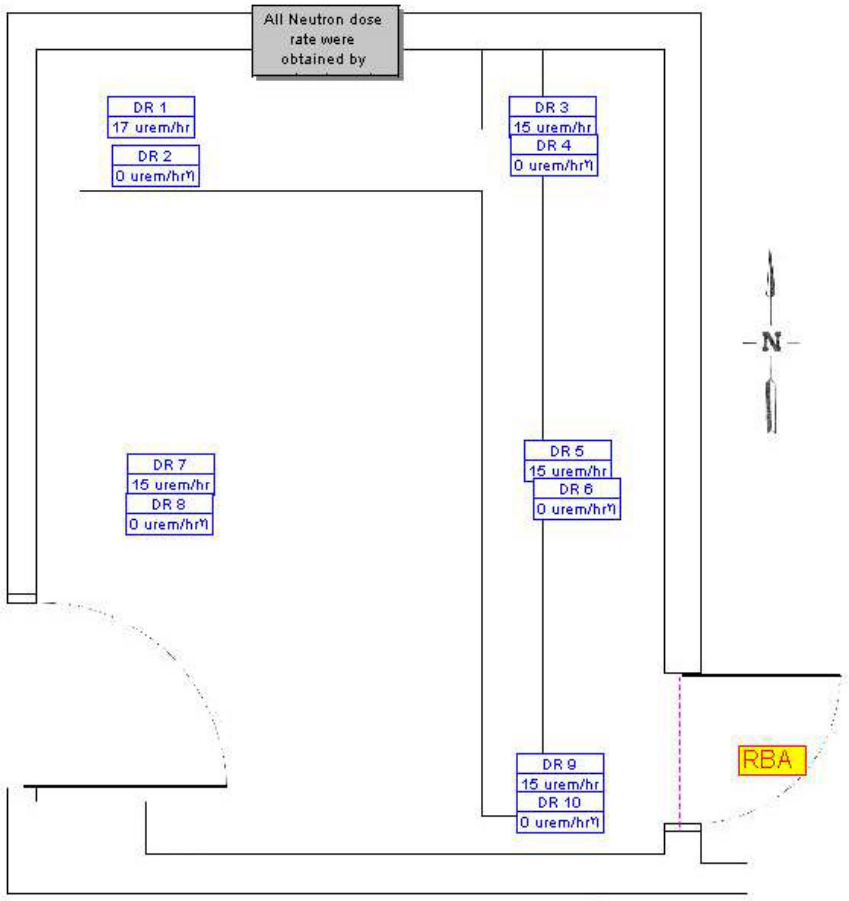
Instruments Used - Notes

#	Notes
1	N/A
2	N/A

Log #: 348830
Notes:: N/A - 0 pages
Survey #: M-20171012-33 - Printed On: 12/11/2017 09:02

VSDS Standard Map Survey Report

Map: 1	TREAT EXPERIMENTERS ROOM	Survey #: M-20171012-33	Date/Time: 10/12/2017 11:33



Experimental Equipment Room 124

Comments:	Summary of Highest Readings (All available values may not be listed)	
	Smears	Air Samples & Wipes
Type: Other - Start up Radiation		
Symbol Legend (for example only): Dose Rate *150 Contact Reading; +75 30 cm Reading; 20 General Area; HS-50 Hot Spot; RCA Posting; Drip Bag; 15 Smear; 15 Air Sample; 15 Direct; 15 Wipe	RWP and Task #: N/A	
Unless otherwise noted, dose rates in mrem/hr.		
Lead Surveyor: Bryan King	Status: Approved by: Blaine Case, 11/15/2017 14:48:16	
Location Code: BOF	Bldg/Area Name: TREAT 720	
Location Description: TREAT 720		

Log #: 348830

Image File: BOF\TREAT\TREAT Experimenters Room

Notes: N/A - 0 pages

Survey #: M-20171012-33 - Printed On: 12/11/2017 09:02

Page 2 of 11

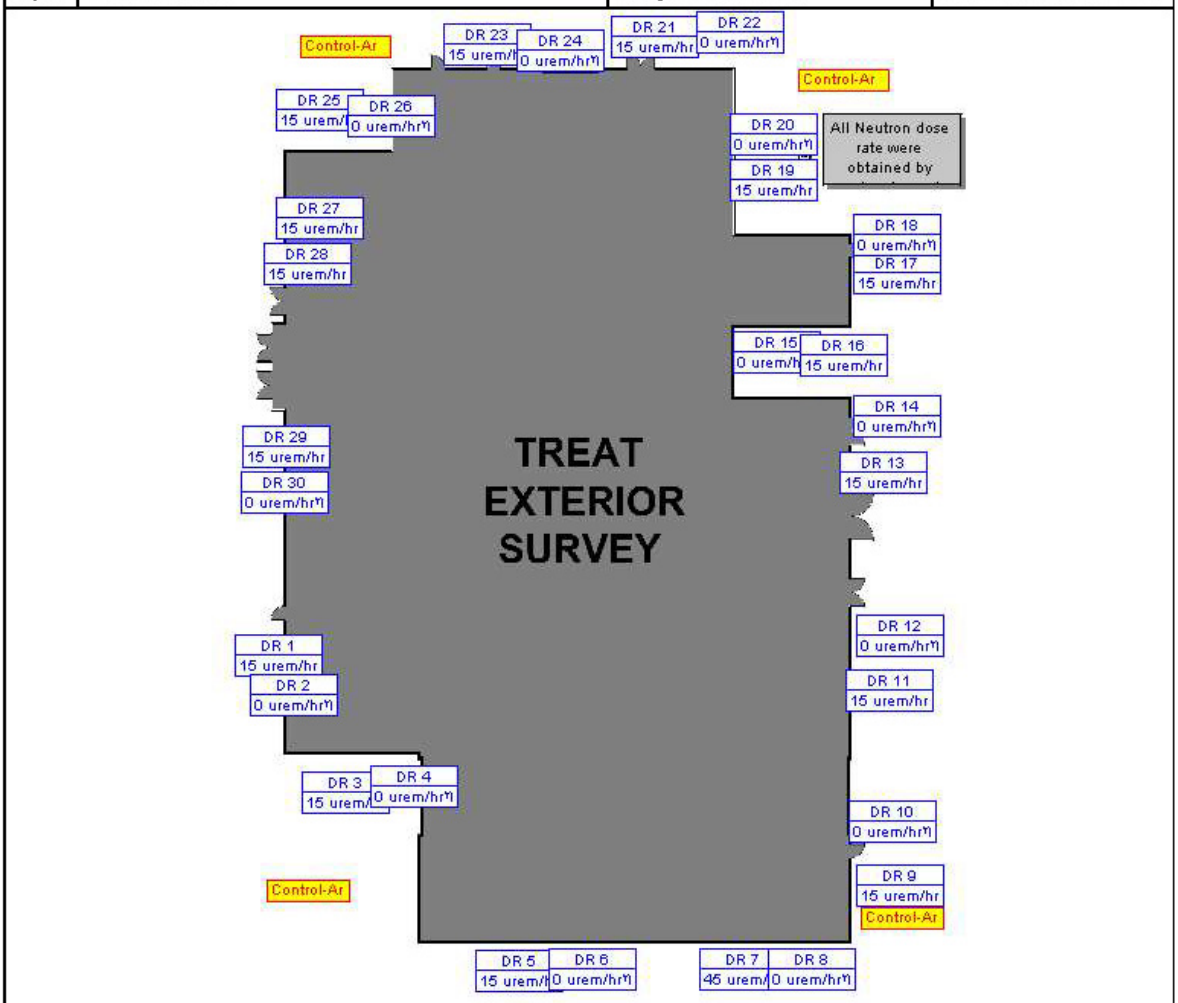
VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171012-33
Map: 1 - TREAT EXPERIMENTERS ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	17	urem/hr		
2	DR Neutron	2	0 η	urem/hr		
3	DR γ	1	15	urem/hr		
4	DR Neutron	2	0 η	urem/hr		
5	DR γ	1	15	urem/hr		
6	DR Neutron	2	0 η	urem/hr		
7	DR γ	1	15	urem/hr		
8	DR Neutron	2	0 η	urem/hr		
9	DR γ	1	15	urem/hr		
10	DR Neutron	2	0 η	urem/hr		
	Posting		RBA			
	Note					All Neutron dose rate were obtained by performing a 1 minute static count.

VSDS Standard Map Survey Report

Map: 2	TREAT EXTERIOR	Survey #: M-20171012-33	Date/Time: 10/12/2017 11:33



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area
HS-50 Hot Spot
RCA Posting
Drip Bag
15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task#: N/A

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Blaine Case, 11/15/2017 14:48:16
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 348830
Image File: BOF\TREAT\TREAT Exterior Survey - Cleaned - No Labels
Notes: N/A - 0 pages
Survey #: M-20171012-33 - Printed On: 12/11/2017 09:02
Page 4 of 11

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171012-33

Map: 2 - TREAT EXPERIMENTERS ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	15	urem/hr		
2	DR Neutron	2	0 η	urem/hr		
3	DR γ	1	15	urem/hr		
4	DR Neutron	2	0 η	urem/hr		
5	DR γ	1	15	urem/hr		
6	DR Neutron	2	0 η	urem/hr		
7	DR γ	1	45	urem/hr		
8	DR Neutron	2	0 η	urem/hr		
9	DR γ	1	15	urem/hr		
10	DR Neutron	2	0 η	urem/hr		
11	DR γ	1	15	urem/hr		
12	DR Neutron	2	0 η	urem/hr		
13	DR γ	1	15	urem/hr		
14	DR Neutron	2	0 η	urem/hr		
15	DR Neutron	2	0 η	urem/hr		
16	DR γ	1	15	urem/hr		
17	DR γ	1	15	urem/hr		
18	DR Neutron	2	0 η	urem/hr		
19	DR γ	1	15	urem/hr		
20	DR Neutron	2	0 η	urem/hr		
21	DR γ	1	15	urem/hr		
22	DR Neutron	2	0 η	urem/hr		
23	DR γ	1	15	urem/hr		
24	DR Neutron	2	0 η	urem/hr		
25	DR γ	1	15	urem/hr		
26	DR Neutron	2	0 η	urem/hr		
27	DR γ	1	15	urem/hr		
28	DR γ	1	15	urem/hr		
29	DR γ	1	15	urem/hr		
30	DR Neutron	2	0 η	urem/hr		
	Note					All Neutron dose rate were obtained by performing a 1 minute static count.
	Posting		Control-Ar			
	Posting		Control-Ar			
	Posting		Control-Ar			
	Posting		Control-Ar			

Log #: 348830

Image File: BOF\TREAT\TREAT Exterior Survey - Cleaned - No Labels

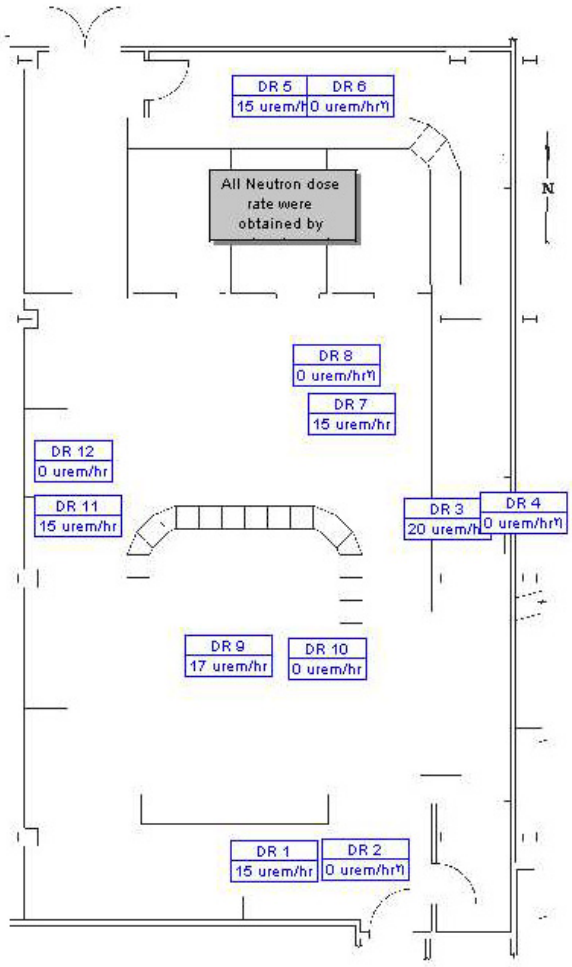
Notes:: N/A - 0 pages

Survey #: M-20171012-33 - Printed On: 12/11/2017 09:02

Page 5 of 11

VSDS Standard Map Survey Report

Map: 3	TREAT I AND C CONTROL ROOM	Survey #: M-20171012-33	Date/Time: 10/12/2017 11:33



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: N/A

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Blaine Case, 11/15/2017 14:48:16
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 348830
Image File: BOF\TREAT\TREAT I_C Control Room
Notes: N/A - 0 pages
Survey #: M-20171012-33 - Printed On: 12/11/2017 09:02
Page 6 of 11

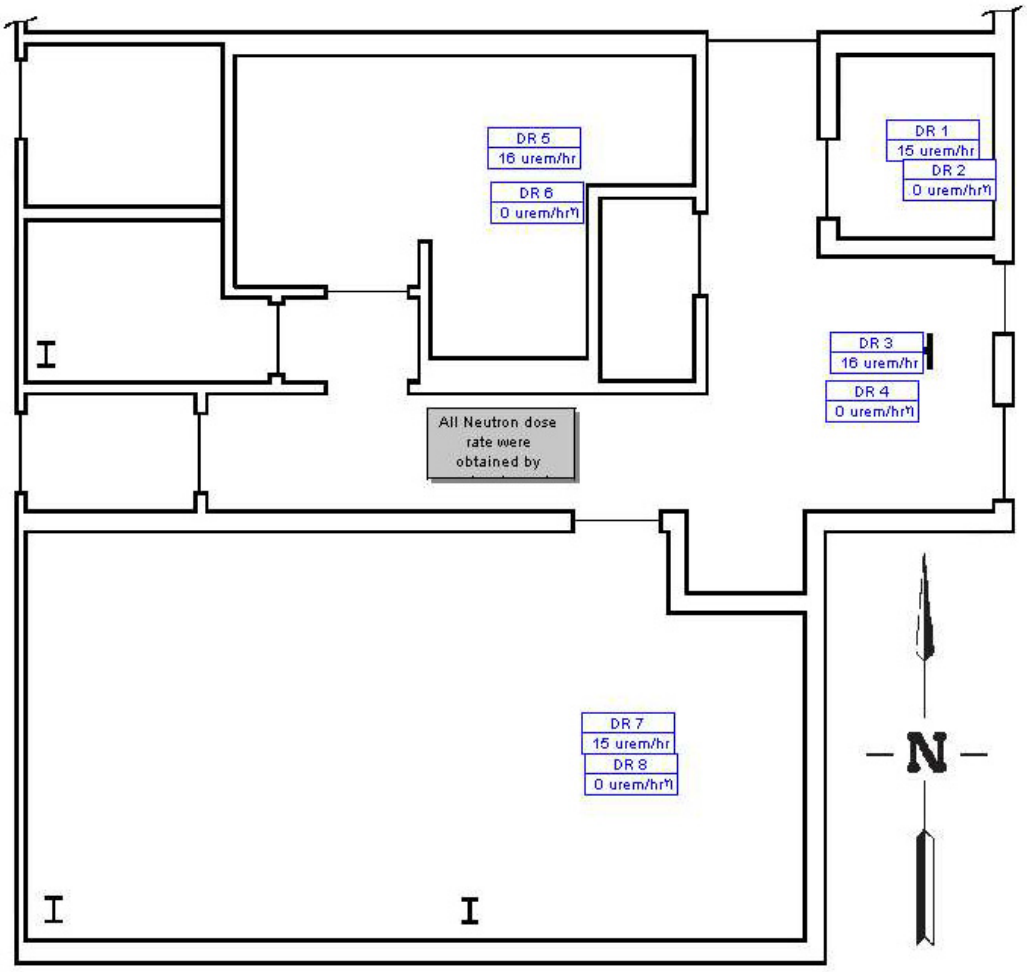
VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171012-33
Map: 3 - TREAT EXPERIMENTERS ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	15	urem/hr		
2	DR Neutron	2	0 η	urem/hr		
3	DR γ	1	20	urem/hr		
4	DR Neutron	2	0 η	urem/hr		
5	DR γ	1	15	urem/hr		
6	DR Neutron	2	0 η	urem/hr		
7	DR γ	1	15	urem/hr		
8	DR Neutron	2	0 η	urem/hr		
9	DR γ	1	17	urem/hr		
10	DR γ	2	0	urem/hr		
11	DR γ	1	15	urem/hr		
12	DR γ	2	0	urem/hr		
	Note					All Neutron dose rate were obtained by performing a 1 minute static count.

VSDS Standard Map Survey Report

Map: 4	TREAT REACTOR OFFICE AREA	Survey #: M-20171012-33	Date/Time: 10/12/2017 11:33



Comments:

Summary of Highest Readings (All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

RWP and Task#: N/A

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+ 75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Blaine Case, 11/15/2017 14:48:16
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 348830
Notes: N/A - 0 pages
Survey #: M-20171012-33 - Printed On: 12/11/2017 09:02

Image File: BOF\TREAT\TREAT Reactor Office Area Survey Map

Page 8 of 11

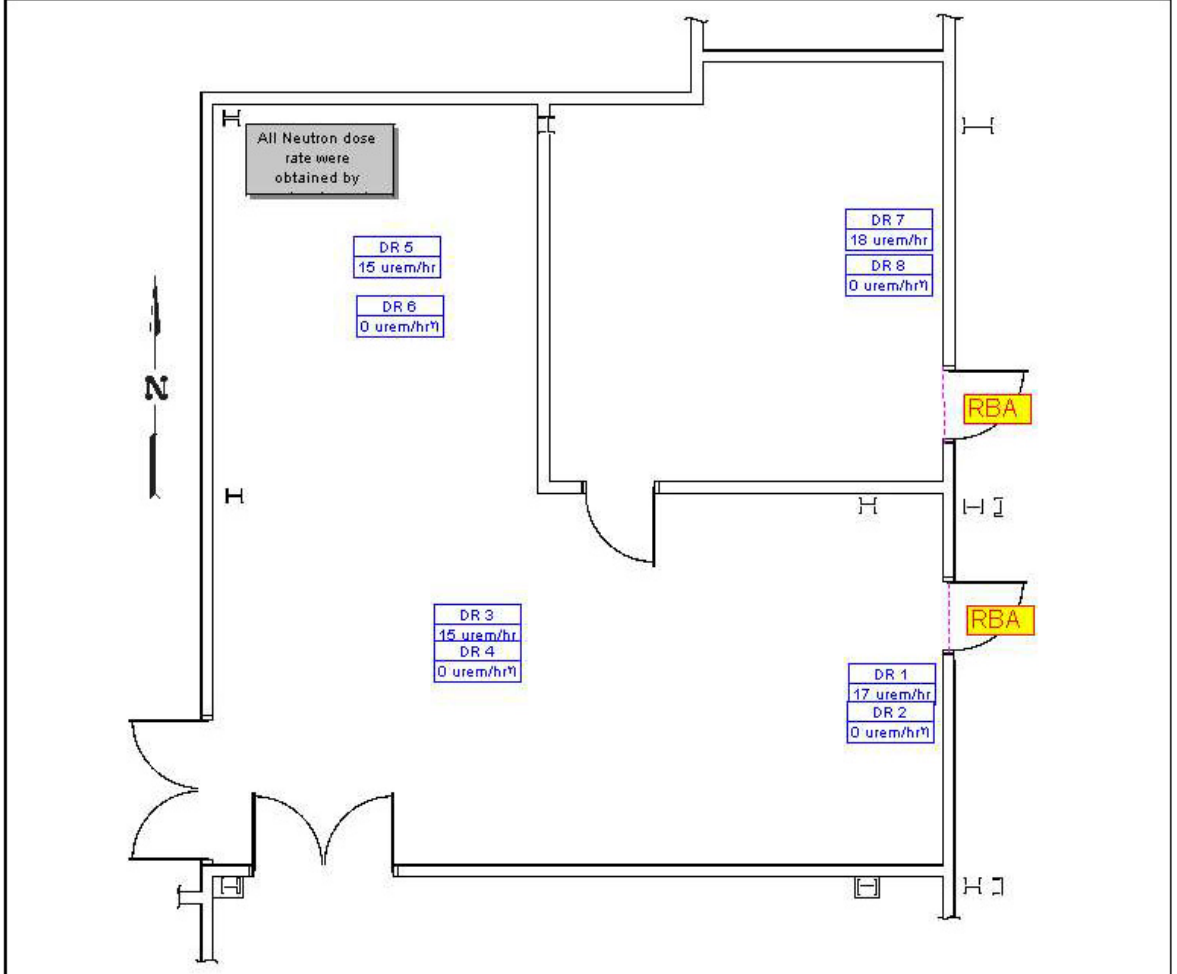
VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171012-33
Map: 4 - TREAT EXPERIMENTERS ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	15	urem/hr		
2	DR Neutron	2	0 η	urem/hr		
3	DR γ	1	16	urem/hr		
4	DR Neutron	2	0 η	urem/hr		
5	DR γ	1	16	urem/hr		
6	DR Neutron	2	0 η	urem/hr		
7	DR γ	1	15	urem/hr		
8	DR Neutron	2	0 η	urem/hr		
	Note					All Neutron dose rate were obtained by performing a 1 minute static count.

VSDS Standard Map Survey Report

Map: 5	TREAT INSTRUMENT SHOP	Survey #: M-20171012-33	Date/Time: 10/12/2017 11:33



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task#: N/A

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Blaine Case, 11/15/2017 14:48:16
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 348830
Image File: BOF\TREAT\TREAT Instrument Shop
Notes: N/A - 0 pages
Survey #: M-20171012-33 - Printed On: 12/11/2017 09:02
Page 10 of 11

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171012-33
Map: 5 - TREAT EXPERIMENTERS ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	17	urem/hr		
2	DR Neutron	2	0 η	urem/hr		
3	DR γ	1	15	urem/hr		
4	DR Neutron	2	0 η	urem/hr		
5	DR γ	1	15	urem/hr		
6	DR Neutron	2	0 η	urem/hr		
7	DR γ	1	18	urem/hr		
8	DR Neutron	2	0 η	urem/hr		
	Posting		RBA			
	Posting		RBA			
	Note					All Neutron dose rate were obtained by performing a 1 minute static count.

Log #: 348830
Notes:: N/A - 0 pages
Survey #: M-20171012-33 - Printed On: 12/11/2017 09:02

Image File: BOF\TREAT\TREAT Instrument Shop

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Appendix B —
1990 Radon Monitoring Results

Bldg	Bldg Description	Room	Avg Radon pCi/l	Duplicate Radon pCi/l	Monid	Oupid	----Monitor---- Install Date	Retrieve Date
720	TREAT REACTOR	BAR	2.9		1662693		11/16/89	2/14/90
751	OLD GATE HOUSE	BLDG 751	1.9		1662659		11/10/89	2/13/90
759	FIRE STATION	FIRE STATION BUNK ROOM	1.9		1662729		11/17/89	2/14/90
753	PLANT SERVICES	OFFICE AREA NORTH OF ROOM 102	1.5		1662130		11/16/89	2/14/90
T-13	(TRAILER T-13)	PERSONNEL OFFICE AREA, WEST END	1.5		1662718		11/17/89	2/13/90
752	LAB AND OFFICE	DRAFTING WING	1.4		1662662		11/10/89	2/13/90
721	TREAT OFFICE	OFFICE HALLWAY	1.2		1562681		11/16/89	2/14/90
791	IMF	INSTRUMENT SHOP STOCKROOM	1.1	.7	1678938	1678897	11/16/89	2/13/90
772	ENGINEERING LAB	1ST FLOOR, CENTER OF ROOM	1.1		1662656		11/16/89	2/14/90
782	MACHINE SHOP	MACHINE SHOP, SOUTH END OF BUILDING	1.1		1662690		11/16/89	2/14/90
785	HFEF-N	MAIN FLOOR ANNULUS-OPERATING FLOOR	1.1		1662694		11/13/89	2/13/90
792	ZPPR MOCKUP BLDG.	MOCKUP BLDG. EAST WALL	1.0		1659739		11/16/89	2/14/90
798	RLWTF	ROOM 108 - TANK ROOM	1.0		1662669		11/16/89	2/14/90
T-12	TRAILER 12	ROOM 107, LUNCHROOM	1.0		1662688		11/16/89	2/14/90
781	MATERIALS HANDLING	RECEIVING AREA	.9		1659722		11/16/89	2/14/90
788	MAINTENANCE SHOP	BLDG. 788-MAINTENANCE SHOP	.9		1662735		11/13/89	2/14/90
789	ENGINEERING LAB-SPD	BETWEEN WEST & MIDDLE BLDG SECTORS	.9		1659743		11/15/89	2/14/90
T-3	TRAILER T-3	ROOM 34 - SECRETARY'S AREA	.9		1562712		11/16/09	2/14/90
701	SECURITY BLDG.	POST 201	.8		1662711		11/16/89	2/14/90
775	ZPPR WORK ROOM	ZPPR WORK ROOM BLDG 775	.8		1659741		11/13/89	2/14/90
785	HFEF-N	BASEMENT - 018 AREA	.8		1662676		11/13/89	2/13/90
793	SCMS	SCMS LOW BAY	.8		1662667		11/17/89	2/14/90
T-1	TRAILER T-1	CONSTRUCTION OFFICE-WEST SIDE 1-1	.8		1662713		11/16/89	2/14/90
774	ZPPR SUPPORT	ZPPR SUPPORT - ROOM 115	.7		1662715		11/13/89	2/14/90
774	ZPPR SUPPORT	BLDG 774 BASEMENT (ANNEX)	.7		1662725		11/13/89	2/14/90
791	IMF	ROOMS 125A AND 127A	.7		1662101		11/16/89	2/13/90
704	FMF	FMF NORTH ROOM	.6		1662689		11/16/89	2/14/90
752	LAB AND OFFICE	ANALYTICAL CHEMISTRY WING/ROOM B134	.6		1662734		11/10/89	2/13/90
776	ZPPR CELL	ZPPR CELL - BLDG 776	.5		1662678		11/13/89	2/14/90
787	FASB	FASB WEST WING	.6		1659723		11/16/89	2/14/90
T-15	TRAILER T-15	T-15 LUNCHROOM	.6		1662708		11/16/89	2/14/90
T-2	TRAILER T-2	INSIDE N - S CORRIDOR	.6		1662655		11/16/89	2/14/90
752	LAB AND OFFICE	BASEMENT, ANALYTICAL OFFICE WING	.5	.6	1677456	1678958	11/10/89	2/13/90
767	EBR-II REACTOR BUILDING	REACTOR BASEMENT, RSCL AREA	.5	.4	1661506	1667167	11/17/89	2/15/90
752	LAB AND OFFICE	BASEMENT - SW WING	.5		1662683		11/10/89	2/13/90
765	HFEF-S	OPERATIONS CONTROL ROOM - ROOM 18	.4		1659717		11/13/89	2/13/90
768	POWER PLANT	POWER PLANT - 1ST FLOOR	.4		1662721		11/13/89	2/15/90
765	HFEF-S	BASEMENT-CENTER CONTROL ROOM	.3	.3	1678964	1618930	11/13/89	2/13/90
768	POWER PLANT	CONTROL ROOM - ROOM 24	.3		1659740		11/13/89	2/15/90

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BATTELLE ENERGY ALLIANCE
ATTN: LAWRENCE BURKE
1765 N. YELLOWSTONE HWY
IDAHO FALLS, ID 83415

Radon Monitoring Report

LICENSES: 101146AL,100584RT

Acct. No. 0410797

LANDAUER®

Landauer, Inc. 2 Science Road Glenwood, Illinois 60425-1586
Telephone: (800)528-8327 Facsimile: (708) 755-7048

PROGRAM NAME: INL/MFC/TREAT720

Detector Number	Detector Type	Starting Date	Ending Date	Field Data / Comments	Exposure pCi/l-days	Avg. Radon Conc. pCi/l	
4970213	DRNM	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 29 FENCE BY GAWD GATE OUT DETAT	* 30.0	* 0.3 ±0.04	
4972991	DRNT	11-FEB-15	18-MAY-15	9 DIELEL GEN RM 112 PILLAR	49.0 ±3.98	0.5 ±0.04	
4972996	DRNT	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 4 ENTRANCE RM 101 PILLAR	* 30.0	* 0.3 ±0.03	
4972997	DRNT	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 3 WOMENS RM 104 N WALL	* 30.0	* 0.3 ±0.03	
4973001	DRNT	11-FEB-15	18-MAY-15	30 MAIN GARD GATE	42.3 ±3.52	0.4 ±0.04	
4973002	DRNT	12-FEB-15	18-MAY-15	28 BSMT STAIR WELL W. WALL	119.7 ±8.0	1.3 ±0.08	
4973004	DRNT	11-FEB-15	18-MAY-15	15 RM 115 CENETER PILLAR	172.6 ±10.3	1.8 ±0.11	
4973008	DRNT	11-FEB-15	18-MAY-15	13 HOROSCOPE RM 120 CENTER	57.6 ±4.54	0.6 ±0.05	
①	②	③	④	⑤	⑥	⑦	⑧

RESULTS RELATED ONLY TO MONITORS AS RECEIVED BY LANDAUER. RADON IN AIR BY ALPHA TRACK - EPA 402-R92-004.

Q.C. Release	Process No.	Report Date	Date Received
LMR	A23260	16-JUN-15	26-MAY-15

Mark Solasky
Radon Measurement Specialist

Page 1 of 9

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PROGRAM NAME: INL/MFC/TREAT720

Detector Number	Detector Type	Starting Date	Ending Date	Field Data / Comments	Exposure pCi/l-days	Avg. Radon Conc. pCi/l	
4973014	DRNT	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 17 STORAGE AREA SOUTH CAGE	* 30.0	* 0.3 ±0.03	
4973020	DRNT	12-FEB-15	18-MAY-15	6 ROND C RM 109 W. WALL	173.5 ±10.3	1.8 ±0.11	
4973030	DRNT	12-FEB-15	18-MAY-15	27 BAR E. WALL	253.7 ±13.3	2.7 ±0.14	
4973051	DRNT	12-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 24 1ST MEZ E. WALL	* 30.0	* 0.3 ±0.04	
4973077	DRNT	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 16 STORAGE AREA NORTH CAGE	* 30.0	* 0.3 ±0.03	
4973093	DRNT	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 22 LOW BAY N. WALL	* 30.0	* 0.3 ±0.03	
4973102	DRNT	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 12 WORK SHOP RM 122	* 30.0	* 0.3 ±0.03	
4973103	DRNT	12-FEB-15	18-MAY-15	26 SUB PILE N. WALL	410.5 ±17.9	4.3 ±0.19	
①	②	③	④		⑤	⑥	⑦ ⑧

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Telephone: (800)528-8327 Facsimile: (708) 755-7048

PROGRAM NAME: INL/MFC/TREAT720

Detector Number	Detector Type	Starting Date	Ending Date	Field Data / Comments	Exposure pCi/l-days	Avg. Radon Conc. pCi/l	
4973108	DRNT	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 18 HIGH BAY PILLAR BY CASK STAND	* 30.0	* 0.3 ±0.04	
4973122	DRNT	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 1 HP OFFICE RM 100 SOUTH WALL	* 30.0	* 0.3 ±0.03	
4973130	DRNT	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 14 FUN RM 113-114 CENTER PILLAR	* 30.0	* 0.3 ±0.03	
4973132	DRNT	11-FEB-15	18-MAY-15	10 ELECT. RM 111 E WALL	69.0 ±5.25	0.7 ±0.05	
4973133	DRNT	11-FEB-15	18-MAY-15	5 CONTROL RM 108 W. WALL	130.3 ±8.5	1.4 ±0.09	
4973134	DRNT	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 20 HIGH BAY SUB PILE STAIR E WALL	* 30.0	* 0.3 ±0.03	
4973136	DRNT	11-FEB-15	18-MAY-15	8 TANK RM 123 N WALL	61.4 ±4.78	0.6 ±0.05	
4973138	DRNT	12-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 25 2 MEZ E. WALL	* 30.0	* 0.3 ±0.04	
①	②	③	④		⑤	⑥	⑦ ⑧

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PROGRAM NAME: INL/MFC/TREAT720

Detector Number	Detector Type	Starting Date	Ending Date	Field Data / Comments	Exposure pCi/l-days	Avg. Radon Conc. pCi/l	
4973152	DRNT	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 2 MENS RESTROOM RM 103 EAST WALL	* 30.0	* 0.3 ±0.03	
4973153	DRNT	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 11 WORK SHOP RM 121 S WALL	* 30.0	* 0.3 ±0.03	
4973166	DRNT	12-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 23 RX TOP SE. CORNER	* 30.0	* 0.3 ±0.04	
4973170	DRNT	11-FEB-15	18-MAY-15	19 RM 124 E. WALL	725.6 ±25.0	7.6 ±0.26	
4973176	DRNT	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 21 LOW BAY E. WALL	* 30.0	* 0.3 ±0.03	
4973178	DRNT	12-FEB-15	18-MAY-15	7 SS OFFICE RM 110 DESK	99.6 ±6.96	1.0 ±0.07	
4982221	DRNF	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 29 FENCE BY GAWD GATE OUTS DETAT	* 30.0	* 0.3 ±0.05	
4989847	DRN	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 21 LOW BAY E. WALL	* 30.0	* 0.3 ±0.04	
①	②	③	④		⑤	⑥	⑦ ⑧

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Telephone: (800)528-8327 Facsimile: (708) 755-7048

PROGRAM NAME: INL/MFC/TREAT720

Detector Number	Detector Type	Starting Date	Ending Date	Field Data / Comments	Exposure pCi/l-days	Avg. Radon Conc. pCi/l	
4989848	DRN	11-FEB-15	18-MAY-15	17 STORAGE AREA SOUTH CAGE	54.3 ±4.96	0.6 ±0.05	
4989849	DRN	NOT GIVEN	NOT GIVEN	* - LESS THAN INDICATED VALUE NO DATES PROVIDED RECEIVED WITH SHIPMENT IN FOIL NO DATES AND NOT ON COC	* 30.0		
4989850	DRN	11-FEB-15	18-MAY-15	15 RM 115 CENTER PILLAR	130.1 ±9.2	1.4 ±0.10	
4989851	DRN	12-FEB-15	18-MAY-15	6 FOND C RM 109 W. WALL	172.5 ±11.1	1.8 ±0.12	
4989853	DRN	12-FEB-15	18-MAY-15	27 BAR E. WALL	253.8 ±14.0	2.7 ±0.15	
4989855	DRN	11-FEB-15	18-MAY-15	14 RAN RM 113-114 CENTER PILLAR	48.6 ±4.55	0.5 ±0.05	
4989857	DRN	12-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 23 RX TOP SE. CORNER	* 30.0	* 0.3 ±0.04	
4989860	DRN	11-FEB-15	18-MAY-15	4 ENTRANCE RM 101 PILLAR	36.2 ±3.60	0.4 ±0.04	
4989862	DRN	11-FEB-15	18-MAY-15	10 ELECT. RM 111 E WALL	61.0 ±5.41	0.6 ±0.06	
①	②	③	④	⑤	⑥	⑦	⑧

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Detector Number	Detector Type	Starting Date	Ending Date	Field Data / Comments	Exposure pCi/l-days	Avg. Radon Conc. pCi/l	
4989863	DRN	12-FEB-15	18-MAY-15	26 SUB PILE N. WALL	367.0 ±17.4	3.9 ±0.18	
4989864	DRN	11-FEB-15	18-MAY-15	9 DIELEL GON RM 112 PILLAR	50.5 ±4.69	0.5 ±0.05	
4989866	DRN	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 22 LOW BAY N. WALL	* 30.0	* 0.3 ±0.04	
4989867	DRN	11-FEB-15	18-MAY-15	30 MAIN GARD GATE	68.7 ±5.91	0.7 ±0.06	
4989868	DRN	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 1 HP OFFICE RM 100 SOUTH WALL	* 30.0	* 0.3 ±0.03	
4989877	DRN	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 2 MENS RESTROOM RM 103 EAST WALL	* 30.0	* 0.3 ±0.03	
4989878	DRN	12-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 24 IST MEZ E. WALL	* 30.0	* 0.3 ±0.04	
4989879	DRN	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 12 WORK SHOP RM 122 N WALL	* 30.0	* 0.3 ±0.03	
①	②	③	④	⑤	⑥	⑦	⑧

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Radon Measurement Specialist

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Radon Monitoring Report

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Telephone: (800)528-8327 Facsimile: (708) 755-7048

PROGRAM NAME: INL/MFC/TREAT720

Detector Number	Detector Type	Starting Date	Ending Date	Field Data / Comments	Exposure pCi/l-days	Avg. Radon Conc. pCi/l	
4989885	DRN	12-FEB-15	18-MAY-15	28 BSMT STAIR WELL W. WALL	123.4 ±8.9	1.3 ±0.09	
4989887	DRN	11-FEB-15	18-MAY-15	3 WOMENS RM 104 N WALL	68.7 ±5.91	0.7 ±0.06	
4989891	DRN	11-FEB-15	18-MAY-15	7 SS OFFICE RM 110 DESK	179.3 ±11.3	1.9 ±0.12	
4989893	DRN	11-FEB-15	18-MAY-15	19 RM 124 E. WALL	665.0 ±24.4	6.9 ±0.25	
4989900	DRN	11-FEB-15	18-MAY-15	8 TANK RM 123 N WALL	93.6 ±7.38	1.0 ±0.08	
4989915	DRN	11-FEB-15	18-MAY-15	13 HOROSCOPE RM 120 CENTER	62.9 ±5.54	0.7 ±0.06	
4989917	DRN	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 18 HIGH BAY PILLAR BY CASK STAND	* 30.0	* 0.3 ±0.03	
4989920	DRN	11-FEB-15	18-MAY-15	11 WORK SHOP RM 121 S WALL	78.2 ±6.50	0.8 ±0.07	
4989974	DRN	11-FEB-15	18-MAY-15	5 CONTROL RM 108 W. WALL	109.9 ±8.2	1.1 ±0.09	
①	②	③	④		⑤	⑥	⑦ ⑧

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PROGRAM NAME: INL/MFC/TREAT720

Detector Number	Detector Type	Starting Date	Ending Date	Field Data / Comments	Exposure pCi/l-days	Avg. Radon Conc. pCi/l	
4991424	DRN	12-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 25 2 MEZ E. WALL	* 30.0	* 0.3 ±0.03	
4991449	DRN	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 16 STORAGE AREA NORTH CAGE	* 30.0	* 0.3 ±0.04	
4991538	DRN	11-FEB-15	18-MAY-15	* - LESS THAN INDICATED VALUE 20 HIGH BAY SUB PILE STAIR EAST WALL	* 30.0	* 0.3 ±0.04	
①	②	③	④	⑤	⑥	⑦	⑧

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The United States Environmental Protection Agency recommends fixing your home if the results of one long-term test or the average of two short-term tests taken in the lowest lived-in level of the home show radon levels of 4.0 pCi/l or higher. A short term test remains in your home for two days to 90 days, whereas a long-term test remains in your home for more than 90 days under these guidelines.

Column 7 of this report indicates the radon test result, i.e., the average radon concentration in pCi/l for the test period. If you did not provide us the starting and ending dates (days the detector was exposed) we are unable to calculate the average radon concentration. To calculate the average radon concentration, divide the total exposure in pCi/l-days (column 6) by the number of days the detector was exposed.

For more information about the interpretation of your test result or about other radon related issues we suggest you contact your state radon office. Your state radon office should have available the following EPA publications:

- A Citizen's Guide to Radon
- Home Buyer's and Seller's Guide to Radon
- Consumer's Guide to Radon Reduction

DISCLAIMER

Landauer, Inc. makes no warranty of any kind, express or implied, as regards to the use, operation or analysis of any Landauer, Inc. monitor. Landauer, Inc. specifically disclaims implied warranties of merchantability and fitness for a particular purpose. Landauer, Inc. is not responsible for any damage, including consequential damages, to persons or property resulting from the use of the monitor or the resulting data.

LANDAUER®

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Appendix D —
2015 Radon Dosimeter Specification Sheet

LANDAUER®

Radtrak® Long-Term Radon Monitoring

Radtrak is an alpha-track radon gas detector designed to monitor radon exposure for three months to one year to obtain a long-term average concentration over time. Landauer service includes the Radtrak detector, comprehensive analysis, and a confidential report of the findings. Radtrak can be packaged for indoor or outdoor area monitoring or personnel monitoring.

Landauer is the leader and pioneer in radon gas detection and monitoring service. Since 1954, our scientists have been involved with the development of radiation monitoring services for nuclear research centers and laboratories, hospitals, medical and dental offices, universities, and other industries where radiation might be present. This experience and technology have been incorporated into Landauer's highly accurate Radtrak radon detector using our exclusive Track-Etch® process. Radtrak radon detectors are used by the Environmental Protection Agency, the National Institutes of Health, the American Lung Association, and many other government and professional organizations.

Radtrak measures the average radon concentration at the location of the detector during the monitoring period. The alpha-track detector has, inside the plastic housing, a radiosensitive element that records alpha particle emissions (alpha tracks) from the natural radioactive decay of radon.

When the detector is returned to Landauer's laboratory, the alpha tracks are counted using computer-assisted image analysis equipment. The number of alpha tracks along with the deployment time period provides the basis for calculating the average radon concentration. The report with the radon gas measurement, reported in picocuries per liter of air (pCi/l), is mailed within seven to ten days after receipt of detector.

