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NL-18-025

April 25, 2018

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

SUBJECT: 2017 Annual Radioactive Effluent Release Report
Indian Point Nuclear Generating Unit Nos. 1, 2, and 3
Docket Nos. 50-003, 50-247, and 50-286
License Nos. DPR-5, DPR-26, and DPR-64

Dear Sir or Madam:

The enclosure to this letter provides Entergy Nuclear Operations, Inc.'s (Entergy) Annual Radioactive Effluent Release Report for 2017. This report is submitted in accordance with Technical Specification 5.6.3 and Regulatory Guide 1.21.

There are no new commitments being made in this submittal. If you have any questions or require additional information, please contact Mr. Robert W. Walpole, Regulatory Assurance Manager at (914) 254-6710.

Sincerely,

B. McCarthy for

AJV/cdm

Enclosure: Radioactive Effluent Release Report: 2017

cc: See next page.

NMSS01
IE48
NRR
NMSS

cc: Mr. David Lew, Acting Regional Administrator, NRC Region I
Mr. Richard V. Guzman, Senior Project Manager, NRC NRR DORL
Mr. Kimberly A. Conway, IPEC NRC Unit 1 Project Manager
NRC Resident Inspector's Office
Ms. Alicia Barton, President and CEO, NYSERDA (w/o enclosure)
Ms. Bridget Frymire, New York State Public Service Commission (w/o enclosure)
Mr. Timothy Rice, Bureau of Hazardous Waste & Radiation Mgmt. NYSDEC
Mr. Robert Snyder, NYS Department of Health
Mr. Chuck Nieder, NYS Department of Environmental Conservation
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Chief, Compliance Section, New York State DEC
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ENCLOSURE TO NL-18-025

Radioactive Effluent Release Report: 2017

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NOS.1, 2, AND 3
DOCKET NOS. 50-003, 50-247, AND 50-286

Radioactive Effluent Release Report: 2017

Facility Indian Point Energy Center (Indian Point Units 1, 2, and 3)

Licensee Entergy Nuclear Operations, Inc. (Entergy)

This information is provided in accordance with the methods of NRC Regulatory Guide 1.21, Rev.1. The numbered sections of this report reference corresponding sections of the subject Guide, pages 10 to 12. This report includes effluent information from Indian Point Units 1, 2, and 3. Units 1 and 2 share effluent processing equipment and Technical Specifications. In this site report, releases from Unit 1 are included with Unit 2, while Unit 3 releases are calculated and shown separately.

A. Supplemental Information

1. Regulatory Limits

Indian Point Energy Center is subject to limits on radioactive waste releases that are set forth in the Offsite Dose Calculation Manual (ODCM), Parts I and II, as defined in the Technical Specifications. ODCM Part I, also known as the Radiological Effluent Controls (or RECS) contains the specific requirements and controls, while ODCM Part II (calculational methodologies) contains the details necessary to perform offsite dose calculations from the sampling and monitoring outlined in the RECS.

2. Maximum Permissible Concentration

a) Airborne Releases

Maximum concentrations and compliance with 10CFR20 release rate limits are controlled by the application of Radiation Monitor setpoints, preliminary grab sampling, and conservative procedural guidance for batch and continuous releases. These measures, in conjunction with plant design, preclude approaching release rate limits, per the ODCM.

b) Liquid Effluents

Proximity to release rate and total release limits is controlled through the application of a calculated Allowed Diluted Concentration (ADC) and ALARA guidance with regard to dilution flow and maximum tank concentration. The ADC is used to determine a Radiation Monitor setpoint associated with an estimated amount of non-gamma activity (H-3, Ni-63, Fe-55, Sr-89/90 etc.), as well as the measured gamma activity. ADC is defined in the station ODCM as a means of assuring compliance with the release rate limits of 10CFR20, as defined by the application of ten times the Effluent Concentrations of the new 10CFR20.

Liquid effluents are further controlled by the application of proceduralized ALARA limits such as a MINIMUM dilution flow of 100,000 gpm required for batch discharges, a maximum gamma concentration of 5E-5 uCi/ml (without gas) for routine effluents, and procedural guidance for optimizing decay and treatment of liquid waste.

3. Average Energy

This information is no longer used. It is available on site.

4. Measurements and Approximations of Total Radioactivity

a) Fission and Activation Gases

Analyses of effluent gases are performed in compliance with the requirements of the RECS (ODCM Part I). In the case of isolated tanks (batch releases), the total activity discharged is based on an isotopic analysis of each batch with the volume of gas in the batch corrected to standard temperature and pressure.

Vapor containment purge and pressure relief (vent) discharges, which routinely total less than 150 hours/quarter in duration, have been treated as batch releases. However, both types of releases from the Vapor Containment are performed randomly with regard to time of day and duration (release periods were not dependent solely on time of day or atmospheric condition). Therefore, determination of doses due to Vapor Containment releases includes the use of annual average dispersion data, as defined in NUREG 0133, Section 3.3.

At least one complete isotopic concentration analysis of containment air is performed monthly and compared to a process monitor's reading. Pressure reliefs are quantified by scaling subsequent releases with the monitor's reading, applying the mixture from the grab sample. In this fashion, the base grab sample defines the mixture and the activity released. The monitor scales the release up or down and provides continuous indication of potential leaks.

Isotopic analyses for each vapor containment purge are taken prior to and during the purge. This information is combined with the volume of air in each discharge to calculate the quantity of activity released from these discharges.

The continuous building discharges are based on weekly samples of ventilation air analyzed for isotopic content. This information is combined with total air volume discharged and the process radiation monitor readings to determine the quantity of activity from continuous discharges.

b/c) Iodines and Particulates

Iodine and particulate releases are quantified by collecting a continuous sample of ventilation air on a Triethylenediamine (TEDA) impregnated, activated charcoal cartridge and a glass-fiber filter paper. These samples are changed weekly as required in the RECS. The concentration of isotopes found by analysis of these samples is combined with the volume of air discharged during the sampling period to calculate the quantity of activity discharged.

If no I-131 is identified in weekly vent samples, "-" is entered in Table 1A. A typical Minimum Detectable Activity (MDA) for weekly I-131 analyses is 1.0E-13 uCi/cc, which is 100 times lower than ODCM requirements.

If I-131 is identified in any routine weekly sample, it is added to the table and other iodine isotopic concentrations (I-133, I-135) are then determined on a 24-hour sample at least once per month. The concentration of each isotope is analytically determined by ratioing the activities with weekly media for I-131. This activity is combined with the volume of air discharged during the sampling period to calculate the quantity of activity discharged. A compositing method of analyzing for gross alpha, Sr-89, and Sr-90 is used per the station ODCMs. An absence of any positive activity is identified as "-".

d) Carbon-14

C-14 release quantification details are discussed in Section E.

e) Liquid Effluents

A sample of each batch discharge is taken and an isotopic analysis is performed in compliance with requirements specified in the ODCM. Proportional composite samples of continuous discharges are taken and analyzed per the ODCM, as well. Isotopic concentration data are combined with the information on volume discharged to determine the amount of each isotope discharged.

A compositing method of analyzing for non-gamma emitters is used per the station ODCM (Gross Alpha, Sr-89, Sr-90, Fe-55 and Ni-63). When there has been no positive activity, "-" is entered.

Liquid Effluent volumes of waste released on Table 2A are differentiated between processed fluids (routine liquid waste and Unit 1's North Curtain Drain), and water discharged through monitored pathways identified in the ODCM, but NOT processed (SG Blowdown and Unit 1's Sphere Foundation Drain Sump). The unprocessed water may still contain trace levels of contamination (generally only tritium) and as such, is identified as liquid waste. Curie and dose data from unprocessed fluid is included in the following tables, along with all other liquid effluent, continuous or batch, processed or not. Processed and unprocessed water is differentiated only to prevent confusion with regard to measures undertaken to convert liquid to solid waste (resin cleanup). Therefore, volumes of processed and unprocessed liquid waste are reported separately on Table 2A.

5. Batch Releases

Airborne:

Unit 1 and 2 Airborne Releases		Qtr 1	Qtr 2	Qtr 3	Qtr 4	2017
Number of Batch Releases		58	54	54	61	227
Total Time Period	(min)	3030	2630	2460	3590	11700
Maximum Time Period	(min)	116	71	73	133	133
Average Time Period	(min)	52.2	48.7	45.5	58.8	51.6
Minimum Time Period	(min)	8	16	5	22	5

Unit 3 Airborne Releases		Qtr 1	Qtr 2	Qtr 3	Qtr 4	2017
Number of Batch Releases		38	26	17	15	96
Total Time Period	(min)	5110	2690	2270	1990	12100
Maximum Time Period	(min)	720	720	203	229	720
Average Time Period	(min)	134	103	134	132	126
Minimum Time Period	(min)	1	6	5	3	1

Liquid:

Unit 1 and 2 Liquid Releases		Qtr 1	Qtr 2	Qtr 3	Qtr 4	2017
Number of Batch Releases		11	5	0	11	27
Total Time Period	(min)	961	499	0	1079	2539
Maximum Time Period	(min)	105	114	0	124	124
Average Time Period	(min)	87.4	99.8	0	99.0	94.0
Minimum Time Period	(min)	76	91	0	79	76

Unit 3 Liquid Releases		Qtr 1	Qtr 2	Qtr 3	Qtr 4	2017
Number of Batch Releases		52	57	25	14	148
Total Time Period	(min)	6030	6420	2730	1540	16700
Maximum Time Period	(min)	284	255	119	117	284
Average Time Period	(min)	116	113	109	110	113
Minimum Time Period	(min)	101	83	102	102	83

Average Stream Flow:

Regulatory Guide 1.21 includes a section to report average stream flows. This data, for some plants, is used to determine dilution volume. However, at IPEC, the Hudson River stream flow is not applied to dilution calculations, in favor of the more conservative method of using only the dilution in the discharge canal, running north to south, parallel to the river, and servicing the plant.

This conservative dilution volume is determined quarterly, applied for liquid offsite dose calculations (and all other determinations of diluted effluent), and reported on Tables 2A, in Section B of this report.

Hudson River flow information remains available, however, from the Department of the Interior, United States Geological Survey (USGS), or from web sites such as:

https://www.usgs.gov/centers/ny-water/data-tools

6. Abnormal Releases

a) Liquid

General Groundwater

The Groundwater Monitoring Program is a voluntary program set up to assure timely effective management of situations involving inadvertent releases of licensed material to ground water. A major part of the IPEC's program is a groundwater quantification model that involves verification/calibration such that the annual release to the environment remains a function of the annual precipitation and source term.

Although no abnormal releases were noted in 2017 and conservative assessments of legacy events have determined that the doses resulting from these events were negligible, the groundwater monitoring program provides additional confirmation of these assessments. The groundwater monitoring program also includes a storm water monitoring program. Together these programs provide data for offsite dose evaluation. The subsurface water flow parameters of this assessment include direction and rate for use as a basis for estimating the dispersion of abnormal releases of liquid effluents into groundwater.

The offsite dose associated with the groundwater pathway remains extremely small. The 2017 effluent dose was similar to that of 2016. The total routine liquid effluent dose inclusive of the groundwater pathway contributes < 0.2 % of the annual limit. Groundwater and storm water effluent flow rates and source term data are further described in Section H of this report. A breakdown of the total dose from the groundwater and storm water pathways is provided in Section E of this report (Radiological Impact on Man).

b) Airborne

Airborne release pathway composite samples for Unit 2 and Unit 3, September 2017, were packaged and shipped along with the other monthly samples to the vendor in accordance with station procedures. However, the samples were received by the vendor laboratory after normal work hours at a secondary location. The box was unsealed and the paperwork and monthly airborne composite samples were missing.

These samples were to be analyzed for gross alpha, strontium-89 and strontium-90 activity. Gamma analyses had been already been performed as is the routine prior to shipment of these samples. The gamma analyses indicated no detectable activity which is typical for these samples. Also, the gross alpha, strontium-89 and strontium-90 analyses for these samples typically indicate less than minimum detectable activity. All the airborne samples collected since September 2017 did not indicate any detectable gamma, gross alpha, and strontium-89 and strontium-90 activity. Therefore, the missing data does not affect any potential activity measured or dose reported.

7. ODCM Reporting Requirements

ODCM Part I requires reporting of various conditions during the year. These include effluent monitoring equipment out of service for periods exceeding 30 consecutive days, notification of any changes in the land use census, changes in the Radiological Environmental Monitoring Program (REMP), any time total curie content limitations in outdoor tanks is exceeded, or any other changes in the ODCM or Process Control Program (PCP).

Out of Service Effluent Monitoring Equipment

During this reporting period there were no instances of ODCM required effluent monitoring equipment out of service (OOS) for periods greater than 30 consecutive days.

Tank Curie Limits

During this reporting period, no tank curie limits in outdoor tanks were exceeded.

Land Use Census

During this reporting period, there were no changes to the Land Use Census.

PCP changes

During this reporting period, there were no changes to the Process Control Program.

ODCM changes

During this reporting period, there were no changes to the ODCM.

Indian Point Energy Center

(Units 1, 2, and 3)

RADIOACTIVE EFFLUENT RELEASE REPORT

B. GASEOUS EFFLUENTS

2017

TABLE 1A

INDIAN POINT 1 and 2 RADIOACTIVE EFFLUENT REPORT (Jan - Dec 2017)

GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

A. Fission & Activation Gases	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year	Est. Total % Error
1. Total Release	Ci	7.35E-02	4.02E-02	8.46E-02	3.76E-01	5.74E-01	± 25
2. Average release rate	uCi/sec	9.45E-03	5.11E-03	1.06E-02	4.73E-02	1.82E-02	

B. Iodines							
1. Total Iodine-131	Ci	-	-	-	-	0.00E+00	± 25
2. Average release rate	uCi/sec	-	-	-	-	0.00E+00	

C. Particulates							
1. Total Release, with half-life > 8 days	Ci	-	-	-	-	0.00E+00	± 25
2. Average release rate	uCi/sec	-	-	-	-	0.00E+00	
3. Gross Alpha	Ci	-	-	-	-	0.00E+00	± 25

D. Tritium							
1. Total release	Ci	1.90E+00	5.86E+00	6.12E+00	2.84E+00	1.67E+01	± 25
2. Average release rate	uCi/sec	2.44E-01	7.45E-01	7.70E-01	3.57E-01	5.30E-01	

E. Carbon-14						
1. Total release	Ci	2.63E+00	2.63E+00	2.63E+00	2.63E+00	1.05E+01
2. Average release rate	uCi/sec	3.38E-01	3.35E-01	3.31E-01	3.31E-01	3.33E-01
		Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year

- Indicates < MDA

% of limit is located in Section E, Radiological Impact on Man, Dose Tables

TABLE 1C

INDIAN POINT 1 and 2 RADIOACTIVE EFFLUENT REPORT (Jan - Dec 2017)

CONTINUOUS GASEOUS EFFLUENTS

Nuclides Released

1) Fission Gases

	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year
Xe-133	Ci	-	-	-	-	0.00E+00
Total for Period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

2) Iodines

I-131	Ci	-	-	-	-	0.00E+00
I-133	Ci	-	-	-	-	0.00E+00
I-135	Ci	-	-	-	-	0.00E+00
Total for Period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

3) Particulates

Co-58	Ci	-	-	-	-	0.00E+00
	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

- Indicates < MDA

TABLE 1C

INDIAN POINT 1 and 2 RADIOACTIVE EFFLUENT REPORT (Jan - Dec 2017)

BATCH GASEOUS EFFLUENTS

Nuclides Released

1) Fission Gases

	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year
Ar-41	Ci	3.40E-02	2.21E-02	3.31E-02	9.16E-02	1.81E-01
Kr-85	Ci	-	-	-	-	0.00E+00
Kr-85M	Ci	2.26E-04	-	2.55E-04	1.12E-03	1.60E-03
Kr-87	Ci	7.56E-05	-	2.23E-04	-	2.99E-04
Kr-88	Ci	1.96E-04	-	2.56E-04	9.20E-04	1.37E-03
Xe-131M	Ci	1.64E-04	-	-	5.78E-05	2.22E-04
Xe-133	Ci	3.26E-02	1.76E-02	4.56E-02	2.42E-01	3.38E-01
Xe-133M	Ci	7.83E-05	-	1.61E-04	5.16E-04	7.55E-04
Xe-135	Ci	5.98E-03	5.48E-04	4.42E-03	3.93E-02	5.02E-02
Xe-135M	Ci	1.32E-04	-	5.78E-04	-	7.10E-04
Xe-138	Ci	-	-	-	-	0.00E+00
Total for Period	Ci	7.35E-02	4.02E-02	8.46E-02	3.76E-01	5.74E-01

- indicates <MDA

2) Iodines

Not Applicable for Batch Releases

3) Particulates

Not Applicable for Batch Releases

TABLE 1A

INDIAN POINT 3 RADIOACTIVE EFFLUENT REPORT (Jan - Dec 2017)

GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

A. Fission & Activation Gases	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year	Est. Total % Error
1. Total Release	Ci	2.32E-01	1.50E-01	1.14E-02	8.06E-03	4.01E-01	± 25
2. Average release rate	uCi/sec	2.98E-02	1.91E-02	1.43E-03	1.01E-03	1.27E-02	

B. Iodines							
1. Total Iodine-131	Ci	-	-	-	-	0.00E+00	± 25
2. Average release rate	uCi/sec	-	-	-	-	0.00E+00	

C. Particulates							
1. Total Release, with half-life > 8 days	Ci	-	-	-	-	0.00E+00	± 25
2. Average release rate	uCi/sec	-	-	-	-	0.00E+00	
3. Gross Alpha	Ci	-	-	-	-	0.00E+00	± 25

D. Tritium							
1. Total release	Ci	3.25E+00	1.18E+01	3.88E+00	2.67E+00	2.16E+01	± 25
2. Average release rate	uCi/sec	4.18E-01	1.50E+00	4.88E-01	3.36E-01	6.85E-01	

E. Carbon-14						
1. Total release	Ci	2.12E+00	2.12E+00	2.12E+00	2.12E+00	8.46E+00
2. Average release rate	uCi/sec	2.72E-01	2.69E-01	2.66E-01	2.66E-01	2.68E-01
		Qtr 1	**Qtr 2**	**Qtr 3**	**Qtr 4**	**Year**

- Indicates < MDA

% of limit is located in Section E, Radiological Impact on Man, Dose Tables

TABLE 1C

INDIAN POINT 3 - RADIOACTIVE EFFLUENT REPORT (Jan - Dec 2017)

CONTINUOUS GASEOUS EFFLUENTS

Nuclides Released

1) Fission Gases

	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year
Ar-41	Ci	-	-	-	-	0.00E+00
Xe-133	Ci	-	-	-	-	0.00E+00
Xe-135	Ci	-	-	-	-	0.00E+00
Total for Period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**

2) Iodines

I-131	Ci	-	-	-	-	0.00E+00
I-133	Ci	-	-	-	-	0.00E+00
I-135	Ci	-	-	-	-	0.00E+00
Total for Period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

3) Particulates

Total for Period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

- indicates < MDA

TABLE 1C

INDIAN POINT 3 RADIOACTIVE EFFLUENT REPORT (Jan - Dec 2017)

BATCH GASEOUS EFFLUENTS

Nuclides Released

1) Fission Gases

	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year
Ar-41	Ci	2.92E-02	6.09E-02	1.05E-02	8.06E-03	1.09E-01
Kr-85	Ci	-	-	-	-	0.00E+00
Kr-85m	Ci	-	1.46E-04	-	-	1.46E-04
Kr-87	Ci	-	3.08E-04	-	-	3.08E-04
Kr-88	Ci	-	3.21E-04	-	-	3.21E-04
Xe-131m	Ci	-	-	-	-	0.00E+00
Xe-133	Ci	1.98E-01	8.78E-02	9.62E-04	-	2.87E-01
Xe-133m	Ci	-	-	-	-	0.00E+00
Xe-135	Ci	4.25E-03	9.36E-04	-	-	5.19E-03
Xe-135m	Ci	-	-	-	-	0.00E+00
Total for Period	Ci	2.31E-01	1.50E-01	1.15E-02	8.06E-03	4.01E-01

- Indicates < MDA

2) Iodines

Not Applicable for Batch Releases

3) Particulates

Not Applicable for Batch Releases

Indian Point Energy Center

(Units 1, 2, and 3)

RADIOACTIVE EFFLUENT REPORT

C. LIQUID EFFLUENTS

2017

TABLE 2A

INDIAN POINT 1 and 2 RADIOACTIVE EFFLUENT REPORT (Jan - Dec 2017)

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

1. Total Release (not including Tritium, Gr Alpha, & Gases)	Ci	2.16E-02	1.11E-02	1.22E-03	5.96E-03	3.99E-02	± 25
2. Average Diluted Conc	uCi/ml	3.10E-11	1.81E-11	1.41E-12	7.72E-12	1.35E-11	

