

POINT BEACH NUCLEAR PLANT
UNIT 1 AND 2

RADIOLOGICAL EFFLUENT AND MATERIALS
CONTROL AND ACCOUNTABILITY PROGRAM

(REMCAP) MANUAL

WISCONSIN ELECTRIC

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PDR ADOCK 05000266
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TABLE OF CONTENTS

	<u>PAGE</u>
1.0 RADIOLOGICAL EFFLUENT AND MATERIALS CONTROL AND ACCOUNTABILITY PROGRAM (REMCAP)	1
1.1 Basis	1
1.2 REMCAP Organization	1
1.3 Location of Former RETS Items	1
2.0 Definitions	1
2.1 Lower Level of Detection (LLD)	2
2.2 Members of the Public	3
2.3 Offsite Dose Calculation Manual (ODCM)	3
2.4 Process Control Program (PCP)	3
2.5 Solidification	3
2.6 Unrestricted Area	3
2.7 Annual Release Limit	3
2.8 Quarterly Release Limit	3
3.0 REVISIONS	4
4.0 PROGRAM IMPLEMENTATION	4
5.0 REPORTING REQUIREMENTS	4
5.1 REMP	4
5.2 RECP	4
5.3 Solid Waste	4



1.0 RADIOLOGICAL EFFLUENT AND MATERIALS CONTROL AND ACCOUNTABILITY PROGRAM (REMCAP)

1.1 Basis

The Point Beach Nuclear Plant's Radiological Effluent and Materials Control and Accountability Program (REMCAP) is designed to comply with Federal Regulations for ensuring the safe operation of the Plant with respect to releases of radioactive material to the environment and its subsequent impact on the public. 10 CFR 50.34a states that operations should be conducted so as to keep the levels of radioactive material in effluents to unrestricted areas as low as reasonably achievable (ALARA). In 10 CFR 50, Appendix I, the NRC provides numerical values for what it considers to be the appropriate ALARA dose objectives to which the licensee's calculated effluent doses may be compared. These doses are a small fraction of the dose limits specified by 10 CFR 20.1301 and lower than the EPA limit in 40 CFR 190. 10 CFR 20.1302 directs the licensee to make the appropriate surveys of radioactive materials in effluents released to unrestricted and controlled areas. This monitoring requirement (also found in the General Design Criterion (GDC) 64 of Appendix A to 10 CFR 50 and in PBNP GDC 17) is implemented in order to control effluent releases as required by PBNP GDC 70 and GDC 60 of Appendix A to 10 CFR 50. PBNP GDC 70 and GDC 60 of Appendix A to 10 CFR 50 also address the need for control of solid waste material. In order to confirm that the appropriate controls have been applied to effluents, surveys are conducted of unrestricted areas in the PBNP environs as required by 10 CFR 20.1302, PBNP GDC 17, GDC 64 of Appendix A to 10 CFR 50, and Section IV.B.2 of Appendix I to 10 CFR 50. The surveys provide data on levels of radiation and radioactive materials in the environment in order to evaluate the relationship between quantities of radioactive material released in effluents and the resultant radiation doses to individuals from principle exposure pathways.

1.2 REMCAP Organization

In order to achieve the control and accountability required by Federal regulations, REMCAP contains the following elements: a radiological effluent control program (RECP) to assess and control radioactive material in liquid and gaseous effluent, a process control program (PCP) for waste solidification, a radiological environmental monitoring program (REMP) for assessing radioactive materials in the environment, and an offsite dose calculation manual (ODCM) containing the methodology for calculating doses to the public from PBNP effluents. These elements of the REMCAP are defined in PBNP Technical Specification 15.7.8.

1.3 Location of Former RETS Items

- 1.3.1 Monitoring Instrumentation, is now in Section 3 of the Radiological Effluent Control Manual (RECM).
- 1.3.2 Monitoring Instrumentation Surveillance Requirements, is now in Section 4 of the RECM.



- 1.3.3 Former RETS 15.7.5, Radioactive Effluent Release Limits, is now in Section 5 of the RECM.
- 1.3.4 Former RETS 15.7.6, Radioactive Effluent Sampling and Analysis Requirements, is now in Section 6 of the RECM.
- 1.3.5 Former RETS 15.7.7, Operational Environmental Monitoring, is now in the Environmental Manual.