Thoron Proof Filter

Upon request, a detector can be fitted with a thoron proof filter that provides measurement of Rn 222 only.

Technical Specifications

- The radiosensitive element is a CR-39 (allyl diglycol carbonate) based, passive alpha-track detector.
- The CR-39 is enclosed in a plastic housing composed of electrically conducting material with filtered openings to permit diffusion of radon gas only.
- Minimum level of detection is 30 pCi/l days i.e., 0.33 pCi/l based on 90 days.
- Detectors, before, during or after exposure, should not be in locations that exceed a temperature of 160°F (70°C).
- Radtrak detectors are packaged in film-foil bags that meet Military specification MIL-B-131, Class 1 to prevent exposure prior to use.
- A metallic label is provided for each detector to seal the filtered openings following the exposure period to minimize subsequent exposure to radon during the return shipment to Landauer's laboratory.
- Each detector is identified by a unique serial number laser engraved on the CR-39, printed and bar coded on the outside of Radtrak, and the film-foil bag.

Indoor Use

Monitoring indoors requires placing the detector in an upright position on a flat surface, or it may be hung from a joist or ceiling with the detector's hanger strip included with the shipment. The U.S. Environmental Protection Agency recommends the detector be placed in the lowest lived-in level of the home. It should be placed in a room that is used regularly but not a kitchen or bathroom. States or other organizations may have differing recommendations. Contact your state agency if you have a question regarding placement.

Outdoor Use

For monitoring outdoors, the detector is fastened to the bottom of a clear plastic cup. The cup is then installed inside a protective canister that has been attached to a post or other location. The protective canisters are sold separately.

Personnel Monitoring

The personnel monitor comes with a clip that easily attaches to the detector and securely fastens to clothing.

For more information on radon, refer to the U.S. Environmental Protection Agency's publication "A Citizen's Guide to Radon" at www.epa.gov/radon, or contact your state department of health.

Landauer, Inc., 2 Science Road, Glenwood, IL 60425 800-528-8327 www.landauer.com

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Appendix E —
TREAT Critical Level Radiation Survey Results

Log #	Log Time	Work Time	User	Site	Facility	Reviewer	Review Date
349401	11/14/2017 3:18:17 PM	11/14/2017 3:11:00 PM	Nelson, Jason, E	BOF	TREAT-BOF	King, Bryan,	11/15/2017 2:04:17 PM

Last Updated	11/14/2017 3:24:01 PM
Job Type	Other
Requestor	RadCon
Survey Map Number	N/A
RWP	BOF2017009
Late Entry	No
Abnormal Entry	No
Abnormal Entry Type	
Log Entry	Performed radiation surveys during the TREAT reactor restart, the reactor power was raised to ~10,000 counts. Surveys were performed on the reactor top; in the BAR/subpile room, in the filtration cooling room, around the exhaust duct where it travels under the floor, and around the radiography stand. All survey results were consistent with the normal non running reactor radiation readings. B. Case, B. King, and I performed the surveys.

Instrument Type	**Instrument Description**
REM Ball	802087
TelePole 2	854459
RO20	803029

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Appendix F —
TREAT Steady State — 80 kW Radiation Survey Maps

VSDS Standard Map Survey Report

Survey M-20171116-36

General Information

Title: BOFTREAT Reactor Start-up, BAR/Subpile

Survey Date/Time: 11/16/2017 14:31 — Lead Surveyor: Jason Nelson

Survey Type: Other - Reactor Startup — Work Order/Task #: N/A

Counted By: N/A — KCN: 102043

RWP and Task#: BOF2017009

Status: Approved by: Bryan King, 12/11/2017 10:07:45 — KCN: 54625

Ready for Review by: Jason Nelson, 11/22/2017 10:35:05 — KCN: 102043

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

HRA=High Radiation Area
HRAACR=HRA ACCESS CONTROLS REQUIRED
RBA=Radiological Buffer Area
RMA=Radioactive Material Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency		
				β/γ	β	α
1	TelePole 2	854459	D			
2	E-600 w/Remball	802087	D			
3	RO20	803029	D			
4	Ludlum 3	802646	C	0.10		
5	Ludlum 3030	853090	C	0.317		0.315

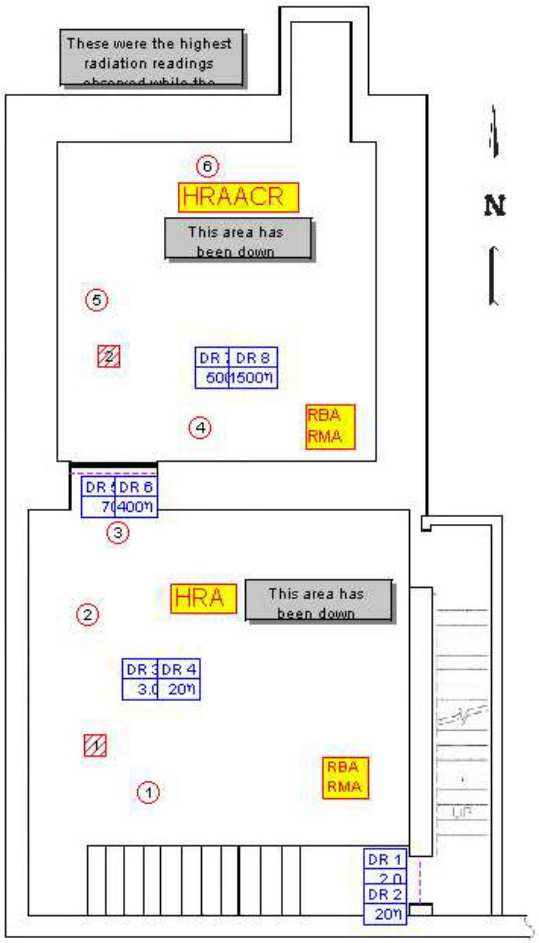
Instruments Used - Notes

#	Notes
1	N/A
2	N/A
3	N/A
4	N/A
5	N/A

Log #: 349630
Notes:: N/A - 0 pages
Survey #: M-20171116-36 - Printed On: 1/23/2018 07:04
Page 1 of 5

VSDS Standard Map Survey Report

Map: 1	TREAT SUB-PILE ROOM	Survey #: M-20171116-36	Date/Time: 11/16/2017 14:31



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes
6) <1000 dpm/100cm2 B/Y 6) <20 dpm/100cm2 α	Wipe 2) BKG CCPM β/γ

Type: Other - Reactor Startup

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Jason Nelson	Status: Approved by: Bryan King, 12/11/2017 10:07:45
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 349630
Image File: BOF\TREAT\TREAT Sub-Pile Room
Notes: N/A - 0 pages
Survey #: M-20171116-36 - Printed On: 1/23/2018 07:04
Page 2 of 5

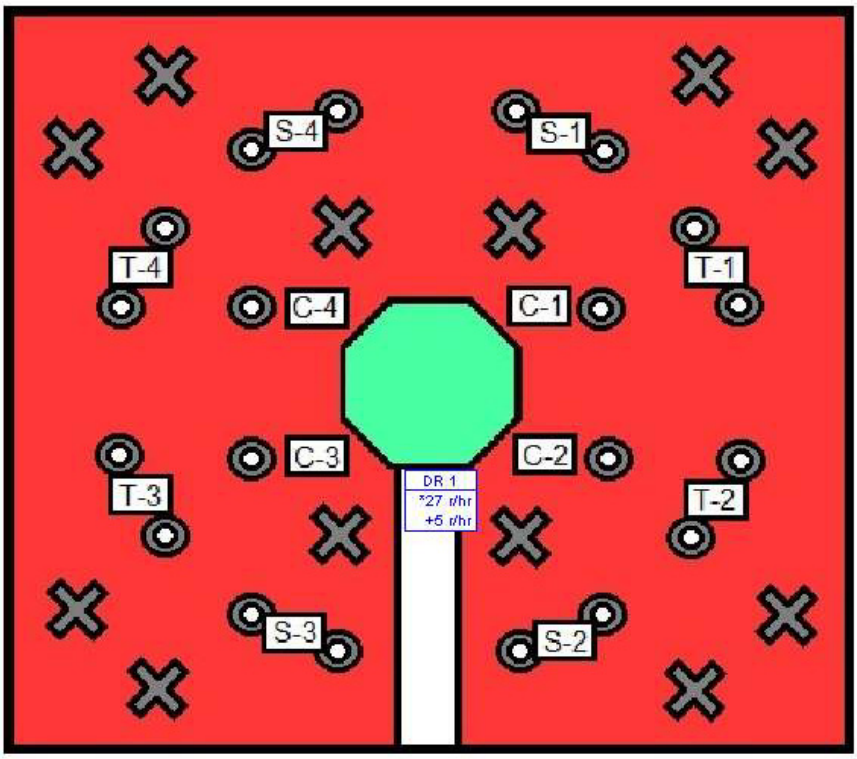
VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171116-36
Map: 1 - TREAT SUB-PILE ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	3	2.0	mrem/hr		
2	DR Neutron	2	20 η	mrem/hr		
3	DR γ	3	3.0	mrem/hr		
4	DR Neutron	2	20 η	mrem/hr		
5	DR γ	3	70	mrem/hr		
6	DR Neutron	2	400 η	mrem/hr		
7	DR γ	3	500	mrem/hr		
8	DR Neutron	2	1500 η	mrem/hr		Instrument read 1.5 R/hr neutron, it is only calibrated to 1 R/hr neutron
1	Smear	5	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		5	α <20	dpm/100cm2		
2	Smear	5	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		5	α <20	dpm/100cm2		
3	Smear	5	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		5	α <20	dpm/100cm2		
4	Smear	5	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		5	α <20	dpm/100cm2		
5	Smear	5	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		5	α <20	dpm/100cm2		
6	Smear	5	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		5	α <20	dpm/100cm2		
1	Wipe	4	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
2	Wipe	4	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
	Posting		HRAACR			
	Posting		HRA			
	Posting		RBA RMA			
	Posting		RBA RMA			
	Note					These were the highest radiation readings observed while the reactor was held at 80 KW.
	Note					This area has been down posted to a HRA.
	Note					This area has been down posted from an HRA.

VSDS Standard Map Survey Report

Map: 2	TREAT CONTROL ROD FOLLOWERS	Survey #: M-20171116-36	Date/Time: 11/16/2017 14:31



These were the highest radiation readings observed while the

N

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Reactor Startup

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF 2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Jason Nelson

Status: Approved by: Bryan King, 12/11/2017 10:07:45

Location Code: BOF

Bldg/Area Name: TREAT 720

Location Description: TREAT 720

Log #: 349630

Image File: BOF\TREAT\TREAT Control Rod Followers

Notes: N/A - 0 pages

Survey #: M-20171116-36 - Printed On: 1/23/2018 07:04

Page 4 of 5

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171116-36
Map: 2 - TREAT SUB-PILE ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	* 27	r/hr		
		1	+ 5	r/hr		
	Note					These were the highest radiation readings observed while the reactor was held at 80 KW.

Log #: 349630
Notes:: N/A - 0 pages
Survey #: M-20171116-36 - Printed On: 1/23/2018 07:04

Image File: BOF\TREAT\TREAT Control Rod Followers

Page 5 of 5

VSDS Standard Map Survey Report

Survey M-20171116-41

General Information

Title: BOFTREAT RX Top

Survey Date/Time: 11/16/2017 14:45 — Lead Surveyor: Blaine Case

Survey Type: Other - Reactor 80KW run — Work Order/Task #: N/A

Counted By: — KCN: 54562

RWP and Task#: BOF2017009

Status: Approved by: Bryan King, 12/11/2017 10:38:28 — KCN: 54625

Ready for Review by: Blaine Case, 11/28/2017 15:56:40 — KCN: 54562

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

HRA=High Radiation Area
HRAACR=HRA ACCESS CONTROLS REQUIRED
RA=Radiation Area
RBA=Radiological Buffer Area
RMA=Radioactive Material Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency		
				β/γ	β	α
1	Ludlum 3030	853090	C	.317	N/A	.315
2	E-600 w/Remball	802087	D	N/A	N/A	N/A
3	RO20	803029	D	N/A	N/A	N/A
4	Ludlum 3	802646	C	.10	N/A	N/A

Instruments Used - Notes

#	Notes
1	N/A
2	N/A
3	N/A
4	N/A

Log #: 349630
Notes:: N/A - 0 pages
Survey #: M-20171116-41 - Printed On: 1/23/2018 07:09

Page 1 of 6

VSDS Standard Map Survey Report

Comments:

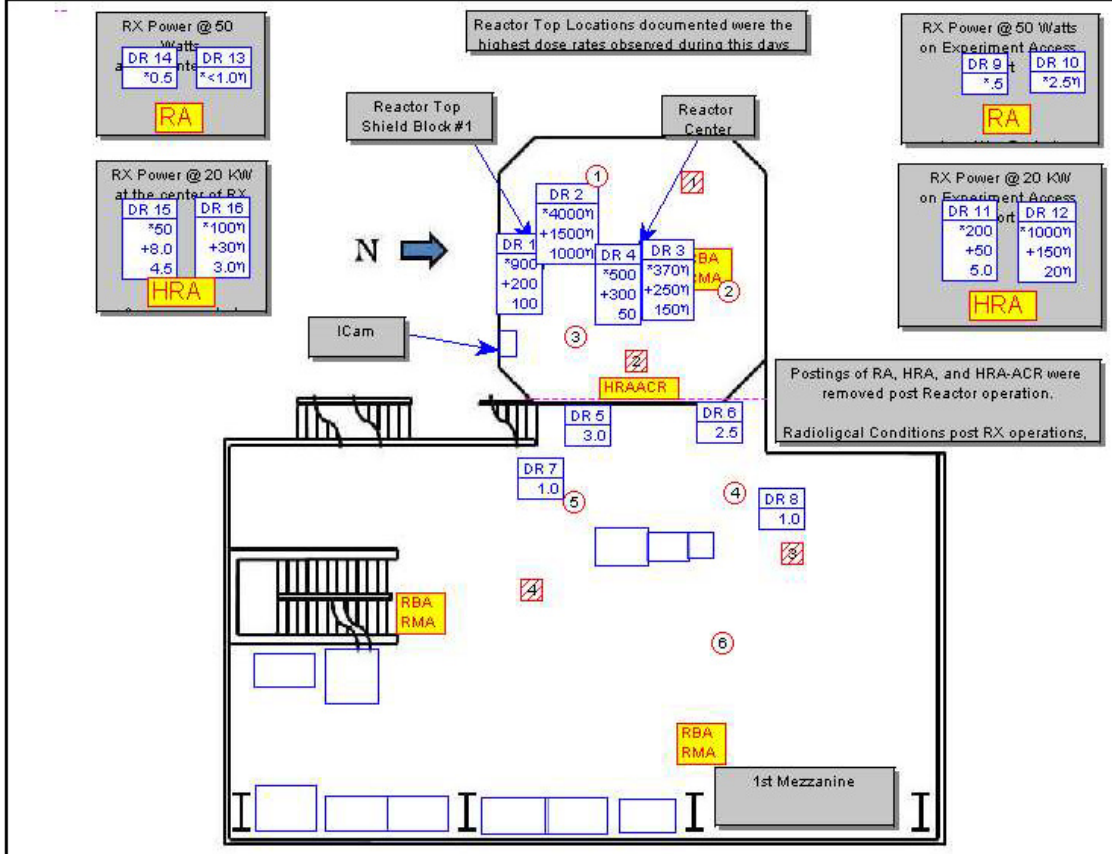
Postings of RA, HRA, and HRA-ACR were removed post Reactor operation.

Radioligcal Conditions post RX operations, were consistant with the weekly routine survey.

Log #: 349630
Notes:: N/A - 0 pages
Survey #: M-20171116-41 - Printed On: 1/23/2018 07:09

VSDS Standard Map Survey Report

FIRST MEZZANINE	Survey #: M-20171116-41	Date/Time: 11/16/2017 14:45



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes
6) <1000 dpm/100cm2 B/Y	Wipe 4) BKG CCPM β/γ
6) <20 dpm/100cm2 α	

Type: Other - Reactor 80KW run

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area
HS-50 Hot Spot
RCA Posting
Drip Bag
15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Blaine Case	Status: Approved by: Bryan King, 12/11/2017 10:38:28
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 349630
Image File: BOF\TREAT\FIRST MEZZANINE
Notes: N/A - 0 pages
Survey #: M-20171116-41 - Printed On: 1/23/2018 07:09
Page 3 of 6

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171116-41
Map: FIRST MEZZANINE

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	3	* 900	mrem/hr	Directly over access port	RX Power @ 80KW
		3	+ 200	mrem/hr		
		3	100	mrem/hr		
2	DR Neutron	2	* 4000 η	mrem/hr	Directly over access port	RX Power @ 80KW
		2	+ 1500 η	mrem/hr		Instrument is only calibrated to 1000 mRem/hr
		2	1000 η	mrem/hr		
3	DR Neutron	2	* 370 η	mrem/hr	Center of the Reactor	RX Power @ 80KW
		2	+ 250 η	mrem/hr		
		2	150 η	mrem/hr		
4	DR γ	3	* 500	mrem/hr	RX Center	RX Power @ 80KW
		3	+ 300	mrem/hr		
		3	50	mrem/hr		
5	DR γ	3	3.0	mrem/hr	Railing	
6	DR γ	3	2.5	mrem/hr	Railing	
7	DR γ	3	1.0	mrem/hr		
8	DR γ	3	1.0	mrem/hr		
9	DR γ	3	* .5	mrem/hr	Contact	
10	DR Neutron	2	* 2.5 η	mrem/hr	Contact	
11	DR γ	3	* 200	mrem/hr		
		3	+ 50	mrem/hr		
		3	5.0	mrem/hr		
12	DR Neutron	2	* 1000 η	mrem/hr	Above Experiment Port	
		2	+ 150 η	mrem/hr		
		2	20 η	mrem/hr		
13	DR Neutron	2	* <1.0 η	mrem/hr		
14	DR γ	3	* 0.5	mrem/hr		
15	DR γ	3	* 50	mrem/hr		
		3	+ 8.0	mrem/hr		
		3	4.5	mrem/hr		
16	DR Neutron	2	* 100 η	mrem/hr		
		2	+ 30 η	mrem/hr		
		3	3.0 η	mrem/hr		
1	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	N/A		
		1	α <20	dpm/100cm2		
2	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	N/A		
		1	α <20	dpm/100cm2		
3	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	N/A		
		1	α <20	dpm/100cm2		
4	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	N/A		
		1	α <20	dpm/100cm2		
5	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	N/A		
		1	α <20	dpm/100cm2		
6	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	N/A		
		1	α <20	dpm/100cm2		

Log #: 349630 **Image File: BOF\TREAT\FIRST MEZZANINE**
Notes:: N/A - 0 pages
Survey #: M-20171116-41 - Printed On: 1/23/2018 07:09 **Page 4 of 6**

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171116-41
Map: FIRST MEZZANINE

#	Type	Inst.	Value	Units	Position	Notes
1	Wipe	4	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
2	Wipe	4	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
3	Wipe	4	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
4	Wipe	4	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
	Note					1st Mezzanine
	Note					ICam
	Note					Reactor Top Shield Block #1 Experiment Access Port
	Note					RX Power @ 50 Watts on Experiment Access Port Area Was Posted:
	Note					RX Power @ 20 KW on Experiment Access Port Area was Posted
	Note					RX Power @ 50 Watts at the center of RX Area was posted:
	Note					RX Power @ 20 KW at the center of RX Area was posted
	Note					Postings of RA, HRA, and HRA-ACR were removed post Reactor operation. Radioligcal Conditions post RX operations, are consistant with the weekly routine survey. Survey# M-20171113-80

Log #: 349630
Image File: BOF\TREAT\FIRST MEZZANINE
Notes:: N/A - 0 pages
Survey #: M-20171116-41 - Printed On: 1/23/2018 07:09
Page 5 of 6

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171116-41
Map: FIRST MEZZANINE

#	Type	Inst.	Value	Units	Position	Notes
	Note					Reactor Top Locations documented were the highest dose rates observed during this days RX operations.
	Note					Reactor Center
	Posting		RBA RMA			
	Posting		RBA RMA			
	Posting		RBA RMA			
	Posting		HRAACR			
	Posting		RA			
	Posting		HRA			
	Posting		RA			
	Posting		HRA			

VSDS Standard Map Survey Report

Survey M-20171116-42

General Information

Title: BOFTREAT Start up 20 KW / 80KW

Survey Date/Time: 11/16/2017 14:44 — Lead Surveyor: Bryan King

Survey Type: Other - Start up Radiation — Work Order/Task #: PLN-5350

Counted By: — KCN: 54625

RWP and Task#: BOF2017009

Status: Approved by: Jason Nelson, 12/11/2017 11:07:01 — KCN: 102043

Ready for Review by: Bryan King, 11/22/2017 10:20:12 — KCN: 54625

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

RA=Radiation Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency		
				β/γ	β	α
1	RO20	803097	D	N/A	N/A	N/A
2	E-600 w/Remball	801890	D	N/A	N/A	N/A

Instruments Used - Notes

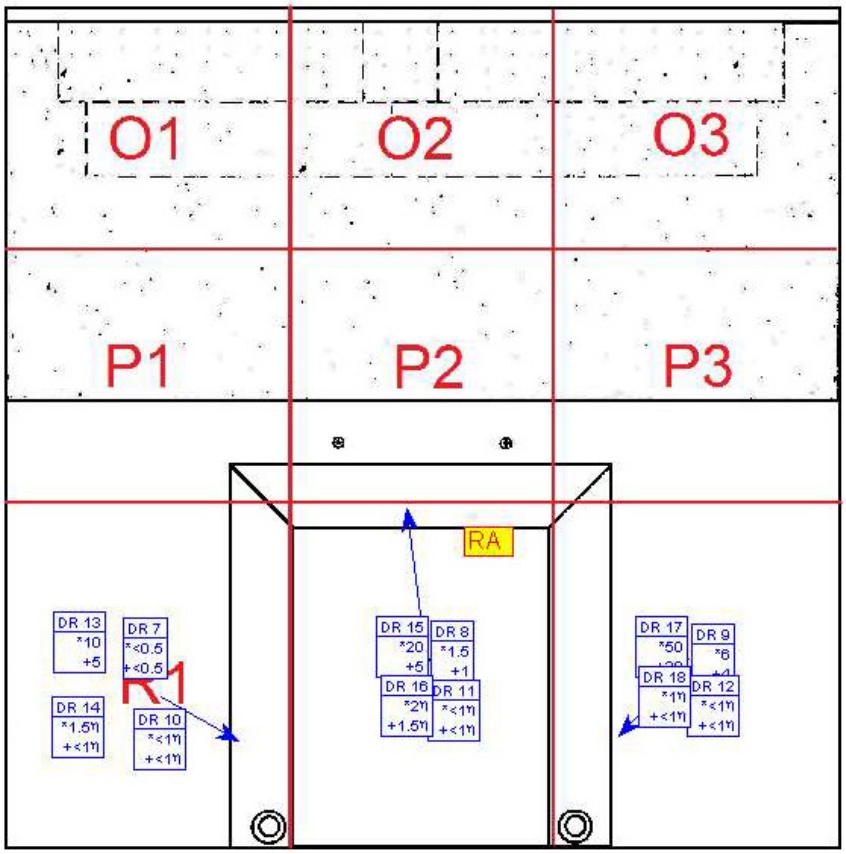
#	Notes
1	N/A
2	N/A

Log #: 349630

Notes:: N/A - 0 pages

VSDS Standard Map Survey Report

Map: 1	TREAT EAST REACTOR FACE SURVEY GRID	Survey #: M-20171116-42	Date/Time: 11/16/2017 14:44



REACTOR EAST FACE

Comments:

Summary of Highest Readings (All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+ 75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King

Status: Approved by: Jason Nelson, 12/11/2017 11:07:01

Location Code: BOF

Bldg/Area Name: TREAT 720

Location Description: TREAT 720

Log #: 349630

Image File: BOF\TREAT\Reactor Grid Surveys\East Reactor Face Survey Grid

Notes: N/A - 0 pages

Survey #: M-20171116-42 - Printed On: 1/23/2018 07:14

Page 2 of 15

VSDS Standard Map Survey Report

Data Point Details

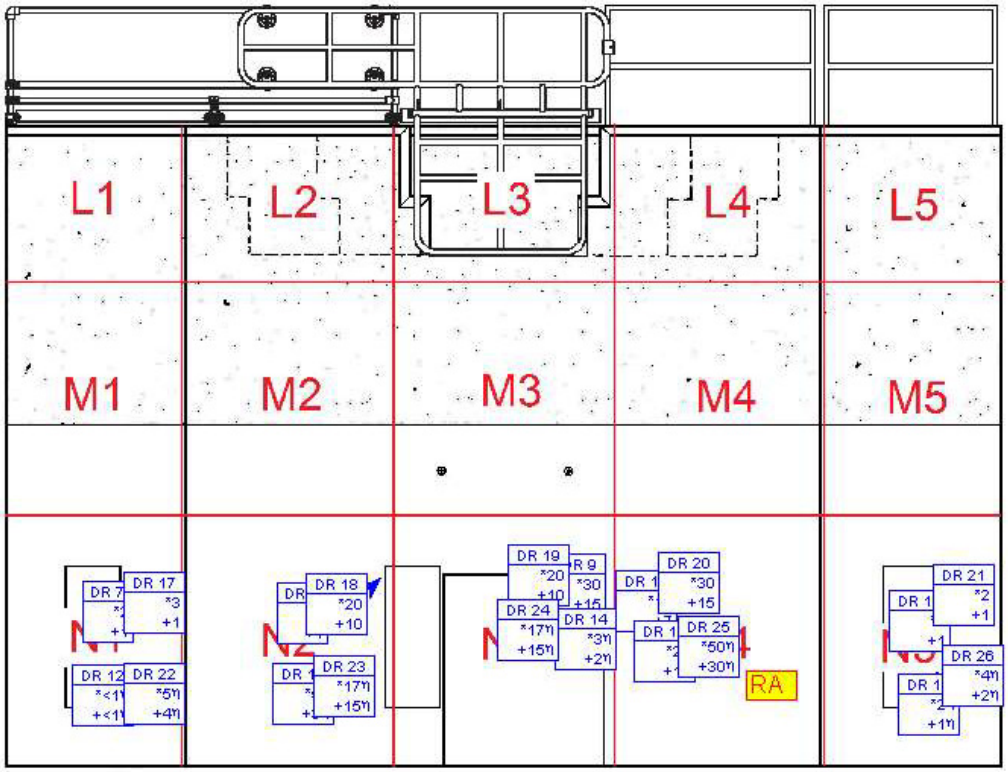
Survey #: M-20171116-42

Map: 1 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
7	DR γ	1	* <0.5	mrem/hr	R1	20KW
		1	+ <0.5	mrem/hr		
8	DR γ	1	* 1.5	mrem/hr	R2	20KW
		1	+ 1	mrem/hr		
9	DR γ	1	* 6	mrem/hr	R3	20KW
		1	+ 4	mrem/hr		
10	DR Neutron	2	* <1 η	mrem/hr	R1	20KW
		2	+ <1 η	mrem/hr		
11	DR Neutron	2	* <1 η	mrem/hr	R2	20KW
		2	+ <1 η	mrem/hr		
12	DR Neutron	2	* <1 η	mrem/hr	R3	20KW
		2	+ <1 η	mrem/hr		
13	DR γ	1	* 10	mrem/hr	R1	80KW
		1	+ 5	mrem/hr		
14	DR Neutron	2	* 1.5 η	mrem/hr	R1	80KW
		2	+ <1 η	mrem/hr		
15	DR γ	1	* 20	mrem/hr	R2	80KW
		1	+ 5	mrem/hr		
16	DR Neutron	2	* 2 η	mrem/hr	R2	80KW
		2	+ 1.5 η	mrem/hr		
17	DR γ	1	* 50	mrem/hr	R3	80KW
		1	+ 20	mrem/hr		
18	DR Neutron	2	* 1 η	mrem/hr	R3	80KW
		2	+ <1 η	mrem/hr		
	Posting		RA			

VSDS Standard Map Survey Report

Map: 2	TREAT NORTH REACTOR FACE SURVEY GRID	Survey #: M-20171116-42	Date/Time: 11/16/2017 14:44



REACTOR NORTH FACE

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King

Status: Approved by: Jason Nelson, 12/11/2017 11:07:01

Location Code: BOF

Bldg/Area Name: TREAT 720

Location Description: TREAT 720

Log #: 349630

Image File: BOF\TREAT\Reactor Grid Surveys\North Reactor Face Survey Grid

Notes: N/A - 0 pages

Survey #: M-20171116-42 - Printed On: 1/23/2018 07:14

Page 4 of 15

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171116-42
Map: 2 - TREAT EAST REACTOR FACE SURVEY GRID

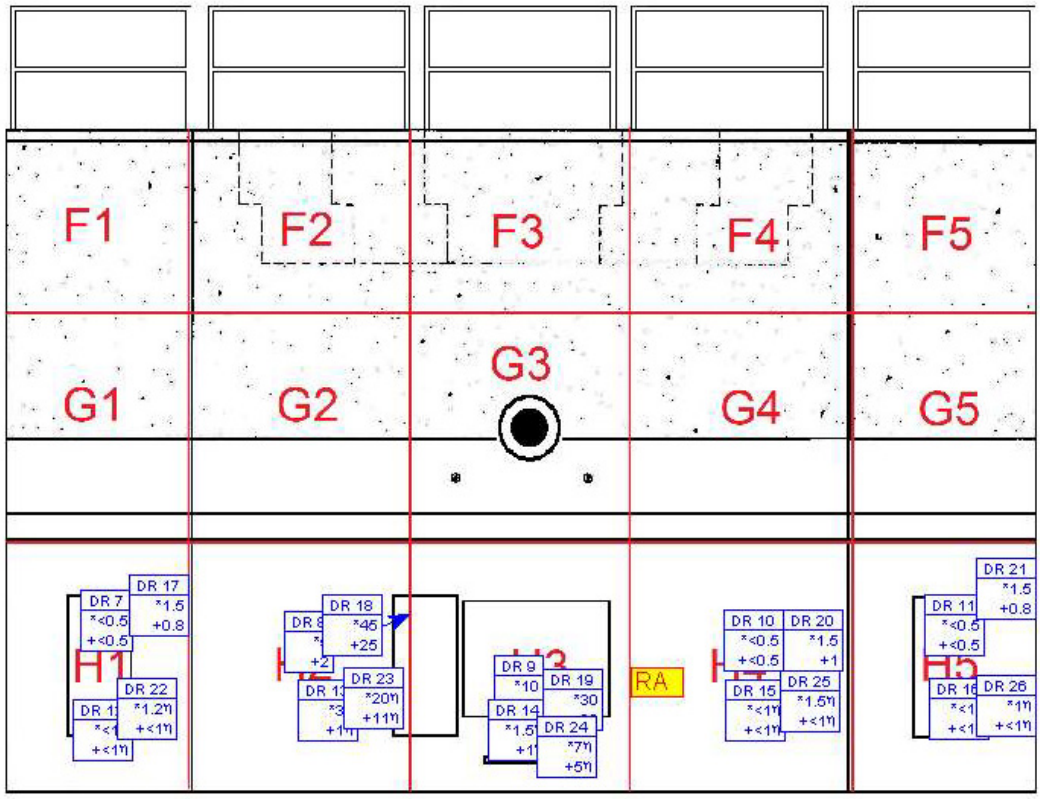
#	Type	Inst.	Value	Units	Position	Notes
7	DR γ	1	* 2	mrem/hr	N1	20KW
		1	+ 1	mrem/hr		
8	DR γ	1	* 3	mrem/hr	N2	20KW
		1	+ 1	mrem/hr		
9	DR γ	1	* 30	mrem/hr	N3	80KW
		1	+ 15	mrem/hr		
10	DR γ	1	* 15	mrem/hr	N4	20KW
		1	+ 7	mrem/hr		
11	DR γ	1	* 2	mrem/hr	N5	20KW
		1	+ 1	mrem/hr		
12	DR Neutron	2	* <1 η	mrem/hr	N1	20KW
		2	+ <1 η	mrem/hr		
13	DR Neutron	2	* 5 η	mrem/hr	N2	20KW
		2	+ 3 η	mrem/hr		
14	DR Neutron	2	* 3 η	mrem/hr	N3	20KW
		2	+ 2 η	mrem/hr		
15	DR Neutron	2	* 2 η	mrem/hr	N4	20KW
		2	+ 1 η	mrem/hr		
16	DR Neutron	2	* 2 η	mrem/hr	N5	20KW
		2	+ 1 η	mrem/hr		
17	DR γ	1	* 3	mrem/hr	N1	80KW
		1	+ 1	mrem/hr		
18	DR γ	1	* 20	mrem/hr	N2	80KW
		1	+ 10	mrem/hr		
19	DR γ	1	* 20	mrem/hr	N3	20KW
		1	+ 10	mrem/hr		
20	DR γ	1	* 30	mrem/hr	N4	80KW
		1	+ 15	mrem/hr		
21	DR γ	1	* 2	mrem/hr	N5	80KW
		1	+ 1	mrem/hr		
22	DR Neutron	2	* 5 η	mrem/hr	N1	80KW
		2	+ 4 η	mrem/hr		
23	DR Neutron	2	* 17 η	mrem/hr	N2	80KW
		2	+ 15 η	mrem/hr		
24	DR Neutron	2	* 17 η	mrem/hr	N3	80KW
		2	+ 15 η	mrem/hr		
25	DR Neutron	2	* 50 η	mrem/hr	N4	80KW
		2	+ 30 η	mrem/hr		
26	DR Neutron	2	* 4 η	mrem/hr	N5	80KW
		2	+ 2 η	mrem/hr		
	Posting		RA			

Log #: 349630
Notes:: N/A - 0 pages
Survey #: M-20171116-42 - Printed On: 1/23/2018 07:14

Image File: BOF\TREAT\Reactor Grid Surveys\North Reactor Face Survey Grid

VSDS Standard Map Survey Report

Map: 3	TREAT SOUTH REACTOR FACE SURVEY GRID	Survey #: M-20171116-42	Date/Time: 11/16/2017 14:44



REACTOR SOUTH FACE

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+ 75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF 2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Jason Nelson, 12/11/2017 11:07:01
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 349630
Image File: BOF\TREAT\Reactor Grid Surveys\South Reactor Face Grid Survey
Notes: N/A - 0 pages
Survey #: M-20171116-42 - Printed On: 1/23/2018 07:14
Page 6 of 15

VSDS Standard Map Survey Report

Data Point Details

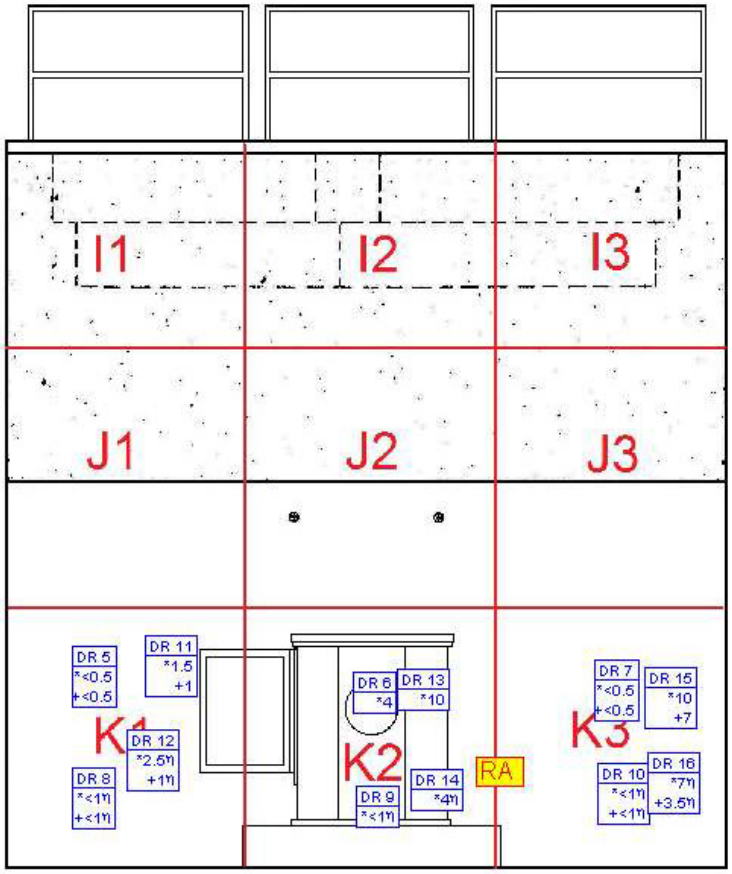
Survey #: M-20171116-42

Map: 3 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
7	DR γ	1	* <0.5	mrem/hr	H1	20KW
		1	+ <0.5	mrem/hr		
8	DR γ	1	* 5	mrem/hr	H2	20KW
		1	+ 2	mrem/hr		
9	DR γ	1	* 10	mrem/hr	H3	20KW
		1	+ 6	mrem/hr		
10	DR γ	1	* <0.5	mrem/hr	H4	20KW
		1	+ <0.5	mrem/hr		
11	DR γ	1	* <0.5	mrem/hr	H5	20KW
		1	+ <0.5	mrem/hr		
12	DR Neutron	2	* <1 η	mrem/hr	H1	20KW
		2	+ <1 η	mrem/hr		
13	DR Neutron	2	* 3 η	mrem/hr	H2	20KW
		2	+ 1 η	mrem/hr		
14	DR Neutron	2	* 1.5 η	mrem/hr	H3	20KW
		2	+ 1 η	mrem/hr		
15	DR Neutron	2	* <1 η	mrem/hr	H4	20KW
		2	+ <1 η	mrem/hr		
16	DR Neutron	2	* <1 η	mrem/hr	H5	20KW
		2	+ <1 η	mrem/hr		
17	DR γ	1	* 1.5	mrem/hr	H1	80KW
		1	+ 0.8	mrem/hr		
18	DR γ	1	* 45	mrem/hr	H2	80KW
		1	+ 25	mrem/hr		
19	DR γ	1	* 30	mrem/hr	H3	80KW
		1	+ 20	mrem/hr		
20	DR γ	1	* 1.5	mrem/hr	H4	80KW
		1	+ 1	mrem/hr		
21	DR γ	1	* 1.5	mrem/hr	H5	80KW
		1	+ 0.8	mrem/hr		
22	DR Neutron	2	* 1.2 η	mrem/hr	H1	80KW
		2	+ <1 η	mrem/hr		
23	DR Neutron	2	* 20 η	mrem/hr	H2	80KW
		2	+ 11 η	mrem/hr		
24	DR Neutron	2	* 7 η	mrem/hr	H3	80KW
		2	+ 5 η	mrem/hr		
25	DR Neutron	2	* 1.5 η	mrem/hr	H4	80KW
		2	+ <1 η	mrem/hr		
26	DR Neutron	2	* 1 η	mrem/hr	H5	80KW
		2	+ <1 η	mrem/hr		
	Posting		RA			

VSDS Standard Map Survey Report

Map: 4	TREAT WEST REACTOR FACE SURVEY GRID	Survey #: M-20171116-42	Date/Time: 11/16/2017 14:44



REACTOR WEST FACE

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+ 75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF 2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King

Status: Approved by: Jason Nelson, 12/11/2017 11:07:01

Location Code: BOF

Bldg/Area Name: TREAT 720

Location Description: TREAT 720

Log #: 349630

Image File: BOF\TREAT\Reactor Grid Surveys\West Reactor Face Survey Grid

Notes: N/A - 0 pages

Survey #: M-20171116-42 - Printed On: 1/23/2018 07:14

Page 8 of 15

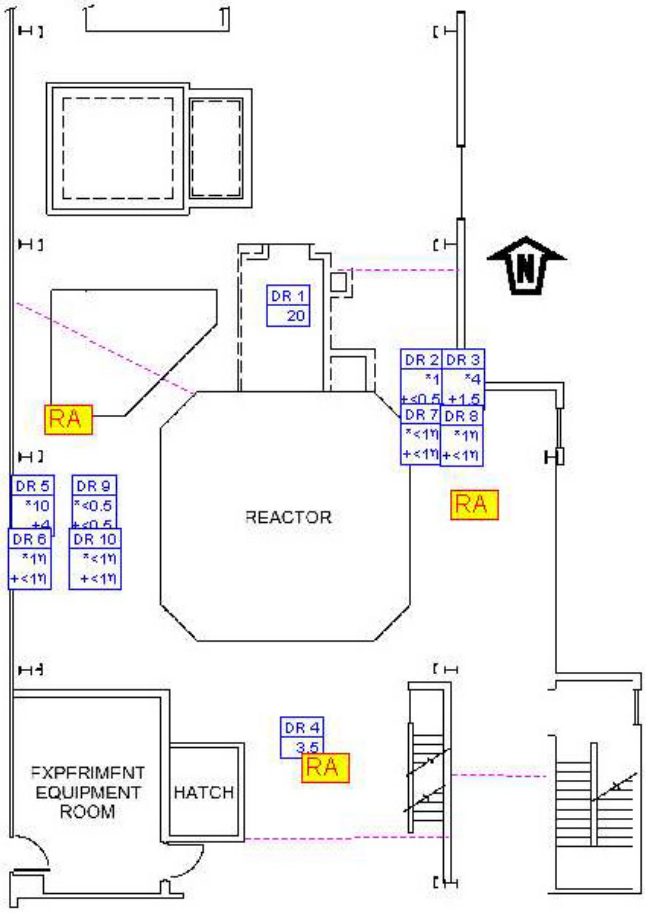
VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171116-42
Map: 4 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
5	DR γ	1	* <0.5	mrem/hr	K1	20KW
		1	+ <0.5	mrem/hr		
6	DR γ	1	* 4	mrem/hr	K2	20KW
7	DR γ	1	* <0.5	mrem/hr	K3	20KW
		1	+ <0.5	mrem/hr		
8	DR Neutron	2	* <1 η	mrem/hr	K1	20KW
		2	+ <1 η	mrem/hr		
9	DR Neutron	2	* <1 η	mrem/hr	K2	20KW
10	DR Neutron	2	* <1 η	mrem/hr	K3	20KW
		2	+ <1 η	mrem/hr		
11	DR γ	1	* 1.5	mrem/hr	K1	80KW
		1	+ 1	mrem/hr		
12	DR Neutron	2	* 2.5 η	mrem/hr	K1	80KW
		2	+ 1 η	mrem/hr		
13	DR γ	1	* 10	mrem/hr	K2	80KW
14	DR Neutron	2	* 4 η	mrem/hr	K2	80KW
15	DR γ	1	* 10	mrem/hr	K3	80KW
		1	+ 7	mrem/hr		
16	DR Neutron	2	* 7 η	mrem/hr	K3	80KW
		2	+ 3.5 η	mrem/hr		
	Posting		RA			

