

From: James Noggle *RT*
To: Kottan, James; Rice, Timothy
Date: 11/08/2006 7:12:01 AM
Subject: Fwd: FW: GWMP plan and procedure

Dear Tim and Jim,

Here are the documents to support Long Term Monitoring plan discussion next week.

Regards,

Jim

B/27



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IPEC SITE
MANAGEMENT
MANUAL

QUALITY RELATED
ADMINISTRATIVE PROCEDURE

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IP-SMM
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Revision 0

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Title: Long Term Ground Water Protection Program

<u>Reviews</u>	<u>Required</u>
Cross Discipline Review	<u>Yes</u>
Code Reviews:	
10CFR50.59 Review	<u>Yes</u>
10CFR50.54 Review	<u>No</u>
On-Site Safety Review Committee Reviews	<u> </u>

Procedure Owner: Daniel Wilson / Chemistry Superintendent
Print Name / Title

Approved: _____
Procedure Owners Signature (Date)

Approved _____
IPEC Site VP/Designee Signature (Date)

Effective Dates: IP2 IP3





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New Procedure/Revision/Cancellation Basis:

This new procedure is established to:

- Establish an IPEC ground water protection program to support implementation of EN-RP-113, Response to Contaminated Spills/Leaks
- Meet Nuclear Energy Institute industry commitments
- Address issues discussed in NRC Information Notice 2006-13: Ground-Water Contamination Due To Undetected Leakage of Radioactive Water
- Implement IPEC commitments to the NRC made in Entergy Letter NL-06-033, "Current Status/Future Plans Regarding Onsite Groundwater Contamination at IPEC."



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3.0 REFERENCES

- 3.1 Entergy Letter NL-06-033, "Current Status/Future Plans Regarding Onsite Groundwater Contamination at IPEC", Fred Decimo, Site Vice President, Indian Point Energy Center.
- 3.2 NRC Information Notice 2006-13: Ground-Water Contamination Due To Undetected Leakage of Radioactive Water.
- 3.3 10CFR50.75(g), Reporting and recordkeeping for decommissioning planning
- 3.4 NRC Bulletin 80-10
- 3.5 NRC Information Notice 2004-05 "Spent Fuel Pool Leakage to Onsite Ground Water"
- 3.6 NRC inspection manual 71122.01 "Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems
- 3.7 EPRI 1011730, Groundwater Monitoring Guidance for Nuclear Power Plants
- 3.8 EN-AD-103," Document Control and Records Management Activities"
- 3.9 NEI Initiative on Managing Situations Involving Inadvertent Radiological Releases in Groundwater, NEI 06-14 news release
- 3.10 EN-LI-108, Event Notification and Reporting
- 3.11 EN-CY-108, Monitoring of Non-Radioactive Systems
- 3.12 EN-RP-106, Radiological Survey Documentation"
- 3.13 EN-RP-113, Response to Contaminated Spills/Leaks

4.0 DEFINITIONS

- 4.1 Action Level – A value established to initiate an action such as a notification, an evaluation or a remediation or intervention.
- 4.2 Boundary Monitoring Well – A ground water well used to provide early detection of IPEC licensed radioactive material transported to adjacent properties via ground water.
- 4.3 Containment – An action or engineered control to limit the spread or migration of a contaminant.
- 4.4 Indicator Monitoring Well– A ground water well within the Protected Area, used for one or more of the following purposes:
 - o Long term detection of new sources of ground water contamination from leaks or spills.
 - o Long term monitoring existing or known sources of ground water contamination.
 - o Long term identification of trends in the nature and extent of on-site ground water plumes.
 - o Long term monitoring of progress of remediation/intervention activities.



1.0 PURPOSE

- 1.1 To establish the objectives, organizational roles and responsibilities, and the program elements and requirements, for the radiological ground water protection program.
- 1.2 This procedure is applicable to boundary monitoring wells, river front monitoring wells and indicator monitoring wells.