B. Tritium

1. Total Release	Ci	4.90E+01	1.25E+02	1.08E-01	4.80E+02	6.54E+02	± 25
2. Average Diluted Conc	uCi/ml	7.04E-08	2.04E-07	1.25E-10	6.22E-07	2.22E-07	

C. Dissolved & Entrained Gases

1. Total Release	Ci	-	-	-	-	0.00E+00	± 25
2. AverageDiluted Conc	uCi/ml	-	-	-	-	0.00E+00	

D. Gross Alpha

1. Total Release	Ci	-	-	-	-	0.00E+00	± 25

E. Volume of Waste Released

1. Processed Waste (LW & NCD)	liters	2.00E+06	1.92E+06	7.56E+05	9.02E+05	5.58E+06	± 10
2. Unprocessed (SGBD, SFDS, U1FD)	liters	4.23E+07	4.16E+07	4.30E+07	3.91E+07	1.66E+08	± 10

F. Volume of Dilution Water	liters	6.96E+11	6.13E+11	8.63E+11	7.72E+11	2.94E+12	± 10

- Indicates < MDA

% of limit is located in Section E, Radiological Impact on Man, Dose Tables

TABLE 2B

INDIAN POINT 1 and 2 RADIOACTIVE EFFLUENT REPORT (Jan - Dec 2017)

CONTINUOUS LIQUID EFFLUENTS

Nuclides Released	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year
Cs-137	Ci	3.20E-03	5.84E-03	1.20E-03	6.26E-04	1.09E-02
Ni-63	Ci	-	-	-	-	0.00E+00
Fe-55	Ci	-	-	-	-	0.00E+00
Sr-89	Ci	-	-	-	-	0.00E+00
Sr-90	Ci	1.85E-04	5.98E-05	1.56E-05	1.70E-05	2.77E-04
Total for Period	Ci	3.39E-03	5.90E-03	1.22E-03	6.43E-04	1.11E-02

H-3 (only)	Ci	1.34E-01	1.43E-01	9.53E-02	5.87E-02	4.31E-01

- Indicates < MDA

TABLE 2B

INDIAN POINT 1 and 2 RADIOACTIVE EFFLUENT REPORT (Jan - Dec 2017)

BATCH LIQUID EFFLUENTS

Nuclides Released	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year
Ag-110M	Ci	2.69E-04	1.46E-05	NR	-	2.84E-04
Co-57	Ci	2.91E-05	2.21E-05	NR	-	5.12E-05
Co-58	Ci	1.98E-03	6.29E-04	NR	3.79E-04	2.99E-03
Co-60	Ci	9.35E-04	4.59E-04	NR	2.38E-04	1.63E-03
Cs-137	Ci	2.59E-03	3.59E-04	NR	1.67E-04	3.12E-03
Fe-55	Ci	2.11E-03	1.36E-04	NR	1.19E-03	3.44E-03
Ni-63	Ci	4.76E-03	3.47E-03	NR	6.71E-04	8.90E-03
Sb-124	Ci	-	3.83E-06	NR	-	3.83E-06
Sb-125	Ci	5.52E-03	8.26E-05	NR	2.68E-03	8.28E-03
Sr-89	Ci	-	-	NR	-	0.00E+00
Sr-90	Ci	-	-	NR	-	0.00E+00
Total for Period	Ci	1.82E-02	5.18E-03	NR	5.33E-03	2.87E-02

Dissolved & Entrained Gas						
Kr-85	Ci	-	-	NR	-	0.00E+00
Xe-133	Ci	-	-	NR	-	0.00E+00
Total for Period	Ci	0.00E+00	0.00E+00	NR	0.00E+00	0.00E+00

- Indicates < MDA

NR indicates no releases

TABLE 2A

INDIAN POINT 3 RADIOACTIVE EFFLUENT REPORT (Jan - Dec 2017)

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

A. Fission & Activation Products	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year	Est. Total % Error
1. Total Release (not including Tritium, Gr Alpha, & Gases)	Ci	1.97E-02	1.66E-02	2.26E-03	1.47E-03	4.00E-02	± 25
2. Average Diluted Conc	uCi/ml	2.83E-11	2.71E-11	2.62E-12	1.90E-12	1.36E-11	

B. Tritium

1. Total Release	Ci	5.88E+02	1.02E+02	4.34E+01	3.46E+01	7.68E+02	± 25
2. Average Diluted Conc	uCi/ml	8.45E-07	1.66E-07	5.03E-08	4.48E-08	2.61E-07	

C. Dissolved & Entrained Gases

1. Total Release	Ci	3.70E-03	7.11E-05	1.19E-05	-	3.78E-03	± 25
2. AverageDiluted Conc	uCi/ml	5.32E-12	1.16E-13	1.38E-14	-	1.28E-12	

D. Gross Alpha

1. Total Release	Ci	-	-	-	-	0.00E+00	± 25

E. Volume of Waste Released

1. Processed Fluids (Mon Tanks)	liters	1.36E+06	1.45E+06	6.49E+05	3.61E+05	3.82E+06	± 10
2. Unprocessed Fluids (SGs)	liters	1.58E+06	1.24E+07	1.64E+06	3.49E+06	1.91E+07	± 10

F. Volume of Dilution Water	liters	6.96E+11	6.13E+11	8.63E+11	7.72E+11	2.94E+12	± 10

- indicates < MDA

% of limit is located in Section E, Radiological Impact on Man, Dose Tables

TABLE 2B

INDIAN POINT 3 RADIOACTIVE EFFLUENT REPORT (Jan - Dec 2017)

BATCH and CONTINUOUS RADIOACTIVE LIQUID EFFLUENTS

Batch Fission/Activation Products

	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year
Ag-110M	Ci	2.26E-03	3.04E-04	4.67E-04	4.51E-05	3.08E-03
Co-57	Ci	2.51E-06	-	-	-	2.51E-06
Co-58	Ci	8.66E-05	1.50E-03	1.20E-04	5.29E-05	1.76E-03
Co-60	Ci	5.31E-03	1.37E-03	1.48E-04	7.72E-05	6.91E-03
Cr-51	Ci	-	3.20E-04	-	-	3.20E-04
Cs-137	Ci	-	-	-	1.83E-06	1.83E-06
Fe-55	Ci	6.25E-03	1.20E-03	1.06E-04	2.08E-04	7.76E-03
Mn-54	Ci	2.23E-05	4.91E-05	3.83E-06	1.58E-06	7.68E-05
Nb-95	Ci	-	2.13E-04	1.64E-05	-	2.29E-04
Ni-63	Ci	4.38E-03	4.16E-03	4.15E-04	3.05E-04	9.26E-03
Sb-124	Ci	3.00E-06	4.05E-05	1.44E-04	3.26E-06	1.91E-04
Sb-125	Ci	1.41E-03	6.39E-04	6.87E-04	7.75E-04	3.51E-03
Te-123M	Ci	1.03E-05	7.09E-04	1.50E-04	2.69E-06	8.72E-04
Te-125M	Ci	-	6.07E-03	-	-	6.07E-03
Total for Period	Ci	1.97E-02	1.66E-02	2.26E-03	1.47E-03	4.00E-02

Dissolved and Entrained Gas (Batch)

Xe-133	Ci	3.70E-03	7.11E-05	1.19E-05	-	3.78E-03
Xe-135	Ci	-	-	-	-	0.00E+00
Total for Period	Ci	3.70E-03	7.11E-05	1.19E-05	0.00E+00	3.78E-03

Continuous Releases (SG Blowdown)

H-3 (only)	Ci	5.64E-04	-	5.21E-04	4.22E-03	5.31E-03

- indicates < mda

Indian Point Energy Center

(Units 1, 2, and 3)

RADIOACTIVE EFFLUENT REPORT

D. SOLID WASTE

2017

Units 1 and 2 Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream 01/01/2017 to 12/31/2017

Combined Waste Type Shipment, Major Volume Waste Type Shown

Waste Stream: Resins, Filters, and Evap Bottoms

Waste Class	Volume ft^3	Volume m^3	Curies Shipped	% Error (Ci)
A	2.31E+02	6.53E+00	2.06E+01	+/- 25%
B	1.42E+02	4.02E+00	2.96E+01	+/- 25%
C	0.00E+00	0.00E+00	0.00E+00	+/- 25%
All	3.73E+02	1.06E+01	5.02E+01	+/- 25%

Waste Stream : Dry Active Waste

Waste Class	Volume ft^3	Volume m^3	Curies Shipped	% Error (Ci)
A	6.73E+03	1.90E+02	5.56E-01	+/- 25%
B	0.00E+00	0.00E+00	0.00E+00	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	6.73E+03	1.90E+02	5.56E-01	+/-25%

Waste Stream : Irradiated Components

Waste Class	Volume ft^3	Volume m^3	Curies Shipped	% Error (Ci)
A	0.00E+00	0.00E+00	0.00E+00	+/-25%
B	0.00E+00	0.00E+00	0.00E+00	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	0.00E+00	0.00E+00	0.00E+00	+/-25%

Waste Stream: Other Waste

Waste Class	Volume ft^3	Volume m^3	Curies Shipped	% Error (Ci)
A	1.10E+03	3.11E+01	9.92E-04	+/- 25%
B	0.00E+00	0.00E+00	0.00E+00	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	1.10E+03	3.11E+01	9.92E-04	+/-25%

Waste Stream: Sum of All 4 Categories

Waste Class	Volume ft^3	Volume m^3	Curies Shipped	% Error (Ci)
A	8.06E+03	2.28E+02	2.12E+01	+/-25%
B	1.42E+02	4.02E+00	2.96E+01	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	8.20E+03	2.32E+02	5.08E+01	+/-25%

Units 1 and 2 Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream 01/01/2017 to 12/31/2017

Percent Cutoff: 0

Number of Shipments	Mode of Transportations	Destination
1	Hittman Transport	ALARON Services (Veolia)
7	Hittman Transport	Energy Solutions – Bear Creek
2	Hittman Transport	Erwin Resin Solutions LLC

Resins, Filters and Evaporator Bottoms
Waste Class A

Nuclide Name	Percent Abundance	Curies
H-3	0.02%	3.52E-03
C-14	0.00%	5.25E-04
Cr-51	0.67%	1.39E-01
Mn-54	1.44%	2.96E-01
Fe-55	15.78%	3.25E+00
Fe-59	0.50%	1.04E-01
Co-57	0.23%	4.77E-02
Co-58	9.66%	1.99E+00
Co-60	50.01%	1.03E+01
Ni-59	0.06%	1.20E-02
Ni-63	7.53%	1.55E+00
Zn-65	0.45%	9.22E-02
Sr-90	0.00%	6.63E-04
Zr-95	0.61%	1.26E-01
Nb-95	0.93%	1.91E-01
Ag-110m	6.41%	1.32E+00
Sn-113	0.21%	4.27E-02
Sb-124	0.07%	1.54E-02
Sb-125	4.44%	9.15E-01
Cs-137	0.93%	1.91E-01
Ce-144	0.01%	1.35E-03
Pu-238	0.00%	4.17E-05
Pu-241	0.03%	6.00E-03
Am-241	0.00%	4.25E-05
Cm-243	0.00%	1.58E-05

Note: For radionuclides H-3, C-14, Tc-99 and I-129 if value is <MDA then MDA is used to report Curies shipped.

Units 1 and 2 Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream 01/01/2017 to 12/31/2017

Percent Cutoff: 0

Resins, Filters and Evaporator Bottoms
Waste Class B

Nuclide Name	Percent Abundance	Curies
H-3	0.01%	3.19E-03
C-14	0.19%	5.69E-02
Mn-54	0.68%	2.01E-01
Fe-55	3.06%	9.07E-01
Co-57	1.41%	4.17E-01
Co-58	9.33%	2.76E+00
Co-60	23.75%	7.03E+00
Ni-59	0.43%	1.28E-01
Ni-63	31.76%	9.40E+00
Zn-65	0.05%	1.52E-02
Sr-90	0.30%	8.91E-02
Tc-99	0.08%	2.23E-02
Ag-110m	0.03%	1.02E-02
Sb-125	0.32%	9.40E-02
Cs-134	0.10%	2.91E-02
Cs-137	28.42%	8.41E+00
Ce-144	0.01%	2.26E-03
Pu-238	0.00%	4.14E-04
Pu-239	0.00%	8.51E-05
Pu-241	0.07%	2.02E-02
Am-241	0.00%	2.29E-04
Cm-242	0.00%	2.24E-05
Cm-243	0.00%	4.24E-04

Note: For radionuclides H-3, C-14, Tc-99 and I-129 if value is <MDA then MDA is used to report Curies shipped.

Units 1 and 2 Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream 01/01/2017 to 12/31/2017

Percent Cutoff: 0

Resins, Filters and Evaporator Bottoms
Total Combined

Nuclide Name	Percent Abundance	Curies
H-3	0.01%	6.71E-03
C-14	0.11%	5.74E-02
Cr-51	0.28%	1.39E-01
Mn-54	0.99%	4.97E-01
Fe-55	8.28%	4.16E+00
Fe-59	0.21%	1.04E-01
Co-57	0.93%	4.65E-01
Co-58	9.46%	4.75E+00
Co-60	34.65%	1.74E+01
Ni-59	0.28%	1.40E-01
Ni-63	21.71%	1.09E+01
Zn-65	0.21%	1.07E-01
Sr-90	0.18%	8.97E-02
Zr-95	0.25%	1.26E-01
Nb-95	0.38%	1.91E-01
Tc-99	0.04%	2.23E-02
Ag-110m	2.65%	1.33E+00
Sn-113	0.09%	4.27E-02
Sb-124	0.03%	1.54E-02
Sb-125	2.01%	1.01E+00
Cs-134	0.06%	2.91E-02
Cs-137	17.13%	8.60E+00
Ce-144	0.01%	3.61E-03
Pu-238	0.00%	4.56E-04
Pu-239	0.00%	8.51E-05
Pu-241	0.05%	2.63E-02
Am-241	0.00%	2.72E-04
Cm-242	0.00%	2.24E-05
Cm-243	0.00%	4.40E-04

Note: For radionuclides H-3, C-14, Tc-99 and I-129 if value is <MDA then MDA is used to report Curies shipped.

Units 1 and 2 Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream 01/01/2017 to 12/31/2017

Percent Cutoff: 0

Dry Active Waste
Waste Class A

Nuclide Name	Percent Abundance	Curies
H-3	0.34%	1.87E-03
C-14	0.05%	2.77E-04
Mn-54	0.49%	2.70E-03
Fe-55	64.61%	3.59E-01
Co-57	0.02%	1.38E-04
Co-58	0.08%	4.22E-04
Co-60	20.88%	1.16E-01
Ni-59	0.11%	6.21E-04
Ni-63	11.63%	6.46E-02
Sb-125	0.37%	2.03E-03
Cs-137	1.33%	7.40E-03
Ce-144	0.02%	8.97E-05
Pu-238	0.00%	1.36E-06
Pu-241	0.09%	5.10E-04
Am-241	0.00%	8.30E-07
Cm-243	0.00%	8.10E-07

Note: For radionuclides H-3, C-14, Tc-99 and I-129 if value is <MDA then MDA is used to report Curies shipped.

Units 1 and 2 Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream 01/01/2017 to 12/31/2017

Percent Cutoff: 0

Dry Active Waste
Total Combined

Nuclide Name	Percent Abundance	Curies
H-3	0.34%	1.87E-03
C-14	0.05%	2.77E-04
Mn-54	0.49%	2.70E-03
Fe-55	64.61%	3.59E-01
Co-57	0.02%	1.38E-04
Co-58	0.08%	4.22E-04
Co-60	20.88%	1.16E-01
Ni-59	0.11%	6.21E-04
Ni-63	11.63%	6.46E-02
Sb-125	0.37%	2.03E-03
Cs-137	1.33%	7.40E-03
Ce-144	0.02%	8.97E-05
Pu-238	0.00%	1.36E-06
Pu-241	0.09%	5.10E-04
Am-241	0.00%	8.30E-07
Cm-243	0.00%	8.10E-07

Note: For radionuclides H-3, C-14, Tc-99 and I-129 if value is <MDA then MDA is used to report Curies shipped.

Units 1 and 2 Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream 01/01/2017 to 12/31/2017

Percent Cutoff: 0

Other Waste
Waste Class A

Nuclide Name	Percent Abundance	Curies
H-3	0.33%	3.32E-06
C-14	0.05%	4.92E-07
Mn-54	0.50%	4.91E-06
Fe-55	64.73%	6.42E-04
Co-57	0.03%	2.52E-07
Co-58	0.08%	8.29E-07
Co-60	20.77%	2.06E-04
Ni-59	0.11%	1.10E-06
Ni-63	11.59%	1.15E-04
Sb-125	0.37%	3.63E-06
Cs-137	1.33%	1.32E-05
Ce-144	0.02%	1.64E-07
Pu-238	0.00%	2.42E-09
Pu-241	0.09%	9.08E-07
Am-241	0.00%	1.48E-09
Cm-243	0.00%	1.44E-09

Note: For radionuclides H-3, C-14, Tc-99 and I-129 if value is <MDA then MDA is used to report Curies shipped.

Units 1 and 2 Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream 01/01/2017 to 12/31/2017

Percent Cutoff: 0

Other Waste
Total Combined

Nuclide Name	Percent Abundance	Curies
H-3	0.33%	3.32E-06
C-14	0.05%	4.92E-07
Mn-54	0.50%	4.91E-06
Fe-55	64.73%	6.42E-04
Co-57	0.03%	2.52E-07
Co-58	0.08%	8.29E-07
Co-60	20.77%	2.06E-04
Ni-59	0.11%	1.10E-06
Ni-63	11.59%	1.15E-04
Sb-125	0.37%	3.63E-06
Cs-137	1.33%	1.32E-05
Ce-144	0.02%	1.64E-07
Pu-238	0.00%	2.42E-09
Pu-241	0.09%	9.08E-07
Am-241	0.00%	1.48E-09
Cm-243	0.00%	1.44E-09

Note: For radionuclides H-3, C-14, Tc-99 and I-129 if value is <MDA then MDA is used to report Curies shipped.

Units 1 and 2 Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream 01/01/2017 to 12/31/2017

Percent Cutoff: 0

Sum of All 4 Categories
Waste Class A

Nuclide Name	Percent Abundance	Curies
H-3	0.03%	5.39E-03
C-14	0.00%	8.03E-04
Cr-51	0.65%	1.39E-01
Mn-54	1.41%	2.99E-01
Fe-55	17.00%	3.61E+00
Fe-59	0.49%	1.04E-01
Co-57	0.23%	4.78E-02
Co-58	9.37%	1.99E+00
Co-60	49.46%	1.05E+01
Ni-59	0.06%	1.26E-02
Ni-63	7.58%	1.61E+00
Zn-65	0.43%	9.22E-02
Sr-90	0.00%	6.63E-04
Zr-95	0.59%	1.26E-01
Nb-95	0.90%	1.91E-01
Ag-110m	6.22%	1.32E+00
Sn-113	0.20%	4.27E-02
Sb-124	0.07%	1.54E-02
Sb-125	4.32%	9.17E-01
Cs-137	0.93%	1.98E-01
Ce-144	0.01%	1.44E-03
Pu-238	0.00%	4.31E-05
Pu-241	0.03%	6.51E-03
Am-241	0.00%	4.33E-05
Cm-243	0.00%	1.66E-05

Note: For radionuclides H-3, C-14, Tc-99 and I-129 if value is <MDA then MDA is used to report Curies shipped.

Units 1 and 2 Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream 01/01/2017 to 12/31/2017

Percent Cutoff: 0

Sum of All 4 Categories
Waste Class B

Nuclide Name	Percent Abundance	Curies
H-3	0.01%	3.19E-03
C-14	0.19%	5.69E-02
Mn-54	0.68%	2.01E-01
Fe-55	3.06%	9.07E-01
Co-57	1.41%	4.17E-01
Co-58	9.33%	2.76E+00
Co-60	23.75%	7.03E+00
Ni-59	0.43%	1.28E-01
Ni-63	31.76%	9.40E+00
Zn-65	0.05%	1.52E-02
Sr-90	0.30%	8.91E-02
Tc-99	0.08%	2.23E-02
Ag-110m	0.03%	1.02E-02
Sb-125	0.32%	9.40E-02
Cs-134	0.10%	2.91E-02
Cs-137	28.42%	8.41E+00
Ce-144	0.01%	2.26E-03
Pu-238	0.00%	4.14E-04
Pu-239	0.00%	8.51E-05
Pu-241	0.07%	2.02E-02
Am-241	0.00%	2.29E-04
Cm-242	0.00%	2.24E-05
Cm-243	0.00%	4.24E-04

Note: For radionuclides H-3, C-14, Tc-99 and I-129 if value is <MDA then MDA is used to report Curies shipped.