VSDS Standard Map Survey Report

Map: 5	TREAT FLOOR AROUND REACTOR	Survey #: M-20171116-42	Date/Time: 11/16/2017 14:44



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Jason Nelson, 12/11/2017 11:07:01
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 349630
Image File: BOF\TREAT\TREAT Floor Around Reactor Survey Map
Notes: N/A - 0 pages
Survey #: M-20171116-42 - Printed On: 1/23/2018 07:14
Page 10 of 15

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171116-42
Map: 5 - TREAT EAST REACTOR FACE SURVEY GRID

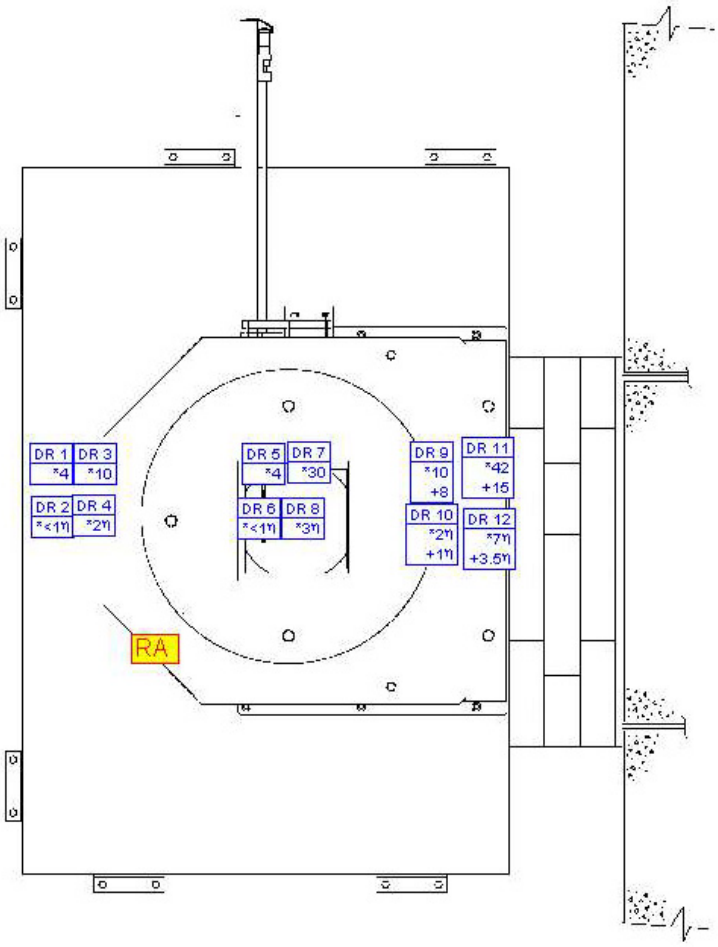
#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	20	mrem/hr	behind shield	80KW
2	DR γ	1	* 1	mrem/hr	Floor	20KW
		1	+ <0.5	mrem/hr		
3	DR γ	1	* 4	mrem/hr	Floor	80KW
		1	+ 1.5	mrem/hr		
4	DR γ	1	3.5	mrem/hr		80KW
5	DR γ	1	* 10	mrem/hr	Out Side of shield	80KW
		1	+ 4	mrem/hr		
6	DR Neutron	2	* 1 η	mrem/hr	Out Side of shield	80KW
		2	+ <1 η	mrem/hr		
7	DR Neutron	2	* <1 η	mrem/hr	Floor	20KW
		2	+ <1 η	mrem/hr		
8	DR Neutron	2	* 1 η	mrem/hr	Floor	80KW
		2	+ <1 η	mrem/hr		
9	DR γ	1	* <0.5	mrem/hr	Out Side of shield	20KW
		1	+ <0.5	mrem/hr		
10	DR Neutron	2	* <1 η	mrem/hr	Out Side of shield	20KW
		2	+ <1 η	mrem/hr		
	Posting		RA			
	Posting		RA			
	Posting		RA			

Log #: 349630
Notes:: N/A - 0 pages
Survey #: M-20171116-42 - Printed On: 1/23/2018 07:14

Image File: BOF\TREAT\TREAT Floor Around Reactor Survey Map

VSDS Standard Map Survey Report

Map: 6	TREAT RADIOGRAPHY STAND-TOP VIEW	Survey #: M-20171116-42	Date/Time: 11/16/2017 14:44



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Jason Nelson, 12/11/2017 11:07:01
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 349630
Notes: N/A - 0 pages
Survey #: M-20171116-42 - Printed On: 1/23/2018 07:14

Image File: BOF\TREAT\Radioagraphy Stand\Radiography Stand - Top View

Page 12 of 15

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171116-42

Map: 6 - TREAT EAST REACTOR FACE SURVEY GRID

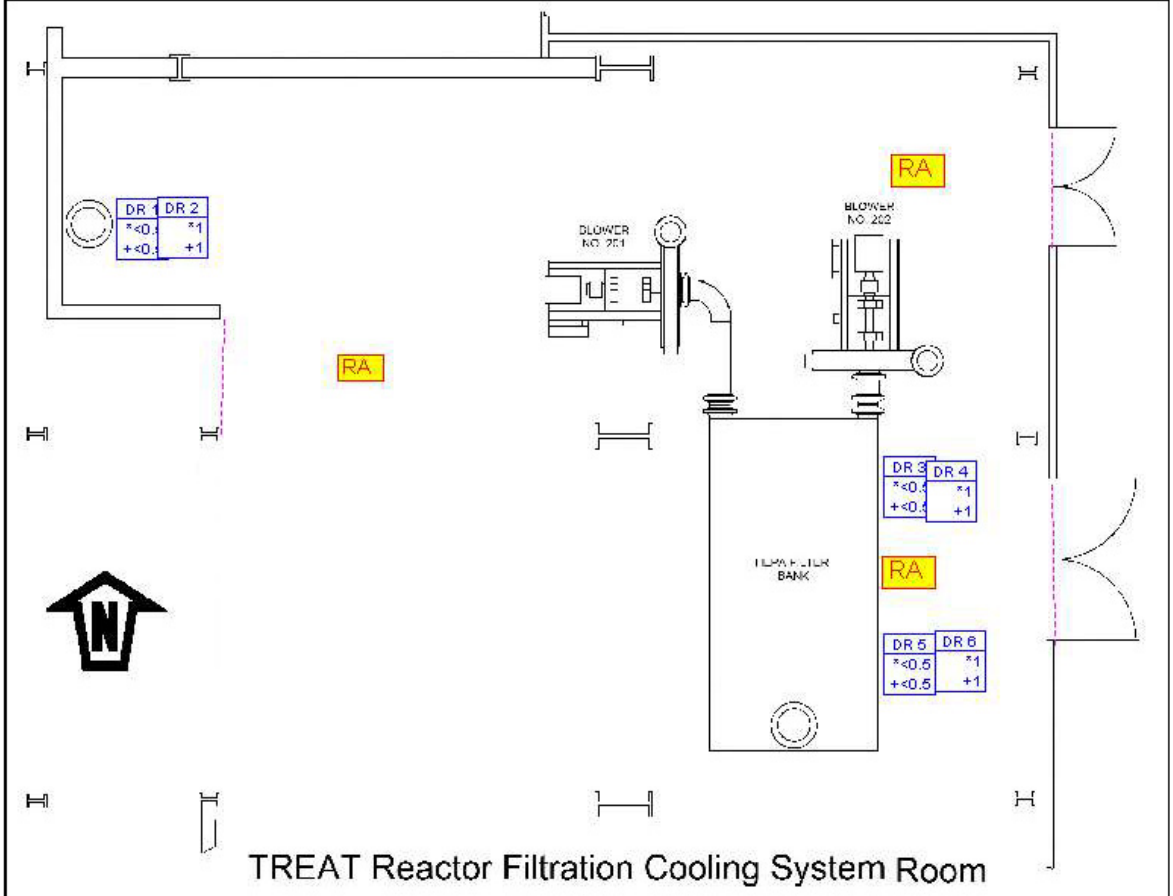
#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	* 4	mrem/hr		20KW
2	DR Neutron	2	* <1 η	mrem/hr		20KW
3	DR γ	1	* 10	mrem/hr		80KW
4	DR Neutron	2	* 2 η	mrem/hr	80KW	
5	DR γ	1	* 4	mrem/hr		20KW
6	DR Neutron	2	* <1 η	mrem/hr		20KW
7	DR γ	1	* 30	mrem/hr		80KW
8	DR Neutron	2	* 3 η	mrem/hr		80KW
9	DR γ	1	* 10	mrem/hr		20KW
		1	+ 8	mrem/hr		
10	DR Neutron	2	* 2 η	mrem/hr		20KW
		2	+ 1 η	mrem/hr		
11	DR γ	1	* 42	mrem/hr		80KW
		1	+ 15	mrem/hr		
12	DR Neutron	2	* 7 η	mrem/hr		80KW
		2	+ 3.5 η	mrem/hr		
	Posting		RA			

Log #: 349630
Notes:: N/A - 0 pages
Survey #: M-20171116-42 - Printed On: 1/23/2018 07:14

Image File: BOF\TREAT\Radioagraphy Stand\Radiography Stand - Top View

VSDS Standard Map Survey Report

Map: 7	TREAT REACTOR FILTRATION COOLING SYSTEM ROOM	Survey #: M-20171116-42	Date/Time: 11/16/2017 14:44



TREAT Reactor Filtration Cooling System Room

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+ 75 30 cm Reading
20 General Area
HS-50 Hot Spot
RCA Posting
Drip Bag
15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Jason Nelson, 12/11/2017 11:07:01
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 349630
Image File: BOF\TREAT\TREAT Reactor Filtration Cooling System Room Clean - Plan View
Notes: N/A - 0 pages
Survey #: M-20171116-42 - Printed On: 1/23/2018 07:14
Page 14 of 15

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171116-42
Map: 7 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	* <0.5	mrem/hr		20KW
		1	+ <0.5	mrem/hr		
2	DR γ	1	* 1	mrem/hr		80KW
		1	+ 1	mrem/hr		
3	DR γ	1	* <0.5	mrem/hr		20KW
		1	+ <0.5	mrem/hr		
4	DR γ	1	* 1	mrem/hr		80KW
		1	+ 1	mrem/hr		
5	DR γ	1	* <0.5	mrem/hr		20KW
		1	+ <0.5	mrem/hr		
6	DR γ	1	* 1	mrem/hr		80KW
		1	+ 1	mrem/hr		
	Posting		RA			
	Posting		RA			
	Posting		RA			

Log #: 349630
Notes:: N/A - 0 pages
Survey #: M-20171116-42 - Printed On: 1/23/2018 07:14

Image File: BOF\TREAT\TREAT Reactor Filtration Cooling System Room Clean - Plan View

VSDS Standard Map Survey Report

Survey M-20171128-39

General Information

Title: BOFTREAT Start-up Mezzanine/ High bay

Survey Date/Time: 11/28/2017 12:45 — Lead Surveyor: Bryan King

Survey Type: Other - Start up Radiation — Work Order/Task #: PLN-5350

Counted By: — KCN: 54625

RWP and Task#: BOF2017009

Status: Approved by: Jared A Daw, 1/11/2018 11:26:53 — KCN: 111225

Ready for Review by: Bryan King, 12/7/2017 16:33:24 — KCN: 54625

Additional Surveyors

Surveyor
Benjamin W Walker

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

HRA=High Radiation Area RA=Radiation Area RBA=Radiological Buffer Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency		
				β/γ	β	α
1	B20-ER	803201	D	N/A	N/A	N/A
2	E-600 w/Remball	802087	D	N/A	N/A	N/A
3	RO20	803106	D	N/A	N/A	N/A

Instruments Used - Notes

#	Notes
1	N/A
2	N/A
3	N/A

Log #: 350364
Notes:: N/A - 0 pages
Survey #: M-20171128-39 - Printed On: 1/23/2018 07:18

VSDS Standard Map Survey Report

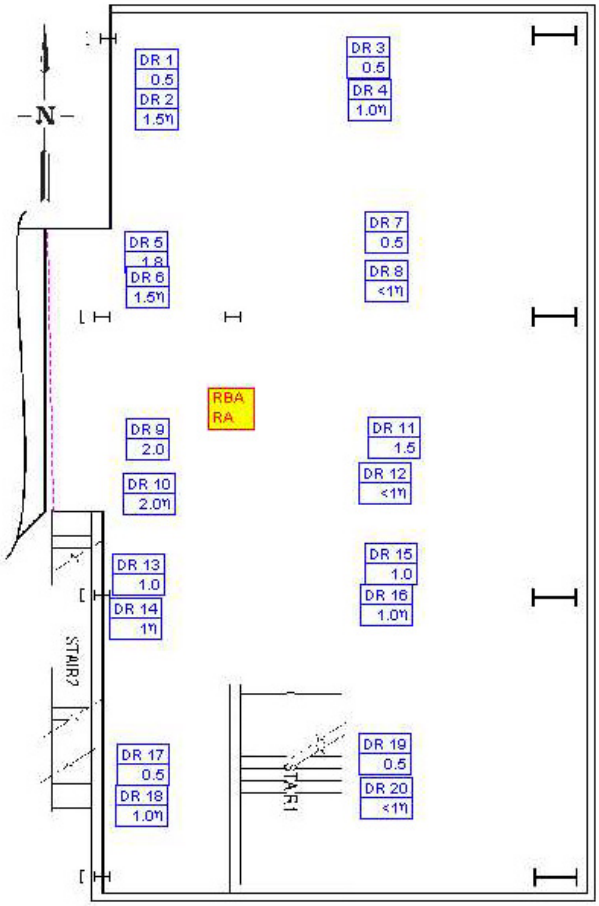
Comments:

TREAT's perimeter fence is posted as a RBA-RO

Log #: 350364
Notes:: N/A - 0 pages
Survey #: M-20171128-39 - Printed On: 1/23/2018 07:18

VSDS Standard Map Survey Report

Map: 1	TREAT FLOOR PLAN SECOND FLOOR	Survey #: M-20171128-39	Date/Time: 11/28/2017 12:45



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Jared A Daw, 1/11/2018 11:26:53
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 350364
Image File: BOF\TREAT\TREAT Floor Plan Second Floor
Notes: N/A - 0 pages
Survey #: M-20171128-39 - Printed On: 1/23/2018 07:18
Page 3 of 8

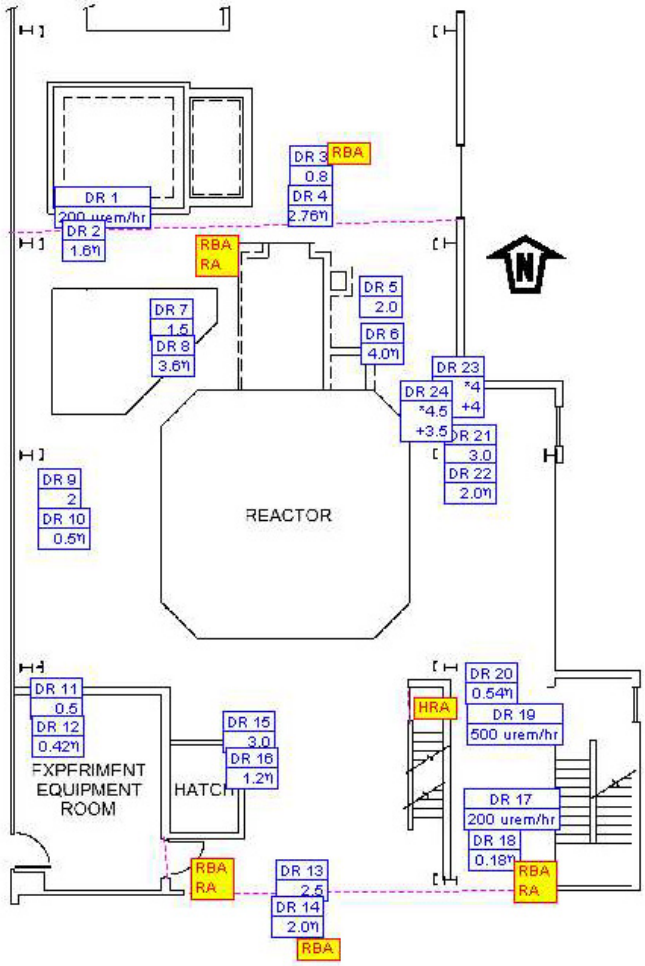
VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171128-39
Map: 1 - TREAT FLOOR PLAN SECOND FLOOR

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	3	0.5	mrem/hr		
2	DR Neutron	2	1.5 η	mrem/hr		
3	DR γ	3	0.5	mrem/hr		
4	DR Neutron	2	1.0 η	mrem/hr		
5	DR γ	3	1.8	mrem/hr		
6	DR Neutron	2	1.5 η	mrem/hr		
7	DR γ	3	0.5	mrem/hr		
8	DR Neutron	2	<1 η	mrem/hr		
9	DR γ	3	2.0	mrem/hr		
10	DR Neutron	2	2.0 η	mrem/hr		
11	DR γ	3	1.5	mrem/hr		
12	DR Neutron	2	<1 η	mrem/hr		
13	DR γ	3	1.0	mrem/hr		
14	DR Neutron	2	1 η	mrem/hr		
15	DR γ	3	1.0	mrem/hr		
16	DR Neutron	2	1.0 η	mrem/hr		
17	DR γ	3	0.5	mrem/hr		
18	DR Neutron	2	1.0 η	mrem/hr		
19	DR γ	3	0.5	mrem/hr		
20	DR Neutron	2	<1 η	mrem/hr		
	Posting		RBA RA			

VSDS Standard Map Survey Report

Map: 2	TREAT FLOOR AROUND REACTOR	Survey #: M-20171128-39	Date/Time: 11/28/2017 12:45



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area
HS-50 Hot Spot
RCA Posting
Drip Bag
15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King
Status: Approved by: Jared A Daw, 1/11/2018 11:26:53
Location Code: BOF
Bldg/Area Name: TREAT 720
Location Description: TREAT 720

Log #: 350364
Image File: BOF\TREAT\TREAT Floor Around Reactor Survey Map
Notes: N/A - 0 pages
Survey #: M-20171128-39 - Printed On: 1/23/2018 07:18
Page 5 of 8

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171128-39

Map: 2 - TREAT FLOOR PLAN SECOND FLOOR

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	200	urem/hr		
2	DR Neutron	2	1.6 η	mrem/hr		
3	DR γ	3	0.8	mrem/hr		
4	DR Neutron	2	2.76 η	mrem/hr		
5	DR γ	3	2.0	mrem/hr		
6	DR Neutron	2	4.0 η	mrem/hr		
7	DR γ	3	1.5	mrem/hr		
8	DR Neutron	2	3.6 η	mrem/hr		
9	DR γ	3	2	mrem/hr		
10	DR Neutron	2	0.5 η	mrem/hr		
11	DR γ	3	0.5	mrem/hr		
12	DR Neutron	2	0.42 η	mrem/hr		
13	DR γ	3	2.5	mrem/hr		
14	DR Neutron	2	2.0 η	mrem/hr		
15	DR γ	3	3.0	mrem/hr		
16	DR Neutron	2	1.2 η	mrem/hr		
17	DR γ	1	200	urem/hr		
18	DR Neutron	2	0.18 η	mrem/hr		
19	DR γ	1	500	urem/hr		
20	DR Neutron	2	0.54 η	mrem/hr		
21	DR γ	3	3.0	mrem/hr		
22	DR Neutron	2	2.0 η	mrem/hr		
23	DR γ	2	* 4	mrem/hr	Floor grate	
		2	+ 4	mrem/hr		
24	DR γ	3	* 4.5	mrem/hr	Floor grate	
		3	+ 3.5	mrem/hr		
	Posting		RBA RA			
	Posting		RBA RA			
	Posting		RBA RA			
	Posting		HRA			
	Posting		RBA			
	Posting		RBA			

Log #: 350364

Notes:: N/A - 0 pages

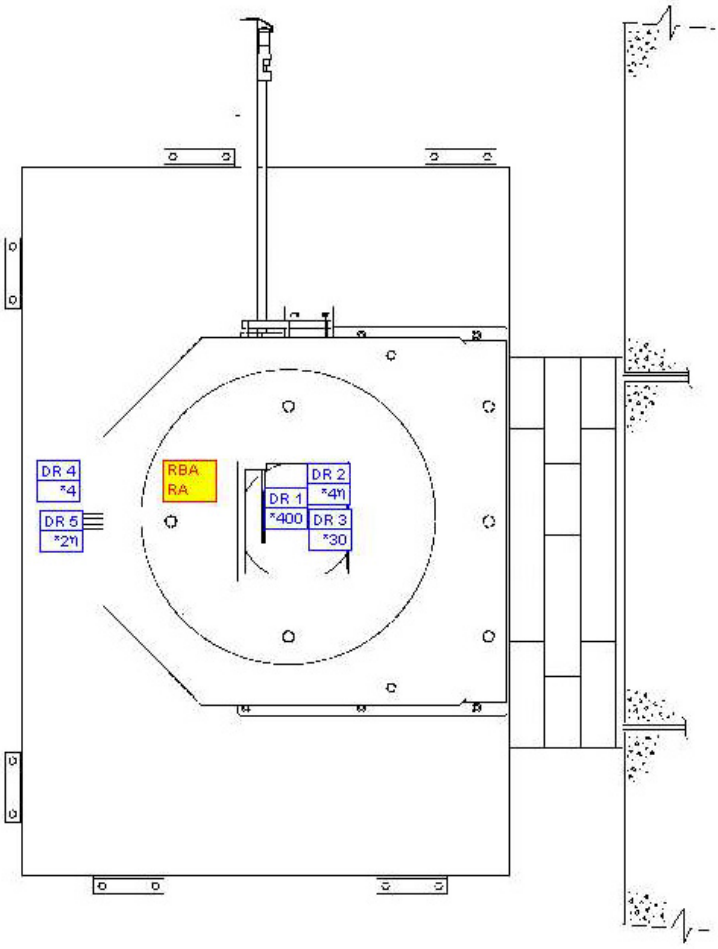
Survey #: M-20171128-39 - Printed On: 1/23/2018 07:18

Image File: BOF\TREAT\TREAT Floor Around Reactor Survey Map

Page 6 of 8

VSDS Standard Map Survey Report

Map: 3	TREAT RADIOGRAPHY STAND-TOP VIEW	Survey #: M-20171128-39	Date/Time: 11/28/2017 12:45



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF 2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Jared A Daw, 1/11/2018 11:26:53
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 350364
Image File: BOF\TREAT\Radioagraphy Stand\Radiography Stand - Top View
Notes: N/A - 0 pages
Survey #: M-20171128-39 - Printed On: 1/23/2018 07:18
Page 7 of 8

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171128-39

Map: 3 - TREAT FLOOR PLAN SECOND FLOOR

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	3	* 400	mrem/hr	Inside hole below cover	
2	DR Neutron	2	* 4 η	mrem/hr	Top of cover	
3	DR γ	3	* 30	mrem/hr	Top of cover	
4	DR γ	3	* 4	mrem/hr		
5	DR Neutron	2	* 2 η	mrem/hr		
	Posting		RBA RA			

VSDS Standard Map Survey Report

Survey M-20171128-40

General Information

Title: BOFTREAT-Startup survey Filtration/ Hodoscope/ Mechanical RM

Survey Date/Time: 11/28/2017 10:30 — Lead Surveyor: Benjamin W Walker

Survey Type: Other - Start-up Radiation — Work Order/Task #: PLN-5350

Counted By: — KCN: 113438

RWP and Task#: BOF2017009

Status: Approved by: Jared A Daw, 11/29/2017 14:24:54 — KCN: 111225

Ready for Review by: Benjamin W Walker, 11/29/2017 07:12:03 — KCN: 113438

Additional Surveyors

Surveyor
Bryan King

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

RA=Radiation Area — RBA=Radiological Buffer Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency		
				β/γ	β	α
1	B20-ER	803201	D	N/A	N/A	N/A
2	E-600 w/Remball	802087	D	N/A	N/A	N/A

Instruments Used - Notes

#	Notes
1	N/A
2	N/A

Log #: 350364

Notes:: N/A - 0 pages

VSDS Standard Map Survey Report

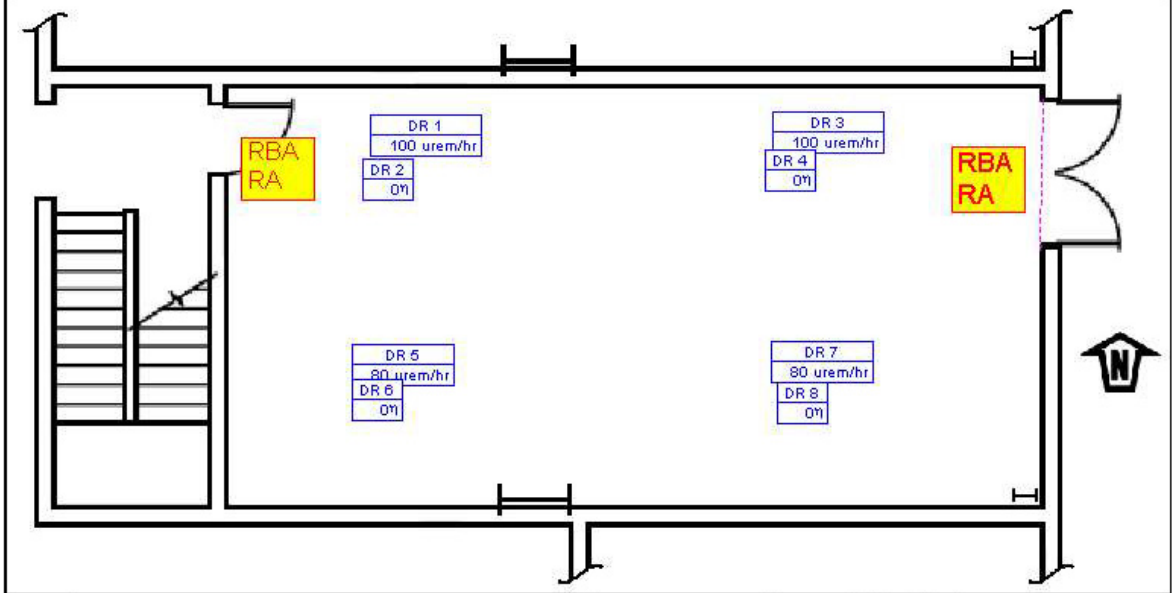
Comments:

TREAT's perimeter fence is posted as a RBA-RO

Log #: 350364
Notes:: N/A - 0 pages
Survey #: M-20171128-40 - Printed On: 12/11/2017 09:14

VSDS Standard Map Survey Report

Map: 1	TREAT MECHANICAL EQUIPMENT ROOM	Survey #: M-20171128-40	Date/Time: 11/28/2017 10:30



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start-up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task#: BOF2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Benjamin W Walker	Status: Approved by: Jared A Daw, 11/29/2017 14:24:54
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 350364
Image File: BOF\TREAT\TREAT Mechanical Equipment Room
Notes: N/A - 0 pages
Survey #: M-20171128-40 - Printed On: 12/11/2017 09:14
Page 3 of 8

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171128-40
Map: 1 - TREAT MECHANICAL EQUIPMENT ROOM

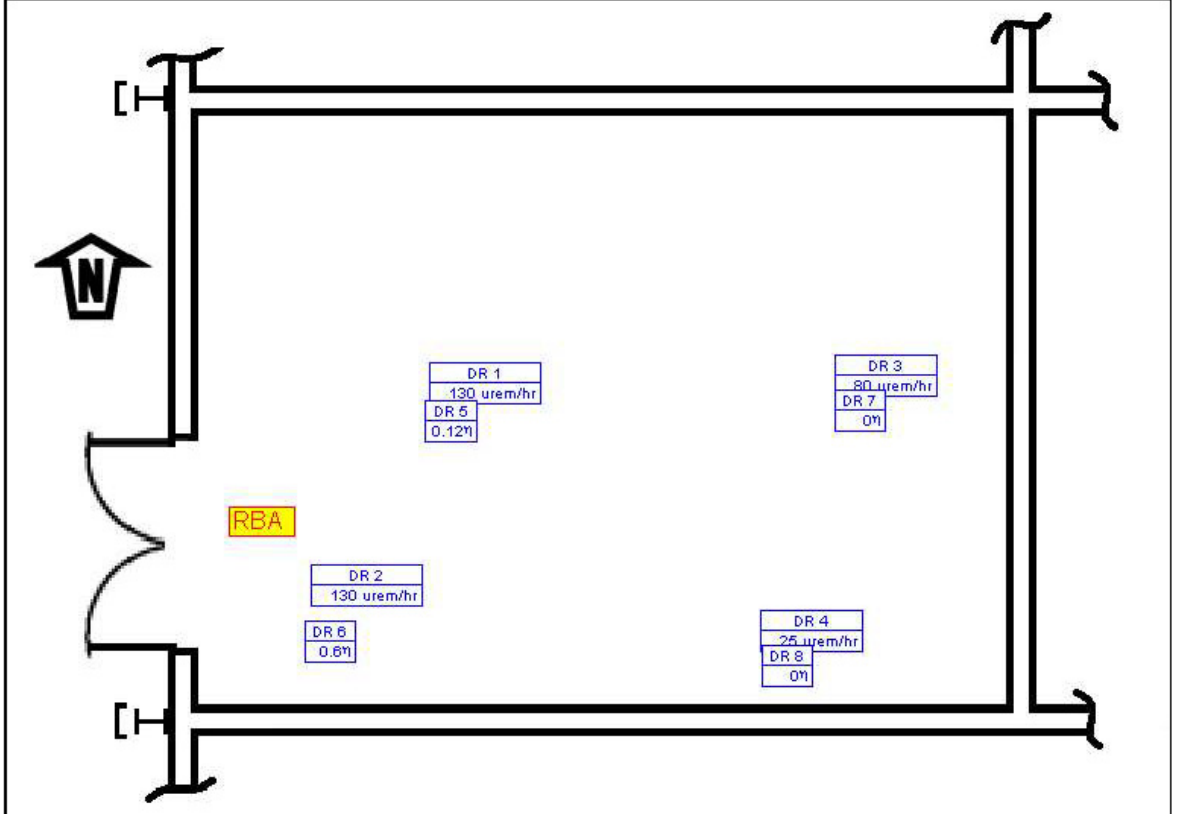
#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	100	urem/hr		
2	DR Neutron	2	0 η	mrem/hr		
3	DR γ	1	100	urem/hr		
4	DR Neutron	2	0 η	mrem/hr		
5	DR γ	1	80	urem/hr		
6	DR Neutron	2	0 η	mrem/hr		
7	DR γ	1	80	urem/hr		
8	DR Neutron	2	0 η	mrem/hr		
	Posting		RBA RA			
	Posting		RBA RA			

Log #: 350364
Notes:: N/A - 0 pages
Survey #: M-20171128-40 - Printed On: 12/11/2017 09:14

Image File: BOF\TREAT\TREAT Mechanical Equipment Room

VSDS Standard Map Survey Report

Map: 2	TREAT HODOSCOPE ROOM	Survey #: M-20171128-40	Date/Time: 11/28/2017 10:30



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start-up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task#: BOF2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Benjamin W Walker	Status: Approved by: Jared A Daw, 11/29/2017 14:24:54
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 350364
Image File: BOF\TREAT\TREAT Hodoscope Room
Notes: N/A - 0 pages
Survey #: M-20171128-40 - Printed On: 12/11/2017 09:14
Page 5 of 8

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171128-40

Map: 2 - TREAT MECHANICAL EQUIPMENT ROOM

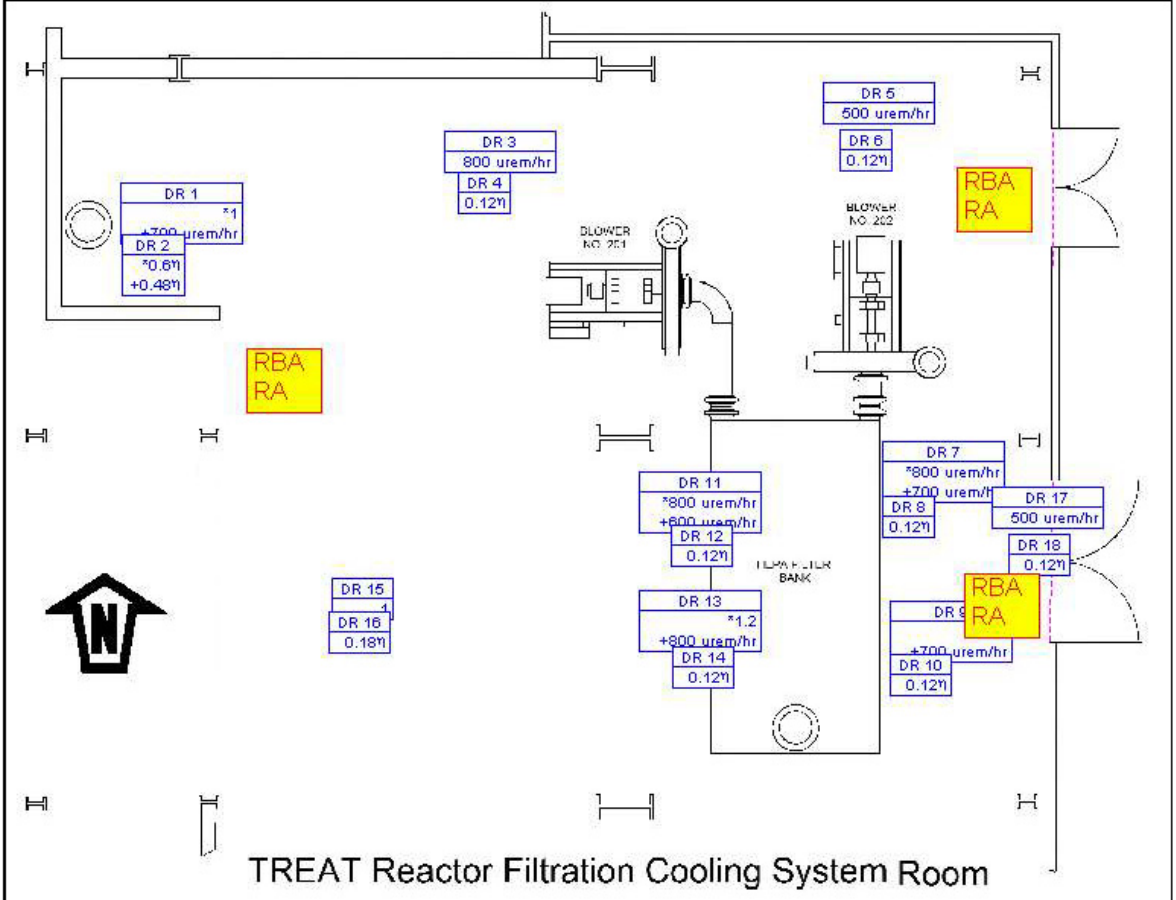
#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	130	urem/hr		
2	DR γ	1	130	urem/hr		
3	DR γ	1	80	urem/hr		
4	DR γ	1	25	urem/hr		
5	DR Neutron	2	0.12 η	mrem/hr		
6	DR Neutron	2	0.6 η	mrem/hr		
7	DR Neutron	2	0 η	mrem/hr		
8	DR Neutron	2	0 η	mrem/hr		
	Posting		RBA			

Log #: 350364
Notes:: N/A - 0 pages
Survey #: M-20171128-40 - Printed On: 12/11/2017 09:14

Image File: BOF\TREAT\TREAT Hodoscope Room

VSDS Standard Map Survey Report

Map: 3	TREAT REACTOR FILTRATION COOLING SYSTEM ROOM	Survey #: M-20171128-40	Date/Time: 11/28/2017 10:30



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start-up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+ 75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF 2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Benjamin W Walker	Status: Approved by: Jared A Daw; 11/29/2017 14:24:54
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 350364
Image File: BOF\TREAT\TREAT Reactor Filtration Cooling System Room Clean - Plan View
Notes: N/A - 0 pages
Survey #: M-20171128-40 - Printed On: 12/11/2017 09:14
Page 7 of 8

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171128-40

Map: 3 - TREAT MECHANICAL EQUIPMENT ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	* 1	mrem/hr		
		1	+ 700	urem/hr		
2	DR Neutron	2	* 0.6 η	mrem/hr		
		2	+ 0.48 η	mrem/hr		
3	DR γ	1	800	urem/hr		
4	DR Neutron	2	0.12 η	mrem/hr		
5	DR γ	1	500	urem/hr		
6	DR Neutron	2	0.12 η	mrem/hr		
7	DR γ	1	* 800	urem/hr		
		1	+ 700	urem/hr		
8	DR Neutron	2	0.12 η	mrem/hr		
9	DR γ	1	* 1	mrem/hr		
		1	+ 700	urem/hr		
10	DR Neutron	2	0.12 η	mrem/hr		
11	DR γ	1	* 800	urem/hr		
		1	+ 600	urem/hr		
12	DR Neutron	2	0.12 η	mrem/hr		
13	DR γ	1	* 1.2	mrem/hr		
		1	+ 800	urem/hr		
14	DR Neutron	2	0.12 η	mrem/hr		
15	DR γ	1	1	mrem/hr		
16	DR Neutron	2	0.18 η	mrem/hr		
17	DR γ	1	500	urem/hr		
18	DR Neutron	2	0.12 η	mrem/hr		
	Posting		RBA RA			
	Posting		RBA RA			
	Posting		RBA RA			

Log #: 350364

Image File: BOF\TREAT\TREAT Reactor Filtration Cooling System Room Clean - Plan View

Notes:: N/A - 0 pages

Survey #: M-20171128-40 - Printed On: 12/11/2017 09:14

Page 8 of 8

VSDS Standard Map Survey Report

Survey M-20171128-41

General Information

Title: BOFTREAT Start-up survey- Office areas and building ext.