2.0 PRECAUTIONS AND LIMITATIONS

- 2.1 Caution should be exercised when formulating actions based upon tritium (H-3) results below 1000 pCi/L or strontium 90 (Sr-90) results below 1 pCi/L. Results at these levels can be observed due to statistical counting errors, laboratory analysis or chemical separation errors, trace level cross contaminations, local fall out from monitored atmospheric plant releases or from background levels of these radionuclides in precipitation, drinking water and surface water in the natural environment. Re-analysis, re-sampling and trending over several data points should be initiated to confirm ground water contamination prior to making notifications or taking more aggressive actions based upon such results.
- 2.2 When either of the following conditions are identified, they should be evaluated, documented and reported in accordance with Entergy procedure "EN-RP-113, Response to Contaminated Spills/Leaks."
 - Spills or leaks of solid or liquid materials containing licensed radioactive material are identified
 - An off-site or on-site ground water sample containing licensed radioactive material is identified



- 4.5 Intervention – An action to remediate or contain/control the radioactive source term.
- 4.6 Investigation/Characterization – Sampling, tests and evaluations initiated when radioactive ground water contamination has been identified to determine the source(s) contamination, determine the locations, extent and concentrations of ground water contamination and/or to define the hydrogeology of the effected area.
- 4.7 Investigation Level – A type of “action level” applied to boundary monitoring well results to initiate notifications and follow-up actions.
- 4.8 Monitoring – Sampling conducted on a periodic basis to verify ground water contamination transport is occurring as predicted by site models, and/or, to determine if ground water contamination is migrating toward or onto adjacent properties, and/or, to quantify the activity and concentrations of radionuclide released to the Hudson River and to detect radioactive leaks or spills or that are contaminating ground water.
- 4.9 Planned Sample Event – The planned sampling activities for a sample point (e.g., MW-48-38’) or a group of sample points (e.g., MW-38, MW-48-23’, MW-48-38’, MW-48 River) that includes the type of sample, analytes, required MDAs, etc.
- 4.10 Remediation – Removing contamination from or decontaminating an area, item or material.
- 4.11 River Front Monitoring Well – A ground water well used to monitor the concentrations and total activity of IPEC licensed radioactive material released to the Hudson River via ground water
- 4.12 Scheduled Sample Event – A “Planned Sample Event” that has been assigned a frequency such that the date or date range the sample event is to occur has been assigned.
- 4.13 Stake Holder – A non-regulatory individual or group with an official capacity or responsibility for the welfare of the community and a desire to be notified of environmental issues.
- 4.14 Trigger Level – A type of “action level” applied to boundary monitoring well results to initiate evaluation of remediation or other intervention actions.

5.0 RESPONSIBILITIES

5.1 **Director Special Projects** – Designates individuals to fill positions of Radiological Ground Water Protection Coordinator, Ground Water Radiological Environmental Monitoring Program (REMP) Contact, Ground Water Hydrogeological Lead, and Ground Water Radiological Effluent Controls Contact.

- Ensures adequate funding and resources to implement the Ground Water Protection Program as required.
- Establishes goals and expectations for Ground Water investigations and monitoring.
- Approves project budget and staffing.
- Approves Annual Ground Water Protection Program Report

5.2 **Chemistry Superintendent**

- Oversees Long Term Ground Water Protection Program
- Designates individual to fill positions of Ground Water Sampling Coordinator



5.3 Radiological Ground Water Protection Coordinator

- Manages and implements the Long Term Ground Water Protection Program.
- Responsible for coordinating staffing, equipment and services required to support the Long Term Ground Water Protection Program. Duties include:
 - procurement of hydrogeological and analytical laboratory services,
 - installation and maintenance of ground water wells,
 - maintenance and procurement of sampling and monitoring instrumentation and equipment
 - conduct of sampling activities, and data collection, review, evaluation and reporting.
- Maintains listing of ground water well status and type, as well as sampling and analysis scheduling matrix.
- Approves ground water well installations and removals.
- Approves changes in ground water well design and status.
- Maintains records of approvals and inspections and the ground water well design basis documents.
- Documents the basis for new and existing well installations which shall contain the following as a minimum:
 - Initial purpose/type of well (e.g., monitoring, investigation, test, injection, remediation, etc.).
 - Well Identification number and date of installation.
 - Northing and easting coordinates.
 - Top of well elevation, ground surface elevation.
 - Diameter and depth of boring
 - Depth of designed sample locations such as packers or screening intervals, depth of injection locations, etc.
 - Installed well equipment such as transducers, pumps, etc.
 - Installation diagram of well construction.
 - Hydraulic connection with other wells on the river
- Maintains and approves changes to ground water investigation and monitoring program, training, procedures, and Technical Information Documents.
- Prepares ground water staffing, budget and equipment needs annually for approval by Director Special Projects.
- Establishes and maintains Long Term Ground Water Protection Program action levels.
- Procures staffing and equipment resources required to implement sampling schedule/matrix.