Units 1 and 2 Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream 01/01/2017 to 12/31/2017

Percent Cutoff: 0

Sum of All 4 Categories
Waste Class All

Nuclide Name	Percent Abundance	Curies
H-3	0.02%	8.58E-03
C-14	0.11%	5.77E-02
Cr-51	0.27%	1.39E-01
Mn-54	0.98%	5.00E-01
Fe-55	8.90%	4.52E+00
Fe-59	0.20%	1.04E-01
Co-57	0.92%	4.65E-01
Co-58	9.35%	4.75E+00
Co-60	34.46%	1.75E+01
Ni-59	0.28%	1.41E-01
Ni-63	21.66%	1.10E+01
Zn-65	0.21%	1.07E-01
Sr-90	0.18%	8.97E-02
Zr-95	0.25%	1.26E-01
Nb-95	0.38%	1.91E-01
Tc-99	0.04%	2.23E-02
Ag-110m	2.62%	1.33E+00
Sn-113	0.08%	4.27E-02
Sb-124	0.03%	1.54E-02
Sb-125	1.99%	1.01E+00
Cs-134	0.06%	2.91E-02
Cs-137	16.95%	8.61E+00
Ce-144	0.01%	3.70E-03
Pu-238	0.00%	4.57E-04
Pu-239	0.00%	8.51E-05
Pu-241	0.05%	2.68E-02
Am-241	0.00%	2.73E-04
Cm-242	0.00%	2.24E-05
Cm-243	0.00%	4.41E-04

Note: For radionuclides H-3, C-14, Tc-99 and I-129 if value is <MDA then MDA is used to report Curies shipped.

Unit 3 Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream 01/01/2017 to 12/31/2017

Combined Waste Type Shipment, Major Volume Waste Type Shown

Waste Stream : Resins, Filters, and Evaporator Bottoms

Waste Class	Volume ft^3	Volume m^3	Curies Shipped	% Error (Ci)
A	3.20E+02	9.06E+00	3.88E+00	+/- 25%
B	0.00E+00	0.00E+00	0.00E+00	+/- 25%
C	0.00E+00	0.00E+00	0.00E+00	+/- 25%
All	3.20E+02	9.06E+00	3.88E+00	+/- 25%

Waste Stream : Dry Active Waste

Waste Class	Volume ft^3	Volume m^3	Curies Shipped	% Error (Ci)
A	1.82E+04	5.15E+02	5.78E-01	+/-25%
B	0.00E+00	0.00E+00	0.00E+00	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	1.82E+04	5.15E+02	5.78E-01	+/-25%

Waste Stream : Irradiated Components

Waste Class	Volume ft^3	Volume m^3	Curies Shipped	% Error (Ci)
A	0.00E+00	0.00E+00	0.00E+00	+/-25%
B	0.00E+00	0.00E+00	0.00E+00	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	0.00E+00	0.00E+00	0.00E+00	+/-25%

Waste Stream : Other Waste

Waste Class	Volume ft^3	Volume m^3	Curies Shipped	% Error (Ci)
A	0.00E+00	0.00E+00	0.00E+00	+/-25%
B	0.00E+00	0.00E+00	0.00E+00	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	0.00E+00	0.00E+00	0.00E+00	+/-25%

Waste Stream : Sum of All 4 Categories

Waste Class	Volume ft^3	Volume m^3	Curies Shipped	% Error (Ci)
A	1.85E+04	5.24E+02	4.46E+00	+/-25%
B	0.00E+00	0.00E+00	0.00E+00	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	1.85E+04	5.24E+02	4.46E+00	+/-25%

Unit 3 Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream 01/01/2017 to 12/31/2017

Number of Shipments	Mode of Transportations	Destination
13	Hittman Transport	Energy Solutions Bear Creek

Unit 3 Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream 01/01/2017 to 12/31/2017

Percent Cutoff: 0

Resins, Filters and Evaporator Bottoms
Waste Class A

Nuclide Name	Percent Abundance	Curies
H-3	1.82%	7.07E-02
C-14	0.02%	7.42E-04
Cr-51	0.87%	3.38E-02
Mn-54	0.61%	2.35E-02
Fe-55	1.61%	6.23E-02
Co-57	0.04%	1.45E-03
Co-58	4.30%	1.67E-01
Co-60	9.67%	3.75E-01
Ni-59	0.59%	2.28E-02
Ni-63	47.68%	1.85E+00
Zn-65	0.52%	2.01E-02
Sr-90	0.01%	2.22E-04
Nb-95	0.11%	4.24E-03
Ag-110m	2.46%	9.54E-02
Sb-125	24.10%	9.35E-01
Te-123m	0.00%	1.89E-04
Te-132	0.00%	1.83E-12
Cs-134	0.03%	1.08E-03
Cs-137	5.54%	2.15E-01
Ce-144	0.04%	1.43E-03
Pu-238	0.00%	5.63E-06
Am-241	0.00%	4.50E-06
Cm-243	0.00%	5.57E-06

Note: For radionuclides H-3, C-14, Tc-99 and I-129 if value is <MDA then MDA is used to report Curies shipped.

Unit 3 Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream 01/01/2017 to 12/31/2017

Percent Cutoff: 0

Resins, Filters and Evaporator Bottoms
Waste Class Total Combined

Nuclide Name	Percent Abundance	Curies
H-3	1.82%	7.07E-02
C-14	0.02%	7.42E-04
Cr-51	0.87%	3.38E-02
Mn-54	0.61%	2.35E-02
Fe-55	1.61%	6.23E-02
Co-57	0.04%	1.45E-03
Co-58	4.30%	1.67E-01
Co-60	9.67%	3.75E-01
Ni-59	0.59%	2.28E-02
Ni-63	47.68%	1.85E+00
Zn-65	0.52%	2.01E-02
Sr-90	0.01%	2.22E-04
Nb-95	0.11%	4.24E-03
Ag-110m	2.46%	9.54E-02
Sb-125	24.10%	9.35E-01
Te-123m	0.00%	1.89E-04
Te-132	0.00%	1.83E-12
Cs-134	0.03%	1.08E-03
Cs-137	5.54%	2.15E-01
Ce-144	0.04%	1.43E-03
Pu-238	0.00%	5.63E-06
Am-241	0.00%	4.50E-06
Cm-243	0.00%	5.57E-06

Note: For radionuclides H-3, C-14, Tc-99 and I-129 if value is <MDA then MDA is used to report Curies shipped.

Unit 3 Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream 01/01/2017 to 12/31/2017

Percent Cutoff: 0

Dry Active Waste
Waste Class A

Nuclide Name	Percent Abundance	Curies
H-3	7.94%	4.59E-02
C-14	0.69%	3.99E-03
Mn-54	0.60%	3.46E-03
Fe-55	11.77%	6.80E-02
Co-60	33.40%	1.93E-01
Ni-59	0.36%	2.08E-03
Ni-63	42.06%	2.43E-01
Nb-94	0.19%	1.10E-03
Tc-99	0.11%	6.37E-04
Sb-125	2.41%	1.39E-02
Cs-137	0.30%	1.76E-03
Ce-144	0.08%	4.64E-04
Pu-238	0.00%	1.12E-05
Pu-241	0.09%	5.07E-04

Note: For radionuclides H-3, C-14, Tc-99 and I-129 if value is <MDA then MDA is used to report Curies shipped.

Unit 3 Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream 01/01/2017 to 12/31/2017

Percent Cutoff: 0

Dry Active Waste
Waste Class Total Combined

Nuclide Name	Percent Abundance	Curies
H-3	7.94%	4.59E-02
C-14	0.69%	3.99E-03
Mn-54	0.60%	3.46E-03
Fe-55	11.77%	6.80E-02
Co-60	33.40%	1.93E-01
Ni-59	0.36%	2.08E-03
Ni-63	42.06%	2.43E-01
Nb-94	0.19%	1.10E-03
Tc-99	0.11%	6.37E-04
Sb-125	2.41%	1.39E-02
Cs-137	0.30%	1.76E-03
Ce-144	0.08%	4.64E-04
Pu-238	0.00%	1.12E-05
Pu-241	0.09%	5.07E-04

Note: For radionuclides H-3, C-14, Tc-99 and I-129 if value is <MDA then MDA is used to report Curies shipped.

Unit 3 Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream 01/01/2017 to 12/31/2017

Percent Cutoff: 0

Sum of All 4 Categories
Waste Class A

Nuclide Name	Percent Abundance	Curies
H-3	2.63%	1.17E-01
C-14	0.11%	4.74E-03
Cr-51	0.76%	3.38E-02
Mn-54	0.61%	2.70E-02
Fe-55	2.92%	1.30E-01
Co-57	0.03%	1.45E-03
Co-58	3.75%	1.67E-01
Co-60	12.75%	5.68E-01
Ni-59	0.56%	2.49E-02
Ni-63	46.92%	2.09E+00
Zn-65	0.45%	2.01E-02
Sr-90	0.00%	2.22E-04
Nb-94	0.02%	1.10E-03
Nb-95	0.10%	4.24E-03
Tc-99	0.01%	6.37E-04
Ag-110m	2.14%	9.54E-02
Sb-125	21.31%	9.49E-01
Te-123m	0.00%	1.89E-04
Te-132	0.00%	1.83E-12
Cs-134	0.02%	1.08E-03
Cs-137	4.85%	2.16E-01
Ce-144	0.04%	1.89E-03
Pu-238	0.00%	1.68E-05
Pu-241	0.01%	5.07E-04
Am-241	0.00%	4.50E-06
Cm-243	0.00%	5.57E-06

Note: For radionuclides H-3, C-14, Tc-99 and I-129 if value is <MDA then MDA is used to report Curies shipped.

Unit 3 Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream 01/01/2017 to 12/31/2017

Percent Cutoff: 0

Sum of All 4 Categories
Total Combined

Nuclide Name	Percent Abundance	Curies
H-3	2.63%	1.17E-01
C-14	0.11%	4.74E-03
Cr-51	0.76%	3.38E-02
Mn-54	0.61%	2.70E-02
Fe-55	2.92%	1.30E-01
Co-57	0.03%	1.45E-03
Co-58	3.75%	1.67E-01
Co-60	12.75%	5.68E-01
Ni-59	0.56%	2.49E-02
Ni-63	46.92%	2.09E+00
Zn-65	0.45%	2.01E-02
Sr-90	0.00%	2.22E-04
Nb-94	0.02%	1.10E-03
Nb-95	0.10%	4.24E-03
Tc-99	0.01%	6.37E-04
Ag-110m	2.14%	9.54E-02
Sb-125	21.31%	9.49E-01
Te-123m	0.00%	1.89E-04
Te-132	0.00%	1.83E-12
Cs-134	0.02%	1.08E-03
Cs-137	4.85%	2.16E-01
Ce-144	0.04%	1.89E-03
Pu-238	0.00%	1.68E-05
Pu-241	0.01%	5.07E-04
Am-241	0.00%	4.50E-06
Cm-243	0.00%	5.57E-06

Note: For radionuclides H-3, C-14, Tc-99 and I-129 if value is <MDA then MDA is used to report Curies shipped.

Indian Point Energy Center
(Units 1, 2, and 3)

RADIOACTIVE EFFLUENT REPORT

E. RADIOLOGICAL IMPACT ON MAN

Jan 1, 2017 - Dec 31, 2017

RADIOLOGICAL IMPACT ON MAN

Routine Effluent Dose Calculations

The Radiological Impact on Man due to radioactive effluent from the site is determined from NRC approved modeling, per Regulatory Guide 1.109 and NUREG 0133. Calculations are divided into 3 categories: Noble Gases, Particulates and Iodine, and Liquid Releases (fish and invertebrate consumption). This modeling involves conservative dose calculations to Adult, Teen, Child, and Infant age groups. Furthermore, dose modeling is performed for six separate organs as well as the total body dose. This well-established industry model provides doses (as a result of plant effluent) to a hypothetical maximally exposed individual offsite. While ALL age groups and organs are considered, it is this maximum value that is provided in the tables that follow.

An approved computer code is used to perform liquid and gaseous dose calculations according to the models and parameters presented in the Indian Point Offsite Dose Calculation Manual (ODCM). This information is stored in a database on site to enhance dose tracking and information management. Site airborne effluent dose calculations include annual average dispersion and deposition factors, averaged from data collected over approximately ten year periods. When new data is averaged (approximately every ten years) the modeling is updated and used in subsequent airborne effluent calculations. Liquid offsite dose calculations involve fish and invertebrate consumption pathways only, as determined appropriate in the ODCM. While the ODCM identified some site-specific dose factors, the bulk of this information is obtained directly from Regulatory Guide 1.109 and NUREG 0133. Details of the calculations, site-specific data, and their bases are presented in the ODCM.

Carbon-14 (C-14):

Concentrations and offsite dose from C-14 were determined from sampling at Indian Point #3 from August 1980 to June 1982, during a study conducted by the NY State Department of Health (C. Kunz, later published and incorporated into NCRP 81). The annual C-14 curies released, as determined from this study, were consistent with NUREG 0017, Rev. 1. Data was then normalized to a maximum expected annual total, based on rated electrical capacity, (approximately 1000 MW(e) maintained for the entire year). Once the curies released were established, dose calculations were performed per the station ODCM, which uses all C-14 released to determine inhalation doses, and 26% of the total (determined to be Carbon Dioxide form), to determine the ingestion doses, in accordance with Regulatory Guide 1.109.

In 2010, IPEC and other facilities combined historical data with the application of an EPRI model designed to estimate C-14 releases, given some key site-specific plant parameters (mass of the primary coolant, average thermal neutron cross section, rated MW, etc.). The estimates from this model, for IPEC, closely match the measured observations of 1982.

The maximum annual C-14 release information is as follows:

Maximum (Bounding) Annual C-14 releases from IPEC		Unit 2	Unit 3
Liquid Effluent C^{14} Released	Curies	**0.07**	**0.07**
Total Airborne C^{14} Released	Curies	**11.19**	**11.05**
Airborne C^{14} as CO_2	Curies	**2.91**	**2.87**

Airborne Effluent Child TB Dose, C^{14}	mrem	**0.0690**	**0.0675**
Airborne Effluent Child Bone Dose, C^{14}	mrem	**0.346**	**0.338**
Liquid Effluent Child TB Dose, C^{14}	mrem	**0.00117**	**0.00116**
Liquid Effluent Child Bone Dose, C^{14}	mrem	**0.00583**	**0.00577**

The bounding values were then normalized with actual effective full power days (EFFD) to yield more accurate year to year annual airborne curies and mrem for each unit. A small liquid effluent component is maintained at IPEC as a result of data accumulated in the 1983 study (Kunz). Tables 1A (shown earlier) include the airborne curie data for the current year. The following section (Radiological Impact on Man) includes the dose information.

C-14 doses are grouped with "Iodine and Particulate" and reported in Table D in the following Radiological Impact on Man tables, for each unit. Table "C" provides doses from this category *excluding* C-14, to facilitate historical comparisons. However, since C-14 is grouped as a particulate, the total dose for this isotope needs to be added to all other Iodines and Particulates, for comparison of the singular dose limit for this category.

Therefore, table "D" includes dose from all categories of this group (Iodine, Particulate, Tritium, and Carbon-14), for appropriate comparison of the dose limits.

C-14 doses (alone) for the current year are provided (for information) in the following table:

Calculated Annual C-14 releases from IPEC, **2017**		**Unit 2**	**Unit 3**
Airborne Effluent Child TB Dose, C^{14}	mrem	**0.0650**	**0.0517**
Airborne Effluent Child Bone Dose, C^{14}	mrem	**0.326**	**0.259**

The airborne effluent dose from C-14 is distributed evenly over the year and applied to a total Iodine and Particulate dose in Table "D" following this section.

Members of the Public:

Members of the public visiting the site receive minimal dose as a result of onsite releases because of the relatively insignificant total amount of time they are on site, as well as the immeasurably low levels of dose at the critical receptors. Their doses can be calculated from standard ODCM methodology, with typical occupancy factors employed. These factors are determined by comparing a conservative assumption for their expected hours on site, to 8760 hours (the number of hours in a year, used in calculations in the ODCM).

example 1: Several students visit the site for an 8-hour guided tour.

Their occupancy factor is: 8 / 8760 or **0.0009**.

example 2: A man drives his wife to work and drops her off at the security gate each morning, with a total stay-time on site for 2 minutes per day. His occupancy factor is calculated as follows:

2 min/60 min/hr =0.0333 hr; 0.0333 / 8760 = **3.8E-6.**

While onsite meteorological factors (dispersion and deposition) may be as high as a factor of ten higher than those used by the ODCM for routine effluents, these occupancy factors, when multiplied by doses calculated per the ODCM, demonstrate that dose to MEMBERS OF THE PUBLIC within the site boundary is negligible.

Groundwater:

Curies and dose contribution from activity discovered in onsite groundwater and storm drain pathways during the year are discussed in more detail in Section H. The offsite dose calculation involves multiple source term measurements, as well as computations for release and dilution flow. A summary of the quantification methodology, and the resulting calculated doses, is provided at the end of Section H. The Total Dose table below provides a means to compare ground water doses with those of other components making up the total offsite dose.

Total Dose:

Unit and pathway specific dose data can be found on the Radiological Impact on Man tables following this discussion. For simplicity and to demonstrate compliance with 40CFR190, the following table indicates the maximum hypothetical Total Dose to an individual from operation of the facility, including any measured direct shine component from the site property:

Year: 2017		Total Body	Max Organ
40 CFR 190 limit ===→	**IPEC**	**25 mrem**	**75 mrem**
Routine Airborne Effluents[1]	**Units 1 and 2**	**2.87E-03**	**2.87E-03**
Routine Liquid Effluents	**Units 1 and 2**	**5.95E-04**	**1.23E-03**
Liquid Releases of C^{14}	Units 1 and 2	1.17E-03	5.83E-03
Airborne Releases of C^{14}	Units 1 and 2	6.50E-02	3.26E-01
Routine Airborne Effluents[1]	**Unit 3**	**3.63E-03**	**3.63E-03**
Routine Liquid Effluents	**Unit 3**	**1.89E-04**	**7.34E-04**
Liquid Releases of C^{14}	Unit 3	1.17E-03	5.83E-03
Airborne Releases of C^{14}	Unit 3	5.17E-02	2.59E-01
Ground Water & Storm Drain Totals	**IPEC[2]**	**4.73E-05**	**1.91E-04**
Direct Shine from areas such as dry cask storage, radwaste storage, SG Mausoleum, etc.	**IPEC[3]**	**2.50E-01**	**2.50E-01**
Indian Point Energy Center Total Dose, per 40 CFR 190	**IPEC**	**3.76E-01**	**8.55E-01**

Note 1: Routine airborne dose in this table is conservatively represented as a sum of Iodine, Particulate, and Tritium dose (excluding C-14, in mrem) with a mrem term added from noble gas gamma air energy (mrad, expressed as mrem). This 'addition' does not represent a real dose and is listed here solely to help demonstrate compliance with 40CFR190. (Doses by type of release and comparison to the specific limits of 10CFR50 Appendix I are summarized on the following pages.)

Note 2: Groundwater curie and dose calculations are provided in Section H.

Note 3: 40CFR190 requires the reporting of total dose, including that of direct shine. Direct shine dose from sources other than dry cask are indistinguishable from background radiation. Direct shine dose is determined from TLDs near the dry cask area and site boundary, compared with REMP TLDs and historical values, and corrected with occupancy factors to determine a bounding, worst case assessment of direct shine dose to a real individual. These doses are slightly higher than those of the previous year due to additional storage on the Independent Spent fuel Storage Installation (ISFSI). Details of each year's dose evaluation are available on site from Radiation Protection.

