2017 Plant Operating History

Palisades Nuclear Plant (PNP) entered the reporting period online on January 1, 2017, at 100% full power. PNP experienced no unexpected scrams during the 2017 calendar year. PNP entered into a maintenance outage on 03/17/2017 to repair a control rod drive mechanism seal. PNP increased to 70% power by 03/27/2017 and remained at approximately that power until the scheduled refueling outage on 04/23/2017. PNP increased to full power by 05/26/2017 and remained at full power for the remainder of the calendar year.

The unit generated 6,097,497.05 MWHrs of net electrical energy during 2017.

A. Gaseous Effluents

Tables 1A, "2017 Gaseous Effluents – Summation of All Releases," 1B, "2017 Gaseous Effluents – Ground-Level Release – Batch Mode," and 1C, "2017 Gaseous Effluents – Ground-Level Release – Continuous Mode," list and summarize gaseous effluents released during this reporting period.

B. Liquid Effluents

Tables 2A, "2017 Liquid Effluents – Summation of All Releases," 2B, "2017 Liquid Effluents – Batch Mode," and 2C, "2017 Liquid Effluents – Continuous Mode," list and summarize liquid effluents released during this reporting period.

C. Solid Waste Storage and Shipments

Table 3, "2017 Solid Waste and Irradiated Fuel Shipments," summarizes solid radioactive waste shipped for processing or burial in 2017 for the following waste streams: resins, filters and evaporator bottoms, dry active waste, irradiated components and other waste.

D. Dose Assessments

Table 4, "2017 Dose Assessments, 10 CFR Part 50, Appendix I," and 5, "2017 EPA 40 CFR Part 190, Individual in the Unrestricted Area," lists annual dose to the members of the public.

E. Supplemental Information

1. Regulatory Limits

a. Noble Gases

The air dose in unrestricted areas due to noble gas released in gaseous effluents shall be limited to the following:

• During the calendar quarter, to ≤ 5 mrad for gamma radiation and ≤ 10 mrad for beta radiation
• During the calendar year, to ≤ 10 mrad gamma radiation and ≤ 20 mrad for beta radiation

b. Iodines – Particulates

The dose to a member of the public from radioiodines, radioactive material in particulate form with half-lives greater than eight days, and radionuclides other than noble gas, e.g., tritium, in gaseous effluents released to unrestricted areas shall be limited to the following:

• During any calendar quarter, to ≤ 7.5 mrem to any organ
• During any calendar year, to ≤ 15 mrem to any organ

c. Liquid Effluents

The dose or dose commitment to an individual from radioactive material in liquid effluents released to unrestricted areas shall be limited to the following:

• During any calendar quarter to ≤ 1.5 mrem to the total body and ≤ 5 mrem to any organ
• During any calendar quarter to ≤ 3 mrem to the total body and ≤ 10 mrem to any organ

d. Total Dose

The dose or dose commitment to a real individual from all uranium fuel cycle sources is limited to ≤ 25 mrem to the total body or any organ (except the thyroid, which is limited to ≤ 75 mrem) over a period of 12 consecutive months.

2. Maximum Permissible Concentrations (Effluent Concentration Limits)

a. Gaseous Effluents

The dose rate due to radioactive material released in gaseous effluents from the site shall be limited to the following:

• For noble gases: ≤ 500 mrem/yr to the total body and ≤ 3000 mrem/yr to the skin

• For all radioiodines and for all radioactive materials in particulate form with half-lives greater than eight days and for radionuclides other than noble gases: ≤ 1500 mrem/yr to any organ

The above limits are provided to ensure that radioactive material discharged in gaseous effluents will not result in the exposure of an individual in an unrestricted area to annual average concentrations exceeding the limits of 10 CFR 20, Appendix B, Table 2, Column 1.

b. Liquid Effluents

The concentration of radioactive material released at any time from the site to unrestricted areas shall be limited to 10 times the concentrations specified in 10 CFR 20, Appendix B, Table 2, Column 2, for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2E-4 µCi/ml total activity.

3. Average Energy

The average energy ($\bar{E}$) of the radionuclide mixture in releases of fission and activation gases as defined in Regulatory Guide 1.21, Appendix B, Section A.3 is not applicable because the limits used for gaseous releases are based on calculated dose to members of the public.

4. Measurements and Approximations of Total Radioactivity

PNP uses 0.25 keV per channel with a range of 0-2000 keV.

a. Fission and activation gases are sampled and then analyzed on an 8192 channel analyzer with a high purity germanium (HpGe) detector.

b. Iodines are sampled and then analyzed on an 8192 channel analyzer with an HpGe detector.

c. Particulates are sampled and then analyzed on an 8192 channel analyzer with an HpGe detector.

d. Liquid effluents are sampled and then analyzed on an 8192 channel analyzer with an HpGe detector. Tritium analysis is performed using liquid scintillation. Gross Alpha, Gross Beta, Fe-55, Ni-63, Sr-89, and Sr-90 analyses are performed by an offsite vendor.