2.0 Definitions

The definitions for frequently used terminology in the REMCAP are stated below:

2.1 Lower Level of Detection (LLD)

The LLD is defined as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a real signal. For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66 S_b}{E \times V \times 2.22 \times 10^6 \times Y \times \exp(-\lambda \Delta t)}$$

Where:

LLD = the a priori lower limit of detection as defined above, in micro-curies per unit volume or mass as applicable.

S_b = the standard deviation of the background counting rate or the counting rate of a blank sample as appropriate in counts per minute,

E = the counting efficiency in counts per disintegration,

V = the sample size in units of volume or mass as applicable,

2.22 x 10⁶ = the number of disintegrations per minute per microcurie,

Y = the fractional radiochemical yield, when applicable,

λ = the radioactivity decay constant for the particular radionuclide, and

Δt = for plant effluents, Δt is the elapsed time between the midpoint of sample collection and time of counting; for environmental samples, Δt is the elapsed time between sample collection, or end of the collection period, and the time of counting.

Typical values of E, V, Y, and Δt will be used in the calculation. It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.



2.2 Members of the Public

Members of the public include all persons who are not occupationally associated with the plant. This category does not include employees of the utility, its contractors, or vendors. Also excluded from this category are persons who enter the site to service equipment or to make deliveries. This category does include persons who use portions of the site for recreational, occupational, or other purposes not associated with the plant.

2.3 Offsite Dose Calculation Manual (ODCM)

The Offsite Dose Calculation Manual contains the methodology for the determination of gaseous and liquid effluent monitoring alarm or trip setpoints, the methodology for determining compliance with release limits, and the methodology used in the calculation of offsite doses due to radioactive gaseous and liquid effluents.

4 Process Control Program (PCP)

The Process Control Program contains the methodologies used to ensure that the processing and packaging of solid radioactive waste will be accomplished in such a way as to assure compliance with 10 CFR Parts 20, 61, and 71, and all other applicable Federal and State regulations as well as burial ground requirements governing the disposal of the radioactive waste.

2.5 Solidification

The conversion of liquid wastes into a form that meets shipping and burial ground requirements.

2.6 Unrestricted Area

An unrestricted area is any area at or beyond the site boundary where access is not controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials.

2.7 Annual Release Limit

The quantity of radioactive material, above background, in PBNP effluent which results in a calculated dose to the maximum exposed individual (MEI) or the air which equals the dose objectives of Appendix I to 10 CFR 50.

2.8 Quarterly Release Limit

The quarterly release limit is defined as $\frac{1}{4}$ the corresponding annual limit.

REMCAP MANUAL

3.0 REVISIONS

Revisions to the various REMCAP program manuals must be documented and kept for the duration of the PBNP operating license. The revisions shall conform to TS 15.7.8.6 and 15.7.8.7. Revisions to the ODCM and the Environmental Manual (EM) are made, as necessary, by the Industry and Regulatory Services Section (IRSS) in concurrence of the PBNP Managers' Supervisory Staff (MSS). Revisions to the PCP and to the Radiological Effluent Control Manual (RECM) are the responsibility of the Manager-Health Physics, with the concurrence of the PBNP MSS.

4.0 PROGRAM IMPLEMENTATION

The responsibilities for implementing the requirements of the ODCM reside with the manager and staff of the IRSS. The responsibility for implementing the requirements of the EM, the PCP, and the RECP reside with the Manager-PBNP.

5.0 REPORTING REQUIREMENTS5.1 REMP

Results from the REMP for the twelve month period, or fraction thereof, ending December 31, shall be reported to the NRC in the Annual Monitoring Report by May 1 of the following year. In addition to a summary of the REMP results as described in RETS 15.7.8.4, the radioanalytical REMP results from the vendor and the vendor's QA program results shall be included in the Annual Report or as a separate, concurrent submittal.

5.2 RECP

Results from the RECP effluent measurements shall be included in the Annual Monitoring Report. Results shall include monthly summaries and quantities of liquid waste and liquid used in dilution as well a monthly isotopic results of principle radionuclides released as specified in RETS 15.7.8.4. The Annual Monitoring Report also shall include the doses from effluent calculated according to ODCM methodology.

5.3 Solid Waste

The isotopic content of solid waste shipments from PBNP shall be reported in the Annual Monitoring Report in addition to the requirements of RETS 15.7.8.4.