INDIAN POINT UNITS 1 and 2 NUCLEAR POWER PLANTS
RADIOLOGICAL IMPACT ON MAN
JANUARY - DECEMBER 2017

Maximum exposed individual doses in mrem or mrad

A. LIQUID DOSES

		Qtr 1	Qtr 2	Qtr 3	Qtr 4	ANNUAL
Organ Dose	(mrem)	5.74E-04	5.11E-04	4.80E-05	1.27E-04	**1.23E-03**
Applicable Limit	(mrem)	5	5	5	5	10
Percent of Limit	(%)	1.15E-02	1.02E-02	9.59E-04	2.54E-03	1.23E-02
Age Group		Child	Child	Child	Adult	Child
Critical Organ		Bone	Bone	Bone	Liver	Bone
Adult Total Body	(mrem)	2.12E-04	2.47E-04	3.05E-05	1.05E-04	**5.95E-04**
Applicable Limit	(mrem)	1.5	1.5	1.5	1.5	3.0
Percent of Limit	(%)	1.41E-02	1.65E-02	2.03E-03	7.02E-03	1.98E-02

B. AIRBORNE NOBLE GAS DOSES

		Qtr 1	Qtr 2	Qtr 3	Qtr 4	ANNUAL
Gamma Air	(mrad)	1.46E-05	8.95E-06	1.45E-05	4.53E-05	**8.34E-05**
Applicable Limit	(mrad)	5	5	5	5	10
Percent of Limit	(%)	2.92E-04	1.79E-04	2.90E-04	9.06E-04	8.34E-04
Beta Air	(mrad)	1.15E-05	6.48E-06	1.21E-05	4.62E-05	**7.63E-05**
Applicable Limit	(mrad)	10	10	10	10	20
Percent of Limit	(%)	1.15E-04	6.48E-05	1.21E-04	4.62E-04	3.81E-04

C. AIRBORNE IODINE, PARTICULATE, & TRITIUM DOSES (excluding C-14, for info only)

		Qtr 1	Qtr 2	Qtr 3	Qtr 4	ANNUAL
Iodine/Part	(mrem)	3.18E-04	9.81E-04	1.02E-03	4.75E-04	**2.79E-03**
Applicable Limit	(mrem)	7.5	7.5	7.5	7.5	15
Percent of Limit	(%)	4.24E-03	1.31E-02	1.36E-02	6.33E-03	1.86E-02
Age Group		Child	Child	Child	Child	Child
Critical Organ		Liver	Liver	Liver	Liver	Liver

D. AIRBORNE IODINE, PARTICULATE, TRITIUM, and CARBON-14 DOSES

Child TB Dose	(mrem)	1.66E-02	1.72E-02	1.73E-02	1.67E-02	**6.78E-02**
Applicable Limit	(mrem)	7.5	7.5	7.5	7.5	15
Percent of Limit	(%)	2.21E-01	2.30E-01	2.30E-01	2.23E-01	4.52E-01
		Qtr 1	Qtr 2	Qtr 3	Qtr 4	ANNUAL
Child Bone Dose	(mrem)	8.15E-02	8.15E-02	8.15E-02	8.15E-02	**3.26E-01**
Applicable Limit	(mrem)	7.5	7.5	7.5	7.5	15
Percent of Limit	(%)	1.09E+00	1.09E+00	1.09E+00	1.09E+00	2.17E+00

INDIAN POINT 3 NUCLEAR POWER PLANT
RADIOLOGICAL IMPACT ON MAN
JANUARY - DECEMBER 2017

Maximum exposed individual doses in mrem or mrad

A. LIQUID DOSES

		Qtr 1	Qtr 2	Qtr 3	Qtr 4	ANNUAL
Organ Dose	(mrem)	4.91E-04	2.63E-04	5.54E-05	1.76E-05	**7.34E-04**
Applicable Limit	(mrem)	5	5	5	5	10
Percent of Limit	(%)	9.82E-03	5.26E-03	1.11E-03	3.53E-04	7.34E-03
Age Group		Adult	Child	Adult	Child	Adult
Critical Organ		GiLLi	Bone	GiLLi	Bone	GiLLi

Adult Total Body	(mrem)	1.39E-04	3.64E-05	7.38E-06	6.76E-06	**1.89E-04**
Applicable Limit	(mrem)	1.5	1.5	1.5	1.5	3.0
Percent of Limit	(%)	9.23E-03	2.43E-03	4.92E-04	4.51E-04	6.30E-03

B. AIRBORNE NOBLE GAS DOSES

		Qtr 1	Qtr 2	Qtr 3	Qtr 4	ANNUAL
Gamma Air	(mrad)	1.86E-05	2.88E-05	4.47E-06	3.42E-06	**5.53E-05**
Applicable Limit	(mrad)	5	5	5	5	10
Percent of Limit	(%)	3.72E-04	5.76E-04	8.94E-05	6.84E-05	5.53E-04

Beta Air	(mrad)	4.46E-05	4.24E-05	5.01E-06	3.75E-06	**9.58E-05**
Applicable Limit	(mrad)	10	10	10	10	20
Percent of Limit	(%)	4.46E-04	4.24E-04	5.01E-05	3.75E-05	4.79E-04

C. AIRBORNE IODINE, PARTICULATE, & TRITIUM DOSES (excluding C-14, for info only)

		Qtr 1	Qtr 2	Qtr 3	Qtr 4	ANNUAL
Iodine/Part	(mrem)	5.38E-04	1.95E-03	6.42E-04	4.41E-04	**3.57E-03**
Applicable Limit	(mrem)	7.5	7.5	7.5	7.5	15
Percent of Limit	(%)	7.17E-03	2.60E-02	8.56E-03	5.88E-03	2.38E-02
Age Group		Child	Child	Child	Child	Child
Critical Organ		Liver	Liver	Liver	Liver	Liver

D. AIRBORNE IODINE, PARTICULATE, TRITIUM, and CARBON-14 DOSES

Child TB Dose	(mrem)	1.35E-02	1.49E-02	1.36E-02	1.34E-02	**5.53E-02**
Applicable Limit	(mrem)	7.5	7.5	7.5	7.5	15
Percent of Limit	(%)	1.80E-01	1.98E-01	1.81E-01	1.78E-01	3.68E-01
		Qtr 1	Qtr 2	Qtr 3	Qtr 4	ANNUAL
Child Bone Dose	(mrem)	6.48E-02	6.48E-02	6.48E-02	6.48E-02	**2.59E-01**
Applicable Limit	(mrem)	7.5	7.5	7.5	7.5	15
Percent of Limit	(%)	8.63E-01	8.63E-01	8.63E-01	8.63E-01	1.73E+00

Indian Point Energy Center
(Units 1, 2, and 3)

RADIOLOGICAL EFFLUENT REPORT

F. METEOROLOGICAL DATA

Jan 1, 2017 - Dec 31, 2017

Per NRC Regulatory Guide 1.21 Rev. 2, this data is summarized and maintained onsite as a record.

Indian Point Energy Center
(Units 1, 2, and 3)

RADIOACTIVE EFFLUENT REPORT

G. OFFSITE DOSE CALCULATION MANUAL, REMP SAMPLING LOCATIONS, PROCESS CONTROL PROGRAM, OR LAND USE CENSUS LOCATION CHANGES

2017

There were no changes to the REMP Sampling Locations in 2017.

There were no changes in the Land Use Census in 2017.

There were no changes to the Process Control Program in 2017

There were no changes to the IPEC ODCM in 2017

Indian Point Energy Center
(Units 1, 2, and 3)

RADIOACTIVE EFFLUENT REPORT

H. GROUNDWATER and STORM WATER REPORT

ACTIVITY ON SITE and OFFSITE DOSE CALCULATION

FOR THE PERIOD:

Jan 1, 2017 - Dec 31, 2017

Summary of IPEC Groundwater and Storm Water Activity, 2017

The precipitation mass balance model applied in previous years was applied for offsite dose calculations in 2017, with some minor calibration updates performed by the contractor with regard to the distribution of groundwater flow through the site. Groundwater elevation readings continued to validate the model throughout the year.

As defined in the ODCM, a conservative method of source term selection is used for determining offsite dose from Groundwater and Storm Water. If a result is *below MDC* (whether positive or negative) it is *not* included in the computed average. This computed average is therefore biased high (more conservative from a dose computation perspective) relative to an average computed using all of the data (many of which indicate no activity). However, in cases where all the sampling locations assigned to a given stream tube provided results below the MDC, then an average activity value of zero was assigned to the effected portion of the stream tube. (This mathematically allows the calculation to proceed in the absence of positive detections).

Historical average precipitation at IPEC has been approximately 3 feet per year; the most recent high being over 6 feet in 2011. In 2017, precipitation was measured at 3.57 feet for the year (which is equivalent to an average of 3.57 inches per month). Doses from Groundwater/Storm water are dependent on two factors: source term and precipitation during the effected year.

Results of 2017 Groundwater and Storm Water Offsite Dose Evaluation

The results of the assessment are shown on the following table. These dose values are a small portion of the annual limits (<0.1%), and were added to the Total Dose table in the opening summary of the Dose to Man section of this report (Section E).

Groundwater (GW) and storm water tritium released from IPEC in 2017 totaled approximately 0.18 curies, resulting in a total body dose of significantly less than 0.1 mrem. It is evident that tritium alone, whether from ground water or routine effluents, does not arithmetically contribute to integrated offsite dose.

Sampling near the effluent points identified only trace levels of Tritium and Strontium-90. These data, as part of the Monitored Natural Attenuation analyses, show a continuation of the decreasing trends established with the termination of the identified Unit 2 SFP leaks (tritium plume) and the defueling and draining of Unit 1 SFPs (strontium plume). Strontium-90, a legacy isotope from Unit 1, contributed approximately 0.000022 curies to site effluent from the groundwater pathway. Combined GW releases from IPEC in 2017 (all radionuclides) resulted in a calculated annual dose of approximately 0.002% of the annual limits for whole body and critical organ:

IPEC Groundwater and Storm Water Effluent Dose, 2017

0.0000473 mrem to the total body	**(0.002% limit)**
0.000191 mrem to the critical organ, adult bone	**(0.002% limit)**

The annual dose from combined groundwater and storm water pathways remains well below applicable limits. When combined with routine liquid effluents (Section E), the total dose also remains significantly below ALARA limits of 3 mrem total body, and 10 mrem to the critical organ.

IPEC Summary for Storm & Ground Water releases (H-3, Co-60, Ni-63, Sr-90, Cs-137 and Sb-125)

2017 *year*

Northern Clean Zone

Adult Doses, in mrem

ISOTOPE	BONE	LIVER	TOT BODY	THYROID	KIDNEY	LUNG	GI-LLI	*uCi*
H-3	0.00E+00	4.69E-09	4.69E-09	4.69E-09	4.69E-09	4.69E-09	4.69E-09	*4.20E+02*
Co-60	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Sr-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Cs-137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
totals	0.00E+00	4.69E-09	4.69E-09	4.69E-09	4.69E-09	4.69E-09	4.69E-09	***4.20E+02***

Unit 2 North

ISOTOPE	BONE	LIVER	TOT BODY	THYROID	KIDNEY	LUNG	GI-LLI	*uCi*
H-3	0.00E+00	3.15E-08	3.15E-08	3.15E-08	3.15E-08	3.15E-08	3.15E-08	*7.58E+04*
Co-60	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Sr-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Cs-137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
totals	0.00E+00	3.15E-08	3.15E-08	3.15E-08	3.15E-08	3.15E-08	3.15E-08	***7.58E+04***

Unit 1/2

ISOTOPE	BONE	LIVER	TOT BODY	THYROID	KIDNEY	LUNG	GI-LLI	*uCi*
H-3	0.00E+00	2.32E-07	2.32E-07	2.32E-07	2.32E-07	2.32E-07	2.32E-07	*6.46E+04*
Co-60	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Sr-90	1.91E-04	0.00E+00	4.69E-05	0.00E+00	0.00E+00	0.00E+00	5.51E-06	*2.24E+01*
Cs-137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
totals	1.91E-04	2.32E-07	4.71E-05	2.32E-07	2.32E-07	2.32E-07	5.74E-06	***6.46E+04***

Unit 3 North

ISOTOPE	BONE	LIVER	TOT BODY	THYROID	KIDNEY	LUNG	GI-LLI	*uCi*
H-3	0.00E+00	1.25E-07	1.25E-07	1.25E-07	1.25E-07	1.25E-07	1.25E-07	*1.32E+04*
Co-60	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Sr-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Cs-137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
totals	0.00E+00	1.25E-07	1.25E-07	1.25E-07	1.25E-07	1.25E-07	1.25E-07	***1.32E+04***

Unit 3 South

ISOTOPE	BONE	LIVER	TOT BODY	THYROID	KIDNEY	LUNG	GI-LLI	*uCi*
H-3	0.00E+00	3.12E-08	3.12E-08	3.12E-08	3.12E-08	3.12E-08	3.12E-08	*1.32E+04*
Co-60	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Sr-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Cs-137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
totals	0.00E+00	3.12E-08	3.12E-08	3.12E-08	3.12E-08	3.12E-08	3.12E-08	***1.32E+04***

Southern Clean Zone

ISOTOPE	BONE	LIVER	TOT BODY	THYROID	KIDNEY	LUNG	GI-LLI	*uCi*
H-3	0.00E+00	1.35E-09	1.35E-09	1.35E-09	1.35E-09	1.35E-09	1.35E-09	*8.06E+03*
Co-60	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Sr-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Cs-137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
totals	0.00E+00	1.35E-09	1.35E-09	1.35E-09	1.35E-09	1.35E-09	1.35E-09	***8.06E+03***

Totals:

Adult Doses, in mrem

H-3 only	0.00E+00	4.26E-07	4.26E-07	4.26E-07	4.26E-07	4.26E-07	4.26E-07	*Total uCi*
	BONE	LIVER	TOT BODY	THYROID	KIDNEY	LUNG	GI-LLI	*1.75E+05* H3
all isotopes	**1.91E-04**	4.26E-07	**4.73E-05**	4.26E-07	4.26E-07	4.26E-07	5.93E-06	*0.00E+00* Co
								0.00E+00 Ni
Adult Doses								*2.24E+01* Sr
% Annual Limit	***0.00191***	*0.000*	***0.00158***	*0.000*	*0.000*	*0.000*	*0.000*	*0.00E+00* Cs
								0.00E+00 Sb

INDIAN POINT
RADIOLOGICAL GROUNDWATER
MONITORING PROGRAM

2017

Summary of Results

The following pages represent the isotopic radio-analytical data for all onsite groundwater testing performed at Indian Point in 2017, as required per the ODCM and NEI 07-07.

Well ID	Date	2017 Laboratory Analytical Results*													
		H3 (pCi/L)		Sr-90 (pCi/L)		Cs-137 (pCi/L)		Co-60 (pCi/L)		Ni-63 (pCi/L)		Sb-125 (pCi/L)		Co-58 (pCi/L)	
		Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ
I-2	5/19/2017	6.10E+01	3.84E+02	0.1	1.1	-0.5	6.2	0.2	4.9			-3.4	14.4	-2.7	6.4
MH-5 VCFD	1/4/2017	**1.43E+03**	4.89E+02												
MH-5 VCFD	1/16/2017	**1.42E+03**	5.28E+02	-0.3	1.4	5.1	6.1	-0.5	5.5			-4.4	14.9	3.2	7.2
MH-5 VCFD	2/13/2017	**1.67E+03**	5.04E+02	-0.4	1.0	0.6	4.8	-0.3	5.2			4.7	11.6	-0.4	3.9
MH-5 VCFD	3/6/2017	**1.80E+03**	6.09E+02	0.1	1.6	0.0	5.1	0.7	5.5			-1.2	13.3	0.5	6.8
MH-5 VCFD	4/4/2017	**2.39E+04**	1.33E+03	0.9	1.1	-1.3	5.5	-0.5	4.7			0.0	24.1	4.7	7.1
MH-5 VCFD	5/5/2017	**8.26E+02**	4.26E+02	0.6	0.8	1.0	5.0	-2.3	5.9			13.6	11.9	0.7	5.0
MH-5 VCFD	6/1/2017	**5.79E+03**	7.56E+02	-0.4	0.7	-2.4	4.6					5.7	12.2	-1.4	6.0
MH-5 VCFD	6/28/2017	**9.83E+02**	6.24E+02	0.9	1.3	-2.0	6.8					10.1	12.8	-1.3	5.2
MH-5 VCFD	8/1/2017	**1.51E+03**	5.34E+02	-0.8	0.9	-0.3	5.3	1.8	5.7			5.2	13.6	0.9	6.2
MH-5 VCFD	9/27/2017	<MDC**													
MH-5 VCFD	10/25/2017	4.29E+02	4.53E+02	0.0	0.7	-0.3	6.4	-2.6	6.3			1.9	16.3	-1.4	7.2
MH-5 VCFD	12/18/2017	**4.27E+02**	3.78E+02	0.4	1.4	2.1	5.2	1.4	6.8			3.4	14.1	4.4	7.4
MW-107	5/12/2017	1.41E+02	3.75E+02	0.0	1.1	0.9	5.1	0.4	5.6			-4.9	12.9	-1.6	7.1
MW-111	1/17/2017	**3.35E+04**	1.79E+03	-0.5	1.4	3.3	8.1	0.3	6.7			-3.5	15.9	1.7	7.5
MW-111	2/20/2017	**2.23E+04**	1.18E+03	0.9	1.4	-0.1	4.6	-2.2	6.4			3.2	11.8	-2.9	6.9
MW-111	4/24/2017	**5.66E+04**	2.75E+03	1.4	1.8	2.2	5.2	2.2	5.6			1.3	11.6	1.1	5.9
MW-111	5/31/2017	**5.43E+04**	2.49E+03	-0.4	0.7	-1.8	3.9	0.1	3.9			-5.8	13.1	-0.5	5.2
MW-111	8/1/2017	**9.59E+04**	2.90E+03	0.1	1.2	0.2	5.3	0.1	5.5			-1.3	16.0	1.4	5.5
MW-111	10/23/2017	**1.19E+05**	2.91E+03	1.1	1.3	-0.7	6.7	-3.2	6.9			-6.4	17.4	-3.9	8.3
MW-111	11/22/2017	**1.02E+05**	3.12E+03	0.4	0.7	0.9	5.6	4.1	5.4			4.0	15.3	-2.1	6.1
MW-30-69	1/3/2017	**5.61E+05**	1.68E+04	-0.5	1.0	0.0	7.4	-0.2	5.6			12.7	27.4	1.4	5.6
MW-30-69	1/16/2017	**5.08E+05**													
MW-30-69	2/13/2017	**7.51E+05**	2.12E+04	-0.2	1.3	-0.1	7.2	1.6	8.0			-1.7	18.5	0.0	7.5
MW-30-69	2/16/2017	**4.35E+05**	1.30E+04	0.2	1.2	2.9	5.2	2.8	5.2			7.9	14.2	0.2	4.8
MW-30-69	3/6/2017	**3.35E+05**	9.69E+03	0.0	1.0	1.5	6.4	-0.6	4.5			14.9	29.3	-1.5	5.3
MW-30-69	4/4/2017	**2.44E+05**	7.14E+03	-0.8	0.9	1.4	5.6	1.4	7.6			3.6	22.4	0.4	10.4
MW-30-69	7/31/2017	**1.81E+05**	5.46E+03	-0.1	0.7	1.3	4.2	0.8	4.3			5.8	11.3	-1.4	6.0
MW-30-71	10/25/2017	**1.84E+05**													
MW-30-84	2/13/2017	**1.43E+05**	4.05E+03	0.1	1.0	-1.3	4.8	-0.2	5.6			-5.2	14.8	-3.3	5.6
MW-30-84	5/2/2017	**1.35E+05**	4.11E+03	1.2	1.5	-0.5	6.2	0.9	4.3			2.8	13.3	1.5	6.4