5. Batch Releases – 2017

For PNP, these totals are not directly proportional to actual release volumes due to PNP having two sets of tanks with different volumes in both the gaseous and liquid release systems. The number of batches performed in this section will fluctuate yearly and quarterly due to the utilization of the smaller and larger tanks. During the first and second quarter of 2017 smaller tanks were used for the batch releases and during the third and fourth quarter larger tanks were used.

Information regarding total activity released is quantified in the Table 1A, 1B, 1C, 2A, 2B, and 2C. Reporting average stream flow during periods of release of effluent into a flowing stream is not required as PNP's releases are made into Lake Michigan, and not a flowing stream of water.

a. Liquid

Number of batch releases for each quarter:
- 51 in the 1st quarter
- 47 in the 2nd quarter
- 1 in the 3rd quarter
- 1 in the 4th quarter

Total time period for batch releases: 13,330 minutes

Maximum time period for a batch release: 737 minutes

Average time period for a batch release: 133.3 minutes

Minimum time period for a batch release: 46 minutes

b. Gaseous

Number of batch releases for each quarter:
- 10 in the 1st quarter
- 13 in the 2nd quarter
- 5 in the 3rd quarter
- 2 in the 4th quarter

Total time period for batch releases: 40817 minutes

Maximum time period for a batch release: 30770 minutes

Average time period for a batch release: 1361 minutes

Minimum time period for a batch release: 51 minutes

6. Abnormal Discharges

a. Liquid

Number of releases for each quarter

1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1	1	0	0

Total activity released in Curies (Ci)

1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
3.10E-03	1.80E-03	0	0

There was one abnormal discharge in 2017 that spanned portions of both the first and second calendar quarters.

PNP demonstrates compliance with NRC bulletin 80-10, "Contamination of non-radioactive system and resulting potential for unmonitored, uncontrolled release of radioactivity to environment," by sampling a variety of non-radiological systems for radiological material. The intent of this sampling program is to be proactive in identifying cross contamination between different systems.

A water sample from PNP septic system on 05/09/2017 contained low levels (1,010 pCi/L) of tritium. The sample was promptly re-analyzed and the first analysis was confirmed as correct. On 06/02/2017 the water from PNP septic system was re-sampled and tritium was not detected. Tritium was not detected in PNP septic system for the remainder of 2017.

The septic system sampled discharges into a drain field just north of PNP. The hydrological characteristics of this area indicate that the tritium would migrate to Lake Michigan.

Although tritium concentrations were well below permissible effluent concentrations limits, drinking water limits, and non-drinking water limits, this was considered an "abnormal release" because it was an unplanned release.

It was calculated that a maximum of 3.10E-03 Curies of tritium was released in the first quarter and 1.80E-03 Curies of tritium was released in the second quarter via this release. The projected dose consequence from this release is 3.69E-09 mrem total body and 3.69E-09 mrem organ dose. This is 2.46E-07% and 7.38E-08% of the 10 CFR Part 50, Appendix I offsite dose limit.

b. Gaseous

None.

7. Controlled Discharge

a. Liquid

None.

b. Gaseous

None.

8. Radioactive Waste Treatment System Changes

None.

9. Annual Land Use Census Changes

The garden critical receptor is located in the SSE sector at 0.70 miles. The residence critical receptor for atmospheric dispersion is located in the S sector at 0.51 miles and for atmospheric deposition is located in the SSE sector at 0.80 miles. The goat critical receptor is in the NE sector at 2.45 miles. The beef cattle critical receptor is located in the ESE sector at 2.04 miles. There are no dairy cows located within five miles of the plant.

10. Effluent Monitoring System Inoperability

Five of the Radiological Effluent Monitors described in the Offsite Dose Calculation Manual (ODCM) were inoperable for greater than 30 consecutive days. These monitors include RIA-1113, "Waste Gas Discharge Process Monitor," RIA-2326, "Normal Range Noble Gas Stack Monitor," RIA-2325, "Iodine and Particulate Stack Monitor," RIA-2327, "High Range Noble Gas Stack Monitor," and RIA-0707, "Steam Generator Blowdown Effluent Monitor".

PNP declared RIA-1113, "Waste Gas Discharge Process Monitor" as "not functional" on 11/07/2017 due to the instrument behaving erratically. The instrument was repaired and returned to service on 12/14/2017. The delay in restoring the instrument was due to problems with the readout monitor, problems with the detection element, and time for ordering a new detection element from the vendor. Through troubleshooting it was identified that both the readout monitor and the detection element were not functioning properly.