Survey Date/Time: 11/28/2017 12:00
Lead Surveyor: Benjamin W Walker

Survey Type: Other - Start up Radiation
Work Order/Task #: PLN-5350

Counted By:
KCN: 113438

RWP and Task#: BOF2017009

Status: Approved by: Jared A Daw, 11/29/2017 14:31:42
KCN: 111225

Ready for Review by: Bryan King, 11/29/2017 09:37:04
KCN: 54625

Additional Surveyors

Surveyor
Bryan King
Jason Nelson

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

RBA-RO=RBA - Radiation Only

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency		
				β/γ	β	α
1	B20-ER	803202	D	N/A	N/A	N/A
2	E-600 w/Remball	801890	D	N/A	N/A	N/A

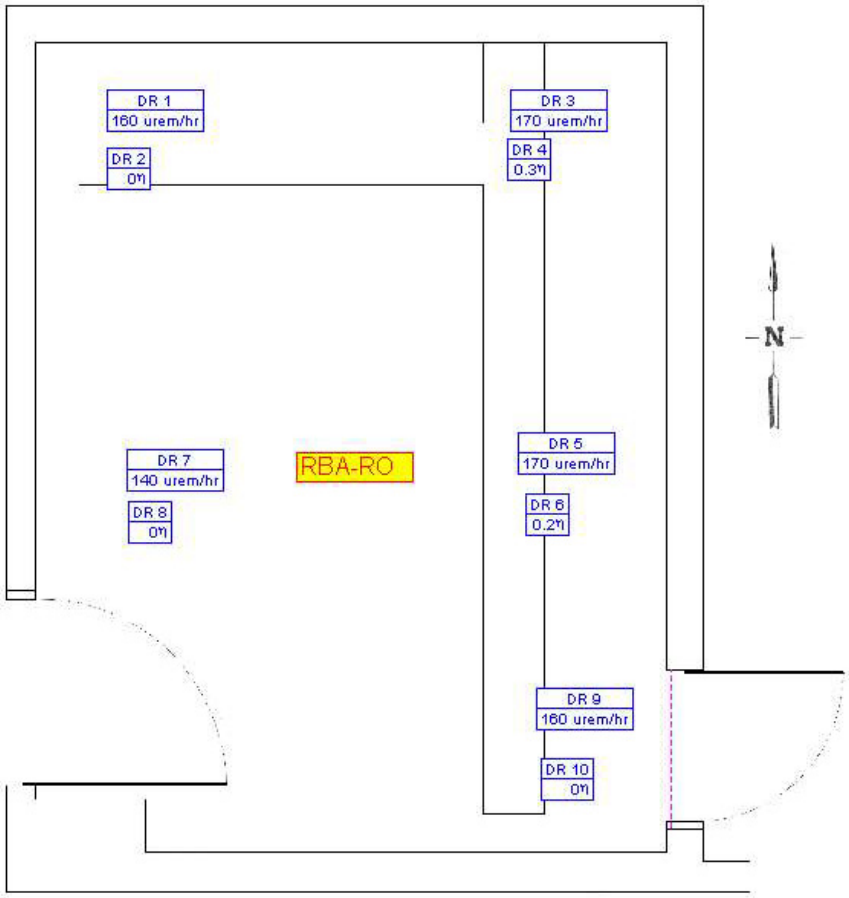
Instruments Used - Notes

#	Notes
1	N/A
2	N/A

Log #: 350364
Notes:: N/A - 0 pages
Survey #: M-20171128-41 - Printed On: 12/11/2017 09:17

VSDS Standard Map Survey Report

Map: 1	TREAT EXPERIMENTERS ROOM	Survey #: M-20171128-41	Date/Time: 11/28/2017 12:00



Experimental Equipment Room 124

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

RWP and Task#: BOF2017009

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Benjamin W Walker

Status: Approved by: Jared A Daw, 11/29/2017 14:31:42

Location Code: BOF

Bldg/Area Name: TREAT 720

Location Description: TREAT 720

Log #: 350364

Image File: BOF\TREAT\TREAT Experimenters Room

Notes: N/A - 0 pages

Survey #: M-20171128-41 - Printed On: 12/11/2017 09:17

Page 2 of 11

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171128-41
Map: 1 - TREAT EXPERIMENTERS ROOM

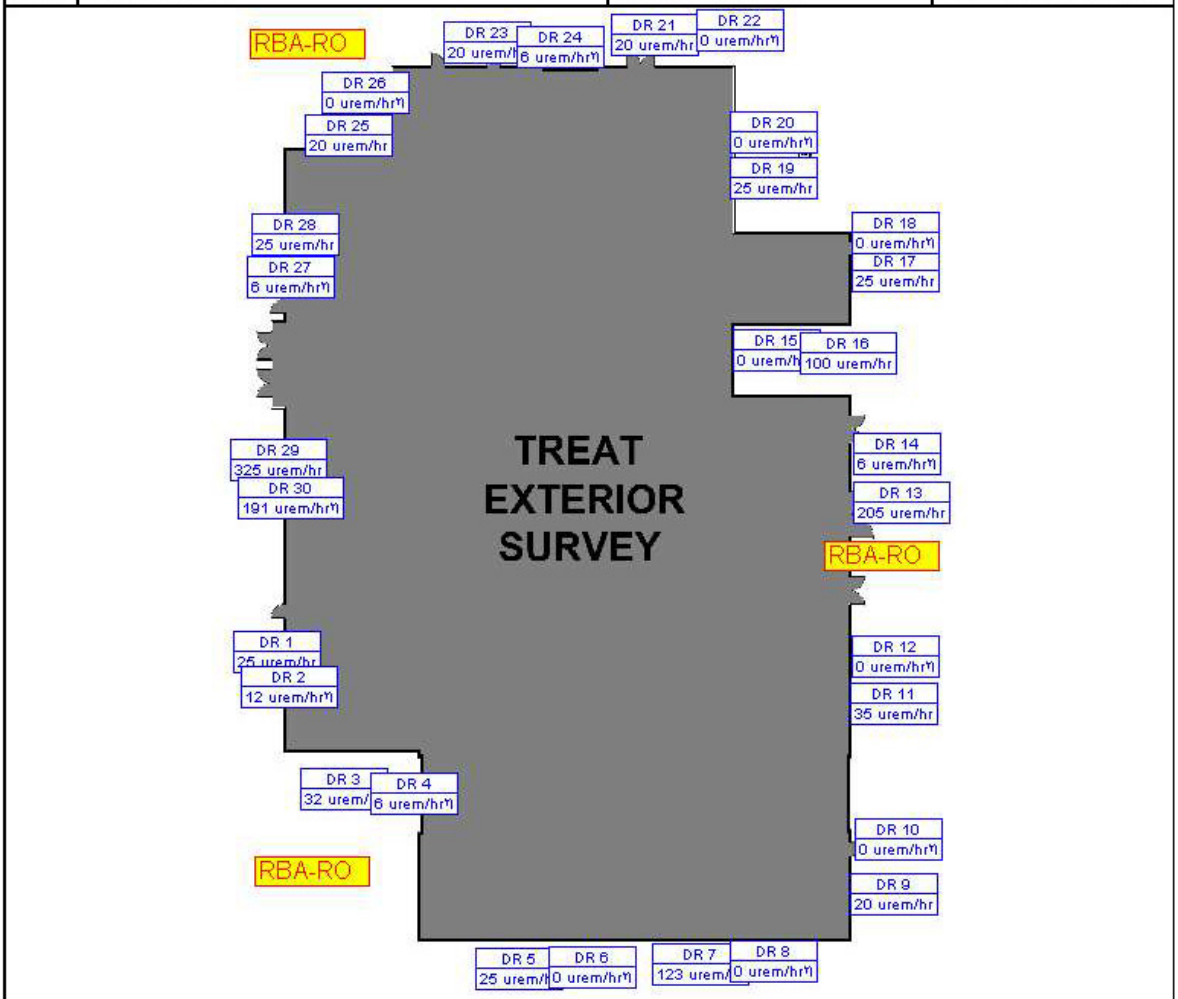
#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	160	urem/hr		
2	DR Neutron	2	0 η	mrem/hr		
3	DR γ	1	170	urem/hr		
4	DR Neutron	2	0.3 η	mrem/hr		
5	DR γ	1	170	urem/hr		
6	DR Neutron	2	0.2 η	mrem/hr		
7	DR γ	1	140	urem/hr		
8	DR Neutron	2	0 η	mrem/hr		
9	DR γ	1	160	urem/hr		
10	DR Neutron	2	0 η	mrem/hr		
	Posting		RBA-RO			

Log #: 350364
Notes:: N/A - 0 pages
Survey #: M-20171128-41 - Printed On: 12/11/2017 09:17

Image File: BOF\TREAT\TREAT Experimenters Room

VSDS Standard Map Survey Report

Map: 2	TREAT EXTERIOR	Survey #: M-20171128-41	Date/Time: 11/28/2017 12:00



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task#: BOF 2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Benjamin W Walker	Status: Approved by: Jared A Daw, 11/29/2017 14:31:42
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 350364
Notes: N/A - 0 pages
Survey #: M-20171128-41 - Printed On: 12/11/2017 09:17

Image File: BOF\TREAT\TREAT Exterior Survey - Cleaned - No Labels

Page 4 of 11

VSDS Standard Map Survey Report

Data Point Details

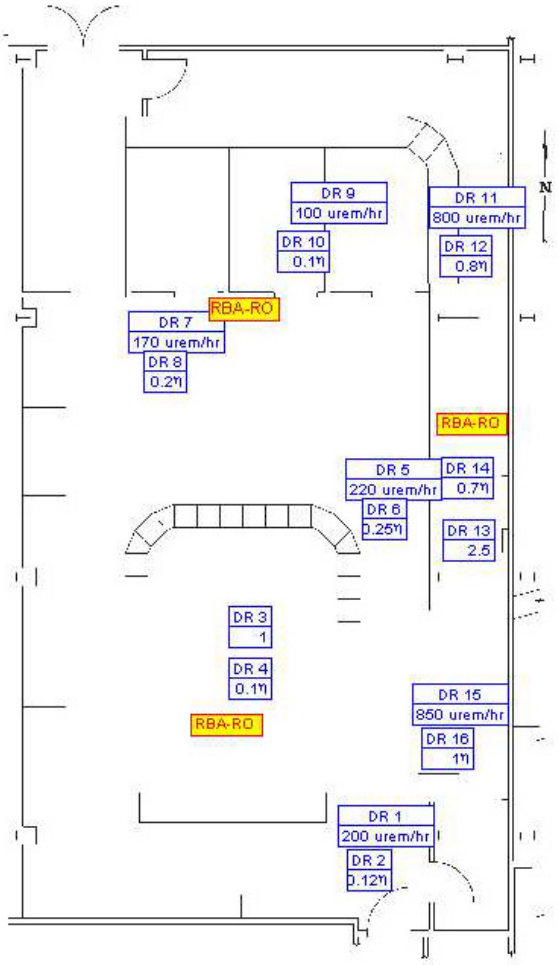
Survey #: M-20171128-41

Map: 2 - TREAT EXPERIMENTERS ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	25	urem/hr		
2	DR Neutron	2	12 η	urem/hr		
3	DR γ	1	32	urem/hr		
4	DR Neutron	2	6 η	urem/hr		
5	DR γ	1	25	urem/hr		
6	DR Neutron	2	0 η	urem/hr		
7	DR γ	1	123	urem/hr		
8	DR Neutron	2	0 η	urem/hr		
9	DR γ	1	20	urem/hr		
10	DR Neutron	2	0 η	urem/hr		
11	DR γ	1	35	urem/hr		
12	DR Neutron	2	0 η	urem/hr		
13	DR γ	1	205	urem/hr		
14	DR Neutron	2	6 η	urem/hr		
15	DR Neutron	2	0 η	urem/hr		
16	DR γ	1	100	urem/hr		
17	DR γ	1	25	urem/hr		
18	DR Neutron	2	0 η	urem/hr		
19	DR γ	1	25	urem/hr		
20	DR Neutron	2	0 η	urem/hr		
21	DR γ	1	20	urem/hr		
22	DR Neutron	2	0 η	urem/hr		
23	DR γ	1	20	urem/hr		
24	DR Neutron	2	6 η	urem/hr		
25	DR γ	1	20	urem/hr		
26	DR Neutron	2	0 η	urem/hr		
27	DR Neutron	2	6 η	urem/hr		
28	DR γ	1	25	urem/hr		
29	DR γ	1	325	urem/hr		
30	DR Neutron	2	191 η	urem/hr		
	Posting		RBA-RO			
	Posting		RBA-RO			
	Posting		RBA-RO			

VSDS Standard Map Survey Report

Map: 3	TREAT I AND C CONTROL ROOM	Survey #: M-20171128-41	Date/Time: 11/28/2017 12:00



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Benjamin W Walker	Status: Approved by: Jared A Daw, 11/29/2017 14:31:42
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 350364
Image File: BOF\TREAT\TREAT I_C Control Room
Notes: N/A - 0 pages
Survey #: M-20171128-41 - Printed On: 12/11/2017 09:17
Page 6 of 11

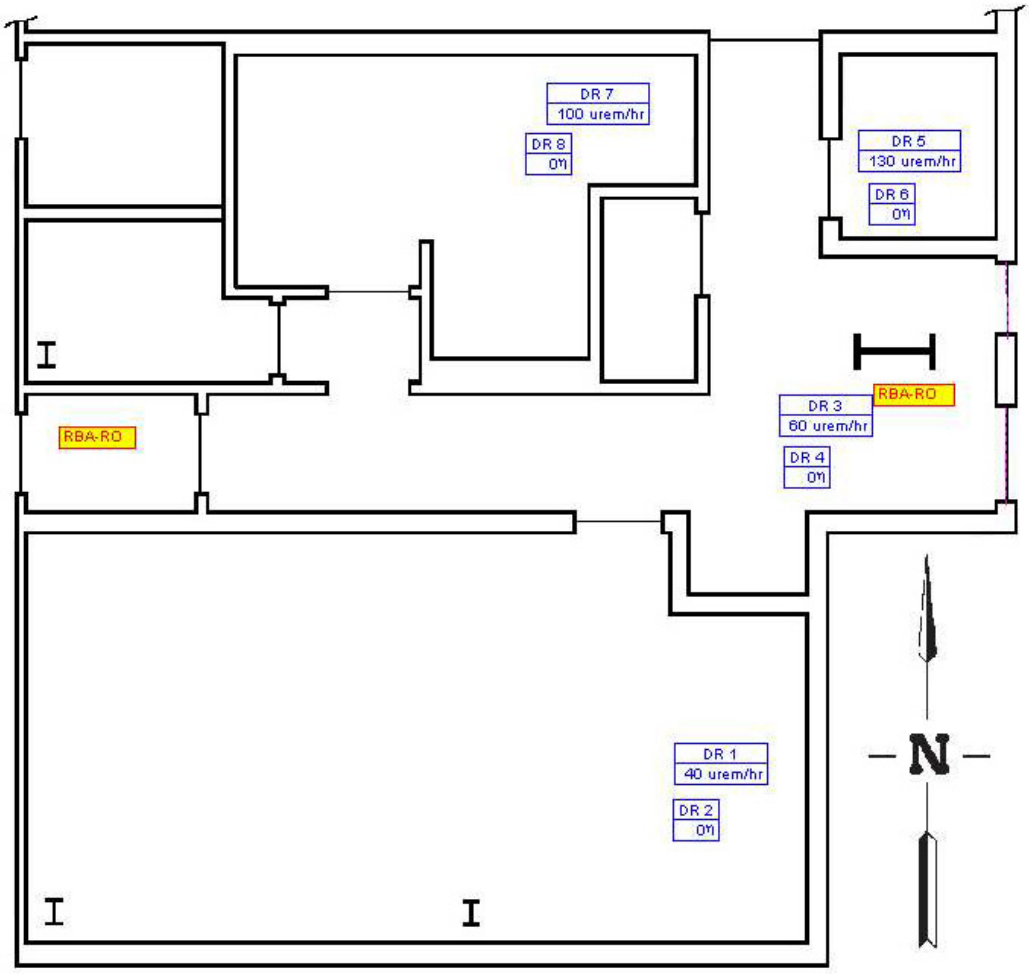
VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171128-41
Map: 3 - TREAT EXPERIMENTERS ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	200	urem/hr		
2	DR Neutron	2	0.12 η	mrem/hr		
3	DR γ	1	1	mrem/hr		
4	DR Neutron	2	0.1 η	mrem/hr		
5	DR γ	1	220	urem/hr		
6	DR Neutron	2	0.25 η	mrem/hr		
7	DR γ	1	170	urem/hr		
8	DR Neutron	2	0.2 η	mrem/hr		
9	DR γ	1	100	urem/hr		
10	DR Neutron	2	0.1 η	mrem/hr		
11	DR γ	1	800	urem/hr		
12	DR Neutron	2	0.8 η	mrem/hr		
13	DR γ	1	2.5	mrem/hr		
14	DR Neutron	2	0.7 η	mrem/hr		
15	DR γ	1	850	urem/hr		
16	DR Neutron	2	1 η	mrem/hr		
	Posting		RBA-RO			
	Posting		RBA-RO			
	Posting		RBA-RO			

VSDS Standard Map Survey Report

Map: 4	TREAT REACTOR OFFICE AREA	Survey #: M-20171128-41	Date/Time: 11/28/2017 12:00



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF 2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Benjamin W Walker	Status: Approved by: Jared A Davy, 11/29/2017 14:31:42
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 350364
Notes: N/A - 0 pages
Survey #: M-20171128-41 - Printed On: 12/11/2017 09:17

Image File: BOF\TREAT\TREAT Reactor Office Area Survey Map

Page 8 of 11

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171128-41
Map: 4 - TREAT EXPERIMENTERS ROOM

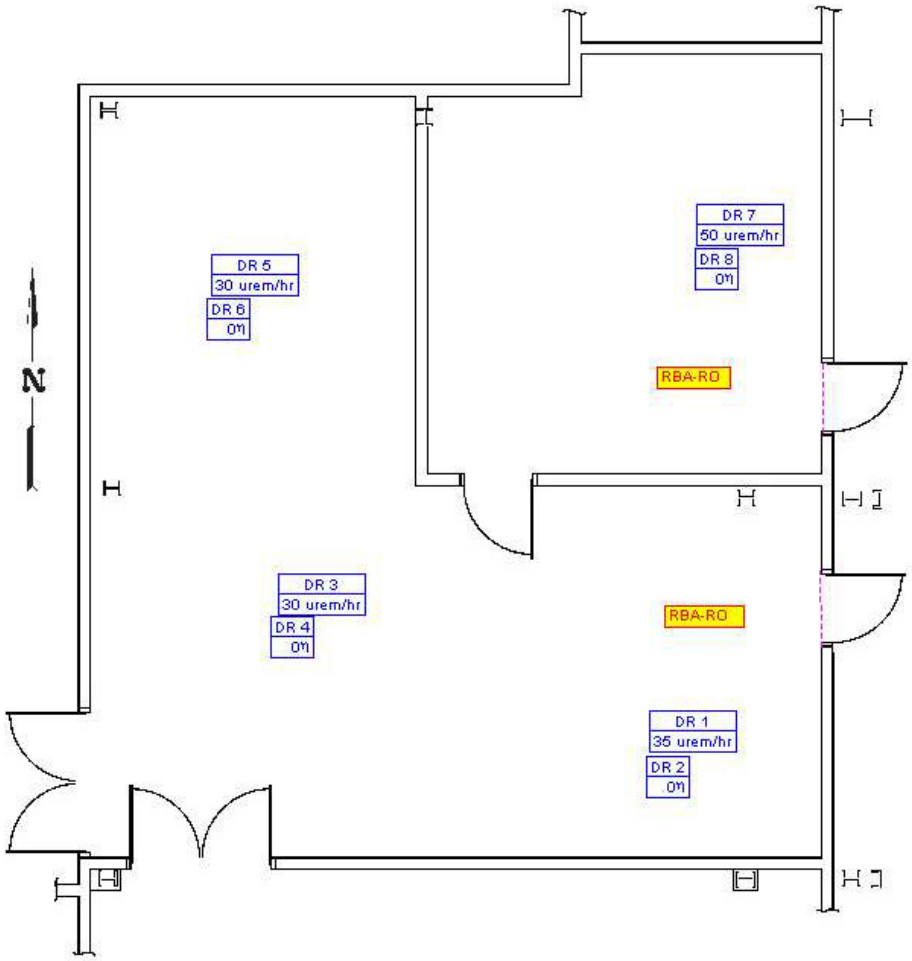
#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	40	urem/hr		
2	DR Neutron	2	0 η	mrem/hr		
3	DR γ	1	60	urem/hr		
4	DR Neutron	2	0 η	mrem/hr		
5	DR γ	1	130	urem/hr		
6	DR Neutron	2	0 η	mrem/hr		
7	DR γ	1	100	urem/hr		
8	DR Neutron	2	0 η	mrem/hr		
	Posting		RBA-RO			
	Posting		RBA-RO			

Log #: 350364
Notes:: N/A - 0 pages
Survey #: M-20171128-41 - Printed On: 12/11/2017 09:17

Image File: BOF\TREAT\TREAT Reactor Office Area Survey Map

VSDS Standard Map Survey Report

Map: 5	TREAT INSTRUMENT SHOP	Survey #: M-20171128-41	Date/Time: 11/28/2017 12:00



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF 2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Benjamin W Walker	Status: Approved by: Jared A Daw; 11/29/2017 14:31:42
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 350364
Notes: N/A - 0 pages
Survey #: M-20171128-41 - Printed On: 12/11/2017 09:17

Image File: BOF\TREAT\TREAT Instrument Shop

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171128-41

Map: 5 - TREAT EXPERIMENTERS ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	35	urem/hr		
2	DR Neutron	2	0 n	mrem/hr		
3	DR γ	1	30	urem/hr		
4	DR Neutron	2	0 n	mrem/hr		
5	DR γ	1	30	urem/hr		
6	DR Neutron	2	0 n	mrem/hr		
7	DR γ	1	50	urem/hr		
8	DR Neutron	2	0 n	mrem/hr		
	Posting		RBA-RO			
	Posting		RBA-RO			

Log #: 350364
Notes:: N/A - 0 pages
Survey #: M-20171128-41 - Printed On: 12/11/2017 09:17

Image File: BOF\TREAT\TREAT Instrument Shop

VSDS Standard Map Survey Report

Survey M-20171128-43

General Information

Title: BOFTREAT RX Grid survey

Survey Date/Time: 11/28/2017 13:28
Lead Surveyor: Bryan King
Survey Type: Other - Start up Radiation
Work Order/Task #: PLN-5350
Counted By:
KCN: 54625
RWP and Task#: BOF2017009
Status: Approved by: Jared A Daw, 1/9/2018 07:05:46
KCN: 111225
Ready for Review by: Bryan King, 11/29/2017 15:03:07
KCN: 54625

Additional Surveyors

Surveyor
Blaine Case

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

HRA=High Radiation Area RA=Radiation Area RBA=Radiological Buffer Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency		
				β/γ	β	α
1	RO20	803106	D	N/A	N/A	N/A
2	B20-ER	803201	D	N/A	N/A	N/A
3	E-600 w/Remball	802087	D	N/A	N/A	N/A
4	TelePole 2	854459	D	N/A	N/A	N/A

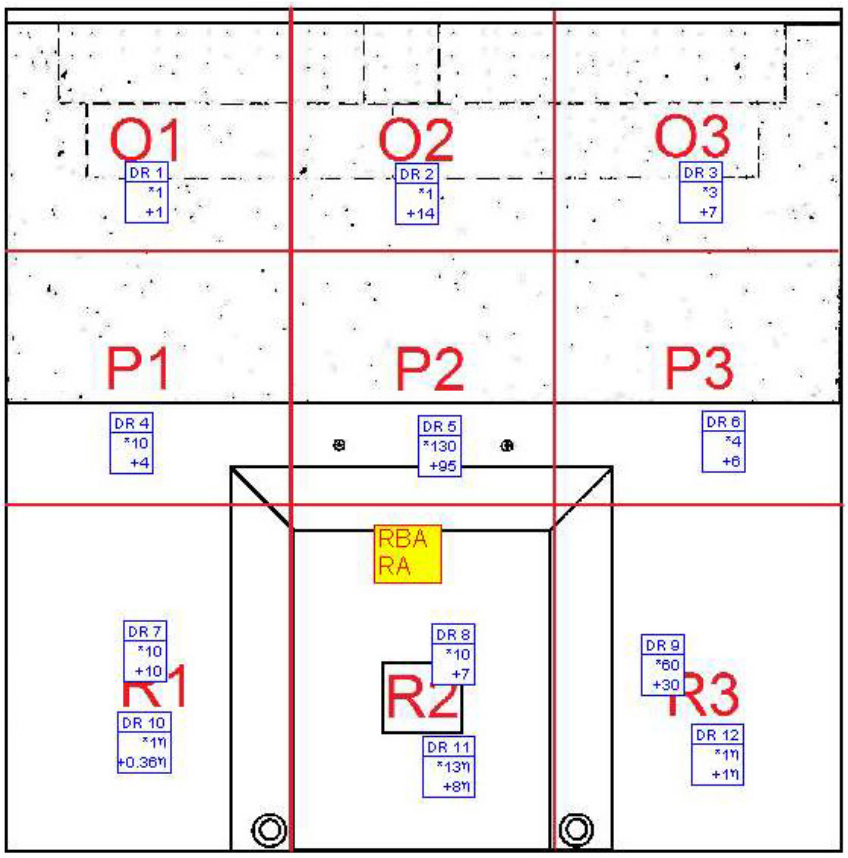
Instruments Used - Notes

#	Notes
1	N/A
2	N/A
3	N/A
4	N/A

Log #: 350364
Notes:: N/A - 0 pages
Survey #: M-20171128-43 - Printed On: 1/23/2018 07:22

VSDS Standard Map Survey Report

Map: 1	TREAT EAST REACTOR FACE SURVEY GRID	Survey #: M-20171128-43	Date/Time: 11/28/2017 13:28



REACTOR EAST FACE

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Jared A Daw, 1/9/2018 07:05:46
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 350364
Image File: BOF\TREAT\Reactor Grid Surveys\East Reactor Face Survey Grid
Notes: N/A - 0 pages
Survey #: M-20171128-43 - Printed On: 1/23/2018 07:22
Page 2 of 13

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171128-43

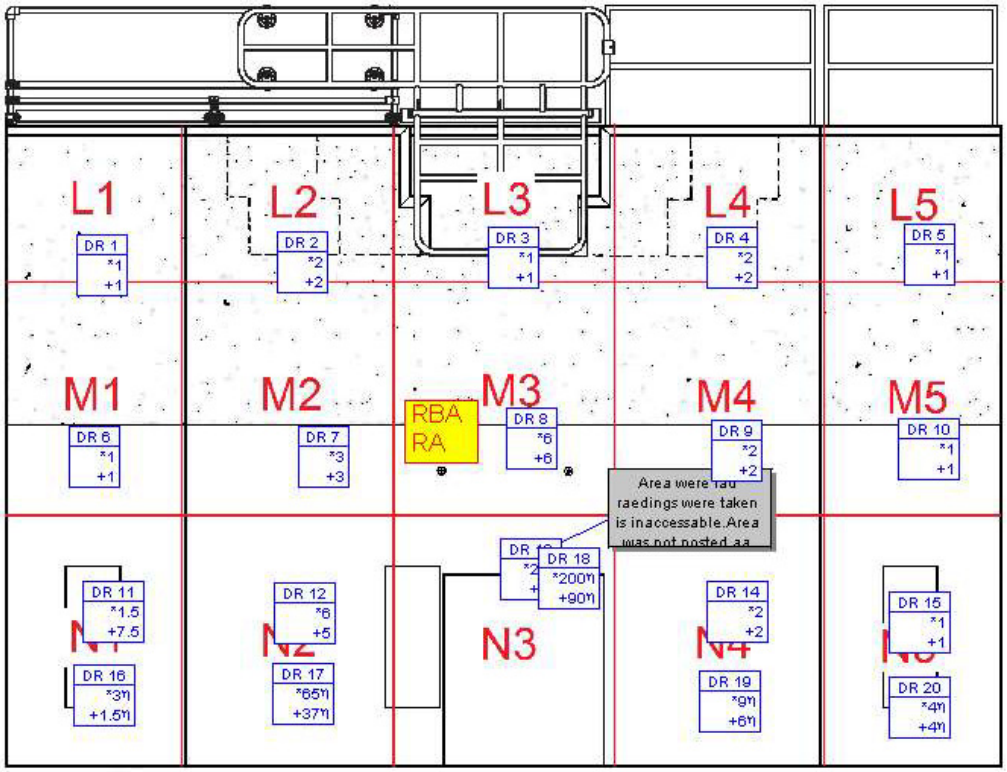
Map: 1 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	4	* 1	mrem/hr	O1	
		4	+ 1	mrem/hr		
2	DR γ	4	* 1	mrem/hr	O2	
		4	+ 14	mrem/hr		
3	DR γ	4	* 3	mrem/hr	03	
		4	+ 7	mrem/hr		
4	DR γ	4	* 10	mrem/hr	P1	
		4	+ 4	mrem/hr		
5	DR γ	4	* 130	mrem/hr	P2	
		4	+ 95	mrem/hr		
6	DR γ	4	* 4	mrem/hr	P3	
		4	+ 6	mrem/hr		
7	DR γ	2	* 10	mrem/hr	R1	
		2	+ 10	mrem/hr		
8	DR γ	2	* 10	mrem/hr	R2	
		2	+ 7	mrem/hr		
9	DR γ	2	* 60	mrem/hr	R3	
		2	+ 30	mrem/hr		
10	DR Neutron	3	* 1 η	mrem/hr	R1	
		3	+ 0.36 η	mrem/hr		
11	DR Neutron	3	* 13 η	mrem/hr	R2	
		3	+ 8 η	mrem/hr		
12	DR Neutron	3	* 1 η	mrem/hr	R3	
		3	+ 1 η	mrem/hr		
	Posting		RBA RA			

Log #: 350364
Image File: BOF\TREAT\Reactor Grid Surveys\East Reactor Face Survey Grid
Notes:: N/A - 0 pages
Survey #: M-20171128-43 - Printed On: 1/23/2018 07:22
Page 3 of 13

VSDS Standard Map Survey Report

Map: 2	TREAT NORTH REACTOR FACE SURVEY GRID	Survey #: M-20171128-43	Date/Time: 11/28/2017 13:28



REACTOR NORTH FACE

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task#: BOF2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King

Status: Approved by: Jared A Daw, 1/9/2018 07:05:46

Location Code: BOF

Bldg/Area Name: TREAT 720

Location Description: TREAT 720

Log #: 350364

Image File: BOF\TREAT\Reactor Grid Surveys\North Reactor Face Survey Grid

Notes: N/A - 0 pages

Survey #: M-20171128-43 - Printed On: 1/23/2018 07:22

Page 4 of 13

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171128-43

Map: 2 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	4	* 1	mrem/hr	L1	
		4	+ 1	mrem/hr		
2	DR γ	4	* 2	mrem/hr	L2	
		4	+ 2	mrem/hr		
3	DR γ	4	* 1	mrem/hr	L3	
		4	+ 1	mrem/hr		
4	DR γ	4	* 2	mrem/hr	L4	
		4	+ 2	mrem/hr		
5	DR γ	4	* 1	mrem/hr	L5	
		4	+ 1	mrem/hr		
6	DR γ	4	* 1	mrem/hr	M1	
		4	+ 1	mrem/hr		
7	DR γ	4	* 3	mrem/hr	M2	
		4	+ 3	mrem/hr		
8	DR γ	4	* 6	mrem/hr	M3	
		4	+ 6	mrem/hr		
9	DR γ	4	* 2	mrem/hr	M4	
		4	+ 2	mrem/hr		
10	DR γ	4	* 1	mrem/hr	M5	
		4	+ 1	mrem/hr		
11	DR γ	2	* 1.5	mrem/hr	N1	
		2	+ 7.5	mrem/hr		
12	DR γ	2	* 6	mrem/hr	N2	
		2	+ 5	mrem/hr		
13	DR γ	2	* 200	mrem/hr	N3	
		2	+ 38	mrem/hr		
14	DR γ	2	* 2	mrem/hr	N4	
		2	+ 2	mrem/hr		
15	DR γ	2	* 1	mrem/hr	N5	
		2	+ 1	mrem/hr		
16	DR Neutron	3	* 3 η	mrem/hr	N1	
		3	+ 1.5 η	mrem/hr		
17	DR Neutron	3	* 65 η	mrem/hr	N2	
		3	+ 37 η	mrem/hr		
18	DR Neutron	3	* 200 η	mrem/hr	N3	
		3	+ 90 η	mrem/hr		
19	DR Neutron	3	* 9 η	mrem/hr	N4	
		3	+ 6 η	mrem/hr		
20	DR Neutron	3	* 4 η	mrem/hr	N5	
		3	+ 4 η	mrem/hr		
	Note					Area were rad raedings were taken is inaccessable.Area was not posted aa HRA
	Posting		RBA RA			

Log #: 350364

Image File: BOF\TREAT\Reactor Grid Surveys\North Reactor Face Survey Grid

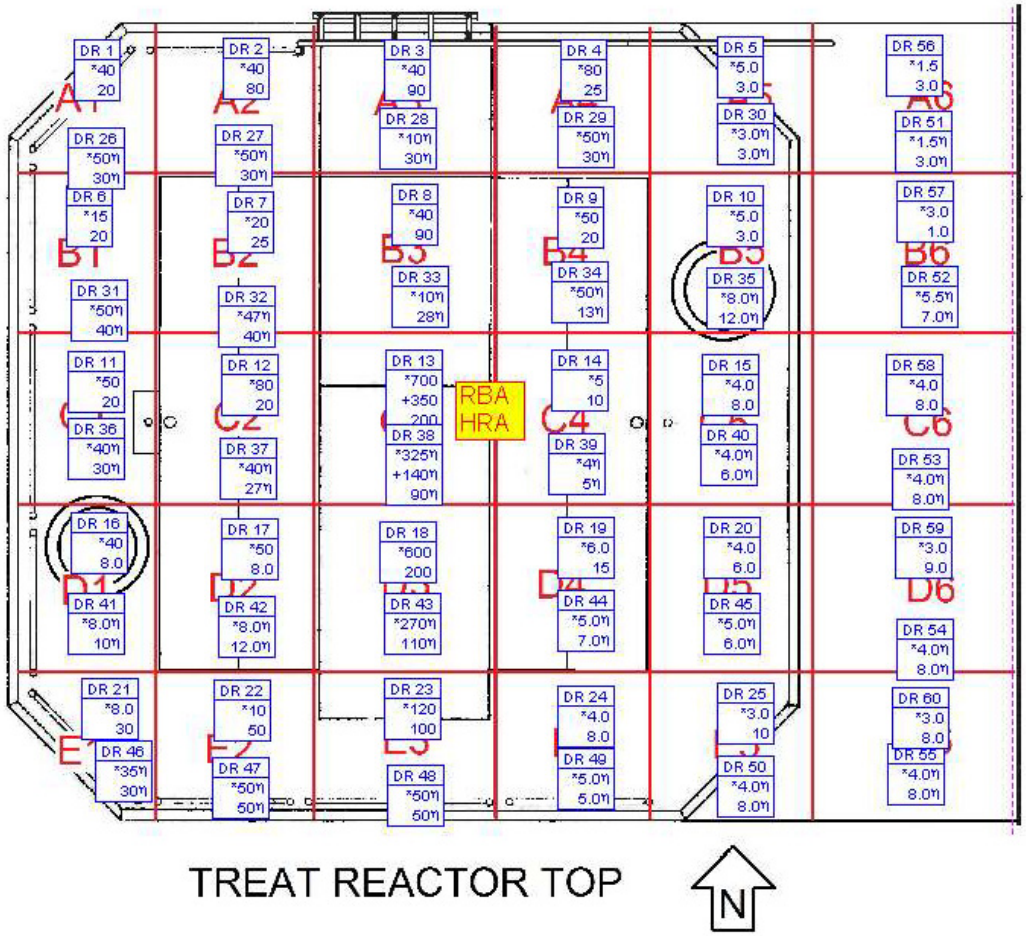
Notes:: N/A - 0 pages

Survey #: M-20171128-43 - Printed On: 1/23/2018 07:22

Page 5 of 13

VSDS Standard Map Survey Report

Map: 3	TREAT REACTOR TOP SURVEY GRID	Survey #: M-20171128-43	Date/Time: 11/28/2017 13:28



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Jared A Daw, 1/9/2018 07:05:46
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 350364
Image File: BOF\TREAT\Reactor Grid Surveys\Reactor Top Grid Survey Improved
Notes: N/A - 0 pages
Survey #: M-20171128-43 - Printed On: 1/23/2018 07:22
Page 6 of 13

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171128-43

Map: 3 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	* 40	mrem/hr	A1	
		1	20	mrem/hr		
2	DR γ	1	* 40	mrem/hr	A2	
		1	80	mrem/hr		
3	DR γ	1	* 40	mrem/hr	A3	
		1	90	mrem/hr		
4	DR γ	1	* 80	mrem/hr	A4	
		1	25	mrem/hr		
5	DR γ	1	* 5.0	mrem/hr	A5	
		1	3.0	mrem/hr		
6	DR γ	1	* 15	mrem/hr	B1	
		1	20	mrem/hr		
7	DR γ	1	* 20	mrem/hr	B2	
		1	25	mrem/hr		
8	DR γ	1	* 40	mrem/hr	B3	
		1	90	mrem/hr		
9	DR γ	1	* 50	mrem/hr	B4	
		1	20	mrem/hr		
10	DR γ	1	* 5.0	mrem/hr	B5	
		1	3.0	mrem/hr		
11	DR γ	1	* 50	mrem/hr	C1	
		1	20	mrem/hr		
12	DR γ	1	* 80	mrem/hr	C2	
		1	20	mrem/hr		
13	DR γ	1	* 700	mrem/hr	C3	
		1	+ 350	mrem/hr		
		1	200	mrem/hr		
14	DR γ	1	* 5	mrem/hr	C4	
		1	10	mrem/hr		
15	DR γ	1	* 4.0	mrem/hr	C5	
		1	8.0	mrem/hr		
16	DR γ	1	* 40	mrem/hr	D1	
		1	8.0	mrem/hr		
17	DR γ	1	* 50	mrem/hr	D2	
		1	8.0	mrem/hr		
18	DR γ	1	* 600	mrem/hr	D3	
		1	200	mrem/hr		
19	DR γ	1	* 6.0	mrem/hr	D4	
		1	15	mrem/hr		
20	DR γ	1	* 4.0	mrem/hr	D5	
		1	6.0	mrem/hr		
21	DR γ	1	* 8.0	mrem/hr	E1	
		1	30	mrem/hr		
22	DR γ	1	* 10	mrem/hr	E2	
		1	50	mrem/hr		
23	DR γ	1	* 120	mrem/hr	E3	
		1	100	mrem/hr		
24	DR γ	1	* 4.0	mrem/hr	E4	
		1	8.0	mrem/hr		
25	DR γ	1	* 3.0	mrem/hr	E5	
		1	10	mrem/hr		

Log #: 350364

Image File: BOF\TREAT\Reactor Grid Surveys\Reactor Top Grid Survey Improved

Notes:: N/A - 0 pages

Survey #: M-20171128-43 - Printed On: 1/23/2018 07:22

Page 7 of 13

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171128-43

Map: 3 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
26	DR Neutron	3	* 50 η	mrem/hr	A1	
		3	30 η	mrem/hr		
27	DR Neutron	3	* 50 η	mrem/hr	A2	
		3	30 η	mrem/hr		
28	DR Neutron	3	* 10 η	mrem/hr	A3	
		3	30 η	mrem/hr		
29	DR Neutron	3	* 50 η	mrem/hr	A4	
		3	30 η	mrem/hr		
30	DR Neutron	3	* 3.0 η	mrem/hr	A5	
		3	3.0 η	mrem/hr		
31	DR Neutron	3	* 50 η	mrem/hr	B1	
		3	40 η	mrem/hr		
32	DR Neutron	3	* 47 η	mrem/hr	B2	
		3	40 η	mrem/hr		
33	DR Neutron	3	* 10 η	mrem/hr	B3	
		3	28 η	mrem/hr		
34	DR Neutron	3	* 50 η	mrem/hr	B4	
		3	13 η	mrem/hr		
35	DR Neutron	3	* 8.0 η	mrem/hr	B5	
		3	12.0 η	mrem/hr		
36	DR Neutron	3	* 40 η	mrem/hr	C1	
		3	30 η	mrem/hr		
37	DR Neutron	3	* 40 η	mrem/hr	C2	
		3	27 η	mrem/hr		
38	DR Neutron	3	* 325 η	mrem/hr	C3	
		3	+ 140 η	mrem/hr		
		3	90 η	mrem/hr		
39	DR Neutron	3	* 4 η	mrem/hr	C4	
		3	5 η	mrem/hr		
40	DR Neutron	3	* 4.0 η	mrem/hr	C5	
		3	6.0 η	mrem/hr		
41	DR Neutron	3	* 8.0 η	mrem/hr	D1	
		3	10 η	mrem/hr		
42	DR Neutron	3	* 8.0 η	mrem/hr	D2	
		3	12.0 η	mrem/hr		
43	DR Neutron	3	* 270 η	mrem/hr	D3	
		3	110 η	mrem/hr		
44	DR Neutron	3	* 5.0 η	mrem/hr	D4	
		3	7.0 η	mrem/hr		
45	DR Neutron	3	* 5.0 η	mrem/hr	D5	
		3	6.0 η	mrem/hr		
46	DR Neutron	3	* 35 η	mrem/hr	E1	
		3	30 η	mrem/hr		
47	DR Neutron	3	* 50 η	mrem/hr	E2	
		3	50 η	mrem/hr		
48	DR Neutron	3	* 50 η	mrem/hr	E3	
		3	50 η	mrem/hr		
49	DR Neutron	3	* 5.0 η	mrem/hr	E4	
		3	5.0 η	mrem/hr		
50	DR Neutron	3	* 4.0 η	mrem/hr	E5	
		3	8.0 η	mrem/hr		

Log #: 350364 Image File: BOF\TREAT\Reactor Grid Surveys\Reactor Top Grid Survey Improved

Notes:: N/A - 0 pages

Survey #: M-20171128-43 - Printed On: 1/23/2018 07:22 Page 8 of 13

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171128-43
Map: 3 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
51	DR Neutron	3	* 1.5 η	mrem/hr	A6	
		3	3.0 η	mrem/hr		
52	DR Neutron	3	* 5.5 η	mrem/hr	B6	
		3	7.0 η	mrem/hr		
53	DR Neutron	3	* 4.0 η	mrem/hr	C6	
		3	8.0 η	mrem/hr		
54	DR Neutron	3	* 4.0 η	mrem/hr	D6	
		3	8.0 η	mrem/hr		
55	DR Neutron	3	* 4.0 η	mrem/hr	E6	
		3	8.0 η	mrem/hr		
56	DR γ	1	* 1.5	mrem/hr	A6	
		1	3.0	mrem/hr		
57	DR γ	1	* 3.0	mrem/hr	B6	
		1	1.0	mrem/hr		
58	DR γ	1	* 4.0	mrem/hr	C6	
		1	8.0	mrem/hr		
59	DR γ	1	* 3.0	mrem/hr	D6	
		1	9.0	mrem/hr		
60	DR γ	1	* 3.0	mrem/hr	E6	
		1	8.0	mrem/hr		
	Posting		RBA HRA			

VSDS Standard Map Survey Report

Map: 4	TREAT SOUTH REACTOR FACE SURVEY GRID	Survey #: M-20171128-43	Date/Time: 11/28/2017 13:28