Well ID	Date	2017 Laboratory Analytical Results*													
		H3 (pCi/L)		Sr-90 (pCi/L)		Cs-137 (pCi/L)		Co-60 (pCi/L)		Ni-63 (pCi/L)		Sb-125 (pCi/L)		Co-58 (pCi/L)	
		Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ
MW-30-84	7/31/2017	**1.04E+05**	3.18E+03	0.7	1.1	1.4	5.5	1.1	5.7			-0.8	15.3	2.9	6.9
MW-30-84	10/25/2017	**1.30E+05**	3.96E+03	0.1	0.2	2.4	5.9	0.9	6.2			1.8	15.5	0.4	8.6
MW-31-49	2/16/2017	2.78E+02	3.45E+02	-0.3	1.1	-1.7	6.4	-3.9	5.4			-2.4	15.2	-0.1	5.3
MW-31-49	5/2/2017	**1.31E+03**	4.62E+02	0.9	1.0	-1.3	5.0	4.0	5.1			-2.0	13.9	-0.6	4.6
MW-31-49	7/31/2017	**3.04E+04**	1.69E+03	-0.1	0.9	2.2	5.2	-0.7	4.8			-1.3	13.5	-2.8	7.0
MW-31-49	10/26/2017	**6.15E+04**	2.27E+03	0.1	0.9	1.2	5.1	-0.6	6.1			-4.0	13.8	-3.2	6.5
MW-31-63	1/3/2017	**4.00E+05**	1.16E+04	0.5	1.1	0.2	5.6	-0.8	4.7			**177.0**	42.0	**14.6**	12.1
MW-31-63	1/16/2017	**4.05E+05**	1.18E+04	-0.7	1.2	0.0	9.9	1.3	5.3			**107.0**	26.1	0.0	11.8
MW-31-63	2/16/2017	**3.54E+05**	1.01E+04	-0.5	1.5	3.2	5.4	1.9	6.1			0.0	18.0	-0.2	5.3
MW-31-63	3/6/2017	**3.98E+05**	1.16E+04	-1.3	1.4	-1.2	5.9	2.2	5.5			0.0	31.5	-0.7	6.3
MW-31-63	4/5/2017	**3.29E+05**	9.72E+03	0.3	1.1	2.3	10.6	4.6	9.0			**69.2**	33.6	-2.3	8.3
MW-31-63	5/2/2017	**2.89E+05**	4.65E+03	-0.1	0.6	-0.7	4.1	-2.5	5.2			**50.1**	26.0	-0.2	4.5
MW-31-63	6/2/2017	**2.46E+05**	7.26E+03	-0.3	1.4	-2.6	4.0	2.8	4.2			**47.8**	27.2	-0.8	5.5
MW-31-63	6/26/2017	**1.86E+05**	5.70E+03	0.1	1.2	0.1	5.1	4.2	4.8			**59.7**	33.6	0.9	5.6
MW-31-63	7/31/2017	**2.22E+05**	6.69E+03	-0.6	0.8	1.2	8.2	0.1	7.4			**43.7**	35.7	1.9	7.0
MW-31-63	8/29/2017	**2.10E+05**	6.12E+03	0.3	0.8	-1.5	5.7	-2.2	7.4			**42.0**	39.6	-0.1	7.2
MW-31-63	9/25/2017	**2.30E+05**	6.45E+03									0.0	22.1	-6.8	7.6
MW-31-63	10/26/2017	**1.84E+05**	5.55E+03	0.2	0.8	4.4	7.8	1.7	6.8			8.5	18.4	-2.8	7.4
MW-31-63	11/20/2017	**1.66E+05**	4.80E+03	-0.2	0.6	1.5	6.1	1.5	6.4			**49.6**	32.4	-0.1	6.3
MW-31-63	12/11/2017	**1.66E+05**	4.77E+03	0.2	1.1	-3.2	6.3	1.3	6.1			**69.7**	37.2	0.1	8.3
MW-31-63	12/18/2017	**1.76E+05**													
MW-31-85	2/16/2017	**2.38E+04**	1.33E+03	0.3	1.3	1.4	4.1	0.8	4.2			**45.9**	27.7	0.9	4.9
MW-31-85	5/2/2017	**2.19E+04**	1.37E+03	1.0	1.0	0.7	6.0	0.1	6.2			0.0	71.7	-1.8	6.8
MW-31-85	6/26/2017	**3.10E+04**	1.94E+03	-0.1	0.7	-1.5	5.2	-0.5	4.5			**22.1**	21.2	1.2	5.0
MW-31-85	7/31/2017	**2.28E+04**	1.41E+03	0.3	0.9	-1.7	5.9	-3.5	5.7			0.0	26.1	-2.7	6.8
MW-31-85	10/26/2017	**1.44E+04**	1.15E+03	0.2	0.7	0.0	5.8	2.8	6.8			0.0	28.1	1.6	6.5
MW-32-149	2/16/2017	1.70E+02	3.99E+02	-0.6	1.2	0.7	5.7	-3.3	7.9			-4.7	17.3	-0.6	6.6
MW-32-149	5/1/2017	4.61E+02	4.65E+02	-0.3	0.4	4.1	4.1	1.4	4.0			-0.8	10.0	0.7	4.8
MW-32-149	7/24/2017	3.14E+02	4.59E+02	0.0	1.3	1.4	8.4	-0.9	5.1			3.4	12.6	-1.2	6.5
MW-32-149	10/26/2017	9.44E+01	4.02E+02	0.0	0.9	0.5	6.6	-1.1	7.6			-1.2	15.7	2.5	7.5
MW-32-173	2/16/2017	6.48E+01	3.66E+02	-0.6	1.3	1.5	4.7	-1.3	4.5			-1.6	11.5	0.0	4.5

Well ID	Date	2017 Laboratory Analytical Results*													
		H3 (pCi/L)		Sr-90 (pCi/L)		Cs-137 (pCi/L)		Co-60 (pCi/L)		Ni-63 (pCi/L)		Sb-125 (pCi/L)		Co-58 (pCi/L)	
		Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ
MW-32-173	5/1/2017	3.45E+02	4.53E+02	0.1	0.7	0.7	5.2	1.8	5.9			2.7	15.4	-0.2	6.3
MW-32-173	7/24/2017	**4.42E+02**	4.41E+02	-0.1	0.7	2.3	4.7	2.0	5.6			9.2	15.2	-2.1	6.7
MW-32-173	10/26/2017	2.49E+02	4.23E+02	-1.0	1.3	-4.7	7.4	-1.7	5.8			0.5	13.2	-1.0	5.6
MW-32-190	2/16/2017	**5.73E+02**	4.26E+02	0.3	1.2	-2.5	4.4	-2.3	6.0			7.7	9.8	1.0	4.0
MW-32-190	5/1/2017	**6.08E+02**	4.83E+02	-0.1	0.6	0.3	5.1	3.1	5.2			-7.0	14.8	0.1	5.3
MW-32-190	7/24/2017	**7.14E+02**	4.86E+02	-0.2	0.7	2.4	6.2	-1.9	7.8			2.2	16.9	-2.0	8.6
MW-32-190	10/26/2017	**6.26E+02**	3.75E+02	0.3	0.9	0.0	5.7	1.9	5.9			-2.9	16.1	2.2	6.0
MW-32-59	1/3/2017	**3.54E+05**	1.03E+04	-0.6	0.9	2.2	6.6	6.1	7.0			**320.0**	57.0	**42.8**	15.5
MW-32-59	1/16/2017	**2.70E+05**	7.89E+03	0.6	1.4	4.1	6.6	5.1	6.1			**345.0**	47.4	**27.3**	11.9
MW-32-59	2/16/2017	**1.37E+05**	3.87E+03	-0.4	0.6	-1.3	4.1	0.9	8.7			**219.0**	37.2	7.7	8.0
MW-32-59	3/6/2017	**2.01E+05**	5.79E+03	1.8	2.0	-0.3	4.7	-2.2	7.3			**303.0**	50.4	**12.3**	8.9
MW-32-59	4/5/2017	**7.50E+03**	8.07E+02	0.0	0.8	-0.4	6.1	-0.7	6.5			**103.0**	35.7	0.3	8.9
MW-32-59	4/25/2017	**1.72E+05**													
MW-32-59	5/1/2017	**1.48E+05**	4.47E+03	0.5	0.9	4.4	14.1	-1.9	4.4			**279.0**	42.3	4.8	5.7
MW-32-59	6/2/2017	**9.90E+04**	3.33E+03	-0.6	1.0	0.1	5.4	2.1	4.0			**221.0**	43.5	5.9	7.1
MW-32-59	6/26/2017	**1.76E+05**	5.22E+03	0.7	1.3	0.0	7.3	1.0	6.6			**307.0**	50.4	4.1	7.0
MW-32-59	7/24/2017	**9.50E+04**	2.87E+03	-0.2	1.0	-1.2	5.5	2.0	8.2			**192.0**	46.8	0.4	7.5
MW-32-59	8/29/2017	**2.27E+05**	5.76E+03	-0.4	0.8	3.2	4.5	2.5	4.3			**305.0**	43.5	2.7	7.9
MW-32-59	9/25/2017	**2.65E+05**	7.65E+03									**255.0**	49.8	5.3	9.4
MW-32-59	10/26/2017	**8.44E+04**	2.56E+03	-0.1	1.2	0.1	5.4	1.4	4.7			**89.4**	31.2	-1.4	5.0
MW-32-59	11/20/2017	**3.92E+05**	1.13E+04	0.3	0.4	1.1	6.3	-2.2	7.9			**232.0**	49.8	0.8	7.9
MW-32-59	12/4/2017	**3.47E+05**	1.01E+04	0.0	0.2	2.1	7.3	-1.4	6.8			**228.0**	48.0	-2.1	8.7
MW-32-59	12/11/2017	**1.63E+05**	2.99E+03	-0.2	1.1	-1.5	5.6	4.0	7.4			**167.0**	36.9	-3.4	6.8
MW-32-59	12/18/2017	**3.83E+04**													
MW-32-85	2/16/2017	**1.77E+05**	5.34E+03	-0.2	1.1	-4.1	5.7	-1.1	4.9			0.4	13.0	-0.9	5.0
MW-32-85	5/1/2017	**1.50E+05**	4.53E+03	0.1	0.8	-0.2	5.6	-1.5	5.6			-0.5	13.7	-1.0	5.7
MW-32-85	6/26/2017	**1.36E+05**	4.11E+03	-0.1	1.5	0.6	5.8	0.7	4.8			-2.9	14.3	1.1	6.0
MW-32-85	7/24/2017	**1.33E+05**	4.02E+03	-0.5	1.0	-2.0	5.6	3.0	8.4			-2.6	12.5	4.9	13.3
MW-32-85	8/29/2017	**1.14E+05**	3.45E+03	0.0	0.8	3.2	5.1	0.5	4.0			-0.9	12.8	-1.1	4.7
MW-32-85	9/25/2017	**1.09E+05**	3.06E+03									-2.2	13.1	3.6	7.2
MW-32-85	10/26/2017	**8.58E+04**	2.62E+03	-0.9	1.1	0.2	5.4	-9.3	11.2			-2.4	17.5	-3.4	8.0

Well ID	Date	2017 Laboratory Analytical Results*													
		H3 (pCi/L)		Sr-90 (pCi/L)		Cs-137 (pCi/L)		Co-60 (pCi/L)		Ni-63 (pCi/L)		Sb-125 (pCi/L)		Co-58 (pCi/L)	
		Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ
MW-32-85	11/20/2017	**9.55E+04**	2.91E+03	-0.2	0.2	-3.7	6.3	0.0	5.5			-7.0	14.6	-1.8	7.9
MW-33	1/17/2017	**9.52E+04**	2.97E+03	0.0	1.4	0.8	9.8	-3.7	8.4			-8.0	20.2	8.3	9.1
MW-33	2/20/2017	**1.29E+05**	3.69E+03	-1.0	1.3	3.1	6.5	-1.5	7.6			-0.7	13.2	3.9	5.0
MW-33	4/24/2017	**2.62E+05**	7.89E+03	0.6	0.9	3.2	5.3	3.0	5.2			5.4	13.5	0.0	7.0
MW-33	5/31/2017	**2.63E+05**	7.65E+03	0.1	0.9	-2.2	4.7	0.4	4.1			0.6	11.2	-0.6	5.6
MW-33	6/27/2017	**6.29E+04**	2.10E+03	-0.2	0.7	0.4	5.7	1.1	4.6			-3.8	12.7	3.0	5.6
MW-33	8/1/2017	**2.78E+05**	7.95E+03	0.9	1.4	0.7	4.1	1.5	5.1			6.4	17.0	0.0	5.5
MW-33	8/28/2017	**5.35E+04**													
MW-33	10/23/2017	**5.38E+04**													
MW-35	1/5/2017	**2.43E+04**	1.33E+03	0.3	1.2	**16.8**	12.3	2.6	6.5			-3.2	12.5	-3.4	5.2
MW-35	1/17/2017	**1.02E+04**	1.03E+03	-0.3	1.5	**28.7**	10.1	-0.8	5.0			-4.5	12.2	0.4	6.7
MW-35	4/3/2017	**5.18E+03**	7.17E+02	1.2	1.5	3.5	6.0	-0.5	4.9			2.4	13.1	-1.7	6.5
MW-35	5/31/2017	**7.98E+03**	1.05E+03	-0.3	1.0	-1.2	8.7	-2.4	8.5			0.1	16.5	2.0	10.4
MW-35	6/27/2017	**3.18E+03**	6.33E+02	0.3	1.1	-0.5	5.0	0.7	5.5			-4.7	12.4	-1.2	5.6
MW-35	8/1/2017	**8.39E+03**	9.09E+02	-0.4	0.8	-0.3	5.9	-1.7	4.7			-1.0	13.3	2.7	5.4
MW-35	8/28/2017	**7.49E+03**	5.52E+02	0.9	1.6	0.2	4.6	0.4	4.9			-2.5	14.1	2.7	4.7
MW-35	9/26/2017	**3.96E+03**	6.72E+02									0.3	10.8	1.2	7.7
MW-35	10/23/2017	**8.96E+03**	8.67E+02	-0.4	0.7	-1.2	4.8	5.0	4.9			1.0	12.7	0.0	25.2
MW-35	11/22/2017	**2.89E+03**	6.21E+02	0.0	0.2	4.0	4.4	-5.1	6.1			0.1	13.8	0.8	6.1
MW-35	12/19/2017	**1.31E+04**	9.48E+02	-0.7	1.0	-1.7	5.0	-1.6	5.3			-1.1	11.3	2.4	6.2
MW-36-24	1/31/2017	**2.02E+04**	1.26E+03	-0.6	1.4	-0.1	5.5	0.0	5.0			1.8	13.9	-3.8	5.1
MW-36-24	5/19/2017	**2.77E+03**	5.97E+02	1.7	1.9	0.3	5.6	2.0	4.7			3.2	14.0	-0.1	6.2
MW-36-24	7/28/2017	3.73E+02	4.26E+02	0.2	0.9	-1.9	4.6	2.0	3.8			-0.1	11.6	-1.6	5.7
MW-36-24	10/24/2017	1.87E+02	3.84E+02	-0.3	0.8	0.0	7.9	-2.6	6.1			5.2	16.7	-3.0	6.7
MW-36-41	1/31/2017	**6.84E+04**	2.24E+03	**2.4**	1.8	2.6	6.6	-0.5	5.6			-6.8	15.4	-0.4	6.8
MW-36-41	3/21/2017	**5.68E+04**	2.31E+03	**2.5**	1.6	-1.0	8.0	1.2	8.0			-8.3	22.0	-3.6	8.0
MW-36-41	5/19/2017	**4.11E+04**	2.12E+03	**4.4**	1.6	-0.7	6.8	2.3	5.8			1.9	14.6	-0.1	6.5
MW-36-41	6/27/2017	**2.03E+04**	1.32E+03	**2.5**	1.5	-0.5	5.0	-0.9	4.7			0.4	11.9	0.9	5.4
MW-36-41	7/28/2017	**4.02E+04**	1.88E+03	**3.5**	1.8	4.2	6.6	0.2	5.9			4.3	14.0	-1.3	8.8
MW-36-41	9/26/2017	**3.39E+04**													
MW-36-41	10/24/2017	**1.16E+04**	1.01E+03	**3.5**	1.6	-0.9	7.8	-3.3	6.0			-4.1	11.8	3.5	5.0

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		H3 (pCi/L)		Sr-90 (pCi/L)		Cs-137 (pCi/L)		Co-60 (pCi/L)		Ni-63 (pCi/L)		Sb-125 (pCi/L)		Co-58 (pCi/L)	
		Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ
MW-36-41	12/11/2017	**1.73E+04**													
MW-36-52	1/31/2017	**1.16E+04**	9.99E+02	**3.0**	2.2	-1.2	6.7	1.1	6.8			-4.2	14.9	6.1	12.5
MW-36-52	5/19/2017	**1.30E+04**	1.25E+03	**2.7**	1.5	-1.2	7.2	-0.2	4.8			-2.3	17.0	0.9	6.5
MW-36-52	7/28/2017	**1.18E+04**	1.09E+03	**3.1**	1.3	1.4	4.9	0.5	5.8			3.9	12.7	-0.5	5.8
MW-36-52	10/24/2017	**1.18E+04**	1.04E+03	**3.0**	1.5	-0.5	5.8	6.9	5.2			-9.6	15.0	0.0	7.6
MW-37-22	5/11/2017	**2.55E+04**	1.58E+03	**10.2**	2.8	0.1	5.1	0.0	4.5			3.4	11.0	-1.9	5.9
MW-37-22	10/30/2017	**3.92E+03**	6.81E+02	**10.9**	2.6	2.4	5.8	-0.1	5.9			-7.3	12.2	-3.5	4.5
MW-37-32	2/2/2017	**3.55E+04**													
MW-37-32	5/11/2017	**2.62E+04**	1.59E+03	**6.8**	2.2	-1.5	5.0	1.3	5.6			1.4	13.1	-5.4	6.6
MW-37-32	5/31/2017	**2.27E+04**													
MW-37-32	10/30/2017	**5.32E+03**	7.59E+02	**11.7**	2.6	3.4	7.0	1.1	6.7			8.0	16.3	0.0	7.7
MW-37-40	5/11/2017	**3.36E+04**	1.82E+03	**14.0**	2.9	-4.9	5.7	0.5	4.4			1.5	12.2	2.3	5.9
MW-37-40	10/30/2017	**1.65E+04**	1.21E+03	**30.2**	2.9	1.8	6.2	1.9	5.7			-0.9	15.0	2.1	6.7
MW-37-57	2/2/2017	**3.23E+04**													
MW-37-57	5/11/2017	**3.20E+04**	1.79E+03	**13.9**	3.1	-1.6	4.2	-1.5	3.6			-0.6	9.6	-2.5	5.3
MW-37-57	5/31/2017	**3.11E+04**													
MW-37-57	10/30/2017	**1.40E+04**	1.10E+03	**13.2**	2.5	2.0	4.8	0.6	5.1			1.8	10.4	0.3	5.0
MW-39-102	6/7/2017	-2.58E+01	3.75E+02	0.7	1.2	-0.8	4.6	4.4	5.5			-4.1	11.0	3.1	6.4
MW-39-102	11/8/2017	1.34E+02	3.57E+02	-0.7	0.7	-4.3	6.8	0.8	5.9			0.9	17.6	5.9	9.5
MW-39-183	6/7/2017	-1.71E+02	3.63E+02	-0.3	1.1	3.2	6.5	-1.6	7.7			-0.9	14.5	1.7	8.0
MW-39-183	11/8/2017	3.88E+01	3.51E+02	-0.4	0.6	0.0	10.1	0.4	5.9			1.0	14.0	-1.9	7.7
MW-39-195	6/7/2017	-1.62E+01	3.39E+02	1.1	1.6	-1.4	4.8	1.4	4.4			4.3	11.9	-1.4	5.7
MW-39-195	11/8/2017	5.10E+01	3.42E+02	0.1	0.7	-0.6	5.4	2.0	6.4			-0.8	14.0	2.5	7.1
MW-39-67	6/7/2017	1.03E+02	3.87E+02	0.6	1.3	-0.3	8.3	0.0	8.9			-1.4	17.6	7.8	11.7
MW-39-67	11/8/2017	8.21E+01	3.54E+02	0.8	0.8	-0.4	6.4	0.7	6.5			2.4	15.8	-2.1	7.2
MW-39-84	6/7/2017	6.00E+01	3.81E+02	1.2	1.5	-2.2	7.0	3.4	5.9			-2.5	12.4	-2.6	6.8
MW-39-84	11/8/2017	1.73E+02	3.60E+02	0.6	0.7	2.3	5.6	-0.3	6.7			2.7	14.1	1.5	8.6
MW-40-100	5/12/2017	7.84E+01	4.35E+02	1.5	1.6	-2.0	6.3	-3.6	8.3			3.7	13.6	-0.6	9.3
MW-40-127	5/12/2017	6.22E+01	4.35E+02	0.5	1.4	-3.1	5.5	1.4	4.5			-0.6	14.2	1.3	7.1
MW-40-162	5/12/2017	6.22E+01	4.35E+02	0.7	1.3	-5.0	7.3	-0.5	6.2			5.6	17.6	-0.6	6.6
MW-40-27	5/12/2017	-1.18E+01	4.29E+02	0.0	0.9	4.5	5.1	-1.2	5.1			-0.7	12.8	0.6	5.3