The three radiological monitors RIA-2326, "Normal Range Noble Gas Stack Monitor," RIA-2325, "Iodine and Particulate Stack Monitor," and RIA-2327, "High Range Noble Gas Stack Monitor," perform real time radiological monitoring on the main gaseous discharge point at PNP. All three monitors are part of the Radiological Gaseous Effluent Monitoring System (RGEM), a custom built instrument. This entire system was replaced with a new system during which time

the radiation monitors were not functional. The replacement project began on 12/05/2016 and ended on 04/10/2017.

Radiation monitor RIA-0707, "Steam generator blowdown effluent monitor," was non-functional from 12/07/2017 to 01/12/2018 due to communication problems between the sample stream flow element and control room alarms. Upon troubleshooting it was identified that a relay socket base needed to be replaced and a probe was loose at the flowmeter. The delay in restoring functionality in a timelier manner was in part due to ordering and obtaining the relay socket base replacement.

11. Offsite Dose Calculation Manual (ODCM) Changes

The Offsite Dose Calculation Manual (ODCM) was revised two times in 2017. The General Manager of Plant Operations approved changes to the ODCM as required per site technical specifications. These two revisions are revision number 28 and 29. Revision 28 was implemented on 10/31/2017 and Revision 29 was implemented on 12/18/2017. Revision 28 changed an environmental lower limit of detection value, incorporated equipment identification numbers, and corrected minor typographical errors. Revision 29 changed two environmental lower limit of detection values, included additional technical information for the change into the ODCM, and revised atmospheric dispersion and deposition constants in accordance with the recent land use census.

A copy of the ODCM revision 28 and revision 29 are provided in Enclosure 1.

12. Process Control Program Changes

The following list summarizes changes made during 2017 to various procedures related to the Process Control Program (PCP). The changes did not have an impact on PNP ODCM.

EN-RW-102, "Radioactive Shipping Procedure," Rev.15 and Rev 16:

The purpose of revision 15 was to add instruction for contacting American Nuclear Institute in the event of off-normal shipment of Radioactive Materials (CR-HQN-2016-00874) and to add an option for use of type B(U) and B(M) packaging (CR-HQN-2016-00869).

- Step 2.0[16]: added reference to ANI Guideline 15-02, "Transportation of Radioactive Materials"
- Step 3.0[5]: added definition for Special Shipment (from ANI 15-02)
- Step 5.1[14] and preceding Note: added step for advance notification of ANI of Special Shipments
- Step 5.2[16]: revised Flow Chart 1 and Flow Chart 2 to reflect contacting ANI for Special Shipments

- Section 8.0: updated commitment number per Grand Gulf Nuclear Station (GGNS) Commitment Review.
- Attachment 9.2, step 4: added item for Type B(U) or B(M) packaging; added "Excl Use SCO" to 5th bullet item.

The purpose of revision 16 was to remove GGNS section 8.0 items that are not commitments. This revision is non-editorial for GGNS and editorial for the rest of the fleet.

- Deleted GGNS line items from section 8.0 that are not actually commitments.

EN-RW-108, "Radioactive Shipment Accident Response," Rev.3:

The purpose of this revision was to address the issue identified in CR-HQN-2016-00530 and CR-HQN-2016-00873 regarding contacting ANI.

- Step 2.0[9]: added reference to ANI Information Bulletin 11-01, "Emergency Notification Procedures For ANI Policyholders"
- Step 2.0[10]: added reference to ANI Guideline 15-02
- Step 5.4[1]: simplified step for contacting Licensing
- Step 5.4[2]: added step addressing how to contact ANI

13. Errata/Corrections to Previous Reports

Small errors in the 2016 Annual Effluent Release Report (ARERR) were identified during 2017. All errors in the 2016 ARERR were defined as "small errors" per the Regulatory Guide 1.21 Revision 2 definition. Enclosure 2 contains the corrected pages for the 2016 ARERR. All data that was changed is marked with vertical revision bars on the right side of the page. Changes include the addition of all 2016 groundwater monitoring data into the report, a footnote describing the asterisks in table 2C, the correction to the concentration limit of liquid effluents via Palisades' effluents discharge, changing ".48 miles" to "0.48 miles" in the land use census description section, the C-14 "% of limit" in Table 1A being corrected (from fraction of limit to percentage of the limit), and the removal of an asterisk from Tc-99m isotope in Table 2B.

14. Other

Estimations in Effluent Monitoring

PNP continuously samples the stack effluent pathway for particulates using a sample assembly fitted with a particulate filter paper. Once weekly the filter paper is replaced and analyzed. On 08/09/2017 while the filter paper was being collected it was observed that the filter paper was not covering the entire flow pathway. This is adverse to quality because some of the sample stream could have traveled around (not through) the filter paper.