- Oversees collection, preparation, tracking, on-site delivery and shipment of Ground Water investigation and monitoring samples.
- Maintains a log of samples collected and sample transfers by Ground Water Sampling Technician(s) to on-site or off-site sample recipients.
- Organizes and schedules sampling to meet project objectives
- Specifies required analyses and limits of detection.
- Performs data review and validation
- Performs or provides support for performance of technical evaluations, assessment reports and calculations
- Identifies and reports results above action levels.
- Prepares Annual Ground Water Protection Program Report including the following:
 - Description of program objectives, activities conducted, and results for ground water monitoring, investigations, characterizations, remediations and interventions conducted during the course of the year.
 - Summarize reports describing hydrogeologic data obtained and of any hydrogeologic tests and results performed during the year.
 - Description of any significant changes to site hydrogeological models.
 - Summary of ground water sample results and trends observed.
 - Quantification of any spills, leaks or any other new sources of ground water contamination observed during the course of the year.
 - Quantification of durations, activities and concentrations of licensed radioactive material released to adjacent properties or the Hudson River over the course of the year, including the required information to evaluate potential pathways and receptors in the environment and exposure pathways and doses to members of the public, if any.
 - Recommendations for future ground water monitoring, investigations, characterizations, or interventions.
- Makes notifications in accordance with program requirements.
- Responsible for maintenance and administration of the ground water data management system.
- Ensures that any spills, leaks or other sources of ground water contamination identified are documented in 10 CFR 50.75(g) files and Condition Reports in accordance with IPEC procedures.

5.4 Chemistry Supervisor

- Designates individuals to fill position of Ground Water Sampling Technician(s).
- Supervises Ground Water Sampling Technicians.
- Works with Training Department to establish Ground Water Protection Program personnel training requirements.



- Schedules and plans sampling events in accordance with the frequencies specified by the Radiological Ground Water Protection Coordinator.

As a minimum, sampling event information should include:

- Scheduled sampling date and time
- Locations to be sampled
- Sample type to be obtained (e.g., packer, low flow, grab, etc.)
- Required analyses and desired MDAs
- On-Site or off-site laboratory(s) to perform analyses

5.5 **Ground Water Sampling Technician(s)** – Designated by and reports to Ground Water Sampling Coordinator for ground water related duties.

- Responsible for collecting, preparing, documenting, transferring and shipping samples in accordance with Ground Water Sampling Coordinator directions and program requirements.
- Collects samples in accordance with direction and event planning documentation.
- Prepares and preserves samples in accordance with program requirements and sampling instructions.
- Delivers samples to on-site laboratory, shipping and storage areas as directed.
- Packages and prepares samples for shipment to off-site laboratory as directed.
- Decontaminates and maintains sampling equipment and supplies as directed.
- Logs sample collection information as directed.

5.6 **Ground Water Hydrogeological Lead** – Designated by and reports to Radiological Ground Water Protection Coordinator for ground water related duties.

- Responsible for procuring, coordinating and supervising Hydrogeological staffing, resources, equipment and documentation.
- Procures staffing and equipment resources required to install, maintain, and evaluate ground water wells, along with other Hydrogeological tests and evaluations, as required.
- Plans and recommends ground water well locations and status based on hydro-geologic and radiological ground water characteristics.
- Develops and maintains Hydrogeological models required to estimate flow, contamination migration and contamination concentrations to support monitoring, remediation, pathway analysis and dose calculation requirements.
- Annually inspects ground water wells and sounds all wells for degradation.
- Designates ground water wells and related equipment as in-service active, in-service inactive, or out-of-service.
- Approves changes in ground water well service or operability status.