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		H3 (pCi/L)		Sr-90 (pCi/L)		Cs-137 (pCi/L)		Co-60 (pCi/L)		Ni-63 (pCi/L)		Sb-125 (pCi/L)		Co-58 (pCi/L)	
		Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ
MW-40-46	5/12/2017	-2.03E+01	4.26E+02	-0.4	1.2	1.2	4.5	0.5	4.3			-4.1	10.8	0.2	6.3
MW-40-81	5/12/2017	7.79E+01	4.32E+02	0.7	1.7	-1.6	7.1	1.7	6.3			-5.4	16.7	-7.2	9.5
MW-41-40	2/20/2017	1.72E+02	3.81E+02	1.0	1.3	2.5	8.1	0.0	5.1			-3.9	13.0	-1.9	7.6
MW-41-40	5/17/2017	3.43E+02	4.47E+02	1.3	1.4	-0.3	7.3	0.5	4.1			2.8	10.7	1.5	5.2
MW-41-40	8/4/2017	2.70E+02	4.11E+02	0.2	1.1	-0.8	4.6	-2.0	4.9			2.1	9.5	0.7	5.1
MW-41-40	11/3/2017	1.28E+02	3.75E+02	0.0	0.3	-0.1	5.2	-0.2	6.0			2.7	12.1	-2.4	7.0
MW-41-63	2/20/2017	**4.78E+02**	4.29E+02	**1.5**	1.5	1.4	5.5	0.2	5.2			1.7	13.6	0.0	5.1
MW-41-63	5/17/2017	3.45E+02	4.08E+02	0.7	1.1	-3.1	5.9	-1.4	4.3			-4.9	11.7	0.4	5.6
MW-41-63	8/4/2017	1.95E+02	4.11E+02	-0.1	1.6	3.8	10.9	-0.9	4.4			-4.2	10.1	-0.6	4.6
MW-41-63	11/3/2017	1.52E+02	3.84E+02	0.2	0.6	1.2	5.4	-3.9	6.2			9.6	13.3	2.8	6.6
MW-42-49	1/4/2017	**1.72E+03**	3.78E+02	**44.0**	4.9	**124000.**	588.0	5.5	6.3			13.2	238.0	-2.3	5.8
MW-42-49	1/17/2017	**6.90E+02**	4.83E+02	**61.5**	5.9	**94700.0**	417.0	0.9	4.7	**1510.0**	53.4	-57.6	167.0	4.5	7.6
MW-42-49	2/6/2017	**6.92E+02**	4.65E+02	**48.0**	6.0	**119000.**	480.0	-1.0	4.2	**1300.0**	49.2	-9.3	179.0	0.1	7.3
MW-42-49	5/9/2017	**5.80E+02**	4.14E+02	**8.8**	2.6	**80300.0**	468.0	-0.5	5.1	**847.0**	45.0	-21.6	198.0	0.4	6.5
MW-42-49	6/26/2017	**6.48E+02**	3.93E+02	**37.1**	4.9	**49500.0**	378.0	-1.8	7.1	**705.0**	50.1	-67.7	148.0	1.8	8.6
MW-42-49	8/2/2017	**5.32E+02**	4.83E+02	**28.0**	4.6	**57750.0**	366.0	-1.8	5.5	**939.0**	39.9	15.5	144.0	5.7	6.2
MW-42-49	8/28/2017	**7.03E+02**	4.68E+02	**29.8**	4.2	**58350.0**	324.0	-1.3	4.9	**881.0**	53.7	-31.9	135.0	1.0	6.2
MW-42-49	9/26/2017	**1.27E+03**	4.77E+02									24.2	152.0	6.4	7.9
MW-42-49	10/27/2017	**2.19E+03**	5.28E+02	**48.7**	6.3	**64700.0**	435.0	1.6	4.8	**1240.0**	50.4	36.4	176.0	2.7	7.8
MW-42-49	11/21/2017	**1.05E+03**	4.74E+02	**28.5**	3.1	**62900.0**	360.0	2.9	5.5	**804.0**	41.4	-62.9	131.0	1.4	6.3
MW-42-49	12/19/2017	**4.64E+03**	5.55E+02	**36.3**	3.4	**59300.0**	309.0	2.2	9.4	**1320.0**	49.2	18.3	114.0	-1.2	5.6
MW-42-78	2/6/2017	**3.21E+03**	5.76E+02	0.6	1.5	3.6	8.4	-5.5	8.2	4.1	18.2	6.2	18.0	1.4	8.8
MW-42-78	5/9/2017	**2.22E+03**	5.43E+02	0.3	0.6	0.5	4.7	-1.2	5.4	4.7	17.1	-1.7	13.4	0.1	4.1
MW-42-78	8/2/2017	**1.78E+03**	5.55E+02	0.3	0.8	0.2	4.5	1.2	4.5	-0.3	19.3	1.8	11.8	0.5	5.4
MW-42-78	10/27/2017	**1.21E+03**	4.68E+02	0.3	1.0	1.7	6.0	-0.7	5.7	1.5	11.5	-2.0	16.9	3.5	7.2
MW-43-28	5/17/2017	2.28E+02	4.02E+02	0.0	1.4	0.0	4.6	1.5	5.0			-6.7	16.4	0.7	5.4
MW-43-62	5/17/2017	5.51E+01	3.78E+02	0.2	0.9	-0.4	5.8	-4.4	5.8			-0.3	12.9	2.5	6.8
MW-44-102	6/7/2017	1.49E+02	3.87E+02	-0.2	1.1	0.8	6.4	-2.8	6.1			-3.3	14.0	-4.5	7.4
MW-44-102	11/8/2017	2.87E+02	3.72E+02	0.0	0.6	1.3	5.3	4.6	7.1			-5.0	13.5	2.1	7.4
MW-44-66	6/7/2017	2.55E+02	3.96E+02	-0.3	0.9	0.7	5.1	-4.7	5.7			-6.9	14.7	0.9	6.4
MW-44-66	11/8/2017	6.40E+01	3.72E+02	0.0	0.5	-2.8	6.0	-0.2	7.1			3.8	15.8	-3.4	8.1

Well ID	Date	2017 Laboratory Analytical Results*													
		H3 (pCi/L)		Sr-90 (pCi/L)		Cs-137 (pCi/L)		Co-60 (pCi/L)		Ni-63 (pCi/L)		Sb-125 (pCi/L)		Co-58 (pCi/L)	
		Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ
MW-45-42	2/20/2017	**1.69E+03**	4.71E+02	-0.3	0.9	1.5	5.2	-1.7	6.1			2.4	13.1	-1.7	5.4
MW-45-42	5/17/2017	**2.06E+03**	5.40E+02	0.7	1.3	-0.4	5.5	-2.4	5.6			-2.6	14.7	0.3	6.2
MW-45-42	8/4/2017	**2.02E+03**	5.55E+02	0.7	1.5	4.0	5.9	0.0	5.6			-5.6	13.7	-0.4	5.3
MW-45-42	11/3/2017	**3.56E+03**	6.51E+02	-0.1	0.3	3.9	7.8	3.2	9.4			-3.9	16.1	1.5	10.8
MW-45-61	2/20/2017	**1.84E+03**	4.80E+02	-1.1	1.4	0.5	4.4	-0.7	5.9			2.6	9.9	-0.8	4.3
MW-45-61	5/17/2017	**1.84E+03**	5.13E+02	0.9	1.2	-0.2	5.0	2.8	4.1			-0.5	13.4	-1.2	5.3
MW-45-61	8/4/2017	**1.91E+03**	5.49E+02	0.4	1.1	-3.2	5.3	0.1	4.3			-2.2	12.2	0.2	6.2
MW-45-61	11/3/2017	**2.57E+03**	6.12E+02	0.1	0.2	3.3	5.5	-1.4	5.4			7.9	14.6	2.1	6.5
MW-46	2/1/2017	2.68E+02	3.60E+02	-0.8	1.2	0.0	11.8	-0.9	5.7			1.1	16.3	-2.3	6.1
MW-46	4/3/2017	**5.85E+02**	4.02E+02	-0.3	1.3	5.2	7.1	-0.6	7.0			3.2	16.1	4.4	15.8
MW-46	6/1/2017	<MDC													
MW-46	6/19/2017	<MDC													
MW-46	7/25/2017	4.05E+02	4.29E+02	-0.1	1.0	0.3	5.3	-1.9	5.5			0.5	14.7	-0.1	6.0
MW-46	8/30/2017	<MDC													
MW-46	11/6/2017	1.89E+02	4.32E+02	-0.1	0.3	0.2	6.1	2.8	4.7			3.7	13.1	2.2	6.8
MW-49-26	3/20/2017	**2.36E+04**													
MW-49-26	4/26/2017	**1.66E+04**	1.48E+03	**13.1**	2.3	1.8	5.0	0.0	9.9	-10.0	22.1	-1.8	12.2	0.1	5.3
MW-49-26	5/31/2017	**1.71E+04**													
MW-49-26	10/31/2017	**1.32E+04**	1.01E+03	**8.0**	1.6	1.2	3.8	-4.5	7.1	4.5	16.1	-2.6	11.8	-2.9	4.5
MW-49-42	3/20/2017	**1.80E+04**													
MW-49-42	4/26/2017	**1.74E+04**	1.17E+03	**14.3**	2.4	2.4	5.2	0.7	6.3	-6.2	17.7	-8.4	14.7	0.1	6.0
MW-49-42	5/31/2017	**1.81E+04**													
MW-49-42	10/31/2017	**1.20E+04**	9.72E+02	**13.4**	2.7	4.9	8.9	-8.5	8.8	-15.2	19.4	1.6	19.9	-1.8	8.5
MW-49-65	4/26/2017	**9.17E+03**	1.13E+03	**7.9**	1.7	-3.2	7.9	1.9	4.6	1.8	18.1	0.3	13.7	-0.3	5.7
MW-49-65	10/31/2017	**8.88E+03**	8.67E+02	**8.5**	2.3	0.0	5.6	0.1	5.1	0.3	11.4	1.5	14.3	-0.4	4.9
MW-50-42	2/7/2017	**1.79E+04**	1.16E+03	**9.7**	2.9	-3.2	6.6	2.2	5.0	2.1	17.5	2.3	15.1	-1.5	6.5
MW-50-42	5/15/2017	**3.21E+03**	6.00E+02	**2.3**	1.5	2.4	5.0	1.6	5.9	5.8	19.0	0.9	12.8	-1.2	6.4
MW-50-42	7/25/2017	2.52E+02	3.84E+02	0.0	1.5	0.0	4.2	2.1	4.2	-2.7	15.9	0.0	11.0	-0.3	4.6
MW-50-42	10/24/2017	2.34E+02	3.84E+02	**3.1**	1.4	-0.2	4.3	-0.8	5.4	-5.3	12.8	2.2	12.8	-3.0	5.4
MW-50-66	2/7/2017	**3.30E+04**	1.59E+03	**22.5**	3.6	1.2	5.2	-2.7	6.5	-4.6	16.6	-1.2	13.2	-1.2	5.5
MW-50-66	5/15/2017	**2.83E+04**	1.49E+03	**16.7**	3.1	1.3	4.9	-0.7	4.6	5.5	19.4	-1.9	11.8	0.4	5.2

Well ID	Date	2017 Laboratory Analytical Results*													
		H3 (pCi/L)		Sr-90 (pCi/L)		Cs-137 (pCi/L)		Co-60 (pCi/L)		Ni-63 (pCi/L)		Sb-125 (pCi/L)		Co-58 (pCi/L)	
		Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ
MW-50-66	7/25/2017	**2.62E+04**	1.54E+03	**19.2**	3.2	1.7	6.0	0.3	6.4	2.9	20.0	0.9	14.4	-1.3	7.8
MW-50-66	10/24/2017	**2.04E+04**	1.30E+03	**16.4**	4.2	0.7	8.6	3.2	14.0	-0.3	11.6	3.2	19.6	1.9	8.7
MW-51-104	2/10/2017	3.14E+02	3.93E+02	0.5	1.0	1.0	6.7	0.4	4.9			3.7	14.2	2.6	5.9
MW-51-135	2/10/2017	8.84E+01	3.72E+02	-0.4	1.0	2.6	5.5	-2.2	5.5			-2.4	13.1	-1.9	6.2
MW-51-163	2/10/2017	2.23E+02	3.90E+02	0.3	1.3	0.0	13.1	-0.7	5.4			-1.7	17.9	-2.3	6.4
MW-51-189	2/10/2017	3.36E+01	3.72E+02	-0.7	1.4	0.0	10.3	-0.9	4.3			1.0	11.6	1.1	5.7
MW-51-40	2/10/2017	1.50E+02	3.78E+02	-0.2	0.9	0.4	5.1	-3.8	7.1			-1.2	14.5	0.0	28.7
MW-51-79	2/10/2017	8.39E+01	3.69E+02	-0.2	1.4	4.7	4.6	-0.9	4.2			7.2	12.6	-0.7	5.0
MW-52-122	5/18/2017	-1.53E+02	3.51E+02	-1.1	1.1	-0.4	6.7	2.8	5.6			-4.1	14.3	2.0	8.2
MW-52-162	5/18/2017	8.71E+01	3.78E+02	0.5	1.3	0.3	6.0	2.5	5.6			3.6	15.1	-2.2	8.2
MW-52-18	5/18/2017	1.45E+02	3.78E+02	-0.1	1.3	1.0	5.4	2.0	6.3			1.4	13.7	-1.4	8.5
MW-52-181	5/18/2017	2.63E+02	3.84E+02	-0.7	1.2	-2.2	3.9	1.8	3.9			-3.4	10.6	2.7	5.1
MW-52-48	5/18/2017	1.52E+02	3.84E+02	1.3	1.6	-2.2	7.6	2.3	5.5			0.8	13.1	-1.7	5.3
MW-52-64	5/18/2017	-6.73E+01	3.51E+02	0.2	1.1	0.6	5.1	0.7	5.4			-5.0	12.2	-1.6	6.9
MW-53-120	1/4/2017	**1.21E+04**	9.87E+02	**28.8**	3.9										
MW-53-120	1/17/2017	**1.22E+04**	1.13E+03	**29.0**	5.8	0.7	6.0	-2.8	6.7			1.3	13.8	2.5	8.9
MW-53-120	2/6/2017	**1.36E+04**	1.16E+03	**25.0**	4.2	-1.2	8.3	0.6	5.6	1.1	20.6	4.0	15.3	-0.6	5.6
MW-53-120	5/9/2017	**1.53E+04**	1.24E+03	**28.1**	2.9	-0.9	7.4	0.4	6.5	13.4	18.7	-1.8	16.6	0.7	7.3
MW-53-120	6/26/2017	**1.65E+04**	1.46E+03	**31.2**	5.0	3.9	8.2	1.6	5.6	13.9	22.7	-5.8	15.1	1.0	6.3
MW-53-120	8/2/2017	**1.55E+04**	1.18E+03	**22.6**	3.4	2.9	5.0	1.1	4.6	5.1	18.2	-4.3	13.4	0.5	6.0
MW-53-120	8/28/2017	**1.72E+04**	1.19E+03	**25.6**	4.2	-0.3	6.8	0.0	3.7	12.3	21.9	-4.4	9.8	1.6	5.1
MW-53-120	9/26/2017	**1.16E+04**	1.04E+03									-2.9	17.6	-10.3	12.3
MW-53-120	10/25/2017	**1.48E+04**	1.12E+03	**22.3**	4.9	0.5	4.7	3.9	5.6	8.9	11.1	0.0	15.5	0.3	6.8
MW-53-120	11/21/2017	**1.74E+04**	1.22E+03	**22.3**	1.3	0.0	5.9	-2.8	5.6	10.2	16.5	0.1	15.7	-2.7	8.1
MW-53-120	12/19/2017	**1.15E+04**	9.03E+02	**17.7**	2.4	3.1	4.2	-0.5	4.1	3.2	16.9	2.3	9.1	2.1	5.9
MW-53-82	2/6/2017	**5.91E+03**	7.29E+02	0.0	1.3	0.2	7.3	1.9	6.4	-3.6	17.7	-3.9	18.8	-0.2	7.9
MW-53-82	5/9/2017	**8.43E+02**	4.50E+02	0.2	0.5	-0.5	6.5	-2.9	9.0	4.5	16.7	0.8	15.7	-1.4	7.4
MW-53-82	8/2/2017	**2.73E+03**	6.51E+02	-0.4	1.2	0.6	4.6	2.9	4.2	-4.1	17.6	-5.2	11.9	1.7	4.7
MW-53-82	10/25/2017	**1.45E+04**	1.12E+03	0.3	0.8	4.2	6.2	-1.4	4.6	-5.6	12.6	-1.4	12.5	-3.1	5.7
MW-54-123	2/3/2017	**4.76E+03**	6.75E+02	0.9	1.5	2.1	5.8	-5.3	7.0	-3.3	19.7	0.8	14.5	-1.8	7.4
MW-54-123	5/5/2017	**4.12E+03**	6.72E+02	0.8	0.9	2.0	5.4	2.6	5.7	3.3	20.6	-3.1	15.2	4.5	5.6

Well ID	Date	2017 Laboratory Analytical Results*													
		H3 (pCi/L)		Sr-90 (pCi/L)		Cs-137 (pCi/L)		Co-60 (pCi/L)		Ni-63 (pCi/L)		Sb-125 (pCi/L)		Co-58 (pCi/L)	
		Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ
MW-54-123	8/3/2017	**3.77E+03**	6.81E+02	0.8	1.2	0.8	6.2	-0.5	5.5	-1.5	19.9	-14.0	17.7	2.3	7.0
MW-54-123	10/30/2017	**3.51E+03**	6.39E+02	-0.2	0.6	**38.7**	13.6	-2.8	6.8	-1.8	14.7	-1.8	10.2	-4.1	5.2
MW-54-123	12/4/2017	**3.37E+03**	6.63E+02	1.0	1.5	1.0	6.8	1.0	7.0			2.2	14.6	-2.5	6.5
MW-54-144	2/3/2017	**8.37E+03**	8.52E+02	**8.8**	2.7	4.2	9.5	-0.9	5.7	-4.7	16.5	8.0	12.0	0.1	5.8
MW-54-144	5/5/2017	**7.17E+03**	8.34E+02	**7.0**	1.9	2.5	6.8	1.5	6.3	3.2	16.7	-2.0	15.6	1.5	6.0
MW-54-144	8/3/2017	**6.48E+03**	8.16E+02	**4.3**	1.8	-0.1	3.9	0.0	4.2	-4.6	16.8	0.0	10.0	-2.6	5.3
MW-54-144	10/30/2017	**6.72E+03**	8.10E+02	**2.2**	1.2	0.6	11.2	-2.9	6.5	-3.5	11.8	6.1	13.3	-0.1	5.0
MW-54-173	2/3/2017	**5.03E+03**	7.05E+02	**3.4**	2.1	1.1	4.5	0.1	5.4	-1.6	18.5	0.3	13.1	-1.9	6.2
MW-54-173	5/5/2017	**6.84E+03**	8.13E+02	**3.1**	1.3	1.3	6.7	-0.6	6.4	6.9	18.0	0.5	17.7	-2.1	7.2
MW-54-173	8/3/2017	**8.43E+03**	9.03E+02	**3.0**	1.5	1.2	4.1	-0.1	3.7	0.3	18.9	-1.1	10.2	0.5	4.2
MW-54-173	10/30/2017	**8.71E+03**	8.85E+02	0.9	1.8	1.2	6.8	0.9	5.4	-5.9	14.0	-1.1	15.9	-0.9	6.9
MW-54-190	2/3/2017	**1.92E+04**	1.22E+03	**7.2**	3.0	-3.4	9.5	-2.1	7.7	1.2	19.9	-1.6	21.1	4.0	14.5
MW-54-190	5/5/2017	**1.44E+04**	1.13E+03	**10.7**	1.9	-3.2	6.2	-1.4	5.9	5.7	16.4	6.7	13.7	-3.8	5.0
MW-54-190	8/3/2017	**1.05E+04**	9.90E+02	**8.3**	2.3	-1.4	3.3	0.0	3.6	-6.8	15.1	-1.7	8.5	1.0	4.4
MW-54-190	10/30/2017	**9.52E+03**	9.24E+02	**8.3**	1.9	0.9	4.7	3.9	5.7	-2.7	13.0	3.6	13.5	0.0	5.0
MW-54-37	2/3/2017	**2.91E+03**	5.79E+02	**2.0**	1.6	-0.5	6.5	3.6	7.9	-4.1	22.0	-0.6	16.8	2.2	8.9
MW-54-37	5/5/2017	**3.02E+03**	6.15E+02	**2.6**	1.1	1.7	4.8	3.2	5.8	-5.6	18.8	-2.6	11.2	-0.3	4.8
MW-54-37	8/3/2017	**2.96E+03**	6.33E+02	**1.8**	1.3	1.0	4.6	-3.7	7.1	-1.7	19.1	6.5	11.3	0.9	4.6
MW-54-37	10/30/2017	**3.41E+03**	6.21E+02	**3.2**	1.5	0.0	17.4	1.5	7.2	-5.4	11.6	5.6	14.5	1.6	6.2
MW-54-58	2/3/2017	**3.86E+03**	6.66E+02	-0.5	1.3	1.5	4.2	1.0	3.9	2.1	17.3	-2.8	10.4	2.3	16.2
MW-54-58	5/5/2017	**3.42E+03**	6.18E+02	1.0	1.2	2.6	7.5	-1.7	5.6	-3.4	18.1	-3.4	19.2	-1.8	8.5
MW-54-58	8/3/2017	**2.94E+03**	6.39E+02	0.2	0.9	1.8	6.0	6.4	6.0	-10.5	19.5	6.9	10.8	-0.8	5.0
MW-54-58	10/30/2017	**2.99E+03**	6.09E+02	1.2	1.3	-1.6	6.3	-0.3	5.8	-4.2	12.2	-7.6	14.5	-1.5	5.6
MW-55-24	1/31/2017	**2.74E+04**	1.43E+03	**25.1**	3.9	-0.7	5.0	-3.5	6.7	0.9	15.3	5.3	17.4	2.5	5.5
MW-55-24	4/24/2017	**1.71E+04**	1.14E+03	**22.5**	3.0	3.1	8.2	-0.2	6.9	-6.2	18.8	-8.9	19.4	-2.2	10.6
MW-55-24	8/1/2017	**1.86E+04**	1.29E+03	**14.6**	2.7	-1.2	7.1	3.6	6.2	-2.0	17.2	-0.4	15.6	-1.2	6.9
MW-55-24	10/23/2017	**8.70E+03**	9.27E+02	**31.2**	2.9	2.8	5.8	2.5	7.4	-5.3	19.1	6.5	14.1	-1.9	7.3
MW-55-35	1/31/2017	**2.91E+04**	1.48E+03	**28.0**	4.5	-0.7	8.3	-2.6	7.9	0.3	16.7	-2.2	21.2	-0.3	8.6
MW-55-35	4/24/2017	**2.02E+04**	1.25E+03	**21.1**	2.7	0.4	5.6	-1.8	5.3	-8.0	17.3	7.8	12.4	0.6	6.8
MW-55-35	8/1/2017	**1.87E+04**	1.29E+03	**20.5**	3.1	-0.1	5.3	0.2	6.5	1.5	17.9	-6.6	14.7	3.6	6.1
MW-55-35	10/23/2017	**9.21E+03**	9.57E+02	**33.2**	3.3	3.3	8.1	2.3	5.6	-0.8	20.4	-3.3	14.9	2.9	7.7