Guidance for estimating particulate effluent for this type of event is provided in Regulatory Guide 1.21 Revision 1 Appendix A Section A.3.a. The estimation performed is in accordance with this guidance. The estimation was performed by analyzing the filter paper for three times longer than normal. When this was done, very low activity of Zr-95 was detected. The concentration of Zr-95 assumed to be present was an average of the minimum detectable Zr-95 activity from the week prior and the following week from this event. The minimum detectable activity was used because no Zr-95 was detected prior to or after this event. The total curie effluent and dose consequence from this estimation was minor (i.e. less than 1% of total dose consequence and less than 1% of total effluent activity).

There was a delay in gross alpha analysis for the October 2017 monthly liquid radiological waste analysis due to the incorrect analysis being requested. Upon discovery of the error the correct analysis was performed. Typically the analysis is performed approximately 40 days after the end of the month. For the October 2017 sample the analysis was performed 140 days after the end of the month. There was no gross alpha activity detected for the sample. There has been no gross alpha activity detected from Palisades' liquid radiological waste over the 2015, 2016, and 2017 reporting periods.

Groundwater Monitoring:

PNP has 23 groundwater monitoring wells strategically placed within the owner controlled area to allow for detection of radioactive contamination of ground water due to leaks or spills from plant systems. Two additional wells were installed in 2016 to increase the ability for PNP to monitor groundwater. PNP also monitors 16 temporary wells in addition to the 23 monitoring wells. Temporary wells have been strategically installed to provide additional monitoring capability beyond what the 23 monitoring wells provide.

Monitoring Well 11 identified a tritium leak from T-91 (Utility Water Storage Tank) during November of 2016. When this leak was identified, T-91 was emptied and repaired. During this period an increased sampling frequency was implemented into the groundwater monitoring program. Details of this event are discussed in

further detail in the 2016 ARERR. Over the 2017 monitoring period there were no new leaks identified and there are currently no known active leaks at PNP.

Temporary wells TW-1, TW-2, TW-9, TW-15, and TW-16 traverse along an East-West transect that is indicative of a historic leak and continues to be monitored. In 2017 tritium among these wells peaked at 14,995 pCi/L. Tritium levels typically spike in TW-15 when the water table rises from a large rainfall or spring melt. The high tritium levels in this area are residual of a leak which was reported to the NRC on December 10, 2007.

Monitoring of the residual groundwater tritium plume continues to assess repair effectiveness and follow the site hydrology data. Monitoring well locations are depicted in Figure 1.

Table 1 contains a summary of all groundwater monitoring well results over the monitoring period. The average tritium concentration considers only those which had a detectable concentration of tritium. Table 1 also contains all radiological data for all monitoring and temporary wells collected over 2017. In addition to the list of results in Table 1, an offsite vendor performed analysis for TW-07 and TW-06 samples collected on 09/21/2017 which identified less than detectable concentrations of Fe-55, Ni-63, Sr-89, and Sr-90. If a less than sign (i.e. "<") precedes a number in Table 1 that means there was no detectable activity from that analysis.

The depth to the water table at PNP was approximately 7 feet throughout 2017. The subsurface aquifer at PNP is not used for drinking water or irrigation. Hydrological studies performed at PNP indicate that the flow of groundwater is west toward Lake Michigan at approximately 2.2 feet per day.

Table 1
2017 Groundwater Monitoring Well Results

Well Number	Total Samples	Samples With Detectable Tritium	Minimum Tritium (pCi/L)	Maximum Tritium (pCi/L)	Average Tritium (pCi/L)
MW1	4	0	NA	NA	NA
MW1A	4	0	NA	NA	NA
MW2	20	17	708	4133	2247
MW3	13	0	NA	NA	NA
MW3A	4	0	NA	NA	NA
MW4	4	0	NA	NA	NA
MW5	4	0	NA	NA	NA
MW6	4	0	NA	NA	NA
MW7	4	0	NA	NA	NA
MW8	4	0	NA	NA	NA
MW9	4	0	NA	NA	NA
MW9A	4	0	NA	NA	NA
MW10	4	0	NA	NA	NA
MW11	37	4	537	1355	1024
MW-12	4	0	NA	NA	NA
MW-13	4	0	NA	NA	NA
MW14	4	0	NA	NA	NA
MW15	4	0	NA	NA	NA
MW16	4	0	NA	NA	NA
MW17	4	0	NA	NA	NA
MW18	4	0	NA	NA	NA
MW19	4	0	NA	NA	NA
MW20	4	0	NA	NA	NA
TW1	10	1	843	843	843
TW2	13	8	1050	3213	1744
TW3	5	0	NA	NA	NA
TW4	6	0	NA	NA	NA
TW5	10	0	NA	NA	NA
TW6	42	10	668	1948	1263
TW7	44	23	694	3772	1779
TW9	13	8	979	8520	4492
TW10	35	4	569	936	722
TW11	4	0	NA	NA	NA
TW13	4	0	NA	NA	NA
TW14	5	0	NA	NA	NA
TW15	20	17	1636	14995	5553
TW16	13	12	968	10833	5129
TW17	5	0	NA	NA	NA
TW18	4	0	NA	NA	NA