REACTOR SOUTH FACE

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King

Status: Approved by: Jared A Daw, 1/9/2018 07:05:46

Location Code: BOF

Bldg/Area Name: TREAT 720

Location Description: TREAT 720

Log #: 350364

Image File: BOF\TREAT\Reactor Grid Surveys\South Reactor Face Grid Survey

Notes: N/A - 0 pages

Survey #: M-20171128-43 - Printed On: 1/23/2018 07:22

Page 10 of 13

VSDS Standard Map Survey Report

Data Point Details

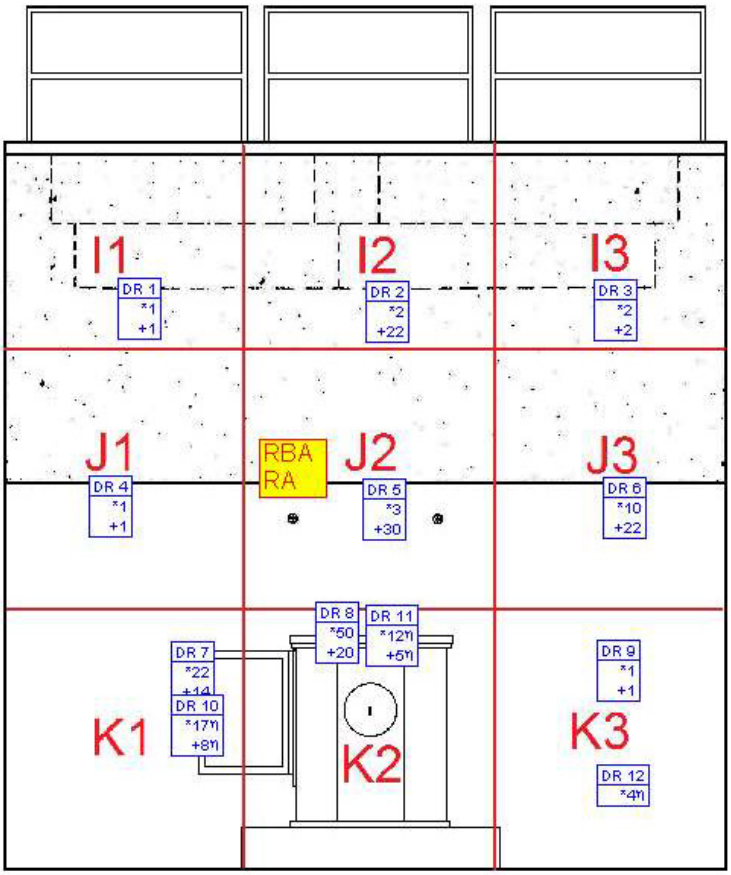
Survey #: M-20171128-43

Map: 4 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	4	* 1	mrem/hr	F1	
		4	+ 1	mrem/hr		
2	DR γ	4	* 1	mrem/hr	F2	
		4	+ 1	mrem/hr		
3	DR γ	4	* 1	mrem/hr	F3	
		4	+ 1	mrem/hr		
4	DR γ	4	* 1	mrem/hr	F4	
		4	+ 1	mrem/hr		
5	DR γ	4	* 1	mrem/hr	F5	
		4	+ 1	mrem/hr		
6	DR γ	4	* 1	mrem/hr	G1	
		4	+ 1	mrem/hr		
7	DR γ	4	* 1	mrem/hr	G2	
		4	+ 1	mrem/hr		
8	DR γ	4	* 3.5	mrem/hr	G3	
		4	+ 2	mrem/hr		
9	DR γ	4	* 1	mrem/hr	G4	
		4	+ 1	mrem/hr		
10	DR γ	2	* 1	mrem/hr	G5	
		2	+ 1	mrem/hr		
11	DR γ	2	* 1	mrem/hr	H1	
		2	+ 1	mrem/hr		
12	DR γ	2	* 42	mrem/hr	H2	
		2	+ 25	mrem/hr		
13	DR γ	2	* 40	mrem/hr	H3	
		2	+ 25	mrem/hr		
14	DR γ	2	* 1	mrem/hr	H4	
		2	+ 0.5	mrem/hr		
15	DR γ	2	* 2	mrem/hr	H5	
		2	+ 2	mrem/hr		
16	DR Neutron	3	* 0.54 η	mrem/hr	H1	
		3	+ 0.54 η	mrem/hr		
17	DR Neutron	3	* 25 η	mrem/hr	H2	
		3	+ 12 η	mrem/hr		
18	DR Neutron	3	* 10 η	mrem/hr	H3	
		3	+ 6 η	mrem/hr		
19	DR Neutron	3	* 1 η	mrem/hr	H4	
		3	+ 1 η	mrem/hr		
20	DR Neutron	3	* 1 η	mrem/hr	H5	
		3	+ 0.54 η	mrem/hr		
	Posting		RBA RA			

VSDS Standard Map Survey Report

Map: 5	TREAT WEST REACTOR FACE SURVEY GRID	Survey #: M-20171128-43	Date/Time: 11/28/2017 13:28



REACTOR WEST FACE

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF 2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King

Status: Approved by: Jared A Daw, 1/9/2018 07:05:46

Location Code: BOF

Bldg/Area Name: TREAT 720

Location Description: TREAT 720

Log #: 350364

Image File: BOF\TREAT\Reactor Grid Surveys\West Reactor Face Survey Grid

Notes: N/A - 0 pages

Survey #: M-20171128-43 - Printed On: 1/23/2018 07:22

Page 12 of 13

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20171128-43

Map: 5 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	4	* 1	mrem/hr	I1	
		4	+ 1	mrem/hr		
2	DR γ	4	* 2	mrem/hr	I2	
		4	+ 22	mrem/hr		
3	DR γ	4	* 2	mrem/hr	I3	
		4	+ 2	mrem/hr		
4	DR γ	4	* 1	mrem/hr	J1	
		4	+ 1	mrem/hr		
5	DR γ	4	* 3	mrem/hr	J2	
		4	+ 30	mrem/hr		
6	DR γ	4	* 10	mrem/hr	J3	
		4	+ 22	mrem/hr		
7	DR γ	2	* 22	mrem/hr	K1	
		2	+ 14	mrem/hr		
8	DR γ	2	* 50	mrem/hr	K2	
		2	+ 20	mrem/hr		
9	DR γ	2	* 1	mrem/hr	K3	
		2	+ 1	mrem/hr		
10	DR Neutron	3	* 17 η	mrem/hr	K1	
		3	+ 8 η	mrem/hr		
11	DR Neutron	3	* 12 η	mrem/hr	K2	
		3	+ 5 η	mrem/hr		
12	DR Neutron	3	* 4 η	mrem/hr	K3	
	Posting		RBA RA			

Log #: 350364

Image File: BOF\TREAT\Reactor Grid Surveys\West Reactor Face Survey Grid

Notes:: N/A - 0 pages

Survey #: M-20171128-43 - Printed On: 1/23/2018 07:22

Page 13 of 13

VSDS Standard Map Survey Report

Survey M-20171128-63

General Information

Title: BOFTREAT Start-up Bar/ subpile

Survey Date/Time: 11/28/2017 15:05 — Lead Surveyor: Jason Nelson

Survey Type: Other - Start-up Radiation — Work Order/Task #: PLN-5350

Counted By: — KCN: 102043

RWP and Task#: BOF2017009

Status: Approved by: Bryan King, 12/11/2017 10:42:08 — KCN: 54625

Ready for Review by: Jason Nelson, 11/28/2017 15:55:38 — KCN: 102043

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

HRA=High Radiation Area — HRAACR=HRA ACCESS CONTROLS REQUIRED — RBA=Radiological Buffer Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency β/γ	Efficiency β	Efficiency α
1	E-600 w/Remball	801890	D			
2	RO20	803106	D			

Instruments Used - Notes

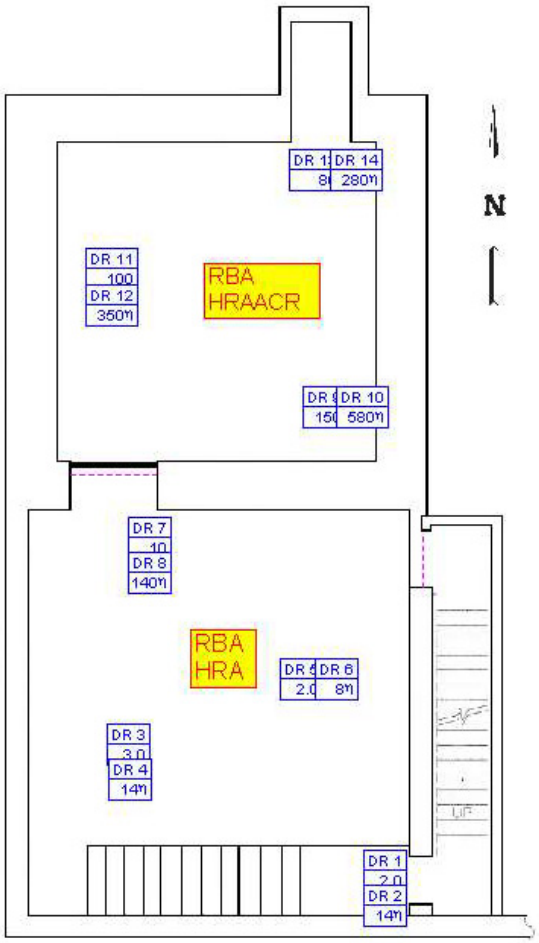
#	Notes
1	N/A
2	N/A

Log #: 350364

Notes:: N/A - 0 pages

VSDS Standard Map Survey Report

TREAT SUB-PILE ROOM	Survey #: M-20171128-63	Date/Time: 11/28/2017 15:05



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Start-up Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017009

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Jason Nelson	Status: Approved by: Bryan King, 12/11/2017 10:42:08
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 350364
Image File: BOF\TREAT\TREAT Sub-Pile Room
Notes: N/A - 0 pages
Survey #: M-20171128-63 - Printed On: 1/23/2018 07:26
Page 2 of 3

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20171128-63
Map: TREAT SUB-PILE ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	2	2.0	mrem/hr		
2	DR Neutron	1	14 η	mrem/hr		
3	DR γ	2	3.0	mrem/hr		
4	DR Neutron	1	14 η	mrem/hr		
5	DR γ	2	2.0	mrem/hr		
6	DR Neutron	1	8 η	mrem/hr		
7	DR γ	2	10	mrem/hr		
8	DR Neutron	1	140 η	mrem/hr		
9	DR γ	2	150	mrem/hr		
10	DR Neutron	1	580 η	mrem/hr		
11	DR γ	2	100	mrem/hr		
12	DR Neutron	1	350 η	mrem/hr		
13	DR γ	2	80	mrem/hr		
14	DR Neutron	1	280 η	mrem/hr		
	Posting		RBA HRAACR			HRAACR was posted with previous operating experience, the higher in elevation the higher the dose rates meeting the HRAACR posting requirement.
	Posting		RBA HRA			

Log #: 350364
Notes:: N/A - 0 pages
Survey #: M-20171128-63 - Printed On: 1/23/2018 07:26

Image File: BOF\TREAT\TREAT Sub-Pile Room

VSDS Standard Map Survey Report

Survey M-20180228-26

General Information

Title: TREAT-720 Steady State Ops at 50k Counts, 50W & 80kW

Survey Date/Time: 2/13/2018 15:08 — Lead Surveyor: Blaine Case

Survey Type: Job Specific — Work Order/Task #: N/A

Counted By: — KCN: 54562

RWP and Task#: BOF2018001

Status: Approved by: Nicholas Christiansen, 3/1/2018 17:00:12 — KCN: 111190

Ready for Review by: Blaine Case, 2/28/2018 11:19:28 — KCN: 54562

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

HRAACR=HRA ACCESS CONTROLS REQUIRED
RA=Radiation Area
RBA=Radiological Buffer Area
RMA=Radioactive Material Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency		
				β/γ	β	α
1	RO20	803106	D	N/A	N/A	N/A
2	E-600 w/Remball	802580	D	N/A	N/A	N/A

Instruments Used - Notes

#	Notes
1	N/A
2	N/A

Log #: 357587
Notes:: MCP-139 - 0 pages
Survey #: M-20180228-26 - Printed On: 3/14/2018 11:03

VSDS Standard Map Survey Report

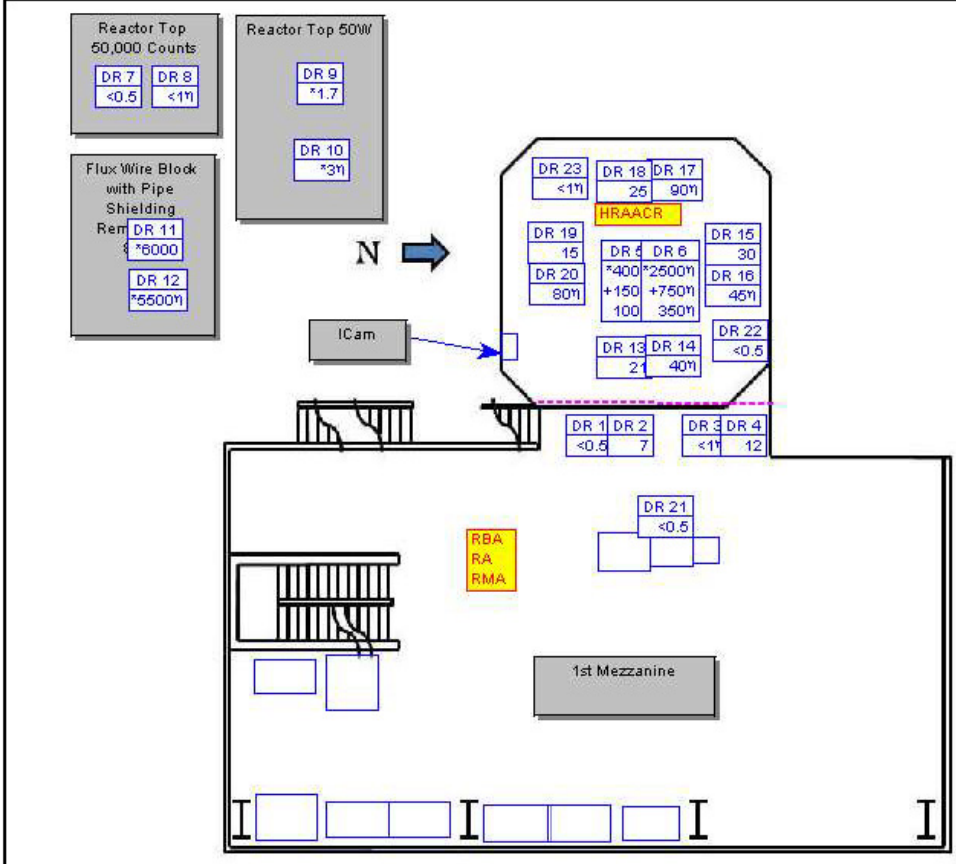
Comments:

This survey replaces M-20180213-62.
A "Unit" error was discovered on Direct Reading #12. The Log indicated that this Direct Reading should have been 5500mr/hr for a contact neutron dose.

The original log number is 356344.

VSDS Standard Map Survey Report

FIRST MEZZANINE	Survey #: M-20180228-26	Date/Time: 2/13/2018 15:08



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Job Specific

Symbol Legend (for example only)

RWP and Task#: BOF 2018001

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Blaine Case

Status: Approved by: Nicholas Christiansen, 3/1/2018 17:00:12

Location Code: BOF

Bldg/Area Name: TREAT 720

Location Description: TREAT 720

Log #: 357587

Image File: BOF\TREAT\FIRST MEZZANINE

Notes: MCP-139 - 0 pages

Survey #: M-20180228-26 - Printed On: 3/14/2018 11:03

Page 3 of 4

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180228-26
Map: FIRST MEZZANINE

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	<0.5	mrem/hr	At Barrier	50,000 Counts and 50W
2	DR γ	1	7	mrem/hr	At Barrier	80kW
3	DR Neutron	2	<1 η	mrem/hr	At Barrier	50,000 counts and 50kW
4	DR γ	2	12	mrem/hr	At Barrier	80kW
5	DR γ	1	* 4000	mrem/hr	Hottest Point Found	South Edge of the Flux Wire Block
		1	+ 1500	mrem/hr		80kW
		1	1000	mrem/hr		
6	DR Neutron	2	* 2500 η	mrem/hr	Hottest Point Found	South Edge of the Flux Wire Block
		2	+ 750 η	mrem/hr		80kW
		2	350 η	mrem/hr		
7	DR γ	1	<0.5	mrem/hr		South Edge of the Flux Wire Block
8	DR Neutron	2	<1 η	mrem/hr	Hottest Point Found	South Edge of the Flux Wire Block
9	DR γ	1	* 1.7	mrem/hr	Hottest Point Found	South Edge of the Flux Wire Block
10	DR Neutron	2	* 3 η	mrem/hr	Hottest Point Found	South Edge of the Flux Wire Block
11	DR γ	1	* 6000	mrem/hr		
12	DR Neutron	2	* 5500 η	mrem/hr		
13	DR γ	1	21	mrem/hr		80kW
14	DR Neutron	2	40 η	mrem/hr		80kW
15	DR γ	1	30	mrem/hr		80kW
16	DR Neutron	2	45 η	mrem/hr		80kW
17	DR Neutron	1	90 η	mrem/hr		80kW
18	DR γ	1	25	mrem/hr		80kW
19	DR γ	1	15	mrem/hr		80kW
20	DR Neutron	2	80 η	mrem/hr		80kW
21	DR γ	1	<0.5	mrem/hr		After Reactor Shut Down
22	DR γ	1	<0.5	mrem/hr	Entire Reactor Top	After Reactor Shut Down
23	DR Neutron	2	<1 η	mrem/hr	Entire Reactor Top	After Reactor Shut Down
	Note					1st Mezzanine
	Note					ICam
	Note					Reactor Top 50,000 Counts
	Note					Reactor Top 50W
	Note					Flux Wire Block with Pipe Shielding Removed at 80kW
	Posting		HRAACR			
	Posting		RBA RA RMA			

Log #: 357587
Notes:: MCP-139 - 0 pages
Survey #: M-20180228-26 - Printed On: 3/14/2018 11:03

Image File: BOF\TREAT\FIRST MEZZANINE

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Appendix G —
TREAT Transient Radiological Data Sheet

FRM-1778
01/16/18
Rev. 2

TREAT TRANSIENT RADIOLOGICAL DATA SHEET

(Instruction on Page 2)

Transient No.: 2888T Date: 1-30-18

Description of Experiment: N/A

ARCS Power Level:	10	GMw	Wind Direction:	209	Degrees
ARCS Energy Level:	1976	Mj	Wind Speed:	26.8	MPH
Reactor Building Evacuated:	1050	Time	Barriers Placed Across Road:	1120	Time
Notifications Initiated:	0950	Time	Transient Scram:	1301	Time

RAM Unit	Prior to Shot	1 Min. After Shot	3 Min. After Shot	5 Min. After Shot	___ Min. After Shot
Time:	1130/1250	1302	1304 1305 1-30-18	1306	
1. 7008 - Main Floor North	1.5 m/hr	2 m/hr	1.5 m/hr	1.5 m/hr	
2. 7003 - Main Floor South	1.0 m/hr	1.5 m/hr	1.5 m/hr	1.5 m/hr	
3. 7005 - Filters	1.5 m/hr	25 m/hr	15 m/hr	9 m/hr	
4. 7002 - Exhaust Air	2.0 m/hr	3 m/hr	2.5 m/hr	2.5 m/hr	
5. 7010 - Sub Pile Room	1.5 m/hr	250 m/hr	220 m/hr	200 m/hr	

Time of Re-Entry: 1314 Time

Rx Top Air Monitor Prior to Transient: 0.1 DAC-hr Alpha 0.1 DAC-hr Beta

Rx Top Air Monitor Prior to Re-Entry: 0.1 DAC–hr Alpha 0.1 DAC-hr Beta

Rx Top Air Monitor After Re-Entry: 0.1 DAC-hr Alpha 0.1 DAC-hr Beta

Building Re-Entry Radiation Readings

1. High-Bay Entrance: <0.5 mR/hr
2. South High-Bay: <0.5 mR/hr
3. Fan Room Door: <0.5 mR/hr
4. Northeast Reactor Corner: <0.5 mR/hr
5. Hodoscope Room Wall: <0.5 mR/hr
6. Northwest Mech Room Wall: <0.5 mR/hr
7. Reactor Top: <0.5 mR/hr
8. Sub-Pile Room door: 150 mR/hr

Remarks: N/A

	Printed Name	S No.	Signature	Date
HPT:	Bryan King	54625	B King	1-30-18
RAD MGMT:	Nicholas T. Christiansen	111190	N Christiansen	1-30-18

TREAT TRANSIENT RADIOLOGICAL DATA SHEET

Instructions

1. Initiate form by completing information above the section enclosed by the double line.
2. In order to ensure data quality objectives, the information in the section enclosed by the double line should be obtained from the following forms and/or Operations:
   - ARCS Power Level, and ARCS Energy Level should be obtained from FRM-1547, TREAT Transient Data Summary Sheet
   - Reactor Building Evacuation, Barriers Placed Across Road and Notifications Initiated should be obtained from FRM-1549, TREAT Supervisor-In-Charge Pre-Transient Check Sheet
   - Wind Speed and Wind Direction should be obtained from FRM-1551, Meteorological Checksheet.
3. Complete the remainder of the form during pre-transient and post-transient operations.
4. Original completed form will be submitted to the SS for retention as part of the OTP Package and a copy retained by TREAT Radiological Control.

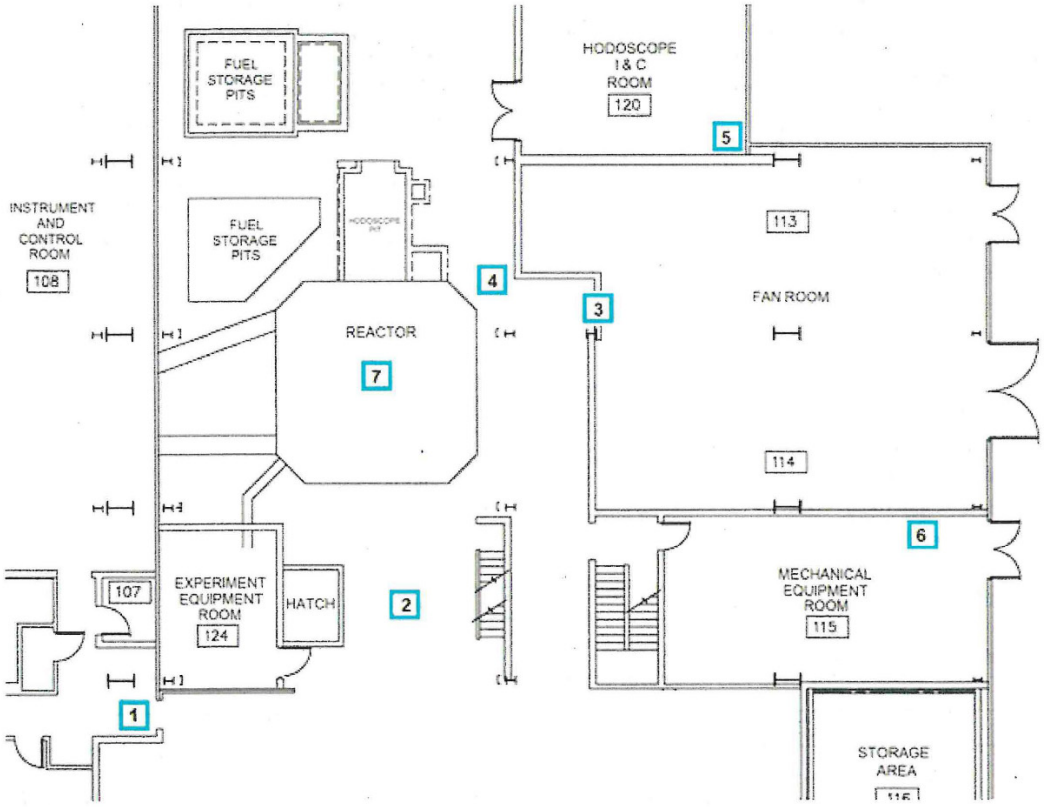


Figure 1. Reactor Dose Rate Reading Locations

Appendix H —
TREAT Post Transient Radiation Survey Maps

VSDS Standard Map Survey Report

Survey M-20180130-67

General Information

Title: BOFTREAT RX Grid survey Post Transient TL#3

Survey Date/Time: 1/30/2018 14:53
Survey Type: Other - Post Transient
Counted By:
RWP and Task#: BOF2017008
Status: Approved by: Nicholas Christiansen, 2/6/2018 09:10:27
Ready for Review by: Bryan King, 1/31/2018 13:21:51

Lead Surveyor: Levi K Tessier
Work Order/Task #: PLN-5350
KCN: 118907
KCN: 111190
KCN: 54625

Additional Surveyors

Surveyor
Blaine Case
Bryan King

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

RBA=Radiological Buffer Area RMA=Radioactive Material Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency		
				β/γ	β	α
1	B20-ER	803202	D	N/A	N/A	N/A
2	E-600 w/Remball	802087	D	N/A	N/A	N/A
3	TelePole 2	854459	D	N/A	N/A	N/A

Instruments Used - Notes

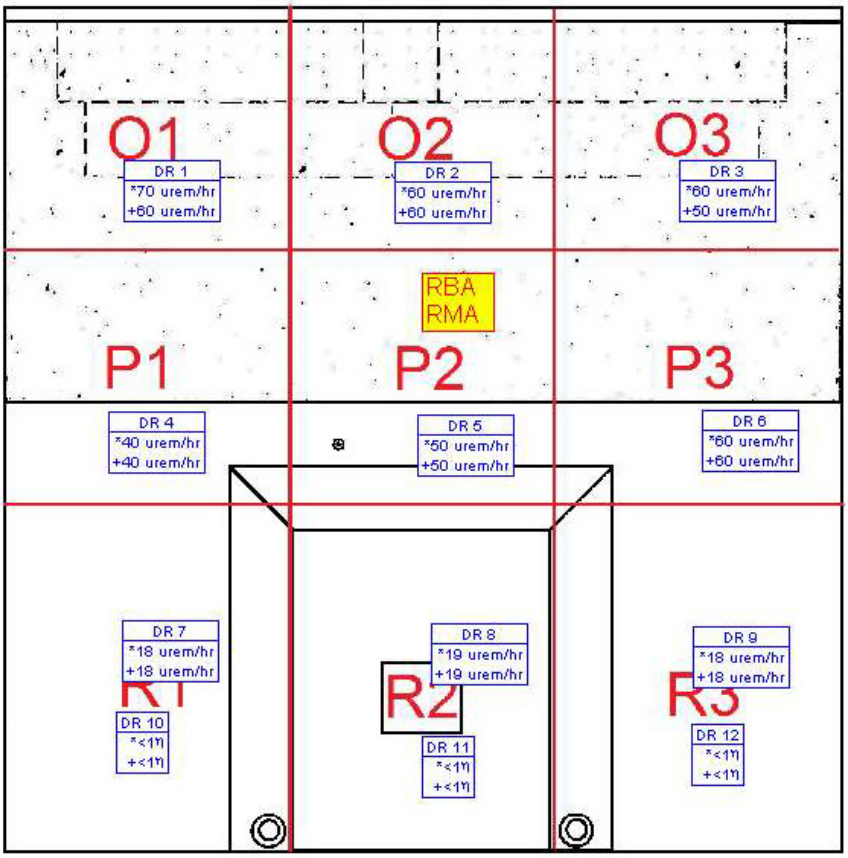
#	Notes
1	N/A
2	N/A
3	N/A

Log #: 355125
Notes:: N/A - 0 pages
Survey #: M-20180130-67 - Printed On: 2/12/2018 12:04

Page 1 of 12

VSDS Standard Map Survey Report

Map: 1	TREAT EAST REACTOR FACE SURVEY GRID	Survey #: M-20180130-67	Date/Time: 1/30/2018 14:53



REACTOR EAST FACE

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Post Transient

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+ 75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF 2017008

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Levi K Tessier	Status: Approved by: Nicholas Christiansen, 2/6/2018 09:10:27
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355125
Image File: BOF\TREAT\Reactor Grid Surveys\East Reactor Face Survey Grid
Notes: N/A - 0 pages
Survey #: M-20180130-67 - Printed On: 2/12/2018 12:04
Page 2 of 12

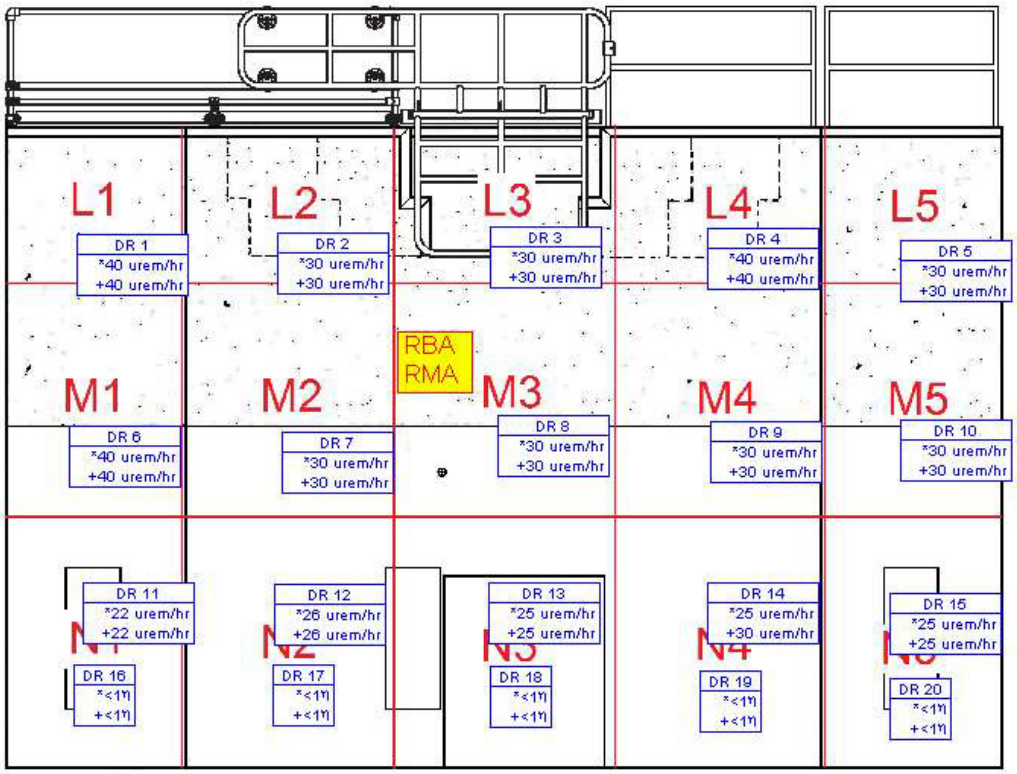
VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180130-67
Map: 1 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	3	* 70	urem/hr	O1	
		3	+ 60	urem/hr		
2	DR γ	3	* 60	urem/hr	O2	
		3	+ 60	urem/hr		
3	DR γ	3	* 60	urem/hr	03	
		3	+ 50	urem/hr		
4	DR γ	3	* 40	urem/hr	P1	
		3	+ 40	urem/hr		
5	DR γ	3	* 50	urem/hr	P2	
		3	+ 50	urem/hr		
6	DR γ	3	* 60	urem/hr	P3	
		3	+ 60	urem/hr		
7	DR γ	1	* 18	urem/hr	R1	
		1	+ 18	urem/hr		
8	DR γ	1	* 19	urem/hr	R2	
		1	+ 19	urem/hr		
9	DR γ	1	* 18	urem/hr	R3	
		1	+ 18	urem/hr		
10	DR Neutron	2	* <1 η	mrem/hr	R1	
		2	+ <1 η	mrem/hr		
11	DR Neutron	2	* <1 η	mrem/hr	R2	
		2	+ <1 η	mrem/hr		
12	DR Neutron	2	* <1 η	mrem/hr	R3	
		2	+ <1 η	mrem/hr		
	Posting		RBA RMA			

VSDS Standard Map Survey Report

Map: 2	TREAT NORTH REACTOR FACE SURVEY GRID	Survey #: M-20180130-67	Date/Time: 1/30/2018 14:53



REACTOR NORTH FACE

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Post Transient

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017008

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Levi K Tessier	Status: Approved by: Nicholas Christiansen, 2/6/2018 09:10:27
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355125
Image File: BOF\TREAT\Reactor Grid Surveys\North Reactor Face Survey Grid
Notes: N/A - 0 pages
Survey #: M-20180130-67 - Printed On: 2/12/2018 12:04
Page 4 of 12

VSDS Standard Map Survey Report

Data Point Details

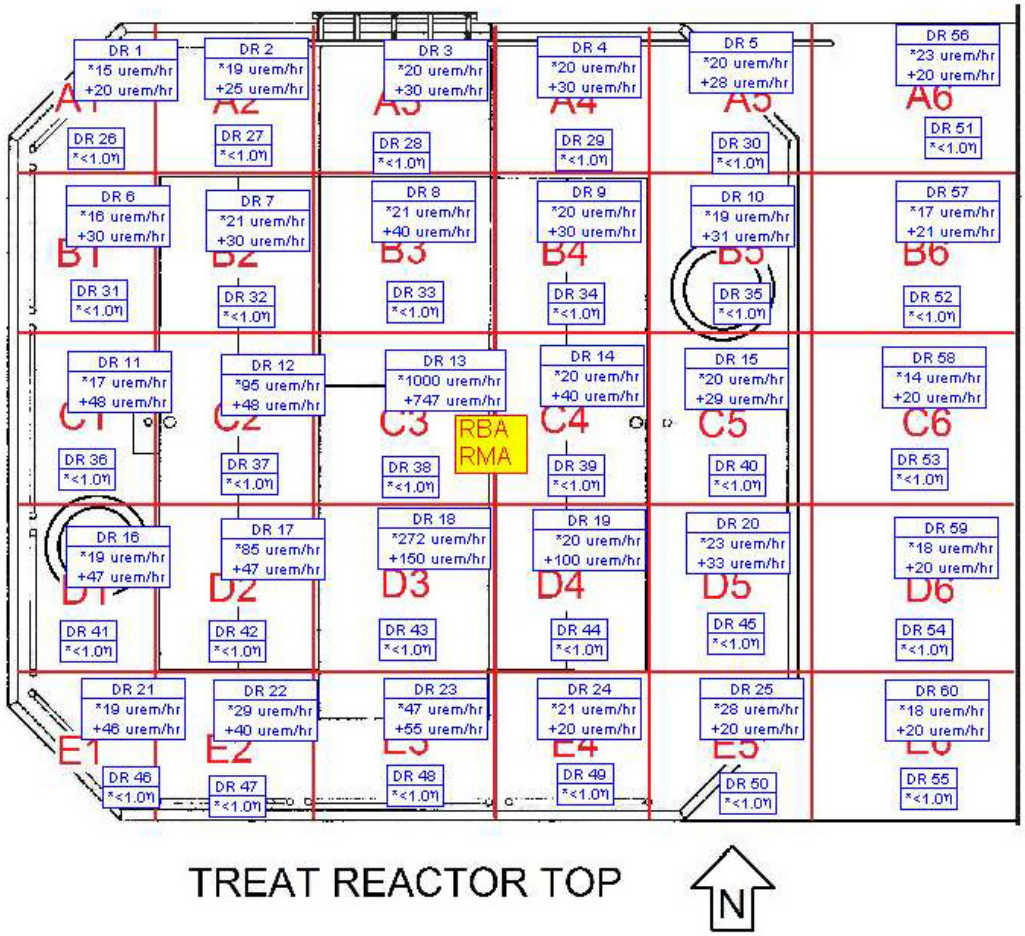
Survey #: M-20180130-67

Map: 2 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	3	* 40	urem/hr	L1	
		3	+ 40	urem/hr		
2	DR γ	3	* 30	urem/hr	L2	
		3	+ 30	urem/hr		
3	DR γ	3	* 30	urem/hr	L3	
		3	+ 30	urem/hr		
4	DR γ	3	* 40	urem/hr	L4	
		3	+ 40	urem/hr		
5	DR γ	3	* 30	urem/hr	L5	
		3	+ 30	urem/hr		
6	DR γ	3	* 40	urem/hr	M1	
		3	+ 40	urem/hr		
7	DR γ	3	* 30	urem/hr	M2	
		3	+ 30	urem/hr		
8	DR γ	3	* 30	urem/hr	M3	
		3	+ 30	urem/hr		
9	DR γ	3	* 30	urem/hr	M4	
		3	+ 30	urem/hr		
10	DR γ	3	* 30	urem/hr	M5	
		3	+ 30	urem/hr		
11	DR γ	1	* 22	urem/hr	N1	
		1	+ 22	urem/hr		
12	DR γ	1	* 26	urem/hr	N2	
		1	+ 26	urem/hr		
13	DR γ	1	* 25	urem/hr	N3	
		1	+ 25	urem/hr		
14	DR γ	1	* 25	urem/hr	N4	
		1	+ 30	urem/hr		
15	DR γ	1	* 25	urem/hr	N5	
		1	+ 25	urem/hr		
16	DR Neutron	2	* <1 η	mrem/hr	N1	
		2	+ <1 η	mrem/hr		
17	DR Neutron	2	* <1 η	mrem/hr	N2	
		2	+ <1 η	mrem/hr		
18	DR Neutron	2	* <1 η	mrem/hr	N3	
		2	+ <1 η	mrem/hr		
19	DR Neutron	2	* <1 η	mrem/hr	N4	
		2	+ <1 η	mrem/hr		
20	DR Neutron	2	* <1 η	mrem/hr	N5	
		2	+ <1 η	mrem/hr		
	Posting		RBA RMA			

VSDS Standard Map Survey Report

Map: 3	TREAT REACTOR TOP SURVEY GRID	Survey #: M-20180130-67	Date/Time: 1/30/2018 14:53



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Post Transient

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+ 75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF 2017008

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Levi K Tessier	Status: Approved by: Nicholas Christiansen, 2/6/2018 09:10:27
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355125

Image File: BOF\TREAT\Reactor Grid Surveys\Reactor Top Grid Survey Improved

Notes: N/A - 0 pages

Survey #: M-20180130-67 - Printed On: 2/12/2018 12:04

Page 6 of 12

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20180130-67

Map: 3 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	* 15	urem/hr	A1	
		1	+ 20	urem/hr		
2	DR γ	1	* 19	urem/hr	A2	
		1	+ 25	urem/hr		
3	DR γ	1	* 20	urem/hr	A3	
		1	+ 30	urem/hr		
4	DR γ	1	* 20	urem/hr	A4	
		1	+ 30	urem/hr		
5	DR γ	1	* 20	urem/hr	A5	
		1	+ 28	urem/hr		
6	DR γ	1	* 16	urem/hr	B1	
		1	+ 30	urem/hr		
7	DR γ	1	* 21	urem/hr	B2	
		1	+ 30	urem/hr		
8	DR γ	1	* 21	urem/hr	B3	
		1	+ 40	urem/hr		
9	DR γ	1	* 20	urem/hr	B4	
		1	+ 30	urem/hr		
10	DR γ	1	* 19	urem/hr	B5	
		1	+ 31	urem/hr		
11	DR γ	1	* 17	urem/hr	C1	
		1	+ 48	urem/hr		
12	DR γ	1	* 95	urem/hr	C2	
		1	+ 48	urem/hr		
13	DR γ	1	* 1000	urem/hr	C3	
		1	+ 747	urem/hr		
14	DR γ	1	* 20	urem/hr	C4	
		1	+ 40	urem/hr		
15	DR γ	1	* 20	urem/hr	C5	
		1	+ 29	urem/hr		
16	DR γ	1	* 19	urem/hr	D1	
		1	+ 47	urem/hr		
17	DR γ	1	* 85	urem/hr	D2	
		1	+ 47	urem/hr		
18	DR γ	1	* 272	urem/hr	D3	
		1	+ 150	urem/hr		
19	DR γ	1	* 20	urem/hr	D4	
		1	+ 100	urem/hr		
20	DR γ	1	* 23	urem/hr	D5	
		1	+ 33	urem/hr		
21	DR γ	1	* 19	urem/hr	E1	
		1	+ 46	urem/hr		
22	DR γ	1	* 29	urem/hr	E2	
		1	+ 40	urem/hr		
23	DR γ	1	* 47	urem/hr	E3	
		1	+ 55	urem/hr		
24	DR γ	1	* 21	urem/hr	E4	
		1	+ 20	urem/hr		
25	DR γ	1	* 28	urem/hr	E5	
		1	+ 20	urem/hr		
26	DR Neutron	2	* <1.0 η	mrem/hr	A1	

Log #: 355125 **Image File: BOF\TREAT\Reactor Grid Surveys\Reactor Top Grid Survey Improved**