Well ID	Date	2017 Laboratory Analytical Results*													
		H3 (pCi/L)		Sr-90 (pCi/L)		Cs-137 (pCi/L)		Co-60 (pCi/L)		Ni-63 (pCi/L)		Sb-125 (pCi/L)		Co-58 (pCi/L)	
		Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ
MW-55-54	1/31/2017	**4.21E+04**	1.76E+03	**12.1**	2.8	-0.8	5.5	0.5	6.1	-1.9	18.1	8.5	15.1	0.3	5.5
MW-55-54	2/20/2017	**4.57E+04**													
MW-55-54	4/24/2017	**3.65E+04**	2.15E+03	**10.2**	1.9	1.1	5.9	2.9	6.0	-8.1	16.5	-0.7	14.5	-3.8	6.8
MW-55-54	5/31/2017	**3.83E+04**													
MW-55-54	8/1/2017	**3.67E+04**	1.76E+03	**10.7**	2.3	-3.2	6.0	2.8	6.3	-6.1	16.9	-1.6	13.9	-0.7	6.6
MW-55-54	10/23/2017	**2.64E+04**	1.37E+03	**10.1**	2.5	1.5	5.5	6.8	5.5	5.7	12.0	-2.7	14.3	-0.3	6.4
MW-56-53	5/19/2017	**5.40E+02**	4.14E+02	0.8	1.3	1.4	6.6	2.3	5.9			-6.7	18.0	-1.2	8.0
MW-56-53	11/7/2017	**5.81E+02**	4.02E+02	0.1	0.2	3.2	6.8	2.0	6.4			-7.2	16.3	-0.6	8.3
MW-56-83	5/24/2017	8.47E+01	3.78E+02	1.4	1.6	3.1	5.3	-0.3	3.6			-2.9	12.7	-2.0	6.1
MW-56-83	11/9/2017	**1.81E+03**	5.10E+02	0.7	0.8	0.0	4.9	-2.4	6.0			-6.0	14.4	3.9	7.3
MW-57-11	3/20/2017	**1.42E+04**													
MW-57-11	5/15/2017	**1.13E+04**	9.90E+02	**10.0**	2.3	4.3	9.8	-0.4	3.7	-6.9	20.0	-0.7	11.3	0.0	5.8
MW-57-11	6/27/2017	**1.72E+04**													
MW-57-20	5/15/2017	**1.47E+03**	6.00E+02	1.2	1.8	2.6	5.4	1.6	5.7	2.1	16.8	3.0	25.6	-0.6	6.3
MW-57-45	5/15/2017	**1.20E+03**	5.79E+02	1.3	1.8	3.5	6.0	-1.7	6.4	3.6	17.9	-1.9	15.5	1.0	7.1
MW-58-26	5/16/2017	<MDC	4.02E+02	-0.8	1.3	-1.4	7.5	-1.8	5.4			-6.8	16.1	-5.1	6.2
MW-58-26	11/7/2017	**6.95E+02**	4.47E+02	-0.2	0.5	2.9	5.6	-0.8	5.8			-0.2	17.0	0.2	8.9
MW-58-65	5/16/2017	1.08E+02	3.81E+02	-0.3	1.3	-1.0	5.0	-2.8	5.0			-7.5	15.6	-0.5	7.0
MW-58-65	11/7/2017	3.50E+02	4.02E+02	-0.1	0.7	-0.4	4.6	0.0	5.3			8.3	11.3	3.0	7.3
MW-60-135	2/2/2017	**6.31E+02**	3.96E+02	-0.4	1.2	3.4	6.6	0.6	5.9			1.2	15.2	-1.9	7.0
MW-60-135	5/10/2017	**5.47E+02**	4.05E+02	0.6	0.9	-2.0	5.4	-2.6	7.6			-8.1	12.3	0.7	5.3
MW-60-176	2/2/2017	**9.74E+02**	4.41E+02	-0.5	1.4	-2.9	6.2	0.3	7.0			-0.5	16.9	-0.7	7.7
MW-60-176	5/10/2017	**1.05E+03**	4.50E+02	0.0	0.7	-0.8	4.2	-0.5	4.4			3.7	11.9	-0.8	5.7
MW-60-35	2/2/2017	3.86E+02	3.96E+02	-1.1	1.4	3.1	5.6	-1.8	5.3			0.7	14.2	1.4	6.2
MW-60-35	5/10/2017	2.06E+02	3.75E+02	-0.2	1.0	1.1	4.7	-0.6	6.4			1.0	12.9	2.1	5.6
MW-60-53	2/2/2017	**4.08E+02**	3.96E+02	0.3	1.2	-4.7	5.5	2.1	5.8			1.5	15.0	-0.1	6.0
MW-60-53	5/10/2017	3.18E+02	3.75E+02	0.8	1.1	3.4	6.8	1.5	7.6			-4.1	16.3	1.6	8.1
MW-60-72	2/2/2017	3.65E+02	3.87E+02	-1.0	1.2	-1.9	5.1	0.3	5.6			-1.9	13.3	-1.1	6.6
MW-60-72	5/10/2017	1.14E+02	3.63E+02	0.1	0.8	0.1	5.0	1.6	4.2			1.7	11.6	0.3	4.8
MW-62-138	2/8/2017	**1.37E+03**	5.34E+02	1.1	1.3	-1.4	6.1	-1.9	6.7			-2.2	12.9	0.4	5.3
MW-62-138	3/7/2017	**1.70E+03**													

Well ID	Date	2017 Laboratory Analytical Results*													
		H3 (pCi/L)		Sr-90 (pCi/L)		Cs-137 (pCi/L)		Co-60 (pCi/L)		Ni-63 (pCi/L)		Sb-125 (pCi/L)		Co-58 (pCi/L)	
		Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ
MW-62-138	4/27/2017	**1.36E+03**	5.70E+02	0.6	0.9	-2.9	5.4	0.6	5.0			6.5	13.8	-1.5	7.2
MW-62-138	5/30/2017	**1.30E+03**													
MW-62-138	7/26/2017	**1.44E+03**	5.46E+02	-0.5	0.8	-0.8	4.5	0.2	3.8			-2.3	10.9	1.2	5.6
MW-62-138	9/27/2017	**1.30E+03**													
MW-62-138	10/31/2017	**1.40E+03**	4.62E+02	0.3	1.2	1.2	5.6	-2.7	5.7			-6.0	11.8	1.7	6.6
MW-62-138	11/20/2017	**1.70E+03**													
MW-62-18	2/8/2017	**1.28E+03**	4.50E+02	0.0	0.9	1.4	4.5	2.0	5.3			1.9	11.7	-3.2	5.7
MW-62-18	4/27/2017	**8.94E+02**	5.19E+02	0.0	0.6	0.6	6.1	2.2	6.0			-8.6	15.7	0.5	6.8
MW-62-18	7/26/2017	**7.40E+02**	4.92E+02	0.6	1.6	0.2	4.3	1.1	3.6			2.1	10.7	1.1	5.2
MW-62-18	10/31/2017	**6.20E+02**	3.75E+02	0.6	1.1	-1.8	5.6	2.1	6.8			-5.4	13.4	-1.3	5.4
MW-62-182	2/8/2017	**1.20E+03**	5.04E+02	0.3	1.3	4.7	8.4	-2.7	5.8			-2.6	12.8	1.0	5.6
MW-62-182	4/27/2017	**1.51E+03**	5.85E+02	0.5	0.7	-0.2	6.5	1.6	6.2			0.8	16.0	-0.5	6.7
MW-62-182	7/26/2017	**1.42E+03**	5.46E+02	-0.5	0.6	0.0	3.8	0.6	4.5			2.8	11.1	-3.8	4.9
MW-62-182	10/31/2017	**1.75E+03**	4.92E+02	0.6	1.0	1.7	4.9	-2.0	4.8			4.9	14.5	2.5	6.0
MW-62-37	2/8/2017	**1.07E+03**	4.98E+02	0.8	1.4	-1.5	5.0	-2.0	5.1			-0.2	11.7	2.7	5.9
MW-62-37	4/27/2017	**1.21E+03**	4.71E+02	-0.7	0.9	-5.0	6.4	2.2	4.4	-4.1	21.3	-3.4	13.1	-2.9	5.9
MW-62-37	7/26/2017	**1.01E+03**	5.13E+02	-0.4	0.8	-0.9	3.7	0.2	4.1			1.2	7.8	-2.8	4.8
MW-62-37	10/31/2017	**9.25E+02**	4.83E+02	0.0	0.9	**11.5**	9.0	1.7	4.0			-0.9	11.5	2.0	6.1
MW-62-37	12/4/2017	**8.20E+02**	4.92E+02	0.0	0.5	-0.3	4.7	-0.4	5.0			-5.2	13.4	-1.7	5.0
MW-62-53	2/8/2017	**1.48E+03**	5.34E+02	-1.0	1.2	1.0	6.4	0.9	4.7			-4.8	17.0	0.6	7.1
MW-62-53	4/27/2017	**1.18E+03**	5.67E+02	0.1	0.6	-2.5	6.3	1.0	6.5			2.8	15.8	-2.9	9.1
MW-62-53	7/26/2017	**1.09E+03**	5.22E+02	-0.2	1.4	-3.7	5.9	-2.1	7.2			-2.8	17.5	0.4	7.5
MW-62-53	10/31/2017	**1.18E+03**	4.53E+02	-0.3	0.8	0.9	5.0	-2.0	4.9			1.8	11.4	-0.8	5.5
MW-62-71	2/8/2017	**1.61E+03**	5.49E+02	-0.9	1.0	-2.7	7.0	3.1	4.0			-8.3	14.1	-1.2	5.3
MW-62-71	4/27/2017	**1.58E+03**	6.75E+02	0.3	0.8	1.1	5.3	0.2	5.9			1.8	14.8	5.8	7.3
MW-62-71	7/26/2017	**1.36E+03**	5.46E+02	-0.3	0.7	0.2	4.9	1.5	4.9			2.4	12.7	-0.1	6.3
MW-62-71	10/31/2017	**1.44E+03**	4.71E+02	0.0	0.8	0.7	4.8	0.1	4.2			4.3	12.0	0.8	5.6
MW-62-92	2/8/2017	**1.52E+03**	5.34E+02	0.6	1.0	-0.2	5.5	1.9	5.5			-6.9	14.3	-3.3	6.7
MW-62-92	3/7/2017	**1.90E+03**													
MW-62-92	4/27/2017	**1.34E+03**	5.70E+02	-0.1	0.6	-0.1	8.1	7.9	8.7			-5.0	19.4	-3.2	9.2
MW-62-92	5/30/2017	**1.40E+03**													

Well ID	Date	2017 Laboratory Analytical Results*													
		H3 (pCi/L)		Sr-90 (pCi/L)		Cs-137 (pCi/L)		Co-60 (pCi/L)		Ni-63 (pCi/L)		Sb-125 (pCi/L)		Co-58 (pCi/L)	
		Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ
MW-62-92	7/26/2017	**1.80E+03**	5.70E+02	1.0	1.1	3.6	7.4	2.3	6.9			-3.4	16.8	-0.1	7.4
MW-62-92	9/27/2017	**2.00E+03**													
MW-62-92	10/31/2017	**1.24E+03**	4.38E+02	-0.1	0.9	1.9	4.8	-3.7	7.0			1.2	10.6	2.1	5.0
MW-62-92	11/20/2017	**1.20E+03**													
MW-63-112	5/16/2017	**9.28E+02**	5.13E+02	0.9	1.0	0.3	5.6	0.1	5.8			0.8	16.1	-0.5	7.7
MW-63-112	11/7/2017	**9.55E+02**	4.38E+02	-0.4	0.5	5.7	7.5	2.3	7.1			-3.7	16.7	-2.7	9.2
MW-63-121	5/16/2017	**7.10E+02**	4.92E+02	1.1	1.2	0.2	5.5	3.3	10.7			3.7	19.1	4.0	6.7
MW-63-121	11/7/2017	**6.18E+02**	4.11E+02	0.0	0.3	0.0	5.0	-4.6	6.6			10.4	13.8	-0.2	7.9
MW-63-163	5/16/2017	**7.69E+02**	5.04E+02	0.7	1.0	4.1	8.9	-0.5	6.1			1.4	17.3	3.8	7.8
MW-63-163	11/7/2017	**7.30E+02**	4.14E+02	-0.1	0.2	2.6	5.1	3.1	6.1			-2.9	13.0	-0.2	7.2
MW-63-174	5/16/2017	**9.65E+02**	5.10E+02	0.1	1.3	0.7	4.1	1.2	3.9			0.2	11.6	-1.0	4.7
MW-63-174	11/7/2017	**8.50E+02**	4.32E+02	-0.3	0.5	0.0	10.9	0.3	4.5			-2.9	11.6	-4.2	7.4
MW-63-18	5/16/2017	**5.31E+02**	4.77E+02	0.0	1.0	1.5	6.3	1.2	5.8			-4.4	13.8	0.4	7.1
MW-63-18	11/7/2017	**4.39E+02**	3.84E+02	-0.2	0.2	0.2	6.1	3.3	7.2			10.4	18.5	2.7	10.4
MW-63-34	5/16/2017	**5.16E+02**	4.74E+02	**1.7**	1.7	-3.6	7.0	0.3	3.7			9.0	10.7	-3.4	5.4
MW-63-34	11/7/2017	**5.33E+02**	4.05E+02	-0.4	0.5	0.0	8.6	2.0	8.0			7.5	16.1	-2.0	8.3
MW-63-50	5/16/2017	**6.92E+02**	3.78E+02	0.7	1.1	2.5	9.3	1.2	8.8			14.1	19.9	-0.4	11.2
MW-63-50	11/7/2017	**4.21E+02**	3.90E+02	0.4	0.5	-1.9	6.3	0.7	6.2			-3.0	15.5	0.9	7.8
MW-63-93	5/16/2017	**7.76E+02**	4.92E+02	0.3	1.1	0.7	11.7	4.4	5.7			3.4	12.7	1.4	6.2
MW-63-93	11/7/2017	**4.79E+02**	4.17E+02	-0.2	0.3	0.9	5.2	-2.7	5.9			4.2	11.1	-0.3	5.9
MW-66-21	2/17/2017	**1.21E+03**	4.08E+02	-0.3	1.0	0.7	4.2	-0.6	3.1	-12.9	14.6	-1.6	12.6	-0.7	3.8
MW-66-21	5/24/2017	**2.56E+03**	5.85E+02	1.5	1.8	-2.3	7.9	-0.1	4.9	-7.8	15.4	-2.8	13.4	-4.2	5.9
MW-66-21	7/27/2017	**2.19E+03**	5.91E+02	-0.3	0.7	-0.7	6.8	-1.8	5.2	-3.7	17.9	-3.6	13.4	3.3	6.4
MW-66-21	11/1/2017	**1.61E+03**	5.22E+02	0.2	1.1	0.0	14.4	0.0	3.9	1.6	16.0	-4.8	12.1	0.5	6.8
MW-66-36	1/18/2017	**9.00E+03**													
MW-66-36	2/17/2017	**9.36E+03**	8.70E+02	**7.5**	2.3	1.4	6.5	-1.3	6.8	-8.5	14.1	-2.1	15.6	2.3	7.2
MW-66-36	3/7/2017	**1.13E+04**													
MW-66-36	4/3/2017	**1.16E+04**													
MW-66-36	5/24/2017	**1.07E+04**	1.15E+03	**8.4**	2.2	-4.0	6.9	-2.1	6.7	2.8	16.7	0.9	13.7	-4.4	5.5
MW-66-36	6/28/2017	**1.23E+04**													
MW-66-36	7/27/2017	**1.28E+04**	1.10E+03	**5.4**	1.7	2.0	5.3	1.2	5.4	-4.0	18.0	-5.5	15.3	5.4	6.7

Well ID	Date	2017 Laboratory Analytical Results*													
		H3 (pCi/L)		Sr-90 (pCi/L)		Cs-137 (pCi/L)		Co-60 (pCi/L)		Ni-63 (pCi/L)		Sb-125 (pCi/L)		Co-58 (pCi/L)	
		Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ
MW-66-36	9/27/2017	**1.20E+04**													
MW-66-36	11/1/2017	**1.07E+04**	1.00E+03	**3.7**	1.5	0.8	6.3	1.8	5.7	-6.2	14.9	7.3	15.0	-1.5	6.4
MW-66-36	11/20/2017	**1.04E+04**													
MW-67-105	1/5/2017	**2.20E+03**													
MW-67-105	1/18/2017	**2.50E+03**													
MW-67-105	2/15/2017	**2.69E+03**	5.52E+02	0.9	1.7	4.0	5.8	0.9	4.9	-4.4	19.6	2.1	12.3	0.0	5.5
MW-67-105	3/7/2017	**2.80E+03**													
MW-67-105	4/3/2017	**2.70E+03**													
MW-67-105	5/3/2017	**2.42E+03**	5.46E+02	1.2	1.7	0.5	4.2	-1.1	4.4	5.8	19.8	3.2	11.0	-3.4	5.4
MW-67-105	5/30/2017	**2.20E+03**													
MW-67-105	6/28/2017	**2.40E+03**													
MW-67-105	7/27/2017	**2.23E+03**	5.79E+02	0.3	1.0	-2.4	7.5	-0.7	6.1	-0.2	14.7	7.8	15.5	2.8	6.2
MW-67-105	9/27/2017	**2.30E+03**													
MW-67-105	11/1/2017	**2.09E+03**	5.58E+02	-0.1	0.9	1.7	5.1	0.3	5.7	-2.3	18.8	4.0	10.7	0.7	4.8
MW-67-105	11/20/2017	**2.50E+03**													
MW-67-173	2/15/2017	**1.07E+03**	4.53E+02	-0.6	1.0	0.9	5.7	-1.2	6.5	16.0	19.4	-8.1	15.7	-0.3	6.7
MW-67-173	5/3/2017	**9.21E+02**	4.35E+02	0.2	0.8	0.4	5.3	-1.0	4.9	8.0	21.2	4.1	14.4	-1.2	6.2
MW-67-173	7/27/2017	**1.07E+03**	4.92E+02	-0.5	0.7	2.6	5.5	0.4	5.5	-3.0	21.5	-4.4	12.2	2.3	6.7
MW-67-173	11/1/2017	**6.06E+02**	4.50E+02	0.8	1.1	-0.3	4.1	0.4	4.5	-5.0	20.3	2.8	10.4	0.5	4.7
MW-67-219	2/15/2017	**1.43E+03**	4.80E+02	0.8	1.4	2.8	6.5	-0.5	5.8	20.6	20.2	-2.2	15.4	-1.7	6.8
MW-67-219	5/3/2017	**1.31E+03**	4.65E+02	-0.6	0.7	4.7	5.3	0.4	6.0	5.0	20.1	-1.7	13.0	-0.6	4.8
MW-67-219	7/27/2017	**1.25E+03**	4.95E+02	-0.1	1.1	3.8	5.3	2.0	6.1	-1.1	14.1	7.6	16.4	-2.3	8.8
MW-67-219	11/1/2017	**1.03E+03**	4.89E+02	0.2	1.1	4.6	13.7	2.9	5.5	3.6	12.3	1.1	13.9	-0.9	4.7
MW-67-276	1/5/2017	**8.00E+02**													
MW-67-276	1/18/2017	**8.00E+02**													
MW-67-276	2/15/2017	**9.60E+02**	4.44E+02	-0.4	0.7	3.4	6.5	0.2	6.7	5.0	20.1	-7.3	17.8	-2.3	5.9
MW-67-276	3/7/2017	**1.60E+03**													
MW-67-276	4/3/2017	**9.00E+02**													
MW-67-276	5/3/2017	**8.12E+02**	4.11E+02	0.0	0.6	-1.4	7.0	0.3	4.2	-0.5	19.0	-1.2	11.6	0.0	5.4
MW-67-276	5/30/2017	**8.00E+02**													
MW-67-276	6/28/2017	**9.00E+02**													