NA = Not applicable

Table 1
2017 Groundwater Monitoring Well Results

Tritium (pCi/L)	Monitoring Well Number											
Sample Date	MW1A	MW1	MW2	MW3	MW3A	MW4	MW5	MW6	MW7	MW8	MW9	MW9A
01/03/17				< 553								
01/17/17				< 599								
01/24/17				< 585								
02/14/17				< 598								
03/14/17			1550	< 596	< 596	< 596	< 596	< 596	< 596	< 596		
03/14/17	< 527	< 591	1542								< 527	< 527
04/13/17				< 570								
05/24/17			3441	< 589								
06/13/17	< 582	< 582	3359	<600	<600	< 607	< 603	< 576	< 570	< 567	< 582	< 582
06/22/17			4133									
06/27/17			3363									
07/05/17			2961									
07/11/17			2901									
07/18/17			2463	< 522								
07/25/17			3401									
08/01/17			2377									
08/08/17			1036									
08/15/17			1441	< 553								
08/22/17			1439									
08/29/17			840									
09/05/17			1253									
09/12/17			708	< 533	< 494	< 492	< 492	< 533	< 533	< 492		
09/13/17	< 501	< 500									< 498	< 501
09/25/17			< 526									
10/02/17			< 562									
10/10/17				< 527								
12/12/17			< 578	< 556	< 556	< 556	< 556	< 578	< 556	< 556		
12/13/17	< 564	< 564									< 564	< 564

Table 1
2017 Groundwater Monitoring Well Results

Tritium (pCi/L)	Monitoring Well Number										
Sample Date	MW10	MW11	MW-12	MW-13	MW14	MW15	MW16	MW17	MW18	MW19	MW20
01/03/17		< 582									
01/17/17		1152									
01/17/17		1355									
01/24/17		< 585									
02/14/17		1052									
03/14/17		< 566		< 596				< 615			
03/14/17	< 527		< 527		< 665	< 591	< 621		< 527	< 527	< 621
04/13/17		< 575									
05/24/17		<605									
06/13/17	< 582	<603	< 563	<600	< 582	< 582	< 582	< 637	< 582	< 582	
06/14/17											< 599
06/22/17		< 568									
06/27/17		< 573									
07/05/17		< 558									
07/11/17		< 528									
07/18/17		< 522									
07/25/17		537									
08/01/17		< 540									
08/08/17		< 565									
08/15/17		< 553									
08/22/17		< 545									
08/29/17		< 511									
09/05/17		< 511									
09/12/17		< 551	< 492	< 492				< 541			
09/13/17	< 498				< 579	< 509	< 512		< 512	< 512	< 512
09/18/17		< 530									
09/21/17		< 558									
09/25/17		< 526									
09/28/17		< 521									
10/02/17		< 562									
10/05/17		< 526									
10/10/17		< 527									
10/12/17		< 510									
10/16/17		< 527									
10/19/17		< 530									
10/23/17		< 513									
10/26/17		< 537									
10/30/17		< 539									
11/02/17		< 527									
12/12/17		< 556	< 578	< 556				< 556			
12/13/17	< 564				< 564	< 564	< 564		< 544	< 564	< 564

Table 1
2017 Groundwater Monitoring Well Results

Gamma Activity (pCi/L)	Monitoring Well											
Sample Date	MW1	MW1A	MW2	MW3	MW3A	MW4	MW5	MW6	MW7	MW8	MW9	MW11
01/03/17				<MDA								
01/17/17												<MDA
01/17/17				<MDA								
01/24/17						<MDA						
01/24/17												<MDA
02/14/17				<MDA								
02/14/17												<MDA
03/14/17			<MDA	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA		<MDA
03/15/17	<MDA	<MDA									<MDA	
04/13/17				<MDA								<MDA
05/24/17			<MDA	<MDA								<MDA
06/13/17			< MDA	<MDA	< MDA	< MDA	< MDA	< MDA	< MDA	< MDA		< MDA
06/14/17	< MDA	< MDA									< MDA	
06/22/17			<MDA									<MDA
06/27/17			<MDA									< MDA
07/05/17			<MDA									<MDA
07/11/17			<MDA									<MDA
07/18/17			<MDA									
07/18/17			<MDA	<MDA								<MDA
07/25/17			<MDA									<MDA
08/01/17			<MDA									<MDA
08/08/17			<MDA									<MDA
08/15/17			<MDA									<MDA
08/22/17			<MDA									<MDA
08/29/17			<MDA									<MDA
09/05/17			<MDA									<MDA
09/12/17			<MDA		<MDA	<MDA	< mda		<MDA	<MDA		<MDA
09/13/17	<MDA										< MDA	
09/18/17												<MDA
09/21/17												<MDA
09/25/17			<MDA									<MDA
09/28/17												<MDA
10/02/17			<MDA									<MDA
10/05/17												<MDA
10/10/17				<MDA								<MDA
10/12/17												<MDA
10/16/17												<MDA
10/19/17												<MDA
10/23/17												<MDA
10/26/17												<MDA
10/30/17												< MDA
11/02/17												< MDA
12/12/17			<MDA	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA		<MDA
12/13/17	<MDA	<MDA									<MDA	