Notes:: N/A - 0 pages

Survey #: M-20180130-67 - Printed On: 2/12/2018 12:04 **Page 7 of 12**

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20180130-67

Map: 3 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
27	DR Neutron	2	* <1.0 η	mrem/hr	A2	
28	DR Neutron	2	* <1.0 η	mrem/hr	A3	
29	DR Neutron	2	* <1.0 η	mrem/hr	A4	
30	DR Neutron	2	* <1.0 η	mrem/hr	A5	
31	DR Neutron	2	* <1.0 η	mrem/hr	B1	
32	DR Neutron	2	* <1.0 η	mrem/hr	B2	
33	DR Neutron	2	* <1.0 η	mrem/hr	B3	
34	DR Neutron	2	* <1.0 η	mrem/hr	B4	
35	DR Neutron	2	* <1.0 η	mrem/hr	B5	
36	DR Neutron	2	* <1.0 η	mrem/hr	C1	
37	DR Neutron	2	* <1.0 η	mrem/hr	C2	
38	DR Neutron	2	* <1.0 η	mrem/hr	C3	
39	DR Neutron	2	* <1.0 η	mrem/hr	C4	
40	DR Neutron	2	* <1.0 η	mrem/hr	C5	
41	DR Neutron	2	* <1.0 η	mrem/hr	D1	
42	DR Neutron	2	* <1.0 η	mrem/hr	D2	
43	DR Neutron	2	* <1.0 η	mrem/hr	D3	
44	DR Neutron	2	* <1.0 η	mrem/hr	D4	
45	DR Neutron	2	* <1.0 η	mrem/hr	D5	
46	DR Neutron	2	* <1.0 η	mrem/hr	E1	
47	DR Neutron	2	* <1.0 η	mrem/hr	E2	
48	DR Neutron	2	* <1.0 η	mrem/hr	E3	
49	DR Neutron	2	* <1.0 η	mrem/hr	E4	
50	DR Neutron	2	* <1.0 η	mrem/hr	E5	
51	DR Neutron	2	* <1.0 η	mrem/hr	A6	
52	DR Neutron	2	* <1.0 η	mrem/hr	B6	
53	DR Neutron	2	* <1.0 η	mrem/hr	C6	
54	DR Neutron	2	* <1.0 η	mrem/hr	D6	
55	DR Neutron	2	* <1.0 η	mrem/hr	E6	
56	DR γ	1	* 23	urem/hr	A6	
		1	+ 20	urem/hr		
57	DR γ	1	* 17	urem/hr	B6	
		1	+ 21	urem/hr		
58	DR γ	1	* 14	urem/hr	C6	
		1	+ 20	urem/hr		
59	DR γ	1	* 18	urem/hr	D6	
		1	+ 20	urem/hr		
60	DR γ	1	* 18	urem/hr	E6	
		1	+ 20	urem/hr		
	Posting		RBA RMA			

Log #: 355125

Image File: BOF\TREAT\Reactor Grid Surveys\Reactor Top Grid Survey Improved

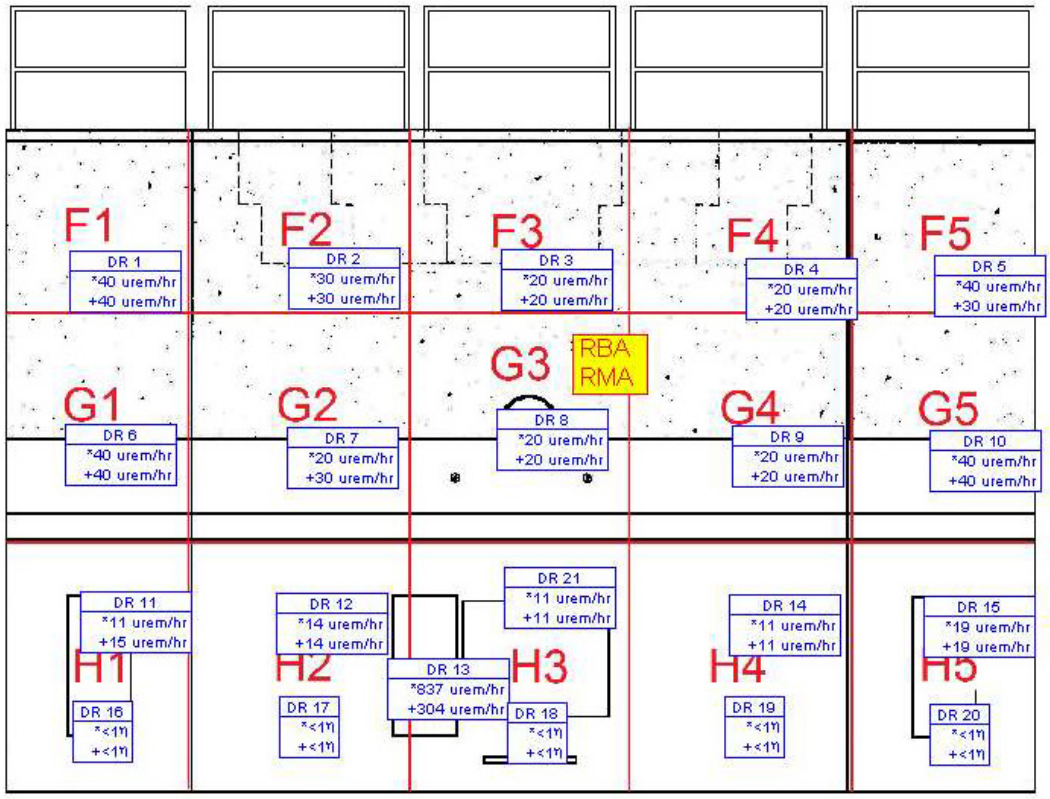
Notes:: N/A - 0 pages

Survey #: M-20180130-67 - Printed On: 2/12/2018 12:04

Page 8 of 12

VSDS Standard Map Survey Report

Map: 4	TREAT SOUTH REACTOR FACE SURVEY GRID	Survey #: M-20180130-67	Date/Time: 1/30/2018 14:53



REACTOR SOUTH FACE

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Post Transient

RWP and Task #: BOF 2017008

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+ 75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Levi K Tessier	Status: Approved by: Nicholas Christiansen, 2/6/2018 09:10:27
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355125
Image File: BOF\TREAT\Reactor Grid Surveys\South Reactor Face Grid Survey
Notes: N/A - 0 pages
Survey #: M-20180130-67 - Printed On: 2/12/2018 12:04
Page 9 of 12

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20180130-67

Map: 4 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	3	* 40	urem/hr	F1	
		3	+ 40	urem/hr		
2	DR γ	3	* 30	urem/hr	F2	
		3	+ 30	urem/hr		
3	DR γ	3	* 20	urem/hr	F3	
		3	+ 20	urem/hr		
4	DR γ	3	* 20	urem/hr	F4	
		3	+ 20	urem/hr		
5	DR γ	3	* 40	urem/hr	F5	
		3	+ 30	urem/hr		
6	DR γ	3	* 40	urem/hr	G1	
		3	+ 40	urem/hr		
7	DR γ	3	* 20	urem/hr	G2	
		3	+ 30	urem/hr		
8	DR γ	3	* 20	urem/hr	G3	
		3	+ 20	urem/hr		
9	DR γ	3	* 20	urem/hr	G4	
		3	+ 20	urem/hr		
10	DR γ	1	* 40	urem/hr	G5	
		1	+ 40	urem/hr		
11	DR γ	1	* 11	urem/hr	H1	
		1	+ 15	urem/hr		
12	DR γ	1	* 14	urem/hr	H2	
		1	+ 14	urem/hr		
13	DR γ	1	* 837	urem/hr	H3	
		1	+ 304	urem/hr		
14	DR γ	1	* 11	urem/hr	H4	
		1	+ 11	urem/hr		
15	DR γ	1	* 19	urem/hr	H5	
		1	+ 19	urem/hr		
16	DR Neutron	2	* <1 η	mrem/hr	H1	
		2	+ <1 η	mrem/hr		
17	DR Neutron	2	* <1 η	mrem/hr	H2	
		2	+ <1 η	mrem/hr		
18	DR Neutron	2	* <1 η	mrem/hr	H3	
		2	+ <1 η	mrem/hr		
19	DR Neutron	2	* <1 η	mrem/hr	H4	
		2	+ <1 η	mrem/hr		
20	DR Neutron	2	* <1 η	mrem/hr	H5	
		2	+ <1 η	mrem/hr		
21	DR γ	1	* 11	urem/hr		
		1	+ 11	urem/hr		
	Posting		RBA RMA			

Log #: 355125

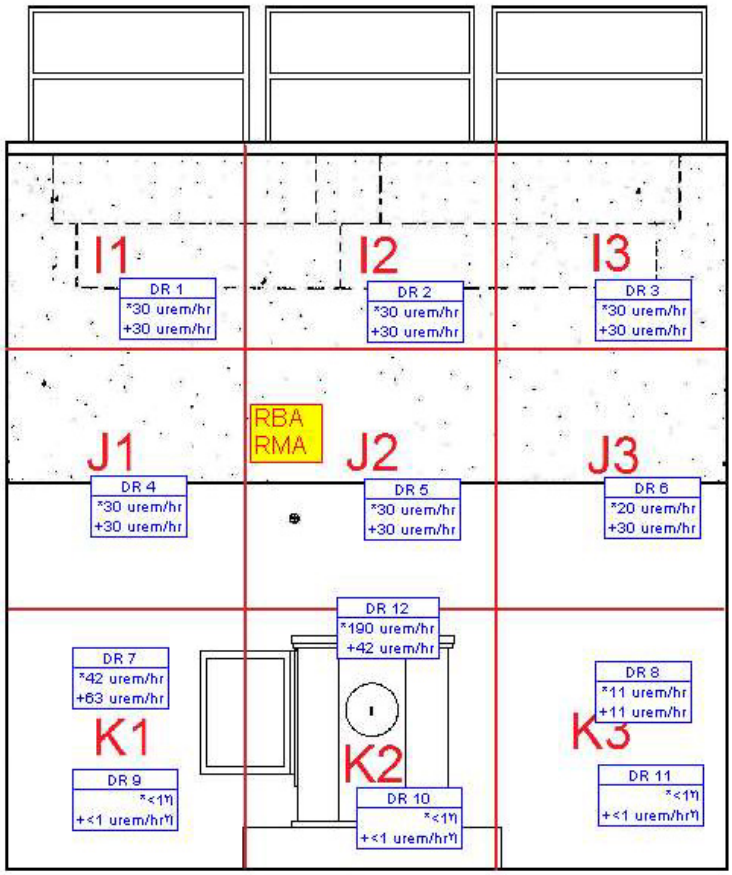
Image File: BOF\TREAT\Reactor Grid Surveys\South Reactor Face Grid Survey

Notes:: N/A - 0 pages

Survey #: M-20180130-67 - Printed On: 2/12/2018 12:04

VSDS Standard Map Survey Report

Map: 5	TREAT WEST REACTOR FACE SURVEY GRID	Survey #: M-20180130-67	Date/Time: 1/30/2018 14:53



REACTOR WEST FACE

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Post Transient

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area
HS-50 Hot Spot
RCA Posting
Drip Bag
15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017008

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Levi K Tessier	Status: Approved by: Nicholas Christiansen, 2/6/2018 09:10:27
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355125
Image File: BOF\TREAT\Reactor Grid Surveys\West Reactor Face Survey Grid
Notes: N/A - 0 pages
Survey #: M-20180130-67 - Printed On: 2/12/2018 12:04
Page 11 of 12

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180130-67
Map: 5 - TREAT EAST REACTOR FACE SURVEY GRID

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	3	* 30	urem/hr	I1	
		3	+ 30	urem/hr		
2	DR γ	3	* 30	urem/hr	I2	
		3	+ 30	urem/hr		
3	DR γ	3	* 30	urem/hr	I3	
		3	+ 30	urem/hr		
4	DR γ	3	* 30	urem/hr	J1	
		3	+ 30	urem/hr		
5	DR γ	3	* 30	urem/hr	J2	
		3	+ 30	urem/hr		
6	DR γ	3	* 20	urem/hr	J3	
		3	+ 30	urem/hr		
7	DR γ	1	* 42	urem/hr	K1	Dose Rates are correct, elevated BKGD from behind
		1	+ 63	urem/hr		
8	DR γ	1	* 11	urem/hr	K3	
		1	+ 11	urem/hr		
9	DR Neutron	2	* <1 η	mrem/hr	K1	
		2	+ <1 η	urem/hr		
10	DR Neutron	2	* <1 η	mrem/hr	K2	
		2	+ <1 η	urem/hr		
11	DR Neutron	2	* <1 η	mrem/hr	K3	
		2	+ <1 η	urem/hr		
12	DR γ	1	* 190	urem/hr		
		1	+ 42	urem/hr		
	Posting		RBA RMA			

Log #: 355125
Image File: BOF\TREAT\Reactor Grid Surveys\West Reactor Face Survey Grid
Notes:: N/A - 0 pages
Survey #: M-20180130-67 - Printed On: 2/12/2018 12:04
Page 12 of 12

VSDS Standard Map Survey Report

Survey M-20180130-69

General Information

Title: BOFTREAT-720 Building post transiant re-entry

Survey Date/Time: 1/30/2018 15:02
Lead Surveyor: Bryan King
Survey Type: Job Specific
Work Order/Task #: N/A
Counted By:
KCN: 54625
RWP and Task#: BOF2017008
Status: Approved by: Trenna Le Page, 2/15/2018 16:00:32
KCN: 52363
Ready for Review by: Bryan King, 2/15/2018 13:48:06
KCN: 54625

Additional Surveyors

Surveyor
Blaine Case
Levi K Tessier

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

Control-Ar=Controlled Area
HRAACR=HRA ACCESS CONTROLS REQUIRED
RA=Radiation Area
RBA=Radiological Buffer Area
RBA-Exit=RBA-Exit
RBA-RO=RBA - Radiation Only
RMA=Radioactive Material Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency		
				β/γ	β	α
1	Ludlum 3030	854461	C	.337	N/A	.300
2	B20-ER	803201	C	0.1	N/A	N/A
3	RO20	803029	D	N/A	N/A	N/A
4	E-600 w/Remball	802087	D	N/A	N/A	N/A

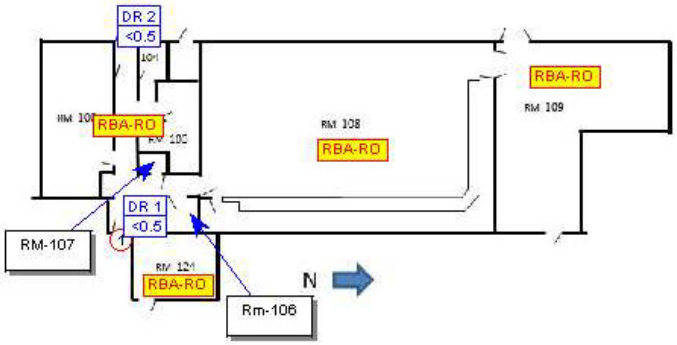
Instruments Used - Notes

#	Notes
1	N/A
2	N/A
3	N/A
4	N/A

Log #: 355133
Notes:: N/A - 0 pages
Survey #: M-20180130-69 - Printed On: 2/19/2018 07:23

VSDS Standard Map Survey Report

Map: 1	OFFICE AREAS	Survey #: M-20180130-69	Date/Time: 1/30/2018 15:02



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes
1) <1000 dpm/100cm2 B/Y 1) <20 dpm/100cm2 α	

Type: Job Specific

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task#: BOF2017008

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Trenna Le Page, 2/15/2018 16:00:32
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355133
Image File: BOF\TREAT\720 Office areas
Notes: N/A - 0 pages
Survey #: M-20180130-69 - Printed On: 2/19/2018 07:23
Page 2 of 18

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180130-69
Map: 1 - OFFICE AREAS

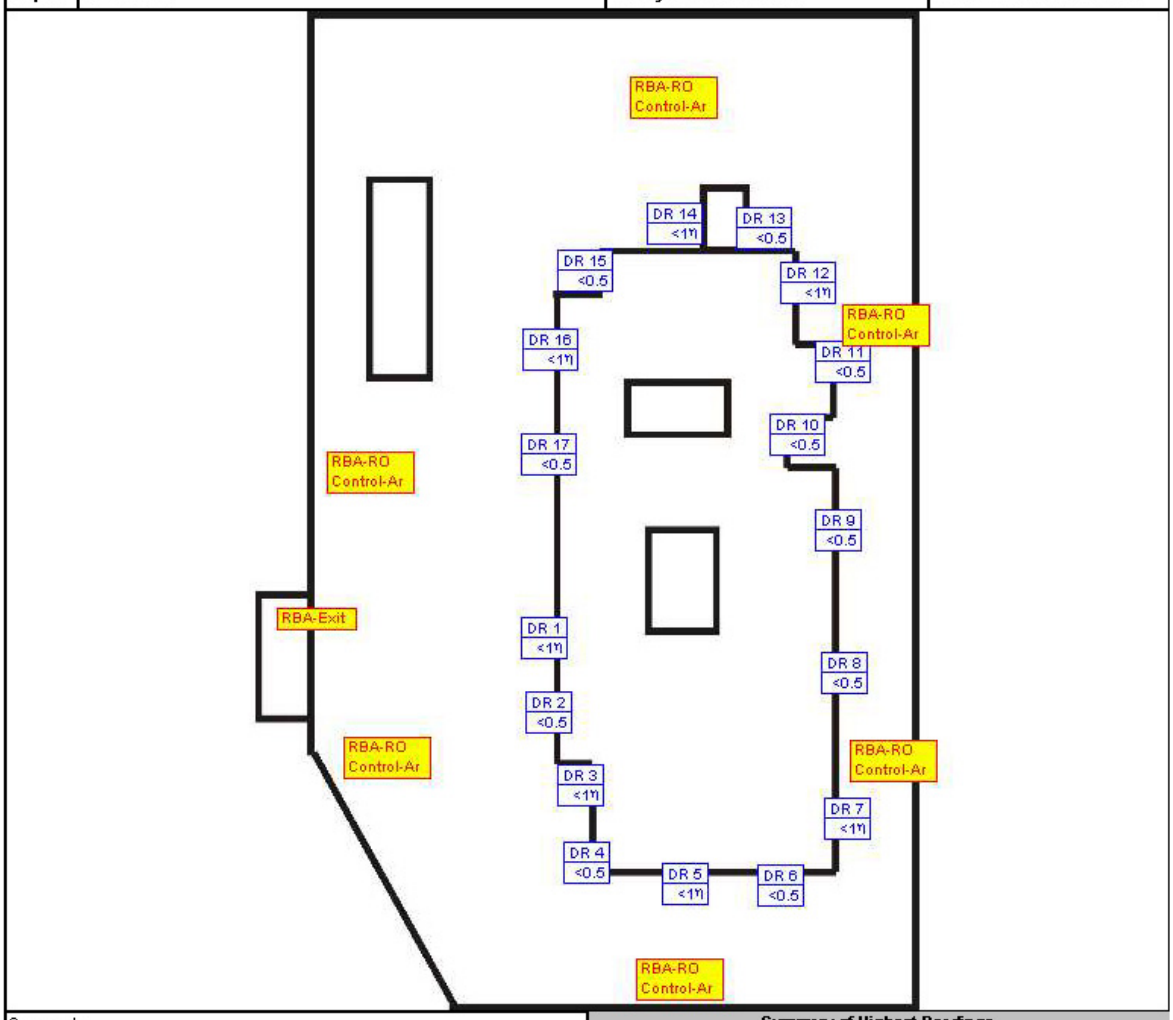
#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	3	<0.5	mrem/hr		
2	DR γ	3	<0.5	mrem/hr		
1	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
	Posting		RBA-RO			
	Posting		RBA-RO			
	Note					RM-107
	Note					Rm-106
	Posting		RBA-RO			
	Posting		RBA-RO			

Log #: 355133
Notes:: N/A - 0 pages
Survey #: M-20180130-69 - Printed On: 2/19/2018 07:23

Image File: BOF\TREAT\720 Office areas
Page 3 of 18

VSDS Standard Map Survey Report

Map: 2	DTRA RDD	Survey #: M-20180130-69	Date/Time: 1/30/2018 15:02



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Job Specific

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+ 75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF 2017008

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King

Status: Approved by: Trenna Le Page, 2/15/2018 16:00:32

Location Code: MFC

Bldg/Area Name: 720 DTRA RDD

Location Description: TREAT DTRA RDD

Log #: 355133

Image File: MFC\TREAT 720\Treat DTRA RDD\MFC 720 Treat DTRA RDD

Notes: N/A - 0 pages

Survey #: M-20180130-69 - Printed On: 2/19/2018 07:23

Page 4 of 18

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180130-69
Map: 2 - OFFICE AREAS

#	Type	Inst.	Value	Units	Position	Notes
1	DR Neutron	4	<1 η	mrem/hr		
2	DR γ	3	<0.5	mrem/hr		
3	DR Neutron	4	<1 η	mrem/hr		
4	DR γ	3	<0.5	mrem/hr		
5	DR Neutron	4	<1 η	mrem/hr		
6	DR γ	3	<0.5	mrem/hr		
7	DR Neutron	4	<1 η	mrem/hr		
8	DR γ	3	<0.5	mrem/hr		
9	DR γ	3	<0.5	mrem/hr		
10	DR γ	3	<0.5	mrem/hr		
11	DR γ	3	<0.5	mrem/hr		
12	DR Neutron	4	<1 η	mrem/hr		
13	DR γ	3	<0.5	mrem/hr		
14	DR Neutron	4	<1 η	mrem/hr		
15	DR γ	3	<0.5	mrem/hr		
16	DR Neutron	4	<1 η	mrem/hr		
17	DR γ	3	<0.5	mrem/hr		
	Posting		RBA-RO Control-Ar			
	Posting		RBA-RO Control-Ar			
	Posting		RBA-RO Control-Ar			
	Posting		RBA-RO Control-Ar			
	Posting		RBA-RO Control-Ar			
	Posting		RBA-RO Control-Ar			
	Posting		RBA-Exit			

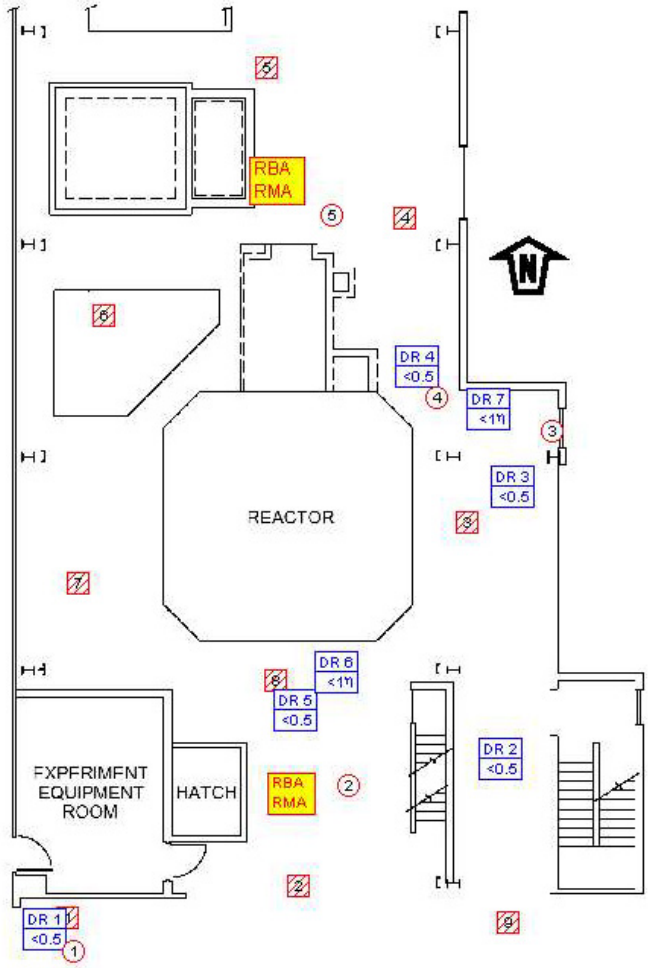
Log #: 355133
Notes:: N/A - 0 pages
Survey #: M-20180130-69 - Printed On: 2/19/2018 07:23

Image File: MFC\TREAT 720\Treat DTRA RDD\MFC 720 Treat DTRA RDD

Page 5 of 18

VSDS Standard Map Survey Report

Map: 3	TREAT FLOOR AROUND REACTOR	Survey #: M-20180130-69	Date/Time: 1/30/2018 15:02



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes
5) <1000 dpm/100cm2 B/Y 5) <20 dpm/100cm2 α	Wipe 9) BKG CCPM β/γ

Type: Job Specific

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017008

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Trenna Le Page, 2/15/2018 16:00:32
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355133
Image File: BOF\TREAT\TREAT Floor Around Reactor Survey Map
Notes: N/A - 0 pages
Survey #: M-20180130-69 - Printed On: 2/19/2018 07:23
Page 6 of 18

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20180130-69

Map: 3 - OFFICE AREAS

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	3	<0.5	mrem/hr		
2	DR γ	3	<0.5	mrem/hr		
3	DR γ	3	<0.5	mrem/hr		
4	DR γ	3	<0.5	mrem/hr		
5	DR γ	3	<0.5	mrem/hr		
6	DR Neutron	4	<1 η	mrem/hr		
7	DR Neutron	4	<1 η	mrem/hr		
1	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
2	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
3	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
4	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
5	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
1	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
2	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
3	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
4	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
5	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
6	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
7	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
8	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
9	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
	Posting		RBA RMA			

Log #: 355133

Image File: BOF\TREAT\TREAT Floor Around Reactor Survey Map

Notes:: N/A - 0 pages

Survey #: M-20180130-69 - Printed On: 2/19/2018 07:23

Page 7 of 18

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180130-69
Map: 3 - OFFICE AREAS

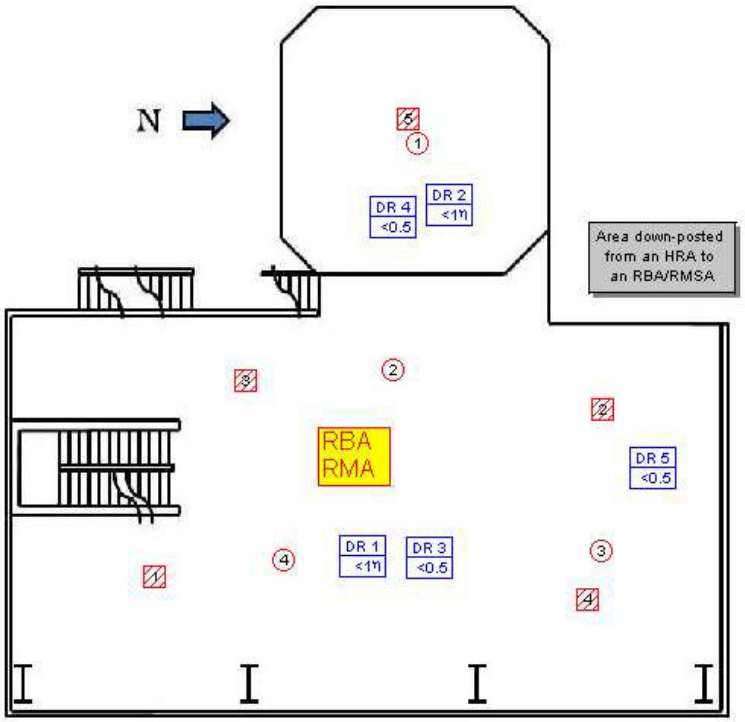
#	Type	Inst.	Value	Units	Position	Notes
	Posting		RBA RMA			

Log #: 355133
Notes:: N/A - 0 pages
Survey #: M-20180130-69 - Printed On: 2/19/2018 07:23

Image File: BOF\TREAT\TREAT Floor Around Reactor Survey Map

VSDS Standard Map Survey Report

Map: 4	FIRST MEZZANINE	Survey #: M-20180130-69	Date/Time: 1/30/2018 15:02



Comments:

Summary of Highest Readings (All available values may not be listed)

Smears	Air Samples & Wipes
4) <1000 dpm/100cm2 B/Y	Wipe 5) BKG CCPM β/γ
4) <20 dpm/100cm2 α	

Type: Job Specific

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF 2017008

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Trenna Le Page, 2/15/2018 16:00:32
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355133 **Image File: BOF\TREAT\FIRST MEZZANINE**

Notes: N/A - 0 pages

Survey #: M-20180130-69 - Printed On: 2/19/2018 07:23 **Page 9 of 18**

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180130-69
Map: 4 - OFFICE AREAS

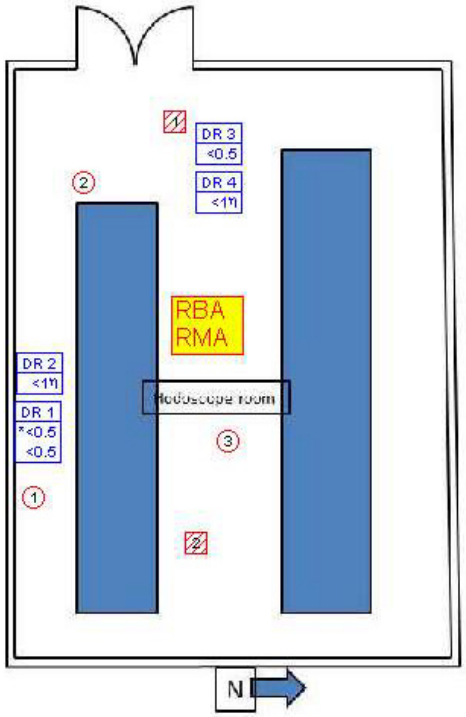
#	Type	Inst.	Value	Units	Position	Notes
1	DR Neutron	4	<1 η	mrem/hr		
2	DR Neutron	4	<1 η	mrem/hr		
3	DR γ	3	<0.5	mrem/hr		
4	DR γ	3	<0.5	mrem/hr		
5	DR γ	3	<0.5	mrem/hr		
1	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
2	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
3	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
4	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
1	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
2	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
3	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
4	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
5	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
	Note					Area down-posted from an HRA to an RBA/RMSA
	Posting		RBA RMA			

Log #: 355133
Notes:: N/A - 0 pages
Survey #: M-20180130-69 - Printed On: 2/19/2018 07:23

Image File: BOF\TREAT\FIRST MEZZANINE

VSDS Standard Map Survey Report

Map: 5	HODOSCOPE ROOM	Survey #: M-20180130-69	Date/Time: 1/30/2018 15:02



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes
3) <1000 dpm/100cm2 B/Y 3) <20 dpm/100cm2 α	Wipe 2) BKG CCPM β/γ

Type: Job Specific

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017008

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Trenna Le Page, 2/15/2018 16:00:32
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355133 **Image File: BOF\TREAT\HODOSCOPE ROOM**

Notes: N/A - 0 pages

Survey #: M-20180130-69 - Printed On: 2/19/2018 07:23 **Page 11 of 18**

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180130-69
Map: 5 - OFFICE AREAS

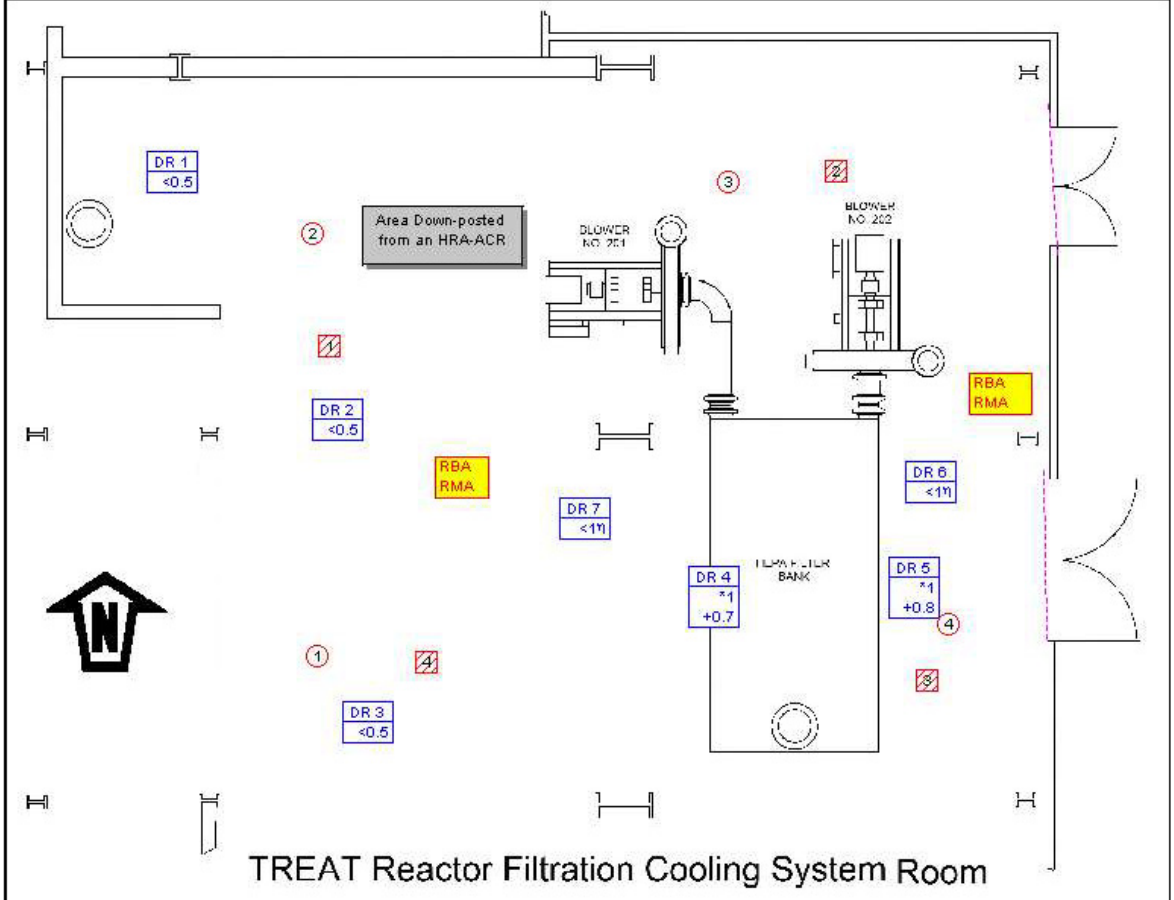
#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	3	* <0.5	mrem/hr		
		3	<0.5	mrem/hr		
2	DR Neutron	4	<1 η	mrem/hr		
3	DR γ	3	<0.5	mrem/hr		
4	DR Neutron	4	<1 η	mrem/hr		
1	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
2	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
3	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
1	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
2	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
	Posting		RBA RMA			

Log #: 355133
Notes:: N/A - 0 pages
Survey #: M-20180130-69 - Printed On: 2/19/2018 07:23

Image File: BOF\TREAT\HODOSCOPE ROOM

VSDS Standard Map Survey Report

Map: 6	TREAT REACTOR FILTRATION COOLING SYSTEM ROOM	Survey #: M-20180130-69	Date/Time: 1/30/2018 15:02



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes
4) <1000 dpm/100cm2 B/Y	Wipe 4) BKG CCPM β/γ
4) <20 dpm/100cm2 α	

Type: Job Specific

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task#: BOF2017008

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Trenna Le Page, 2/15/2018 16:00:32
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355133
Image File: BOF\TREAT\TREAT Reactor Filtration Cooling System Room Clean - Plan View
Notes: N/A - 0 pages
Survey #: M-20180130-69 - Printed On: 2/19/2018 07:23
Page 13 of 18

VSDS Standard Map Survey Report

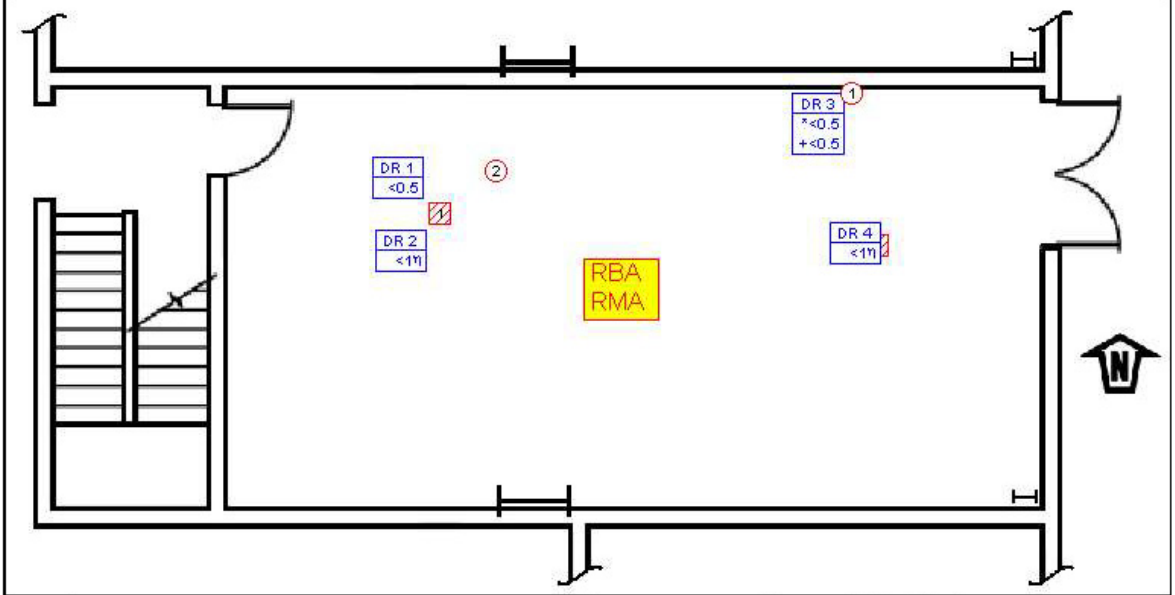
Data Point Details
Survey #: M-20180130-69
Map: 6 - OFFICE AREAS

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	3	<0.5	mrem/hr		
2	DR γ	3	<0.5	mrem/hr		
3	DR γ	3	<0.5	mrem/hr		
4	DR γ	3	* 1	mrem/hr		
		3	+ 0.7	mrem/hr		
5	DR γ	3	* 1	mrem/hr		
		3	+ 0.8	mrem/hr		
6	DR Neutron	4	<1 η	mrem/hr		
7	DR Neutron	4	<1 η	mrem/hr		
1	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
2	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
3	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
4	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
1	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
2	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
3	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
4	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
	Posting		RBA RMA			
	Posting		RBA RMA			
	Note					Area Down-posted from an HRA-ACR

Log #: 355133 **Image File: BOF\TREAT\TREAT Reactor Filtration Cooling System Room Clean - Plan View**
Notes:: N/A - 0 pages
Survey #: M-20180130-69 - Printed On: 2/19/2018 07:23 **Page 14 of 18**

VSDS Standard Map Survey Report

Map: 7	TREAT MECHANICAL EQUIPMENT ROOM	Survey #: M-20180130-69	Date/Time: 1/30/2018 15:02



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes
2) <1000 dpm/100cm2 B/Y 2) <20 dpm/100cm2 α	Wipe 2) BKG CCPM β/γ

Type: Job Specific

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017008

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Trenna Le Page, 2/15/2018 16:00:32
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355133
Image File: BOF\TREAT\TREAT Mechanical Equipment Room
Notes: N/A - 0 pages
Survey #: M-20180130-69 - Printed On: 2/19/2018 07:23
Page 15 of 18

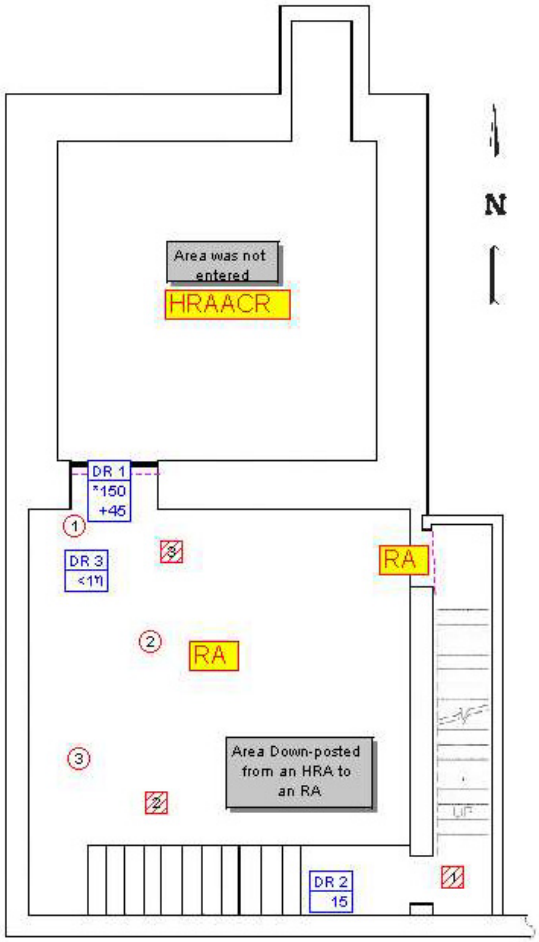
VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180130-69
Map: 7 - OFFICE AREAS

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	3	<0.5	mrem/hr		
2	DR Neutron	4	<1 η	mrem/hr		
3	DR γ	3	* <0.5	mrem/hr		
		3	+ <0.5	mrem/hr		
4	DR Neutron	4	<1 η	mrem/hr		
1	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
2	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
1	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
2	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
	Posting		RBA RMA			

VSDS Standard Map Survey Report

Map: 8	TREAT SUB-PILE ROOM	Survey #: M-20180130-69	Date/Time: 1/30/2018 15:02



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes
3) <1000 dpm/100cm2 B/Y 3) <20 dpm/100cm2 α	Wipe 3) BKG CCPM β/γ

Type: Job Specific

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area
HS-50 Hot Spot
RCA Posting
Drip Bag
15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017008

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Trenna Le Page, 2/15/2018 16:00:32
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355133
Image File: BOF\TREAT\TREAT Sub-Pile Room
Notes: N/A - 0 pages
Survey #: M-20180130-69 - Printed On: 2/19/2018 07:23
Page 17 of 18

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180130-69
Map: 8 - OFFICE AREAS

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	3	* 150	mrem/hr	Window	
		3	+ 45	mrem/hr		
2	DR γ	3	15	mrem/hr		
3	DR Neutron	4	<1 η	mrem/hr		
1	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
2	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
3	Smear	1	B/Y <1000	dpm/100cm2		
		N/A	β N/A	dpm/100cm2		
		1	α <20	dpm/100cm2		
1	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
2	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
3	Wipe	2	β/γ BKG	CCPM		
		N/A	β N/A	CCPM		
		N/A	α N/A	CCPM		
	Note					Area was not entered
	Note					Area Down-posted from an HRA to an RA
	Posting		HRAACR			
	Posting		RA			
	Posting		RA			