Well ID	Date	2017 Laboratory Analytical Results*													
		H3 (pCi/L)		Sr-90 (pCi/L)		Cs-137 (pCi/L)		Co-60 (pCi/L)		Ni-63 (pCi/L)		Sb-125 (pCi/L)		Co-58 (pCi/L)	
		Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ
MW-67-276	7/27/2017	**8.74E+02**	4.74E+02	-0.3	1.0	0.4	5.3	2.5	4.5	1.4	16.4	2.4	11.3	2.8	6.0
MW-67-276	9/27/2017	**7.00E+02**													
MW-67-276	11/1/2017	**7.06E+02**	3.87E+02	-0.5	1.1	0.8	5.8	3.7	6.9	-0.6	12.9	0.8	14.4	0.0	7.0
MW-67-276	11/20/2017	**6.00E+02**													
MW-67-340	2/15/2017	**4.40E+02**	3.99E+02	0.9	1.6	-1.6	6.8	-0.4	7.6	2.4	16.6	14.9	19.9	-3.9	7.3
MW-67-340	5/3/2017	**3.70E+02**	3.45E+02	0.1	0.8	2.6	4.5	0.9	5.1	-2.0	14.5	-1.9	10.4	-0.6	5.1
MW-67-340	7/27/2017	3.73E+02	4.26E+02	0.2	0.9	0.1	4.9	0.3	5.0	-0.4	12.2	-6.1	12.3	-3.3	6.1
MW-67-340	11/1/2017	1.91E+02	4.08E+02	-0.2	0.9	-2.8	5.6	0.3	5.6	-1.1	11.1	-0.4	11.9	3.5	5.5
MW-67-39	1/5/2017	**1.61E+04**													
MW-67-39	1/18/2017	**1.56E+04**													
MW-67-39	2/15/2017	**1.45E+04**	1.06E+03	**7.4**	2.5	2.9	6.2	0.9	6.3	1.0	20.7	6.0	13.1	1.3	6.4
MW-67-39	3/7/2017	**1.46E+04**													
MW-67-39	4/3/2017	**1.51E+04**													
MW-67-39	5/3/2017	**1.36E+04**	1.10E+03	**5.7**	1.6	-0.7	6.3	1.3	6.3	-0.8	18.7	-5.0	17.2	2.4	7.0
MW-67-39	5/30/2017	**1.32E+04**													
MW-67-39	6/28/2017	**1.37E+04**													
MW-67-39	7/27/2017	**1.12E+04**	1.02E+03	**3.7**	1.6	4.5	4.7	-1.2	5.9	-1.0	15.8	-5.4	14.6	-1.9	5.6
MW-67-39	9/27/2017	**1.12E+04**													
MW-67-39	11/1/2017	**8.09E+03**	8.79E+02	**7.4**	2.3	1.5	6.0	-0.5	5.8	2.8	13.2	-0.5	15.7	-1.1	7.3
MW-67-39	11/20/2017	**9.10E+03**													
MW-68-103	2/1/2017	**9.26E+02**	4.47E+02	-0.4	1.3	0.0	9.8	-0.6	7.1			6.1	14.6	-2.1	8.2
MW-68-103	4/4/2017	**9.56E+02**	4.26E+02	-0.1	0.7	-2.1	5.7	-2.8	5.5			4.0	13.5	1.1	8.2
MW-68-103	6/1/2017	**6.00E+02**													
MW-68-103	7/25/2017	**8.76E+02**	4.74E+02	0.7	1.2	1.3	5.4	-2.7	7.4			4.9	14.7	-1.3	7.9
MW-68-103	11/6/2017	**7.52E+02**	4.29E+02	0.1	0.2	0.0	20.6	0.9	6.0			-1.2	15.3	-0.6	7.7
MW-68-132	2/1/2017	**5.92E+02**	4.17E+02	-0.7	1.2	2.8	4.8	0.7	6.4			2.0	11.0	-2.5	5.6
MW-68-132	4/4/2017	**5.84E+02**	3.81E+02	0.5	1.4	-1.3	6.7	-0.8	6.3			-1.8	19.8	1.5	10.3
MW-68-132	6/1/2017	<MDC													
MW-68-132	7/25/2017	**5.65E+02**	4.47E+02	0.1	0.7	-2.4	5.7	-1.0	6.8			4.8	14.4	0.7	6.7
MW-68-132	11/6/2017	**4.62E+02**	4.08E+02	0.0	0.2	4.8	7.5	0.9	7.9			-12.3	20.7	-2.8	11.1
MW-68-19	2/1/2017	**1.26E+03**	4.74E+02	0.8	1.4	3.5	5.6	0.3	4.6			-5.3	13.4	0.1	6.0

Well ID	Date	2017 Laboratory Analytical Results*													
		H3 (pCi/L)		Sr-90 (pCi/L)		Cs-137 (pCi/L)		Co-60 (pCi/L)		Ni-63 (pCi/L)		Sb-125 (pCi/L)		Co-58 (pCi/L)	
		Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ
MW-68-19	4/4/2017	**9.16E+02**	4.08E+02	-0.9	1.5	-0.4	8.3	2.3	4.3			-5.4	12.7	-2.4	9.0
MW-68-19	6/1/2017	**1.20E+03**													
MW-68-19	6/19/2017	**1.20E+03**													
MW-68-19	7/25/2017	**1.32E+03**	5.07E+02	-0.4	1.3	4.2	6.0	0.3	6.4			-3.7	13.7	-0.7	6.8
MW-68-19	8/30/2017	**1.30E+03**													
MW-68-19	11/6/2017	**1.10E+03**	4.59E+02	-0.3	0.6	0.1	5.9	-1.4	6.7			1.0	14.4	-3.1	8.6
MW-68-29	2/1/2017	**1.05E+03**	4.53E+02	-0.1	1.4	-0.6	5.7	0.6	5.1			4.1	14.6	0.0	6.7
MW-68-29	4/4/2017	**1.02E+03**	4.20E+02	0.8	1.0	0.7	6.1	-0.5	5.6			6.0	13.8	-1.6	9.6
MW-68-29	6/1/2017	**8.00E+02**													
MW-68-29	6/19/2017	**8.00E+02**													
MW-68-29	7/25/2017	**1.10E+03**	4.89E+02	0.8	1.8	0.4	10.3	-0.4	4.5			-4.7	12.6	-1.1	5.9
MW-68-29	8/30/2017	**1.10E+03**													
MW-68-29	11/6/2017	**1.28E+03**	4.53E+02	-0.4	0.5	-0.7	6.2	2.7	6.4			-2.6	16.3	-2.5	8.0
MW-68-57	2/1/2017	**8.32E+02**	4.26E+02	0.9	1.4	-0.6	5.7	1.3	4.4			-2.2	11.2	2.0	6.1
MW-68-57	4/4/2017	**9.52E+02**	4.14E+02	0.9	1.3	2.8	6.2	-0.7	6.8			-5.5	19.4	-8.3	11.1
MW-68-57	6/1/2017	**9.00E+02**													
MW-68-57	7/25/2017	**9.41E+02**	4.77E+02	1.2	1.4	0.2	6.1	9.2	9.0			0.6	16.6	0.8	7.2
MW-68-57	11/6/2017	**7.90E+02**	4.38E+02	0.1	0.2	-2.6	4.8	3.7	4.9			-3.8	12.0	-2.5	6.3
U1-CSS	5/15/2017	**4.25E+03**	6.84E+02	**6.0**	2.1	-0.7	5.9	4.1	7.8	11.0	18.4	-12.6	13.8	-3.6	5.9
U1-CSS	10/24/2017	**8.99E+03**	9.39E+02	**9.0**	2.4	3.0	9.0	0.4	4.8	-2.6	14.3	-5.8	12.5	-1.0	5.9
U1-NCD	3/6/2017	**2.87E+04**	1.70E+03	**62.8**	4.4	**32600.0**	225.9	0.9	4.7	**705.0**	35.7	25.6	88.2	-2.6	5.2
U1-NCD	5/29/2017	**1.84E+04**	1.22E+03	**23.5**	3.8	**17300.0**	192.0	5.9	5.8	**356.0**	33.9	11.9	93.6	-3.6	5.8
U1-NCD	8/21/2017	**1.96E+04**	1.89E+03	**42.0**	5.7	**20900.0**	213.6	4.2	5.0	**399.0**	38.1	-21.9	83.7	1.3	6.6
U1-NCD	11/22/2017	**3.84E+04**	1.78E+03	**26.6**	3.8	**17000.0**	233.4	2.2	4.2	**313.0**	30.0	-21.9	97.5	-2.0	7.8
U1-SFDS	3/8/2017	**5.82E+02**	3.78E+02	**4.0**	2.2	7.2	10.2	-1.5	7.1	-6.1	17.2	2.2	17.4	6.4	6.0
U1-SFDS	5/31/2017	**5.11E+02**	4.05E+02	**4.6**	1.8	4.6	8.5	0.1	5.4	12.2	20.3	-1.1	13.0	2.5	4.6
U1-SFDS	8/23/2017	3.13E+02	4.23E+02	**4.1**	1.8	6.2	6.5	1.9	5.4	6.7	19.6	0.6	13.8	0.7	6.5
U1-SFDS	11/15/2017	**4.55E+02**	4.14E+02	**5.1**	0.5	0.0	12.9	1.1	5.9			-1.1	14.9	-3.5	7.2
U3-4D	2/7/2017	**6.39E+02**	4.32E+02	-0.7	1.4	-0.8	6.5	0.4	5.6			-2.3	15.6	2.1	6.9
U3-4D	5/22/2017	1.56E+02	3.81E+02	0.8	1.2	1.3	5.4	-2.9	6.2			0.7	14.6	1.9	6.6
U3-4D	8/3/2017	3.38E+02	4.38E+02	0.7	1.7	3.4	7.2	0.7	3.7			-3.1	11.5	1.3	4.5

Well ID	Date	2017 Laboratory Analytical Results*													
		H3 (pCi/L)		Sr-90 (pCi/L)		Cs-137 (pCi/L)		Co-60 (pCi/L)		Ni-63 (pCi/L)		Sb-125 (pCi/L)		Co-58 (pCi/L)	
		Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ
U3-4D	11/2/2017	3.27E+02	4.50E+02	0.4	0.7	-0.3	6.2	1.7	6.3			8.9	17.2	0.1	7.7
U3-4S	5/22/2017	8.26E+01	3.78E+02	0.6	1.1	0.5	6.2	0.2	7.4			7.8	15.8	-1.4	6.7
U3-4S	11/2/2017	3.41E+02	4.35E+02	0.2	0.2	-0.9	5.7	0.0	5.5			-4.1	15.3	-2.5	9.5
U3-T1	2/7/2017	2.25E+02	3.51E+02	0.2	1.2	-1.5	5.6	2.0	5.0			-0.3	13.8	-0.9	5.7
U3-T1	5/22/2017	**5.19E+02**	4.26E+02	1.6	1.8	-3.1	7.3	-0.8	5.2			0.4	12.2	3.1	5.6
U3-T1	7/28/2017	**7.91E+02**	4.62E+02	0.3	1.1	2.0	4.6	-2.5	5.0			-0.2	13.6	0.7	5.2
U3-T1	11/2/2017	**5.34E+02**	4.38E+02	0.0	0.2	1.6	4.8	2.0	4.6			-6.4	13.1	0.0	8.1
U3-T2	2/7/2017	**9.97E+02**	4.53E+02	1.6	1.8	2.2	6.0	3.4	6.5			-7.9	14.9	-0.1	7.1
U3-T2	5/22/2017	**1.82E+03**	5.22E+02	0.3	0.9	-0.9	4.0	-1.3	5.5			-0.3	13.4	0.7	6.0
U3-T2	7/28/2017	**1.57E+03**	5.25E+02	0.1	0.7	-1.6	5.0	1.0	5.1			-5.2	11.2	1.4	5.9
U3-T2	11/2/2017	**1.20E+03**	5.19E+02	-0.1	0.2	1.8	5.7	0.6	6.0			10.8	15.1	-3.3	8.4

* Positive results are in bold.

** <MDC - Minimum Detectable Activity, these were non-positive values. H-3 positive results without any 3σ value or values <MDC were extra analyses performed onsite.

Indian Point Energy Center
(Units 1, 2, and 3)

RADIOACTIVE EFFLUENT REPORT

I. Addenda

Errata for Previous Reports

ADDENDA

Summary

2016 ARERR Errata

Page 48 of the 2016 Indian Point Unit 3 Radiological Impact on Man table was missing the top two rows for Liquid Doses. The table has been resubmitted with the top two rows included on page 69 of this report.

Page 55 of the 2016 Indian Point Groundwater Monitoring Program Summary of Results was missing data for Well ID MH-5 VCFD dated 3/31/2016. The table has been resubmitted with the missing data included on page 70 of this report.

Page 48 of the 2016 Indian Point ARERR

INDIAN POINT 3 NUCLEAR POWER PLANT
RADIOLOGICAL IMPACT ON MAN
JANUARY - DECEMBER 2016

Maximum exposed individual doses in mrem or mrad

A. LIQUID DOSES

		Qtr 1	Qtr 2	Qtr 3	Qtr 4	ANNUAL
Organ Dose	(mrem)	1.23E-05	3.29E-04	7.07E-05	1.26E-04	**4.98E-04**
Applicable Limit	(mrem)	5	5	5	5	10
Percent of Limit	(%)	2.46E-04	6.58E-03	1.41E-03	2.52E-03	4.98E-03
Age Group		Child	Adult	Child	Child	Child
Critical Organ		Bone	GiLLi	Bone	Bone	Bone

Adult Total Body	(mrem)	2.66E-05	1.11E-04	1.12E-05	3.50E-05	**1.55E-04**
Applicable Limit	(mrem)	1.5	1.5	1.5	1.5	3.0
Percent of Limit	(%)	1.77E-03	7.40E-03	7.47E-04	2.33E-03	5.17E-03

B. AIRBORNE NOBLE GAS DOSES

		Qtr 1	Qtr 2	Qtr 3	Qtr 4	ANNUAL
Gamma Air	(mrad)	1.50E-05	1.64E-05	1.87E-05	1.78E-05	**6.79E-05**
Applicable Limit	(mrad)	5	5	5	5	10
Percent of Limit	(%)	3.00E-04	3.28E-04	3.74E-04	3.56E-04	6.79E-04

Beta Air	(mrad)	1.77E-05	1.96E-05	2.38E-05	2.25E-05	**8.36E-05**
Applicable Limit	(mrad)	10	10	10	10	20
Percent of Limit	(%)	1.77E-04	1.96E-04	2.38E-04	2.25E-04	4.18E-04

C. AIRBORNE IODINE, PARTICULATE, & TRITIUM DOSES (excluding C-14, for info only)

		Qtr 1	Qtr 2	Qtr 3	Qtr 4	ANNUAL
Iodine/Part	(mrem)	5.96E-04	7.59E-04	7.76E-04	4.96E-04	**2.63E-03**
Applicable Limit	(mrem)	7.5	7.5	7.5	7.5	15
Percent of Limit	(%)	7.95E-03	1.01E-02	1.03E-02	6.61E-03	1.75E-02
Age Group		Child	Child	Child	Child	Child
Critical Organ		Liver	Liver	Liver	Liver	Liver

D. AIRBORNE IODINE, PARTICULATE, TRITIUM, and CARBON-14 DOSES

Child TB Dose	(mrem)	1.74E-02	1.76E-02	1.76E-02	1.73E-02	**7.00E-02**
Applicable Limit	(mrem)	7.5	7.5	7.5	7.5	15
Percent of Limit	(%)	2.33E-01	2.35E-01	2.35E-01	2.31E-01	4.67E-01
		Qtr 1	Qtr 2	Qtr 3	Qtr 4	ANNUAL
Child Bone Dose	(mrem)	8.45E-02	8.45E-02	8.45E-02	8.45E-02	**3.38E-01**
Applicable Limit	(mrem)	7.5	7.5	7.5	7.5	15
Percent of Limit	(%)	1.13E+00	1.13E+00	1.13E+00	1.13E+00	2.25E+00

Page 55 of the 2016 Indian Point ARERR

INDIAN POINT RADIOLOGICAL GROUNDWATER

MONITORING PROGRAM

Summary of Results

Well ID	Date	2016 Laboratory Analytical Results													
		H3 (pCi/L)		Sr-90 (pCi/L)		Cs-137 (pCi/L)		Co-60 (pCi/L)		Ni-63 (pCi/L)		Sb-125 (pCi/L)		Co-58 (pCi/L)	
		Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ	Result	3 σ
B-6	3/18/2016	3.68E+02	4.35E+02	0.6	1.2	0.0	5.0	1.6	5.3			-6.4	12.6	2.5	5.3
B-6	6/1/2016	9.52E+01	3.30E+02	-0.2	1.1	-0.1	6.1	-3.5	9.3			-0.9	16.7	-3.4	6.3
B-6	8/11/2016	1.15E+02	3.09E+02	-0.9	1.3	19.6	10.9	2.3	3.6			-2.3	9.9	0.8	4.8
B-6	10/24/2016	8.84E+01	3.54E+02	0.4	1.1	-0.8	4.8	-1.4	4.3			4.5	12.3	0.2	5.6
I-2	3/14/2016	1.78E+02	3.86E+02	0.5	1.2	-0.2	5.9	-1.9	5.9			-0.2	15.2	3.1	6.2
I-2	6/22/2016	<1.77E+01	4.14E+02	1.3	1.5	0.3	6.0	-3.0	8.8			8.6	16.4	-1.4	8.6
I-2	8/10/2016	8.30E+01	3.18E+02	-0.2	0.5	2.3	5.1	3.8	5.1			0.1	12.7	-0.9	5.3
I-2	9/19/2016	1.03E+02	3.81E+02	-0.4	1.1	0.6	5.2	1.8	5.0			-3.5	11.2	2.3	5.7
I-2	11/8/2016	7.65E+01	3.36E+02	0.3	0.8	2.5	4.8	-0.7	6.2			2.8	12.3	0.4	5.1
MH-5 VCFD	1/6/2016	1.91E+03													
MH-5 VCFD	1/20/2016	2.42E+03	8.10E+02	0.2	1.1	0.3	4.7	1.7	2.1			-2.9	12.7	0.6	5.1
MH-5 VCFD	1/29/2016	1.44E+05	4.77E+03	-0.1	1.0	0.4	4.3	3.9	4.1			25.5	19.1	-2.0	4.4
MH-5 VCFD	2/5/2016	2.44E+05	7.26E+03	-0.4	0.8	0.9	6.8	1.7	6.8			54.5	24.8	0.8	6.0
MH-5 VCFD	2/9/2016	7.60E+04	3.81E+03	-0.6	1.3	-1.1	6.6	0.3	5.7			36.3	27.5	0.3	5.9
MH-5 VCFD	2/11/2016	3.98E+04	2.70E+03	-1.1	1.3	3.0	7.2	-1.8	5.6			30.4	29.3	1.3	6.4
MH-5 VCFD	2/15/2016	1.37E+04	9.93E+02	1.7	1.8	0.2	5.6	2.4	3.5			6.5	16.0	-0.8	6.0
MH-5 VCFD	2/18/2016	1.17E+05	3.21E+03	-0.4	1.5	1.6	7.9	0.1	5.7			48.5	20.2	-1.2	6.9
MH-5 VCFD	2/22/2016	1.81E+04	1.01E+03	-0.4	1.5	0.5	8.6	-3.6	6.9			0.0	22.0	-2.5	7.0
MH-5 VCFD	2/25/2016	1.66E+05	1.23E+04	0.0	1.0	-4.5	5.8	0.0	5.7			115.0	37.2	2.0	6.0
MH-5 VCFD	3/1/2016	1.89E+05	4.18E+03	0.2	1.3	-1.2	6.9	2.9	6.7			84.8	45.9	5.8	8.2
MH-5 VCFD	3/3/2016	2.26E+05	4.50E+03	-0.1	1.4	-1.5	4.7	-0.8	5.9			106.0	30.0	0.0	6.2
MH-5 VCFD	3/7/2016	7.01E+04	7.17E+03	-0.4	1.5	1.6	6.8	2.8	7.2			39.6	28.6	0.3	6.9
MH-5 VCFD	3/10/2016	3.05E+04	5.28E+03	-0.5	1.6	0.9	6.4	3.8	8.3			19.8	33.9	3.6	6.3
MH-5 VCFD	3/14/2016	1.99E+04	1.26E+03	-0.7	1.3	2.0	6.8	-1.9	6.6			0.0	25.4	-4.4	7.7
MH-5 VCFD	3/17/2016	1.86E+04	1.26E+03	0.4	1.3	3.0	7.1	2.0	6.2			55.6	24.8	-0.2	8.2
MH-5 VCFD	3/21/2016	1.10E+04	9.90E+02	0.1	1.1	0.0	5.5	2.3	5.5			54.7	24.7	-0.6	4.7
MH-5 VCFD	3/28/2016	2.33E+03	5.16E+02	-0.4	1.2	-3.1	9.1	0.5	6.9			11.3	19.7	0.6	7.1
MH-5 VCFD	3/31/2016	1.68E+04	4.56E+02	-0.3	0.9	1.7	10.1	-1.8	6.4			4.2	20.2	-2.9	6.1
MH-5 VCFD	4/4/2016	8.49E+02	5.52E+02	0.3	1.3	1.7	4.9	-0.8	4.6			10.4	14.4	0.3	5.5
MH-5 VCFD	4/7/2016	8.14E+02	3.81E+02	0.0	1.2	-0.1	5.0	-5.5	6.2			7.2	17.2	3.0	5.9