<MDA = the concentration present was less than the minimum detectable activity

Table 1
2017 Groundwater Monitoring Well Results

Gamma Activity (pCi/L)	Monitoring Well												
Sample Date	MW9A	MW10	MW-12	MW-13	MW14	MW15	MW16	TW15	TW16	MW17	MW18	MW19	MW20
03/14/17			<MDA	<MDA						<MDA			
03/15/17	<MDA	<MDA			<MDA	<MDA	<MDA				<MDA	<MDA	<MDA
04/13/17													
05/24/17													
06/13/17			<MDA	< MDA						<MDA			
06/14/17	< MDA	<MDA			<MDA	< MDA	<MDA				< MDA	< MDA	<MDA
06/22/17													
09/12/17				<MDA						<MDA			
09/13/17	< MDA					< MDA	< MDA				<MDA	<MDA	
12/12/17			<MDA	<MDA						<MDA			
12/13/17	<MDA	<MDA			<MDA	<MDA	<MDA				<MDA	<MDA	<MDA

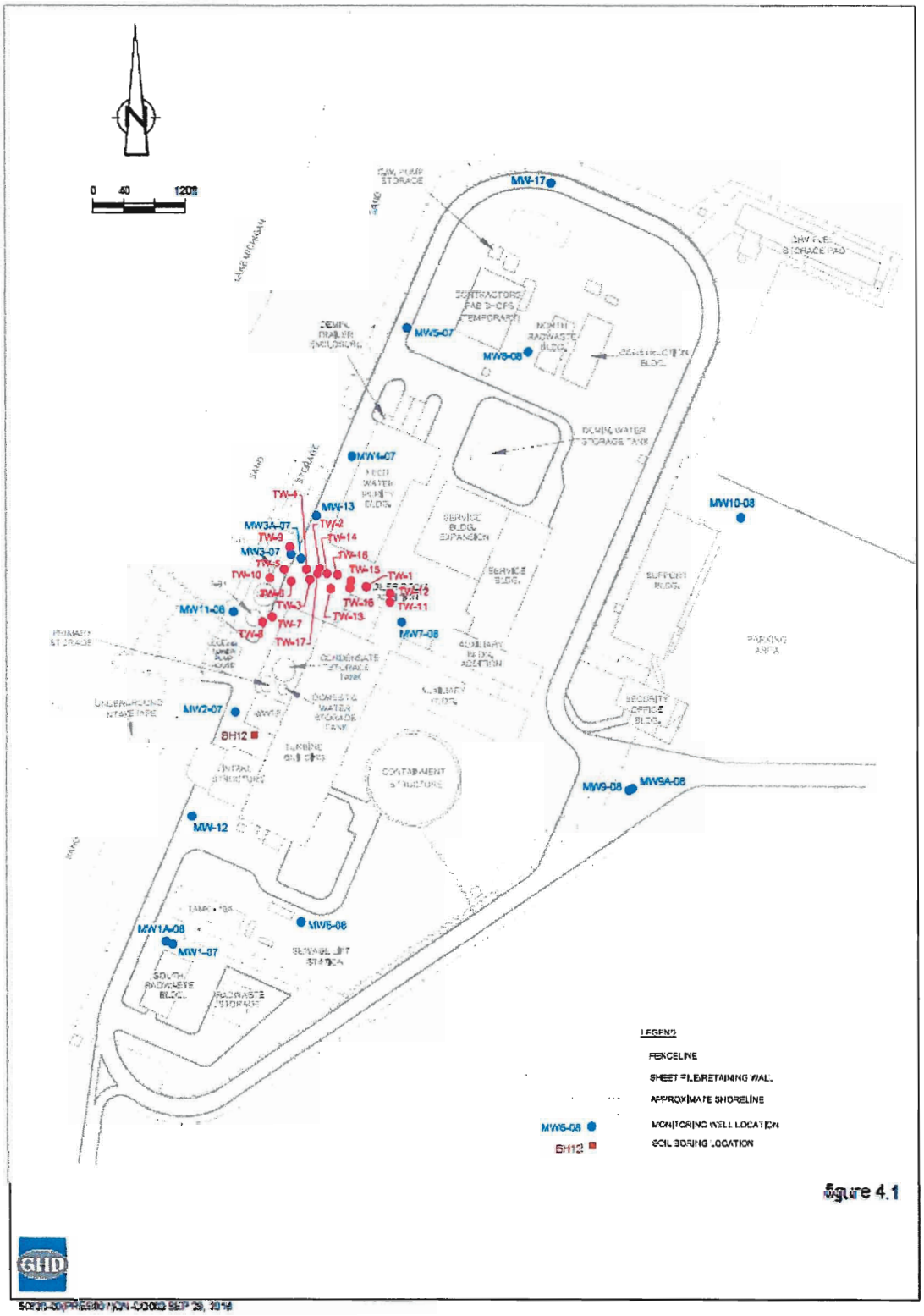
Gamma Activity (pCi/L)	Monitoring Well		
Sample Date	TW6	TW7	TW10
06/22/17	< MDA	< MDA	< MDA
06/27/17	< MDA	< MDA	< MDA
07/05/17	< MDA	< MDA	< MDA
07/11/17	< MDA	< MDA	< MDA
07/18/17	< MDA	< MDA	< MDA
07/25/17	< MDA	< MDA	< MDA
08/01/17	< MDA	< MDA	< MDA
08/08/17	< MDA	< MDA	< MDA
08/15/17	< MDA	< MDA	< MDA
08/22/17	< MDA	< MDA	< MDA
08/29/17	< MDA	< MDA	< MDA
09/05/17	< MDA	< MDA	< MDA
09/12/17	< MDA	< MDA	< MDA
09/18/17	< MDA	< MDA	< MDA
09/21/17	< MDA	< MDA	< MDA
09/25/17	< MDA	< MDA	< MDA
09/28/17		< MDA	