5.7 Ground Water Radiological Environmental Monitoring Program (REMP) Contact- Designated by and reports to Director Special Projects for ground water related duties.

- Incorporates Ground Water Protection Program data, results and information into REMP program and reports as required.
- Reports REMP Ground Water Well results in annual REMP Report.
- Coordinates and supervises obtaining Ground Water Protection Program related REMP samples in accordance with REMP program requirements.
- Evaluates ground water related radionuclide pathways to the environment, to environmental receptors and to members of the public and modifies REMP sampling requirements as necessary.

5.8 Ground Water Radiological Effluent Controls Contact - Designated by and reports to Director Special Projects for ground water related duties.

- Incorporates Ground Water Protection Program data, results and information into Radiological Effluent Controls and Off-Site Dose Calculation Manual (RECS/ODCM) program and reports as required.
- Reports off-site releases via ground water and estimated member of the public exposures in the in the annual Radiological Effluent Controls Report.
- Utilizes ground water monitoring data to estimate the magnitude and duration of licensed radioactive material releases via ground water. Estimates concentrations in environmental media and receptors as necessary to calculate estimated dose to members of the public.

6.0 DETAILS

6.1 Overall Objectives and Requirements

6.1.1 Procedures, training, staffing and equipment shall be maintained to monitor, investigate and characterize contamination of ground water with licensed radioactive material at Indian Point Energy Center (IPEC).

6.1.2 Monitoring activities shall be performed to accomplish one or more of the following objectives:

- Detect and quantify potential release of licensed radioactive material to adjacent properties via ground water.
- Detect and quantify release of licensed radioactive materials to the Hudson River via ground water.
- Provide leak detection capabilities for potential sources of ground water contamination such as the U2 SFP. Detect and quantify new sources of ground water contamination such as a spill or leak from a radioactively contaminated component or system or a change in the site hydrology that mobilizes or exposes radioactive contamination sequestered in the soil or bed rock.



- Verify the accuracy of the characterization and hydrology of existing ground water contamination (e.g., locations, depths, radionuclides of concern, radionuclide concentrations and migration or transfer rates are as predicted).
- Monitor and evaluate the effectiveness of remediation or intervention actions.

6.1.3 Investigation/characterization activities are performed to evaluate and understand ground water contamination once it has been identified above the investigation trigger levels or an event such as a spill or leak with the potential to contaminate ground water to levels above the investigation trigger levels has occurred. Investigation/characterization activities are conducted to accomplish one or more of the following objectives:

- Determine the source(s) of ground water contamination (e.g., leaking radioactive components or systems, radioactive spills or legacy soil or bedrock contamination).
- Determine the locations, extent and potential source term and concentrations of ground water contamination (e.g., define the plume).
- Define the hydrogeology and predicted migration of the contamination in ground water in order to evaluate long term potentials for off-site releases via ground water.

6.2 Ground Water Well System Management and Documentation

6.2.1 Ground water system wells can be constructed to provide one or more of functions such as the following:

- To provide long term monitoring/sampling capabilities.
- To provide short term investigative/characterization sampling capabilities.
- To collect hydrogeological data (e.g., water table levels, flows, etc.)
- To support tests such as dye injection or draw down tests
- To support remediation, containment or intervention activities.

6.2.2 The following types of Ground Water Wells shall be located, constructed and maintained in accordance with Ground Water Protection Program implementing procedures.

- Wells which provide radiological sampling capabilities to support the detection, quantification and reporting of licensed radioactive material releases to ground water from a system structure or component.
- Wells which provide radiological sampling capabilities to support the quantification and reporting of release of licensed radioactive material from the site (e.g., to adjacent properties or the Hudson River) via ground water
- Wells which provide hydrological data supporting the quantification and reporting of releases to ground water or the release of licensed radioactive material from the site via ground water.