Log #: 355133
Notes:: N/A - 0 pages
Survey #: M-20180130-69 - Printed On: 2/19/2018 07:23

Image File: BOF\TREAT\TREAT Sub-Pile Room

Page 18 of 18

VSDS Standard Map Survey Report

Survey M-20180130-71

General Information

Title: BOF/TREAT Post Transient Survey Mezzanine/ High bay

Survey Date/Time: 1/30/2018 14:00 — Lead Surveyor: Benjamin W Walker

Survey Type: Other - Post Transient — Work Order/Task #: PLN-5350

Counted By: — KCN: 113438

RWP and Task#: BOF2017008

Status: Approved by: Trenna Le Page, 2/15/2018 15:56:35 — KCN: 52363

Ready for Review by: Benjamin W Walker, 1/31/2018 10:33:44 — KCN: 113438

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

RBA=Radiological Buffer Area RMA=Radioactive Material Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency		
				β/γ	β	α
1	B20-ER	803202	D	N/A	N/A	N/A
2	E-600 w/Remball	802087	D	N/A	N/A	N/A

Instruments Used - Notes

#	Notes
1	N/A
2	N/A

Log #: 355125

Notes:: N/A - 0 pages

Survey #: M-20180130-71 - Printed On: 2/19/2018 07:28

Page 1 of 6

VSDS Standard Map Survey Report

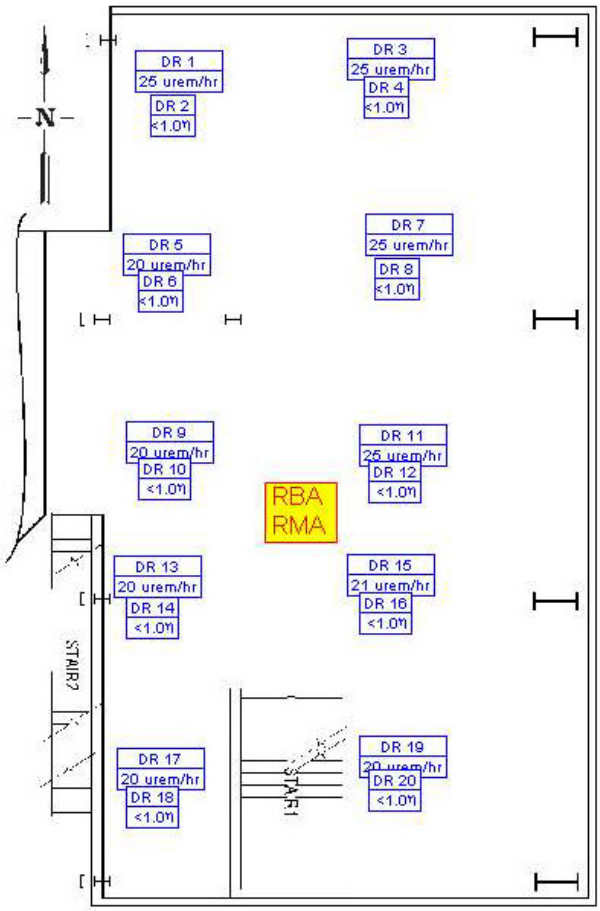
Comments:

Post Transient Survey for Rad Engineer

Log #: 355125
Notes:: N/A - 0 pages
Survey #: M-20180130-71 - Printed On: 2/19/2018 07:28

VSDS Standard Map Survey Report

Map: 1	TREAT FLOOR PLAN SECOND FLOOR	Survey #: M-20180130-71	Date/Time: 1/30/2018 14:00



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Post Transient

RWP and Task#: BOF2017008

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Benjamin W Walker	Status: Approved by: Trenna Le Page, 2/15/2018 15:56:35
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355125
Image File: BOF\TREAT\TREAT Floor Plan Second Floor
Notes: N/A - 0 pages
Survey #: M-20180130-71 - Printed On: 2/19/2018 07:28
Page 3 of 6

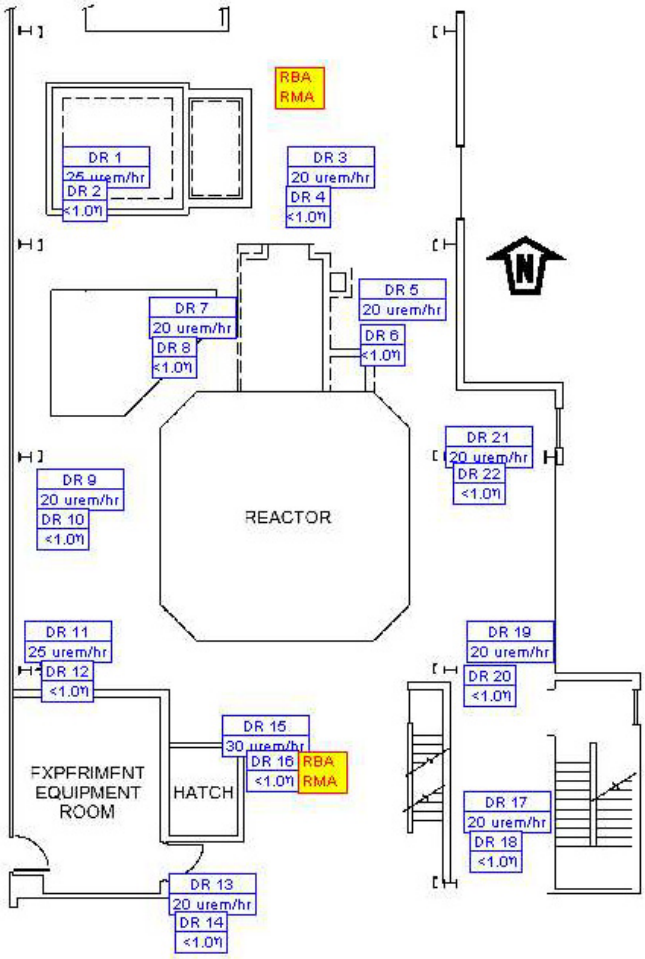
VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180130-71
Map: 1 - TREAT FLOOR PLAN SECOND FLOOR

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	25	urem/hr		
2	DR Neutron	2	<1.0 η	mrem/hr		
3	DR γ	1	25	urem/hr		
4	DR Neutron	2	<1.0 η	mrem/hr		
5	DR γ	1	20	urem/hr		
6	DR Neutron	2	<1.0 η	mrem/hr		
7	DR γ	1	25	urem/hr		
8	DR Neutron	2	<1.0 η	mrem/hr		
9	DR γ	1	20	urem/hr		
10	DR Neutron	2	<1.0 η	mrem/hr		
11	DR γ	1	25	urem/hr		
12	DR Neutron	2	<1.0 η	mrem/hr		
13	DR γ	1	20	urem/hr		
14	DR Neutron	2	<1.0 η	mrem/hr		
15	DR γ	1	21	urem/hr		
16	DR Neutron	2	<1.0 η	mrem/hr		
17	DR γ	1	20	urem/hr		
18	DR Neutron	2	<1.0 η	mrem/hr		
19	DR γ	1	20	urem/hr		
20	DR Neutron	2	<1.0 η	mrem/hr		
	Posting		RBA RMA			

VSDS Standard Map Survey Report

Map: 2	TREAT FLOOR AROUND REACTOR	Survey #: M-20180130-71	Date/Time: 1/30/2018 14:00



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Post Transient

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area
HS-50 Hot Spot
RCA Posting
Drip Bag
15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF 2017008

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Benjamin W Walker	Status: Approved by: Trenna Le Page, 2/15/2018 15:56:35
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355125
Image File: BOF\TREAT\TREAT Floor Around Reactor Survey Map
Notes: N/A - 0 pages
Survey #: M-20180130-71 - Printed On: 2/19/2018 07:28
Page 5 of 6

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180130-71
Map: 2 - TREAT FLOOR PLAN SECOND FLOOR

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	25	urem/hr		
2	DR Neutron	2	<1.0 η	mrem/hr		
3	DR γ	1	20	urem/hr		
4	DR Neutron	2	<1.0 η	mrem/hr		
5	DR γ	1	20	urem/hr		
6	DR Neutron	2	<1.0 η	mrem/hr		
7	DR γ	1	20	urem/hr		
8	DR Neutron	2	<1.0 η	mrem/hr		
9	DR γ	1	20	urem/hr		
10	DR Neutron	2	<1.0 η	mrem/hr		
11	DR γ	1	25	urem/hr		
12	DR Neutron	2	<1.0 η	mrem/hr		
13	DR γ	1	20	urem/hr		
14	DR Neutron	2	<1.0 η	mrem/hr		
15	DR γ	1	30	urem/hr		
16	DR Neutron	2	<1.0 η	mrem/hr		
17	DR γ	1	20	urem/hr		
18	DR Neutron	2	<1.0 η	mrem/hr		
19	DR γ	1	20	urem/hr		
20	DR Neutron	2	<1.0 η	mrem/hr		
21	DR γ	1	20	urem/hr		
22	DR Neutron	2	<1.0 η	mrem/hr		
	Posting		RBA RMA			
	Posting		RBA RMA			

Log #: 355125
Notes:: N/A - 0 pages
Survey #: M-20180130-71 - Printed On: 2/19/2018 07:28

Image File: BOF\TREAT\TREAT Floor Around Reactor Survey Map

VSDS Standard Map Survey Report

Survey M-20180130-75

General Information

Title: BOFTREAT Post Transient Survey Bar/ subpile

Survey Date/Time: 1/30/2018 14:30 — Lead Surveyor: Benjamin W Walker

Survey Type: Other - Post Transient — Work Order/Task #: PLN-5350

Counted By: — KCN: 113438

RWP and Task#: BOF2017008

Status: Approved by: Nicholas Christiansen, 2/6/2018 09:30:28 — KCN: 111190

Ready for Review by: Benjamin W Walker, 1/31/2018 10:33:56 — KCN: 113438

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

HRAACR=HRA ACCESS CONTROLS REQUIRED

RA=Radiation Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency		
				β/γ	β	α
1	E-600 w/Remball	802087	D	N/A	N/A	N/A
2	B20-ER	803202	D	N/A	N/A	N/A

Instruments Used - Notes

#	Notes
1	N/A
2	N/A

Log #: 355125

Notes:: N/A - 0 pages

VSDS Standard Map Survey Report

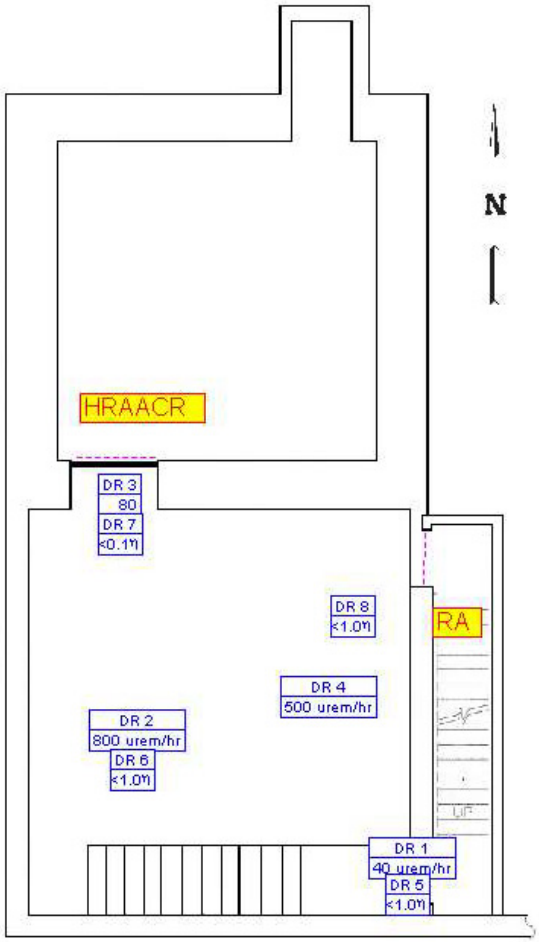
Comments:

Post Transient Survey for RAD Engineer

Log #: 355125
Notes:: N/A - 0 pages
Survey #: M-20180130-75 - Printed On: 2/12/2018 12:07

VSDS Standard Map Survey Report

TREAT SUB-PILE ROOM	Survey #: M-20180130-75	Date/Time: 1/30/2018 14:30



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Post Transient

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017008

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Benjamin W Walker	Status: Approved by: Nicholas Christiansen, 2/6/2018 09:30:28
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355125
Image File: BOF\TREAT\TREAT Sub-Pile Room
Notes: N/A - 0 pages
Survey #: M-20180130-75 - Printed On: 2/12/2018 12:07
Page 3 of 4

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180130-75
Map: TREAT SUB-PILE ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	2	40	urem/hr		
2	DR γ	2	800	urem/hr		
3	DR γ	2	80	mrem/hr		
4	DR γ	2	500	urem/hr		
5	DR Neutron	1	<1.0 η	mrem/hr		
6	DR Neutron	1	<1.0 η	mrem/hr		
7	DR Neutron	1	<0.1 η	mrem/hr		
8	DR Neutron	1	<1.0 η	mrem/hr		
	Posting		RA			
	Posting		HRAACR			

Log #: 355125
Notes:: N/A - 0 pages
Survey #: M-20180130-75 - Printed On: 2/12/2018 12:07

Image File: BOF\TREAT\TREAT Sub-Pile Room

VSDS Standard Map Survey Report

Survey M-20180130-83

General Information

Title: BOFTREAT-Post Transient survey Filtration/ Hodoscope/ Mechanical RM

Survey Date/Time: 1/30/2018 16:33
Lead Surveyor: Bryan King

Survey Type: Other - Post Transient
Work Order/Task #: PLN-5350

Counted By:
KCN: 54625

RWP and Task#: BOF2017008

Status: Approved by: Trenna Le Page, 2/15/2018 15:59:55
KCN: 52363

Ready for Review by: Bryan King, 2/15/2018 13:51:57
KCN: 54625

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

RBA=Radiological Buffer Area RBA-RO=RBA - Radiation Only RMA=Radioactive Material Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency		
				β/γ	β	α
1	B20-ER	803201	D	N/A	N/A	N/A
2	E-600 w/Remball	802087	D	N/A	N/A	N/A

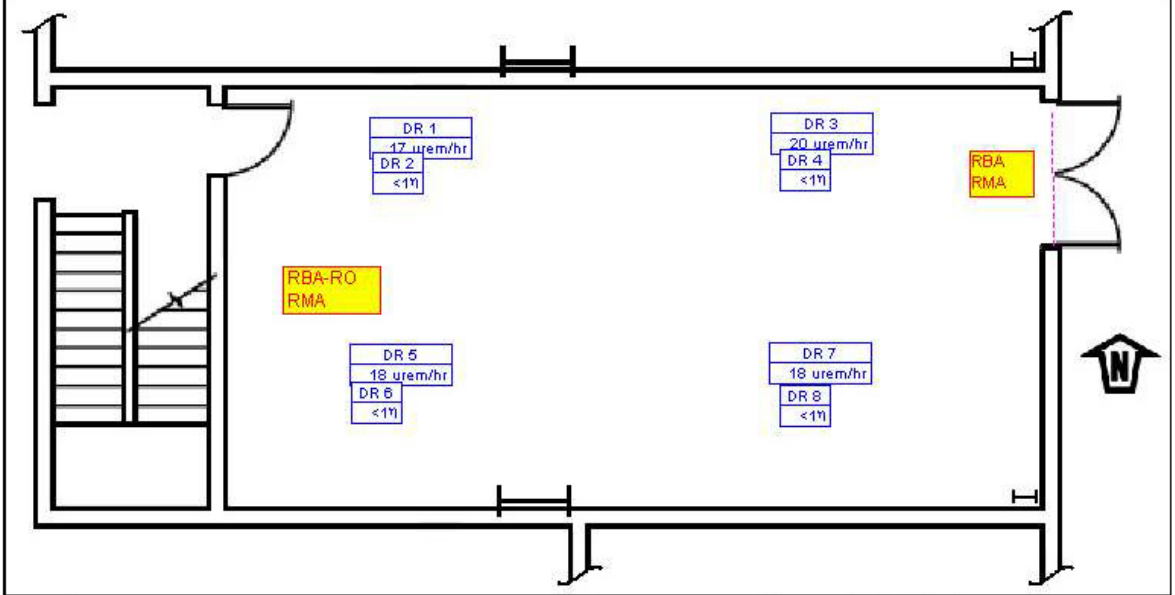
Instruments Used - Notes

#	Notes
1	N/A
2	N/A

Log #: 355217
Notes:: N/A - 0 pages
Survey #: M-20180130-83 - Printed On: 2/19/2018 07:20

VSDS Standard Map Survey Report

Map: 1	TREAT MECHANICAL EQUIPMENT ROOM	Survey #: M-20180130-83	Date/Time: 1/30/2018 16:33



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Post Transient

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF 2017008

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Trenna Le Page, 2/15/2018 15:59:55
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355217
Image File: BOF\TREAT\TREAT Mechanical Equipment Room
Notes: N/A - 0 pages
Survey #: M-20180130-83 - Printed On: 2/19/2018 07:20
Page 2 of 7

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180130-83
Map: 1 - TREAT MECHANICAL EQUIPMENT ROOM

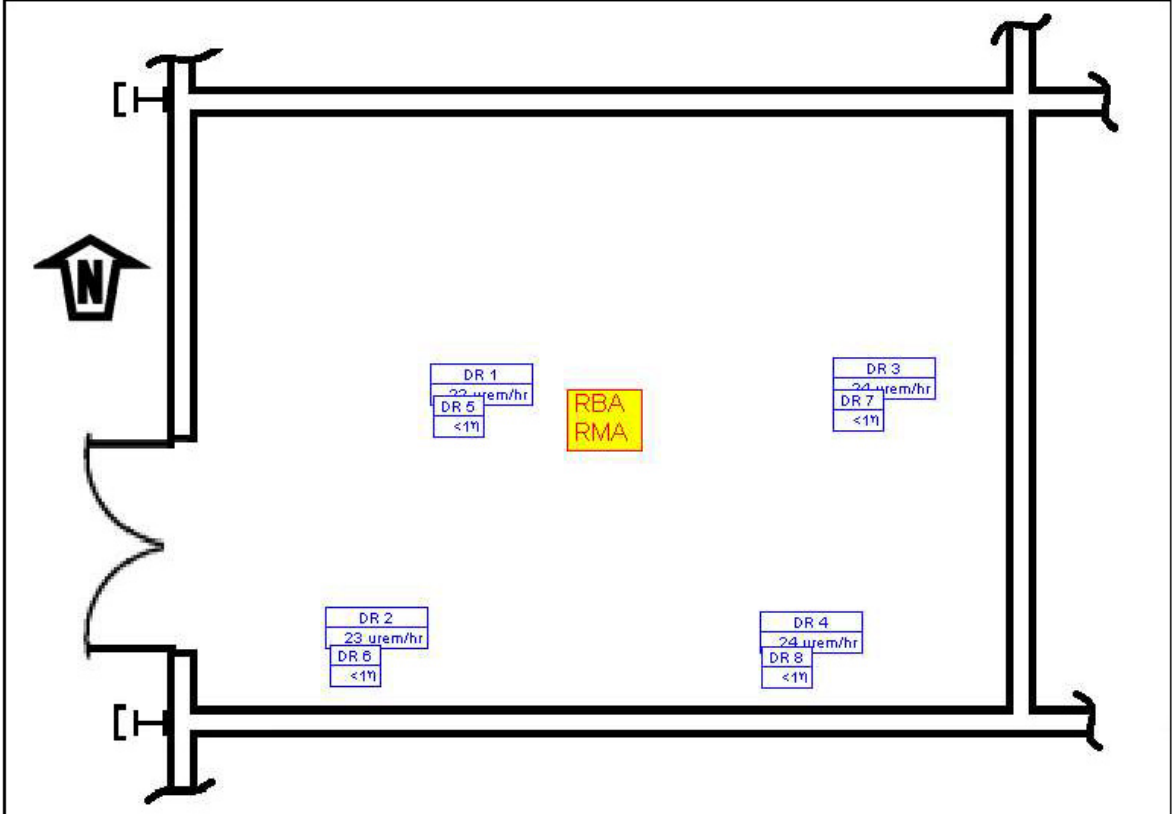
#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	17	urem/hr		
2	DR Neutron	2	<1 η	mrem/hr		
3	DR γ	1	20	urem/hr		
4	DR Neutron	2	<1 η	mrem/hr		
5	DR γ	1	18	urem/hr		
6	DR Neutron	2	<1 η	mrem/hr		
7	DR γ	1	18	urem/hr		
8	DR Neutron	2	<1 η	mrem/hr		
	Posting		RBA-RO RMA			
	Posting		RBA RMA			

Log #: 355217
Notes:: N/A - 0 pages
Survey #: M-20180130-83 - Printed On: 2/19/2018 07:20

Image File: BOF\TREAT\TREAT Mechanical Equipment Room

VSDS Standard Map Survey Report

Map: 2	TREAT HODOSCOPE ROOM	Survey #: M-20180130-83	Date/Time: 1/30/2018 16:33



Comments:

Summary of Highest Readings (All available values may not be listed)	
Smears	Air Samples & Wipes

Type: Other - Post Transient

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF 2017008

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Trenna Le Page, 2/15/2018 15:59:55
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355217

Image File: BOF\TREAT\TREAT Hodoscope Room

Notes: N/A - 0 pages

Survey #: M-20180130-83 - Printed On: 2/19/2018 07:20

Page 4 of 7

VSDS Standard Map Survey Report

Data Point Details

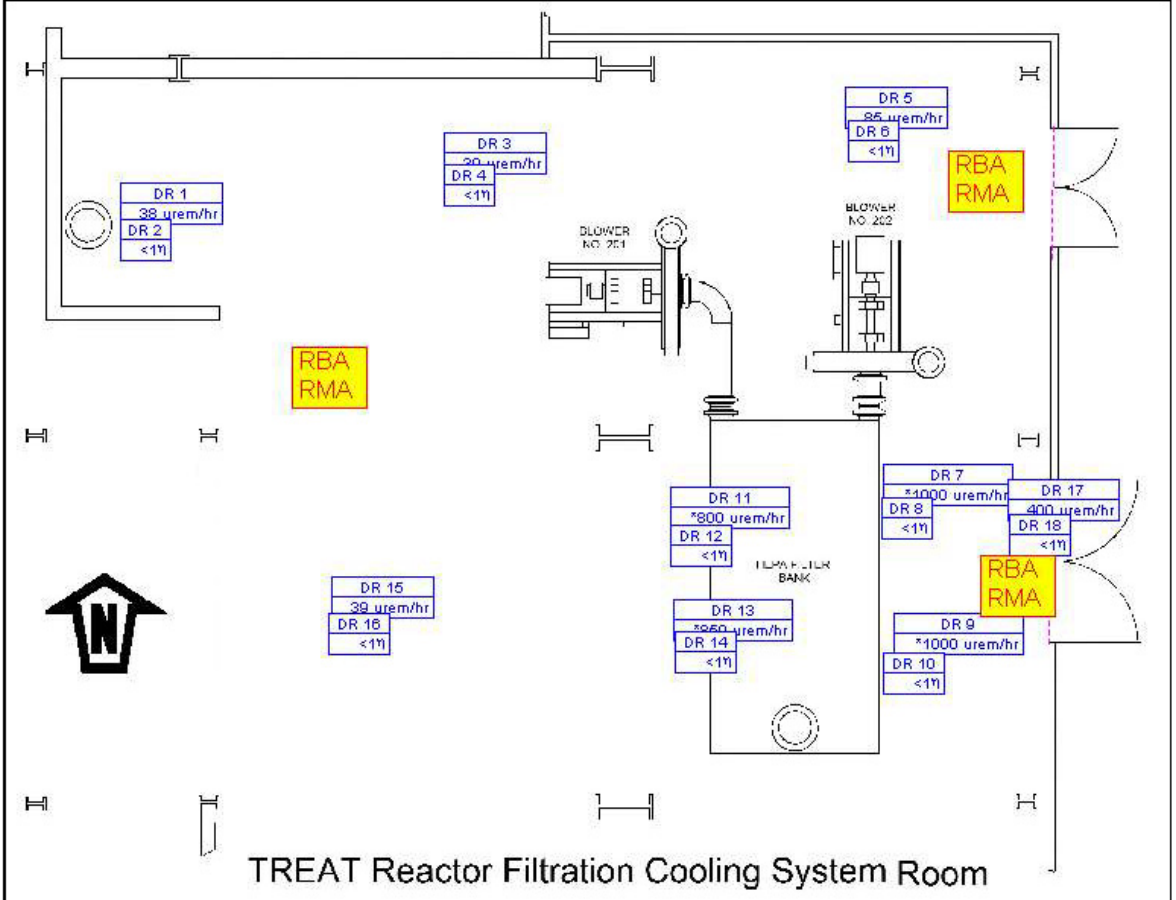
Survey #: M-20180130-83

Map: 2 - TREAT MECHANICAL EQUIPMENT ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	22	urem/hr		
2	DR γ	1	23	urem/hr		
3	DR γ	1	24	urem/hr		
4	DR γ	1	24	urem/hr		
5	DR Neutron	2	<1 η	mrem/hr		
6	DR Neutron	2	<1 η	mrem/hr		
7	DR Neutron	2	<1 η	mrem/hr		
8	DR Neutron	2	<1 η	mrem/hr		
	Posting		RBA RMA			

VSDS Standard Map Survey Report

Map: 3	TREAT REACTOR FILTRATION COOLING SYSTEM ROOM	Survey #: M-20180130-83	Date/Time: 1/30/2018 16:33



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Post Transient

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: BOF2017008

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Trenna Le Page, 2/15/2018 15:59:55
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355217
Image File: BOF\TREAT\TREAT Reactor Filtration Cooling System Room Clean - Plan View
Notes: N/A - 0 pages
Survey #: M-20180130-83 - Printed On: 2/19/2018 07:20
Page 6 of 7

VSDS Standard Map Survey Report

Data Point Details

Survey #: M-20180130-83

Map: 3 - TREAT MECHANICAL EQUIPMENT ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	38	urem/hr		
2	DR Neutron	2	<1 η	mrem/hr		
3	DR γ	1	39	urem/hr		
4	DR Neutron	2	<1 η	mrem/hr		
5	DR γ	1	85	urem/hr		
6	DR Neutron	2	<1 η	mrem/hr		
7	DR γ	1	* 1000	urem/hr		
8	DR Neutron	2	<1 η	mrem/hr		
9	DR γ	1	* 1000	urem/hr		
10	DR Neutron	2	<1 η	mrem/hr		
11	DR γ	1	* 800	urem/hr		
12	DR Neutron	2	<1 η	mrem/hr		
13	DR γ	1	* 850	urem/hr		
14	DR Neutron	2	<1 η	mrem/hr		
15	DR γ	1	39	urem/hr		
16	DR Neutron	2	<1 η	mrem/hr		
17	DR γ	1	400	urem/hr		
18	DR Neutron	2	<1 η	mrem/hr		
	Posting		RBA RMA			
	Posting		RBA RMA			
	Posting		RBA RMA			

Log #: 355217 Image File: BOF\TREAT\TREAT Reactor Filtration Cooling System Room Clean - Plan View

Notes:: N/A - 0 pages

Survey #: M-20180130-83 - Printed On: 2/19/2018 07:20 Page 7 of 7

VSDS Standard Map Survey Report

Survey M-20180130-84

General Information

Title: BOFTREAT Post Transient survey- Office areas and building ext.

Survey Date/Time: 1/30/2018 16:34
Lead Surveyor: Bryan King

Survey Type: Other - Post Transient
Work Order/Task #: PLN 5350

Counted By:
KCN: 54625

RWP and Task#: N/A

Status: Approved by: Trenna Le Page, 2/15/2018 16:01:49
KCN: 52363

Ready for Review by: Bryan King, 2/15/2018 12:10:58
KCN: 54625

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

RBA-RO=RBA - Radiation Only
RMA=Radioactive Material Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency		
				β/γ	β	α
1	B20-ER	803202	D	N/A	N/A	N/A
2	E-600 w/Remball	801890	D	N/A	N/A	N/A

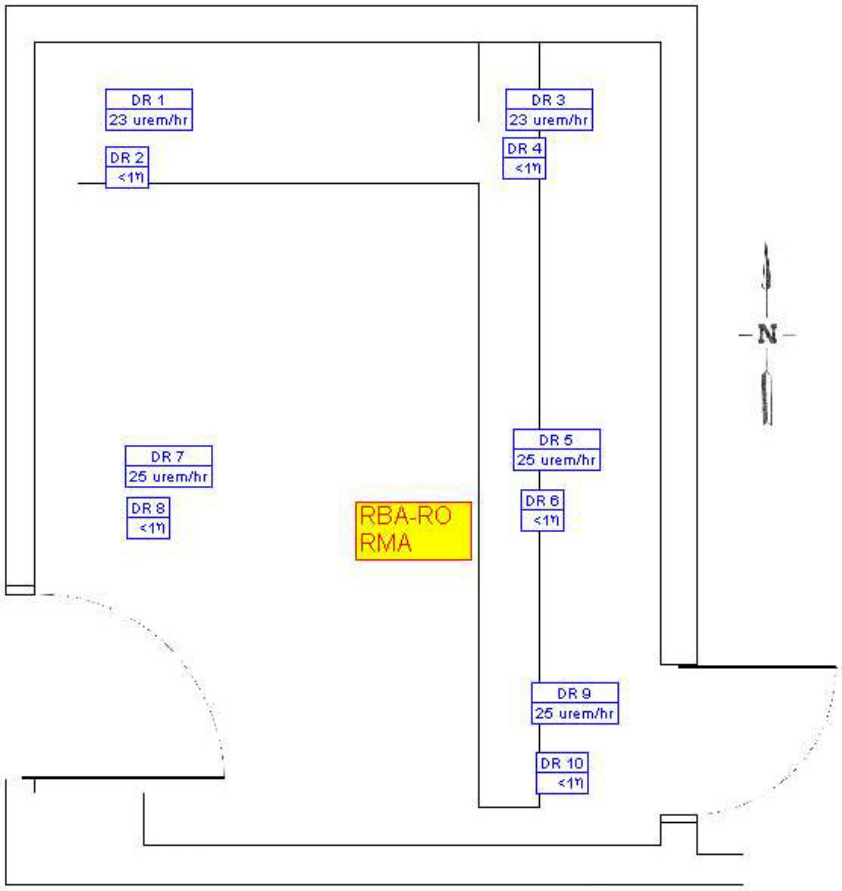
Instruments Used - Notes

#	Notes
1	N/A
2	N/A

Log #: 355217
Notes:: N/A - 0 pages
Survey #: M-20180130-84 - Printed On: 2/19/2018 07:26

VSDS Standard Map Survey Report

Map: 1	TREAT EXPERIMENTERS ROOM	Survey #: M-20180130-84	Date/Time: 1/30/2018 16:34



Experimental Equipment Room 124

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Post Transient

RWP and Task#: N/A

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+ 75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King

Status: Approved by: Trenna Le Page, 2/15/2018 16:01:49

Location Code: BOF

Bldg/Area Name: TREAT 720

Location Description: TREAT 720

Log #: 355217

Image File: BOF\TREAT\TREAT Experimenters Room

Notes: N/A - 0 pages

Survey #: M-20180130-84 - Printed On: 2/19/2018 07:26

Page 2 of 11

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180130-84
Map: 1 - TREAT EXPERIMENTERS ROOM

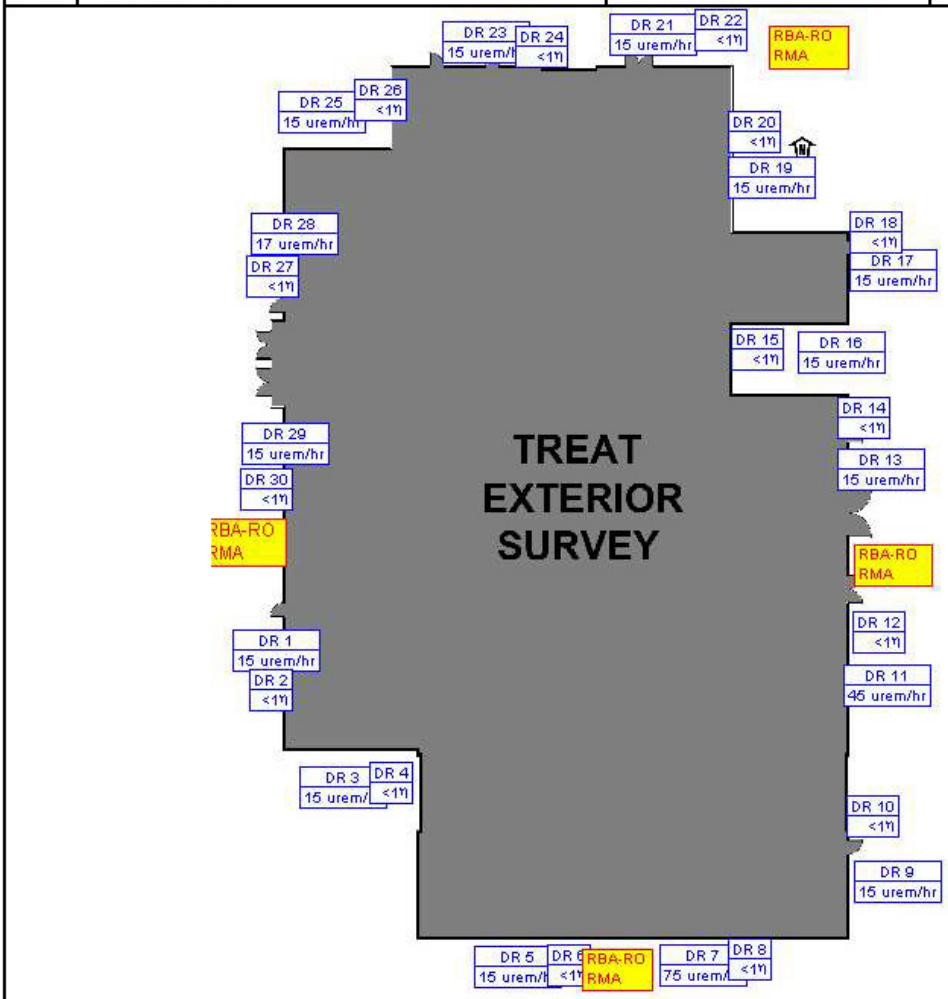
#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	23	urem/hr		
2	DR Neutron	2	<1 η	mrem/hr		
3	DR γ	1	23	urem/hr		
4	DR Neutron	2	<1 η	mrem/hr		
5	DR γ	1	25	urem/hr		
6	DR Neutron	2	<1 η	mrem/hr		
7	DR γ	1	25	urem/hr		
8	DR Neutron	2	<1 η	mrem/hr		
9	DR γ	1	25	urem/hr		
10	DR Neutron	2	<1 η	mrem/hr		
	Posting		RBA-RO RMA			

Log #: 355217
Notes:: N/A - 0 pages
Survey #: M-20180130-84 - Printed On: 2/19/2018 07:26

Image File: BOF\TREAT\TREAT Experimenters Room

VSDS Standard Map Survey Report

Map: 2	TREAT EXTERIOR	Survey #: M-20180130-84	Date/Time: 1/30/2018 16:34



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Post Transient

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: N/A

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Trenna Le Page, 2/15/2018 16:01:49
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355217
Image File: BOF\TREAT\TREAT Exterior Survey - Cleaned - No Labels
Notes: N/A - 0 pages
Survey #: M-20180130-84 - Printed On: 2/19/2018 07:26
Page 4 of 11

VSDS Standard Map Survey Report

Data Point Details

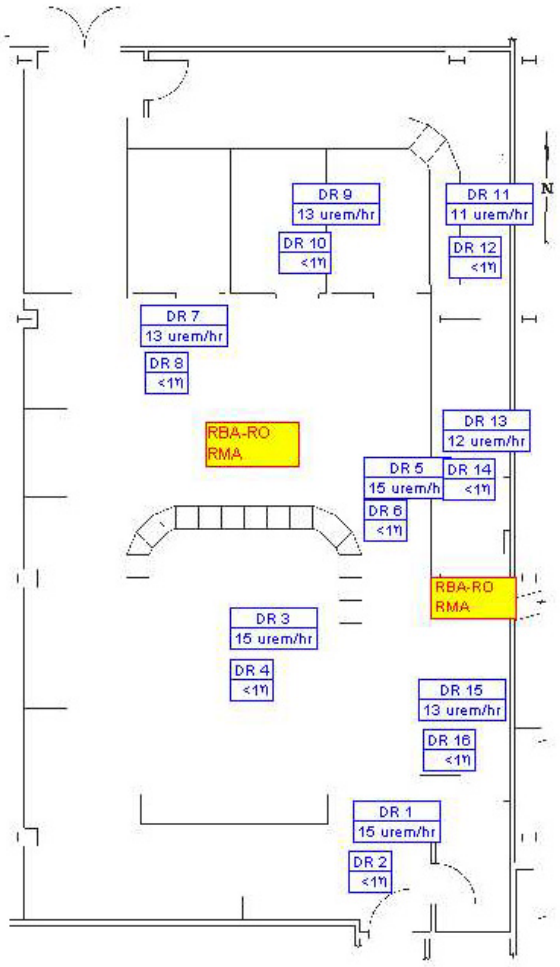
Survey #: M-20180130-84

Map: 2 - TREAT EXPERIMENTERS ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	15	urem/hr		
2	DR Neutron	2	<1 η	mrem/hr		
3	DR γ	1	15	urem/hr		
4	DR Neutron	2	<1 η	mrem/hr		
5	DR γ	1	15	urem/hr		
6	DR Neutron	2	<1 η	mrem/hr		
7	DR γ	1	75	urem/hr		
8	DR Neutron	2	<1 η	mrem/hr		
9	DR γ	1	15	urem/hr		
10	DR Neutron	2	<1 η	mrem/hr		
11	DR γ	1	45	urem/hr		
12	DR Neutron	2	<1 η	mrem/hr		
13	DR γ	1	15	urem/hr		
14	DR Neutron	2	<1 η	mrem/hr		
15	DR Neutron	2	<1 η	mrem/hr		
16	DR γ	1	15	urem/hr		
17	DR γ	1	15	urem/hr		
18	DR Neutron	2	<1 η	mrem/hr		
19	DR γ	1	15	urem/hr		
20	DR Neutron	2	<1 η	mrem/hr		
21	DR γ	1	15	urem/hr		
22	DR Neutron	2	<1 η	mrem/hr		
23	DR γ	1	15	urem/hr		
24	DR Neutron	2	<1 η	mrem/hr		
25	DR γ	1	15	urem/hr		
26	DR Neutron	2	<1 η	mrem/hr		
27	DR Neutron	2	<1 η	mrem/hr		
28	DR γ	1	17	urem/hr		
29	DR γ	1	15	urem/hr		
30	DR Neutron	2	<1 η	mrem/hr		
	Posting		RBA-RO RMA			
	Posting		RBA-RO RMA			
	Posting		RBA-RO RMA			
	Posting		RBA-RO RMA			

VSDS Standard Map Survey Report

Map: 3	TREAT I AND C CONTROL ROOM	Survey #: M-20180130-84	Date/Time: 1/30/2018 16:34



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Post Transient

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: N/A

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Trenna Le Page, 2/15/2018 16:01:49
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355217
Image File: BOF\TREAT\TREAT I_C Control Room
Notes: N/A - 0 pages
Survey #: M-20180130-84 - Printed On: 2/19/2018 07:26
Page 6 of 11