<MDA = the concentration present was less than the minimum detectable activity

Table 1
2017 Groundwater Monitoring Well Results

Tritium (pCi/L)	Monitoring Well															
Sample Date	TW1	TW2	TW3	TW4	TW5	TW6	TW7	TW9	TW10	TW11	TW13	TW14	TW15	TW16	TW17	TW18
01/03/17					< 553	< 553	< 553		< 553							
01/17/17	< 599	< 599			< 599	< 599	< 599	< 599	< 599				2084	3569		
01/24/17							< 585									
01/24/17						< 585										
01/24/17					< 585											
02/14/17	< 662	< 570	< 570	< 598	< 598	998	< 598	< 598	< 598	< 598	< 570	< 570	2560	3570	< 570	< 598
03/14/17	< 580	1094		< 561	< 561	< 561	< 561	979	< 561				3132	968		
04/13/17	843	< 577	< 577	< 577	< 596	< 577	< 577	1030	< 577	< 596	< 589	< 570	4746	6814	< 589	< 570
05/24/17	<609	3213			<609	<609	<609	<609	<609				1981	5046		
06/13/17	< 593				<600	< 581	< 581	<600	<600				< 588	6790		
06/22/17		2024				< 568	< 568		< 568							
06/27/17						< 593	< 580		< 576							
07/05/17						< 563	< 555		< 557							
07/11/17						< 528	< 528		< 528							
07/18/17	< 526	< 526	< 543	< 526	< 539	< 522	< 522	2223	936	< 539	< 543	< 526	11522	< 526	< 543	< 539
07/25/17						< 526	< 525		< 528				14995			
08/01/17						< 542	< 544		738				9259			
08/08/17						< 571	< 567		< 571				10114			
08/15/17		1229				< 553	< 553	< 553	< 553				9144			
08/22/17						< 545	< 545		< 545				7112			
08/29/17						< 512	951		< 509				1723			
08/29/17							694									
09/05/17						< 528	971		569				4915			
09/12/17	< 501	1283				< 551	2272	2196	< 533				3067			
09/13/17							2677							5121		
09/18/17						726	1874		< 530							
09/21/17						< 561	2201		< 562							
09/25/17						< 526	2877		< 526				2544	10833		
09/28/17						< 521	1644		< 524							
10/02/17	< 562	2885				< 544	1268	7755	< 544				< 544	2610		
10/05/17			< 526	< 526	< 526	< 526	1987		< 526	< 526	< 526	< 526				
10/10/17						< 529	2458	5972	< 528				< 526	6885	< 532	< 518
10/12/17						1022	3248		< 511							
10/16/17						1423	3772		< 527							
10/19/17		< 514	< 512	< 514		1876	2147		< 510							
10/23/17						1948	1186		< 513							
10/26/17						1595	< 537		< 537							
10/30/17						1061	1035		< 539							
11/02/17						1317	822		< 529							
11/07/17		1050				< 536	1269	8520					3874	2985		
11/13/17						668	1181									
11/20/17						< 526	< 526									
11/27/17						< 530	1356									
12/05/17	< 555	1170				< 555	1926	7258	646			< 555	1636	6358	< 555	
12/12/17						< 578	1096									
12/19/17						< 544	< 544									