6.2.3 As a minimum procedural guidance for installation, maintenance and inspection of these wells will include:



- Inspection and authorizations to determine that a well is "Active" and suitable to initiate qualitative sampling.
- Routine, periodic inspections of active wells to ensure they remain suitable for sampling.
- Inspection and authorizations to determine that the well is "Developed" and suitable for quantitative sampling.
- Authorizations to change well status (e.g., "Active" and "Inactive").
- Periodic evaluations of well instrumentation (such as transducers) used to provide hydrological data supporting the quantification and reporting of releases to ground water or release of licensed radioactive material from the site via ground water."

6.2.4 Hydrological data required to support quantification and reporting of releases to ground water or release of licensed radioactive material from the site via ground water shall be:

- Maintained in electronic or hard copy form by the Ground Water Hydrogeological Lead.
- Summarized and reported annually, or as directed by the Radiological Ground Water Protection Coordinator, to support quantification of releases to ground water, releases from the site via ground water or to support Off-Site Dose Calculations.

6.3 Ground Water Sampling and Analysis Scheduling and Planning

- 6.3.1 Sampling and analysis scheduling and planning for "Active" wells shall be performed in accordance with Radiological Ground Water Protection Program implementing procedures.
- 6.3.2 Table 1 is an example of the current ground water protection schedule. This schedule may be modified under the direction of the Radiological Ground Water Protection Coordinator.

**Table 1
Ground Water Protection Wells**

Well Description	Well ID	Sample Frequency
Boundary Wells (on-site; off-site)	MW-40, MW-51; LaFarge-01, 02 and 03	Monthly; Quarterly
River Front Monitoring Wells	MW-38, MW-48, MW-60, MW-61, MW-62 and MW-63	*
Indicator Wells	*	*

* = To be determined upon completion of the GW investigation



6.3.3 The Radiological Ground Water Protection Coordinator shall maintain documentation for "Active" wells specifying minimum sampling and analysis frequencies. As a minimum the following should be specified:

- Sample point or designator (e.g., MW-48-23', MW-48 River, MW-111, etc).
- Frequency at which each location is to be sampled (e.g, weekly, bi-monthly, monthly, quarterly, semi-annually, annually, etc.)
- Required analyses and their frequencies of (e.g., H-3 Monthly, gamma spectroscopy Monthly, Sr-90 Quarterly, etc.)

6.4 Sample Collection and Analysis

6.4.1 Sample collection, handling and tracking for "Active" wells shall be performed in accordance with 0-CY-2775, Ground Water Sampling.

6.5 Sample Data Validation, Notifications and Records

6.5.1 Sample data validation, documentation and notifications for "Active" wells shall be performed in accordance with Radiological Ground Water Protection Program implementing procedures.

6.5.2 Action Levels are provided Attachment 10.2.

- In addition to those specified in Reference 6.1, action levels which initiate investigation, notification and intervention shall also be specified for wells used to support quantification and reporting of releases to ground water due to spills, leaks, etc. AND for those used to quantify and report release of licensed radioactive material from the site via ground water, such as those along the Hudson River.

6.5.3 When either of the following conditions are identified, they should be evaluated, documented and reported in accordance with Entergy procedure "EN-RP-113, Response to Contaminated Spills/Leaks."

- Spills or leaks of solid or liquid materials containing licensed radioactive material are identified
- An off-site or on-site ground water sample containing licensed radioactive material is identified"

6.5.4 When any of the following occur, the existing monitoring activities should be re-evaluated to ensure the selected locations, sampling frequencies and radionuclides are appropriate:

- A new leak or spill is detected that could result in migration of licensed radioactive material off site property (e.g., evaluate location / sampling frequency of wells used to quantify such releases).
- Identification of potential unmonitored leakage resulting from system degradation/aging that may result in ground water contamination.
- Changes in site hydrology, which may result from remediation efforts, construction activities, natural occurrences or other events, that may change the understanding of ground water flow patterns.