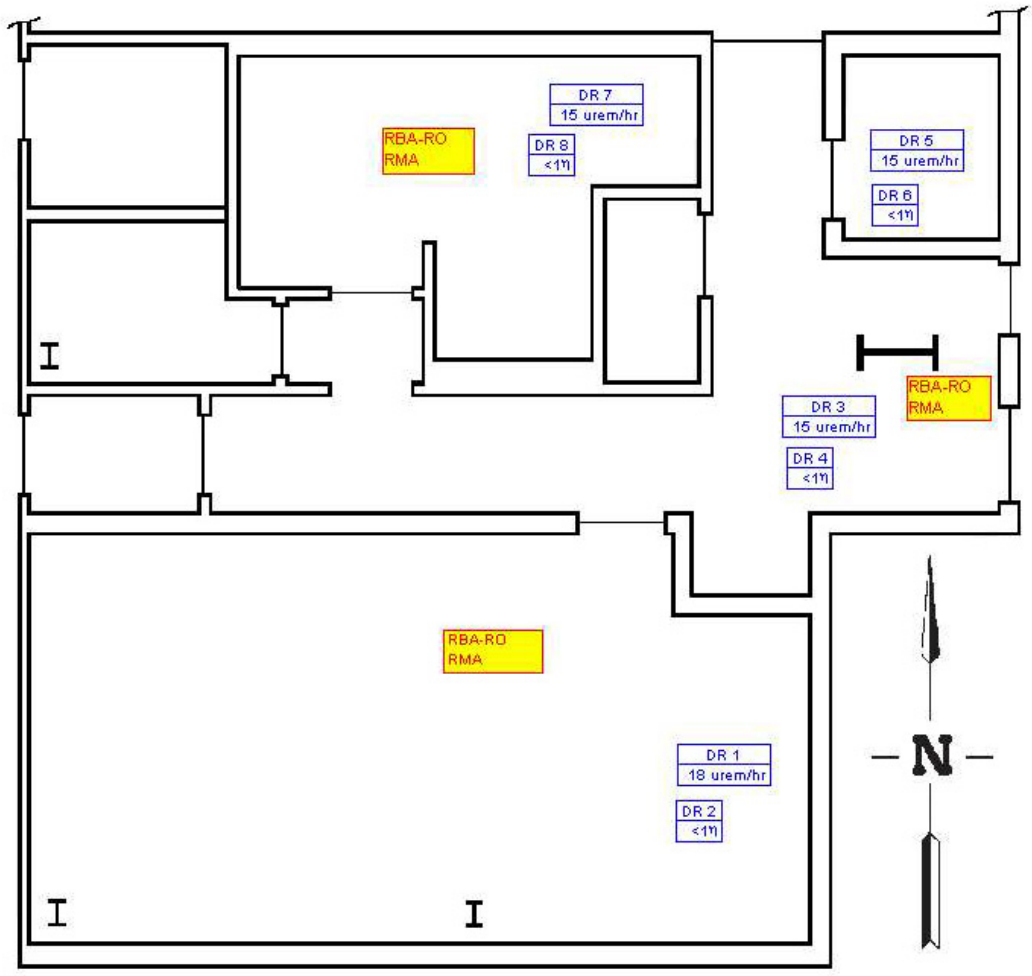
VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180130-84
Map: 3 - TREAT EXPERIMENTERS ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	15	urem/hr		
2	DR Neutron	2	<1 η	mrem/hr		
3	DR γ	1	15	urem/hr		
4	DR Neutron	2	<1 η	mrem/hr		
5	DR γ	1	15	urem/hr		
6	DR Neutron	2	<1 η	mrem/hr		
7	DR γ	1	13	urem/hr		
8	DR Neutron	2	<1 η	mrem/hr		
9	DR γ	1	13	urem/hr		
10	DR Neutron	2	<1 η	mrem/hr		
11	DR γ	1	11	urem/hr		
12	DR Neutron	2	<1 η	mrem/hr		
13	DR γ	1	12	urem/hr		
14	DR Neutron	2	<1 η	mrem/hr		
15	DR γ	1	13	urem/hr		
16	DR Neutron	2	<1 η	mrem/hr		
	Posting		RBA-RO RMA			
	Posting		RBA-RO RMA			

VSDS Standard Map Survey Report

Map: 4	TREAT REACTOR OFFICE AREA	Survey #: M-20180130-84	Date/Time: 1/30/2018 16:34



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Post Transient

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: N/A

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Trenna Le Page, 2/15/2018 16:01:49
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355217
Notes: N/A - 0 pages
Survey #: M-20180130-84 - Printed On: 2/19/2018 07:26

Image File: BOF\TREAT\TREAT Reactor Office Area Survey Map

Page 8 of 11

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180130-84
Map: 4 - TREAT EXPERIMENTERS ROOM

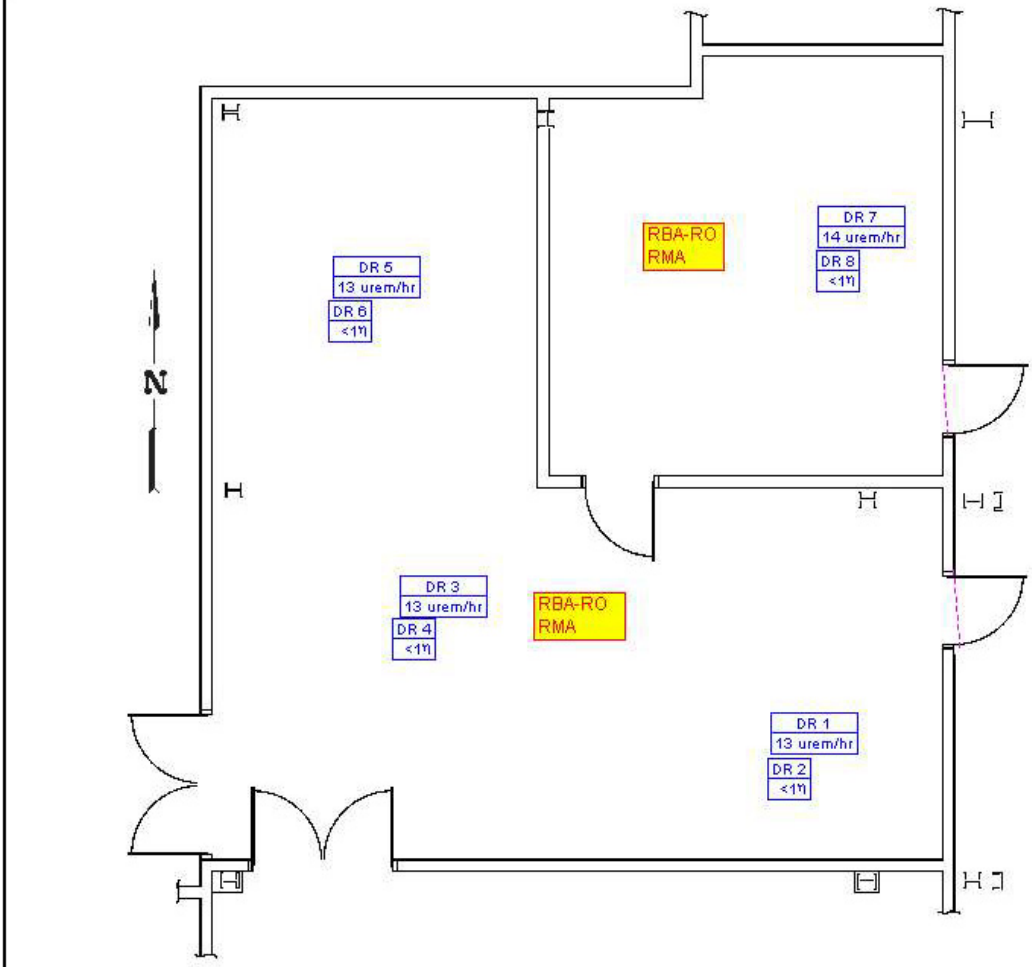
#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	18	urem/hr		
2	DR Neutron	2	<1 η	mrem/hr		
3	DR γ	1	15	urem/hr		
4	DR Neutron	2	<1 η	mrem/hr		
5	DR γ	1	15	urem/hr		
6	DR Neutron	2	<1 η	mrem/hr		
7	DR γ	1	15	urem/hr		
8	DR Neutron	2	<1 η	mrem/hr		
	Posting		RBA-RO RMA			
	Posting		RBA-RO RMA			
	Posting		RBA-RO RMA			

Log #: 355217
Notes:: N/A - 0 pages
Survey #: M-20180130-84 - Printed On: 2/19/2018 07:26

Image File: BOF\TREAT\TREAT Reactor Office Area Survey Map

VSDS Standard Map Survey Report

Map: 5	TREAT INSTRUMENT SHOP	Survey #: M-20180130-84	Date/Time: 1/30/2018 16:34



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - Post Transient

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task #: N/A

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Trenna Le Page, 2/15/2018 16:01:49
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 355217
Image File: BOF\TREAT\TREAT Instrument Shop
Notes: N/A - 0 pages
Survey #: M-20180130-84 - Printed On: 2/19/2018 07:26
Page 10 of 11

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180130-84
Map: 5 - TREAT EXPERIMENTERS ROOM

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	13	urem/hr		
2	DR Neutron	2	<1 η	mrem/hr		
3	DR γ	1	13	urem/hr		
4	DR Neutron	2	<1 η	mrem/hr		
5	DR γ	1	13	urem/hr		
6	DR Neutron	2	<1 η	mrem/hr		
7	DR γ	1	14	urem/hr		
8	DR Neutron	2	<1 η	mrem/hr		
	Posting		RBA-RO RMA			
	Posting		RBA-RO RMA			

Log #: 355217
Notes:: N/A - 0 pages
Survey #: M-20180130-84 - Printed On: 2/19/2018 07:26

Image File: BOF\TREAT\TREAT Instrument Shop

Appendix I —
TREAT Neutron Radiography Survey Maps

VSDS Standard Map Survey Report

Survey M-20180219-31

General Information

Title: BOFTREAT- Radiograghy stand and area with shutter open to replace Map M-20180213-23

Survey Date/Time: 2/13/2018 14:00 — Lead Surveyor: Bryan King

Survey Type: Other - open shutter shield Radiation — Work Order/Task #: PLN-5350

Counted By: — KCN: 54625

RWP and Task#: BOF2018001

Status: Approved by: Nicholas Christiansen, 2/20/2018 12:06:44 — KCN: 111190

Ready for Review by: Bryan King, 2/19/2018 15:11:11 — KCN: 54625

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact + = 30cm	Gen Area	HS = Hot Spot	"n" = Neutron "b" = Beta "c" = Corrected

Postings Legend

Control-Ar=Controlled Area
HRA=High Radiation Area
HRAACR=HRA ACCESS CONTROLS REQUIRED
RA=Radiation Area
RBA=Radiological Buffer Area
RBA-Exit=RBA-Exit
RBA-RO=RBA - Radiation Only
RMA=Radioactive Material Area

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Efficiency		
				β/γ	β	α
1	B20-ER	803211	D	N/A	N/A	N/A
2	RO20	801863	D	N/A	N/A	N/A
3	E-600 w/Remball	802087	D	N/A	N/A	N/A
4	TelePole 2	854425	D	N/A	N/A	N/A
5	AMP-100	802407	D	N/A	N/A	N/A

Instruments Used - Notes

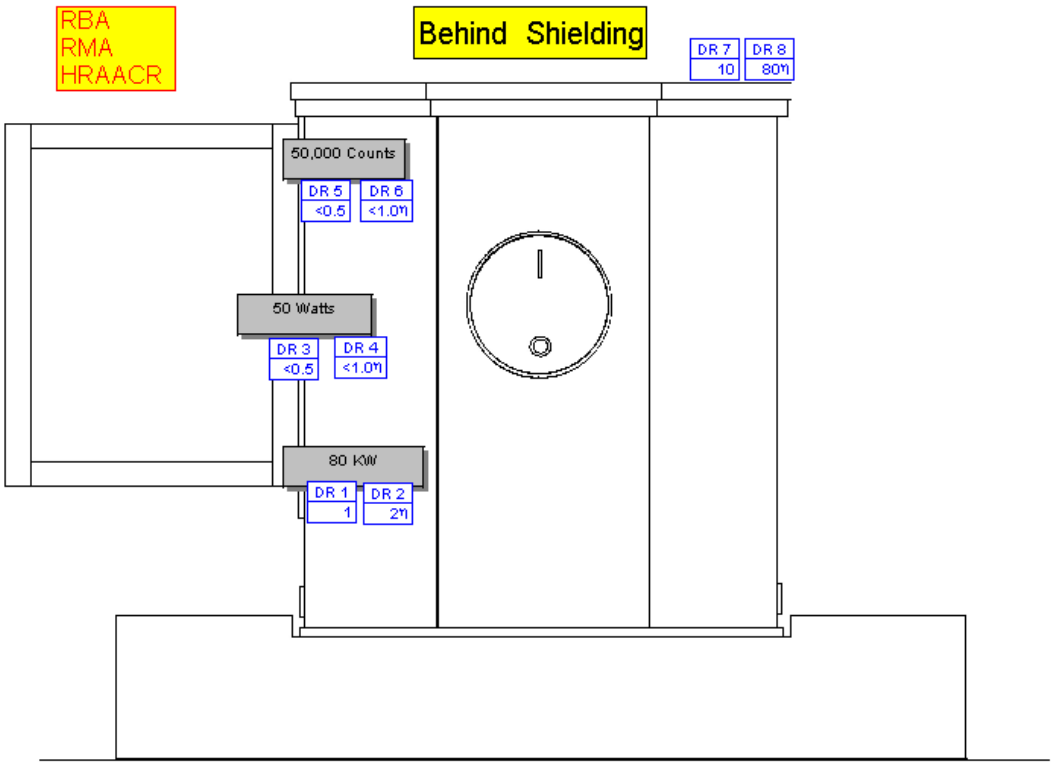
#	Notes
1	N/A
2	N/A
3	N/A
4	N/A
5	N/A

Log #: 356344 and 356756
Notes:: Map replacing M-20180213-23 - 0 pages
Survey #: M-20180219-31 - Printed On: 2/21/2018 07:06

Page 1 of 17

VSDS Standard Map Survey Report

Map: 1	TREAT RADIOGRAPHY STAND-WEST SIDE	Survey #: M-20180219-31	Date/Time: 2/13/2018 14:00



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - open shutter shield Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+ 75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task#: BOP2018001

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Nicholas Christiansen, 2/20/2018 12:06:44
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 356344 and 356756
Image File: BOF\TREAT\Radioagraphy Stand\Radioagraphy Stand - West Side
Notes:: Map replacing M-20180213-23 - 0 pages
Survey #: M-20180219-31 - Printed On: 2/21/2018 07:06
Page 2 of 17

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180219-31
Map: 1 - TREAT RADIOGRAPHY STAND-WEST SIDE

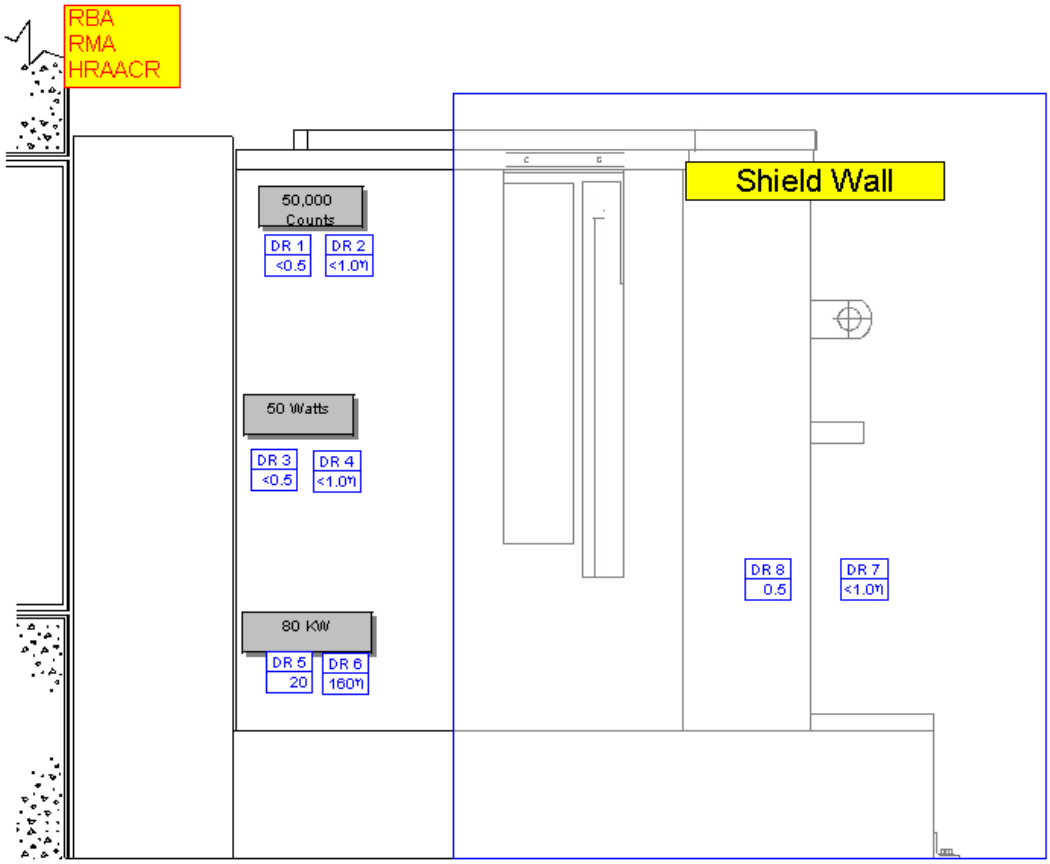
#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	2	1	mrem/hr		
2	DR Neutron	3	2 η	mrem/hr		
3	DR γ	2	<0.5	mrem/hr		
4	DR Neutron	3	<1.0 η	mrem/hr		
5	DR γ	2	<0.5	mrem/hr		
6	DR Neutron	3	<1.0 η	mrem/hr		
7	DR γ	2	10	mrem/hr	Above Shielding at 80KW	
8	DR Neutron	3	80 η	mrem/hr	Above Shielding at 80KW	
	Note					50,000 Counts
	Posting		RBA RMA HRAACR			
	Note					50 Watts
	Note					80 KW
	Text		Behind Shielding			

Log #: 356344 and 356756
Notes:: Map replacing M-20180213-23 - 0 pages
Survey #: M-20180219-31 - Printed On: 2/21/2018 07:06

Image File: BOF\TREAT\Radioagraphy Stand\Radioagraphy Stand - West Side

VSDS Standard Map Survey Report

Map: 2	TREAT RADIOGRAPHY STAND - NORTH SIDE	Survey #: M-20180219-31	Date/Time: 2/13/2018 14:00



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - open shutter shield Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task#: BOP2018001

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King
Status: Approved by: Nicholas Christiansen, 2/20/2018 12:06:44
Location Code: BOF
Bldg/Area Name: TREAT 720
Location Description: TREAT 720

Log #: 356344 and 356756
Image File: BOF\TREAT\Radioagraphy Stand\Radiography Stand - North Side View
Notes:: Map replacing M-20180213-23 - 0 pages
Survey #: M-20180219-31 - Printed On: 2/21/2018 07:06
Page 4 of 17

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180219-31
Map: 2 - TREAT RADIOGRAPHY STAND-WEST SIDE

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	2	<0.5	mrem/hr		
2	DR Neutron	3	<1.0 η	mrem/hr		
3	DR γ	2	<0.5	mrem/hr		
4	DR Neutron	3	<1.0 η	mrem/hr		
5	DR γ	2	20	mrem/hr		
6	DR Neutron	2	160 η	mrem/hr		
7	DR Neutron	3	<1.0 η	mrem/hr	Behind Shielding	@ 80 KW
8	DR γ	2	0.5	mrem/hr	Behind Shielding	@ 80 KW
	Posting		RBA RMA HRAACR			
	Note					80 KW
	Note					50 Watts
	Note					50,000 Counts
	Text		Shield Wall			

Log #: 356344 and 356756
Notes:: Map replacing M-20180213-23 - 0 pages
Survey #: M-20180219-31 - Printed On: 2/21/2018 07:06

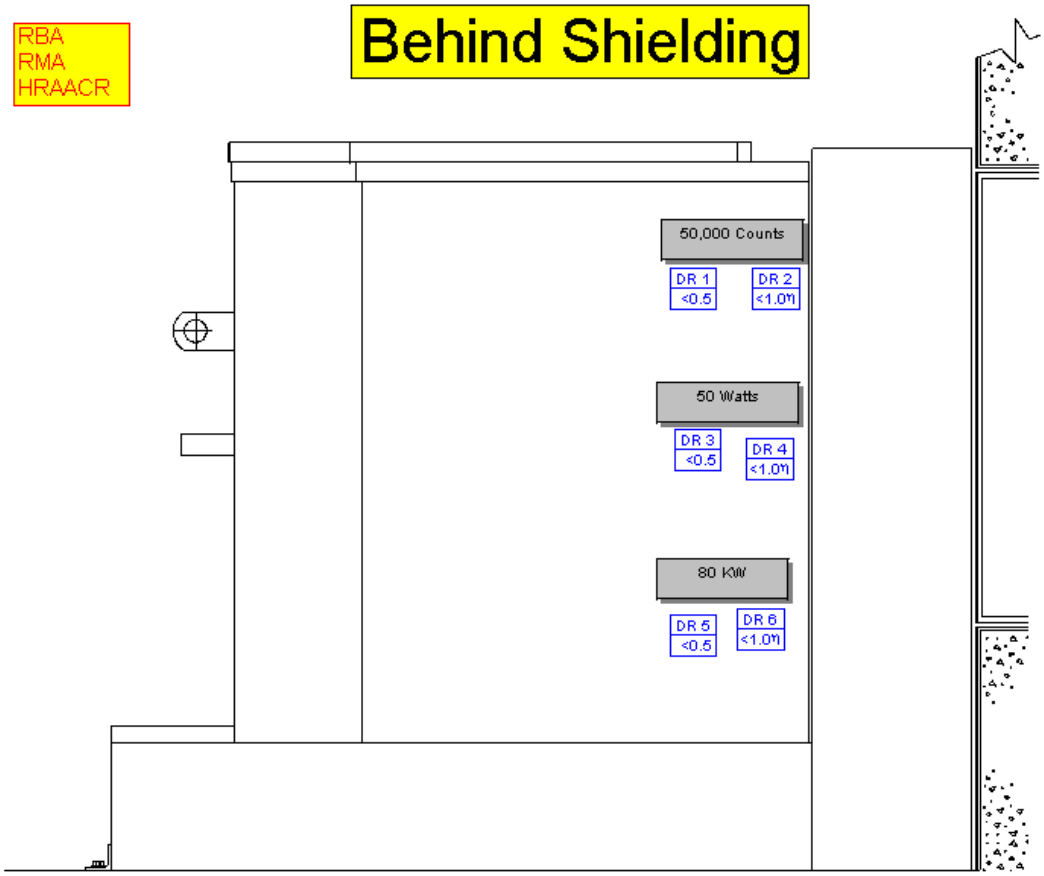
Image File: BOF\TREAT\Radioagraphy Stand\Radiography Stand - North Side View

VSDS Standard Map Survey Report

Map: 3	TREAT RADIOGRAPHY STAND-SOUTH SIDE	Survey #: M-20180219-31	Date/Time: 2/13/2018 14:00

RBA
RMA
HRAACR

Behind Shielding



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - open shutter shield Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task#: BOP2018001

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King
Status: Approved by: Nicholas Christiansen, 2/20/2018 12:06:44
Location Code: BOF
Bldg/Area Name: TREAT 720
Location Description: TREAT 720

Log #: 356344 and 356756
Image File: BOF\TREAT\Radioagraphy Stand\Radiography Stand - South Side View
Notes:: Map replacing M-20180213-23 - 0 pages
Survey #: M-20180219-31 - Printed On: 2/21/2018 07:06
Page 6 of 17

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180219-31
Map: 3 - TREAT RADIOGRAPHY STAND-WEST SIDE

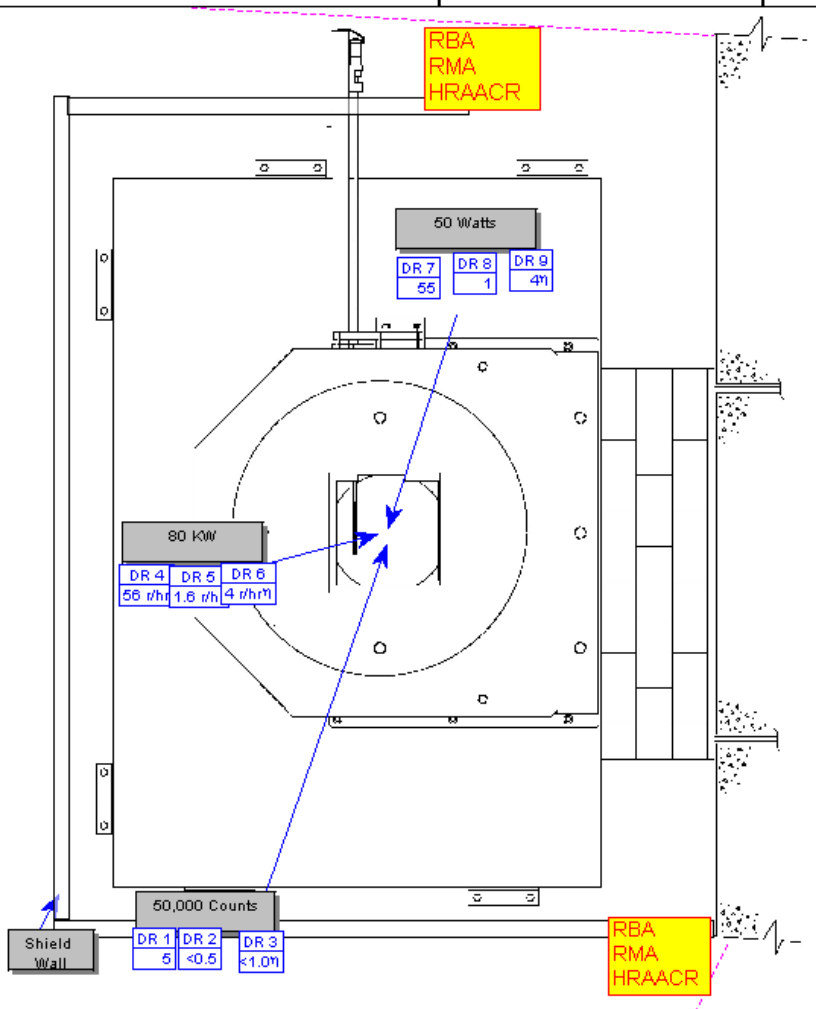
#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	2	<0.5	mrem/hr		
2	DR Neutron	3	<1.0 η	mrem/hr		
3	DR γ	2	<0.5	mrem/hr		
4	DR Neutron	3	<1.0 η	mrem/hr		
5	DR γ	2	<0.5	mrem/hr		
6	DR Neutron	3	<1.0 η	mrem/hr		
	Note					50,000 Counts
	Posting		RBA RMA HRAACR			
	Note					50 Watts
	Note					80 KW
	Text		Behind Shielding			

Log #: 356344 and 356756
Notes:: Map replacing M-20180213-23 - 0 pages
Survey #: M-20180219-31 - Printed On: 2/21/2018 07:06

Image File: BOF\TREAT\Radioagraphy Stand\Radiography Stand - South Side View

VSDS Standard Map Survey Report

Map: 4	TREAT RADIOGRAPHY STAND-TOP VIEW	Survey #: M-20180219-31	Date/Time: 2/13/2018 14:00



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - open shutter shield Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task#: BOP2018001

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Nicholas Christiansen, 2/20/2018 12:06:44
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 356344 and 356756
Image File: BOF\TREAT\Radiography Stand\Radiography Stand - Top View
Notes:: Map replacing M-20180213-23 - 0 pages
Survey #: M-20180219-31 - Printed On: 2/21/2018 07:06
Page 8 of 17

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180219-31
Map: 4 - TREAT RADIOGRAPHY STAND-WEST SIDE

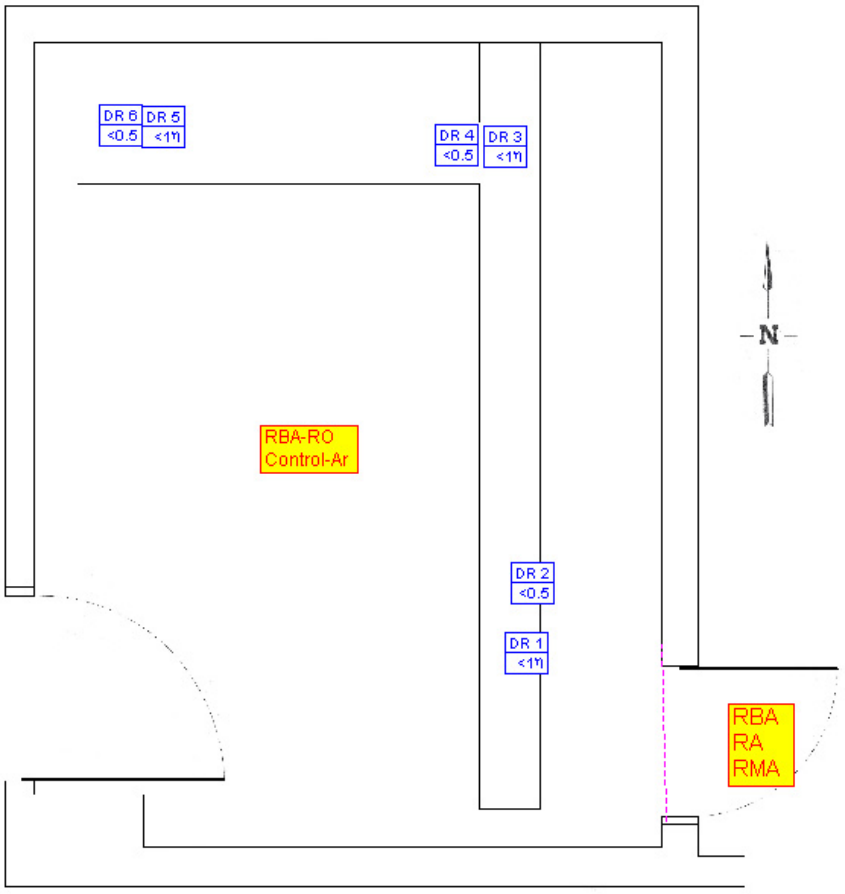
#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	5	5	mrem/hr	Inside Hole	
2	DR γ	2	<0.5	mrem/hr	Above Hole	
3	DR Neutron	3	<1.0 η	mrem/hr	Above Hole	
4	DR γ	5	56	r/hr	Inside Hole	Not accessable for hole body to enter
5	DR γ	4	1.6	r/hr	Above Hole	
6	DR Neutron	3	4 η	r/hr	Above Hole	For Information Only.
7	DR γ	5	55	mrem/hr		
8	DR γ	2	1	mrem/hr	Above Hole	
9	DR Neutron	3	4 η	mrem/hr	Above Hole	
	Note					50 Watts
	Note					80 KW
	Note					50,000 Counts
	Note					Shield Wall
	Posting		RBA RMA HRAACR			
	Posting		RBA RMA HRAACR			

Log #: 356344 and 356756
Notes:: Map replacing M-20180213-23 - 0 pages
Survey #: M-20180219-31 - Printed On: 2/21/2018 07:06

Image File: BOF\TREAT\Radioagraphy Stand\Radiography Stand - Top View

VSDS Standard Map Survey Report

Map: 5	TREAT EXPERIMENTERS ROOM	Survey #: M-20180219-31	Date/Time: 2/13/2018 14:00



Experimental Equipment Room 124

Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - open shutter shield Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+ 75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task#: BOP2018001

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King
Status: Approved by: Nicholas Christiansen, 2/20/2018 12:06:44
Location Code: BOF
Bldg/Area Name: TREAT 720
Location Description: TREAT 720

Log #: 356344 and 356756
Image File: BOF\TREAT\TREAT Experimenters Room
Notes:: Map replacing M-20180213-23 - 0 pages
Survey #: M-20180219-31 - Printed On: 2/21/2018 07:06
Page 10 of 17

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180219-31
Map: 5 - TREAT RADIOGRAPHY STAND-WEST SIDE

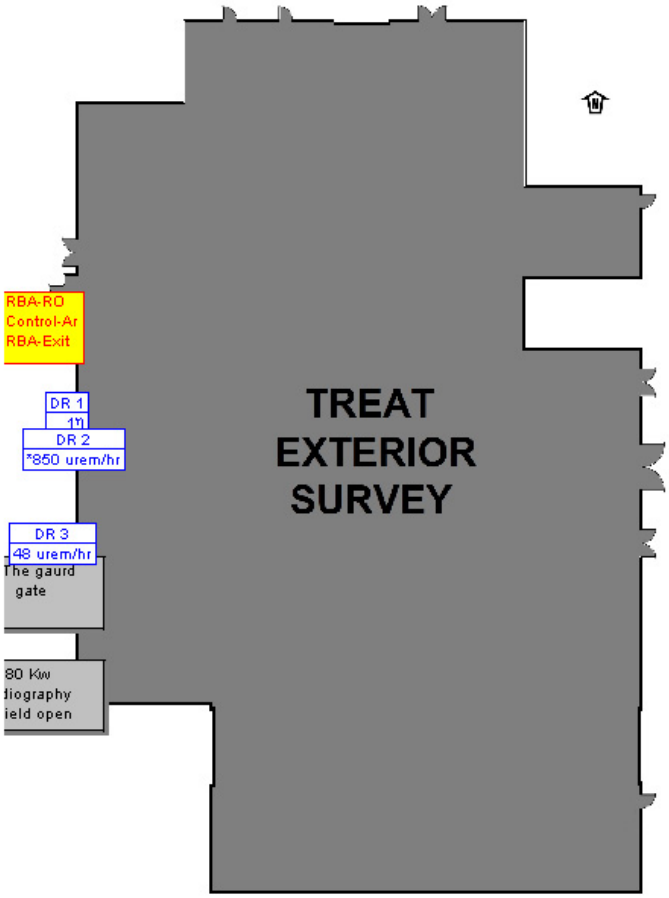
#	Type	Inst.	Value	Units	Position	Notes
1	DR Neutron	3	<1 η	mrem/hr		
2	DR γ	1	<0.5	mrem/hr		
3	DR Neutron	3	<1 η	mrem/hr		
4	DR γ	1	<0.5	mrem/hr		
5	DR Neutron	3	<1 η	mrem/hr		
6	DR γ	1	<0.5	mrem/hr		
	Posting		RBA RA RMA			
	Posting		RBA-RO Control-Ar			

Log #: 356344 and 356756
Notes:: Map replacing M-20180213-23 - 0 pages
Survey #: M-20180219-31 - Printed On: 2/21/2018 07:06

Image File: BOF\TREAT\TREAT Experimenters Room

VSDS Standard Map Survey Report

Map: 6	TREAT EXTERIOR	Survey #: M-20180219-31	Date/Time: 2/13/2018 14:00



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - open shutter shield Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task#: BOP2018001

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Nicholas Christiansen, 2/20/2018 12:06:44
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 356344 and 356756
Image File: BOF\TREAT\TREAT Exterior Survey - Cleaned - No Labels
Notes:: Map replacing M-20180213-23 - 0 pages
Survey #: M-20180219-31 - Printed On: 2/21/2018 07:06
Page 12 of 17

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180219-31
Map: 6 - TREAT RADIOGRAPHY STAND-WEST SIDE

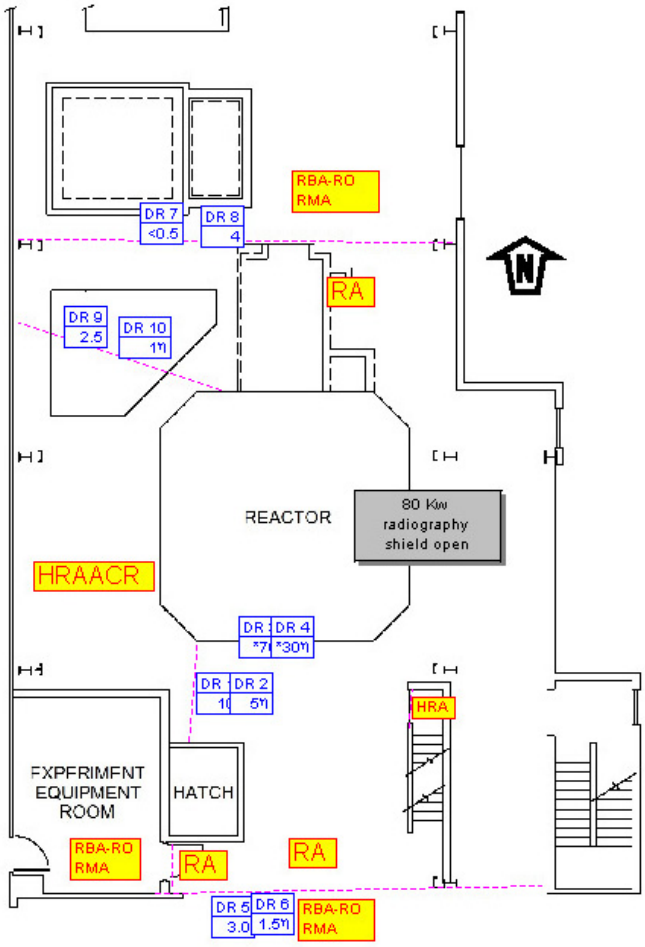
#	Type	Inst.	Value	Units	Position	Notes
1	DR Neutron	3	1 η	mrem/hr		
2	DR γ	1	* 850	urem/hr		
3	DR γ	1	48	urem/hr	Guard gate	
	Note					At The gaurd gate
	Note					80 Kw radiography shield open
	Posting		RBA-RO Control-Ar RBA-Exit			

Log #: 356344 and 356756
Notes:: Map replacing M-20180213-23 - 0 pages
Survey #: M-20180219-31 - Printed On: 2/21/2018 07:06

Image File: BOF\TREAT\TREAT Exterior Survey - Cleaned - No Labels

VSDS Standard Map Survey Report

Map: 7	TREAT FLOOR AROUND REACTOR	Survey #: M-20180219-31	Date/Time: 2/13/2018 14:00



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - open shutter shield Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task#: BOP2018001

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Nicholas Christiansen, 2/20/2018 12:06:44
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 356344 and 356756
Image File: BOF\TREAT\TREAT Floor Around Reactor Survey Map
Notes:: Map replacing M-20180213-23 - 0 pages
Survey #: M-20180219-31 - Printed On: 2/21/2018 07:06
Page 14 of 17

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180219-31
Map: 7 - TREAT RADIOGRAPHY STAND-WEST SIDE

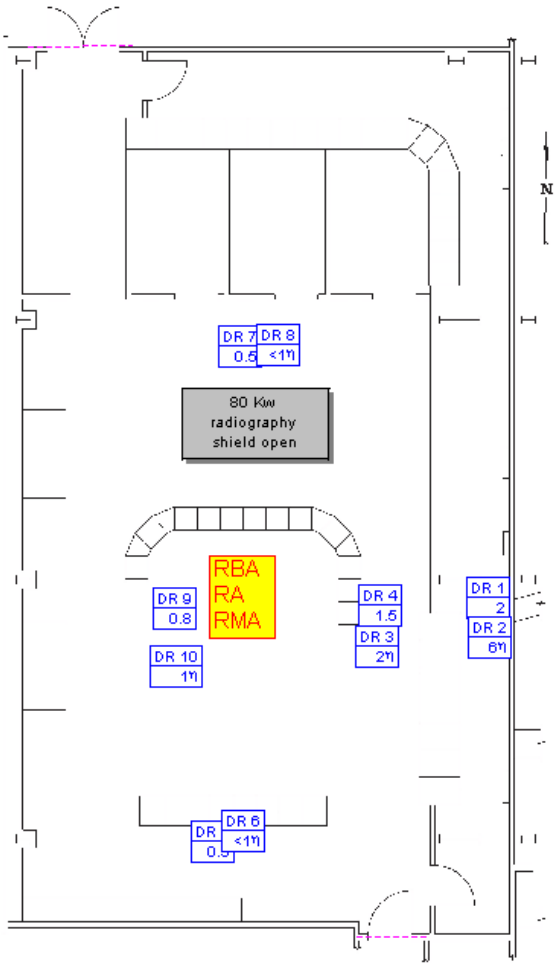
#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	10	mrem/hr		
2	DR Neutron	3	5 η	mrem/hr		
3	DR γ	1	* 70	mrem/hr		
4	DR Neutron	3	* 30 η	mrem/hr	Instrument cabinet	
5	DR γ	1	3.0	mrem/hr		
6	DR Neutron	3	1.5 η	mrem/hr		
7	DR γ	1	<0.5	mrem/hr		
8	DR γ	3	4	mrem/hr		
9	DR γ	1	2.5	mrem/hr		
10	DR Neutron	3	1 η	mrem/hr		
	Posting		RA			
	Posting		RBA-RO RMA			
	Posting		RBA-RO RMA			
	Posting		HRA			
	Posting		RA			
	Posting		RBA-RO RMA			
	Note					80 Kw radiography shield open
	Posting		HRAACR			
	Posting		RA			

Log #: 356344 and 356756
Notes:: Map replacing M-20180213-23 - 0 pages
Survey #: M-20180219-31 - Printed On: 2/21/2018 07:06

Image File: BOF\TREAT\TREAT Floor Around Reactor Survey Map

VSDS Standard Map Survey Report

Map: 8	TREAT I AND C CONTROL ROOM	Survey #: M-20180219-31	Date/Time: 2/13/2018 14:00



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes

Type: Other - open shutter shield Radiation

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+ 75 30 cm Reading
20 General Area

HS-50 Hot Spot
RCA Posting
Drip Bag

15 Smear 15 Air Sample 15 Direct 15 Wipe

RWP and Task#: BOF2018001

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Bryan King	Status: Approved by: Nicholas Christiansen, 2/20/2018 12:06:44
Location Code: BOF	Bldg/Area Name: TREAT 720
Location Description: TREAT 720	

Log #: 356344 and 356756
Image File: BOF\TREAT\TREAT I_C Control Room
Notes:: Map replacing M-20180213-23 - 0 pages
Survey #: M-20180219-31 - Printed On: 2/21/2018 07:06
Page 16 of 17

VSDS Standard Map Survey Report

Data Point Details
Survey #: M-20180219-31
Map: 8 - TREAT RADIOGRAPHY STAND-WEST SIDE

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	1	2	mrem/hr		
2	DR Neutron	3	6 η	mrem/hr		
3	DR Neutron	3	2 η	mrem/hr		
4	DR γ	1	1.5	mrem/hr		
5	DR γ	1	0.5	mrem/hr		
6	DR Neutron	3	<1 η	mrem/hr		
7	DR γ	1	0.5	mrem/hr		
8	DR Neutron	3	<1 η	mrem/hr		
9	DR γ	1	0.8	mrem/hr		
10	DR Neutron	3	1 η	mrem/hr		
	Note					80 Kw radiography shield open
	Posting		RBA RA RMA			

Log #: 356344 and 356756
Notes:: Map replacing M-20180213-23 - 0 pages
Survey #: M-20180219-31 - Printed On: 2/21/2018 07:06

Image File: BOF\TREAT\TREAT I_C Control Room

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