Figure 1
PALISADES NUCLEAR PLANT GROUNDWATER MONITORING WELL LOCATIONS



15. Carbon-14

In 2010, PNP and other facilities participated in an EPRI task force to build a model to accurately estimate gaseous C-14 releases, given some key site-specific plant parameters (mass of the primary coolant, average thermal neutron cross section, rated MW, etc.). This work was completed in November 2010. The estimates for C-14 were constructed using the aforementioned EPRI methodology contained within EPRI 1021106, Estimation of Carbon-14 in Nuclear Power Plant Gaseous Effluents. Using the C-14 curie estimates, the annual dose to man was derived from guidance contained within Regulatory Guide 1.109. The dose contribution of C-14 from liquid radioactive waste is much less than that contributed by gaseous radioactive waste and therefore the evaluation of C-14 in liquid radioactive waste is not required. Gaseous C-14 is reported as CO_2 Curies because the major pathway by which C-14 contributes to the dose to man is by entering vegetables in the form of CO_2 and then being ingested. The "total body" and the "bone" dose reported below is the maximum among the four age groups; Adult, Teenage, Child, Infant.

Annual C-14 release for PNP and subsequent doses for 2017:

Total Gaseous C-14 Released =	7.45E+00 Curies
Gaseous C-14 as CO_2 =	2.24E+00 Curies
Effective Total Body Dose, C-14 =	1.15E-01 mrem
Effective Bone Dose, C-14 =	5.75E-01 mrem

The quarterly curies released are provided in Table 1A, 1B, and 1C. Airborne doses due to C-14 are contained in Table 1A.

16. Meteorological

A meteorological monitoring report is generated semiannually. From January 1, 2017, to June 30, 2017, the meteorological data recovery was at 100% for all variables. From July 1, 2017, to December 30, 2017, the meteorological data recovery was at 100% for all variables except for delta-T (temperature difference between the 10 meter and 60 meter height). Delta-T data recovery was 87.0% from July 1, 2017, to December 30, 2017.

The two periods during which delta-T data was lost was from July 10 at 11:00 through August 3 at 10:00 and from December 6 at 23:30 through December 18 at 15:15. Data from the second period was recovered. Data from the first period was not recoverable. The atmospheric stability for the first period was calculated using data from the 10-meter height.

Regulatory Guide 1.23 Revision 1, "Meteorological Monitoring Programs for Nuclear Power Plants" states that the goal of meteorological data recovery should be 90% or greater. While this goal was not met for one parameter, delta-T, this does not adversely impact the Radiological Effluents Program. Meteorological data used for the Radiological Effluents Program is based upon a 10 year rolling average in accordance with Regulatory Guide 1.21 Revision 2, "Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste". Data for 2017 trended consistent with past year's data. Also the atmospheric stability class was derived using other data for the period when delta-T data was not recoverable.

The two most frequently occurring wind directions from December 2016 through February 2017 was from the WNW and W sectors at the 10-meter level (accounting for 34% of the observations) and from the WNW and W sectors at the 60-meter level (accounting for 32% of the observations). During this period the mean wind speed was 3.91 m/s and 7.22 m/s at the 10 meter and 60 meter height respectively.

The two most frequently occurring wind directions from March 2017 through May 2017 was from the SE and NNW sectors at the 10-meter level (accounting for 27% of the observations) and from the NNW and N sectors at the 60-meter level (accounting for 20% of the observations). During this period the mean wind speed was 3.67 m/s and 6.29 m/s at the 10 meter and 60 meter height respectively.

The two most frequently occurring wind directions from June 2017 through August 2017 was from the SSE and NNW sectors at the 10-meter level (accounting for 24% of the observations) and from the SW and NNW sectors at the 60-meter level (accounting for 21% of the observations). During this period the mean wind speed was 2.15 m/s and 4.95 m/s at the 10 meter and 60 meter height respectively.

The two most frequently occurring wind directions from September 2017 through November 2017 was from the SSE and SE sectors at the 10-meter level (accounting for 32% of the observations) and from the S and SSE sectors at the 60-meter level (accounting for 24% of the observations). During this period the mean wind speed was 2.85 m/s and 6.03 m/s at the 10 meter and 60 meter height respectively.

Data from this report and the annual meteorological data (Hourly Average Data or Joint Frequency Distribution) will be maintained on site and will be made available upon NRC request.