- Ground water contamination is detected at locations or concentrations not predicted by current site hydrology or ground water characterization.
- A new radionuclide is detected in ground water at concentrations/locations that could result in migration of licensed radioactive material off site property.

6.6 Radiological Ground Water Protection Program Data Compilation and Reporting

6.6.1 Sample data and hydro-geologic data shall be compiled, organized and reviewed annually as a minimum to:

- Analyze for increasing or decreasing trends at individual samples points, wells or groups of wells.
- Review the radionuclides detected.
- Evaluate the locations of and migration of radionuclides in groundwater.
- Verify hydrogeologic modeling of the site.

6.6.2 The Radiological Ground Water Protection Coordinator shall ensure that any spills, leaks or other sources of ground water contamination identified are documented in 10 CFR 50.75(g) files and Condition Reports in accordance with IPEC procedures.

6.6.3 The Radiological Ground Water Protection Coordinator shall prepare an annual summary report of ground water program activities and results. This report shall be reviewed and approved by the Director Special Projects. As a minimum this report shall contain the following:

- Description of program objectives, activities conducted, and results for ground water monitoring, investigations, characterizations, remediations and interventions conducted during the course of the year.
- Summarize reports describing hydrogeologic data obtained and of any hydrogeologic tests and results performed during the year.
- Description of any significant changes to-site hydrogeological models.
- Summary of ground water sample results and trends observed.
- Quantification of any spills, leaks or any other new sources of ground water contamination observed during the course of the year.
- Quantification of durations, activities and concentrations of licensed radioactive material released to adjacent properties or the Hudson River over the course of the year, including the required information to evaluate potential pathways and receptors in the environment and exposure pathways and doses to members of the public, if any.
- Recommendations for future ground water monitoring, investigations, characterizations, or interventions.

6.6.4 The Ground Water Radiological Environmental Monitoring Program (REMP) Contact shall review the annual ground water protection report and ensure the following:

- Sample results obtained from REMP wells listed in Reference 6.1 are reported and summarized in the annual REMP report.



- Results of REMP samples obtained in response to ground water monitoring, investigation, characterization, remediation or intervention (e.g., Sr-90 edible fish and invertebrates, Sr-90 sediment, etc.) are reported and summarized in the annual REMP report.
- REMP sampling requirements are adequate to evaluate and validate anticipated ground water radionuclide pathways to the environment and environmental receptors, such as plants or animals that have the highest uptakes.
- REMP sampling requirements are adequate to validate that environmental levels of radionuclides released via ground water are less than those predicted when assessing potential exposures to members of the public.

6.6.5 The Ground Water Radiological Effluent Controls Contact shall review the annual ground water protection report and ensure the annual Radiological Effluents includes:

- A listing of pre-existing and current year "abnormal releases" of licensed radioactive material to ground water.
- A best estimate quantification of the radionuclides, activities and concentrations associated with abnormal releases to ground water.
- A determination of the potential off-site migration of licensed radioactive material via ground water.
- An estimate of the radionuclides, activities, concentrations and resulting member of the public doses associated with off-site releases of licensed radioactive material via ground water.
- Other information as required by EN-RP-113.

6.7 Radiological Ground Water Protection Program Data Base Management

6.7.1 Ground water sample planning, scheduling, collection, tracking and analysis results data should be compiled, organized and reported in a data base.

6.7.2 The System Administrator shall manage the use, maintenance and testing of the data base.

6.7.3 The System Administrator shall perform the following as directed by the Radiological Ground Water Protection Coordinator:

- Establish data base administration parameters (such as sample types, analytes and required MDAs, well groupings and well base line data, etc.)
- Establish user accounts and privileges.
- Provide and document training to users, as required.
- Review, edit and import electronic data files.
- Retire superseded data and designate data for use.
- Perform database upgrades as required.
- Prepare periodic reports summarizing data trends and status.



7.0 INTERFACES

8.0 RECORDS AND DOCUMENTATION

8.1 Records

The following records resulting from this procedure shall be controlled and maintained in accordance with the IPEC records retention schedule.

8.2 Records of well inspections, maintenance, testing results, and Hydrogeological data.

8.3 Records of sample results.

8.4 Radiological Ground Water Protection Program reports.

8.5 Ground Water Data Management System electronic data.

8.6 The following records and reports will be generated in accordance with Ground Water Protection Program procedures.

- o Ground water well information in well design basis documents, for new and existing wells.
- o Listing of types of wells and sampling well status (e.g., Active, Inactive, Developed) and the applicable inspection frequencies.
- o Documentation for "Active" wells specifying minimum sampling and analysis frequencies.
- o Records of well installation and status change approvals.
- o Records of well inspections.
- o Hydrogeological data maintained in electronic or hard copy form
- o Action levels to ensure timely evaluation and reporting of results requiring investigations, notifications, intervention or other actions.
- o List of personnel qualified to plan and schedule ground water samples.
- o An annual summary report of ground water program activities and results.
- o Log or electronic database of samples collected and sample transfers by Ground Water Sampling Technician(s) to on-site or off-site sample recipients.
- o Results of REMP samples obtained in response to ground water monitoring, investigation, characterization, remediation or intervention (e.g., Sr-90 edible fish and invertebrates, Sr-90 sediment, etc.) reported and summarized in the annual REMP report.

9.0 ATTACHMENTS

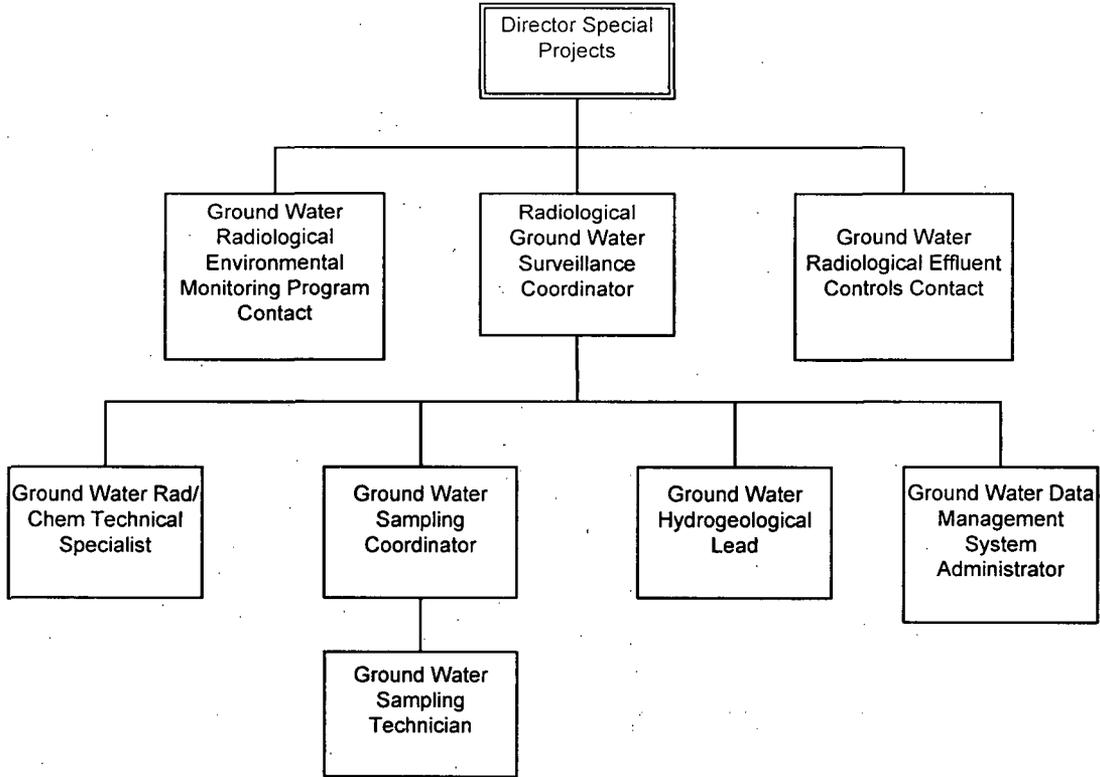
9.1 Example Ground Water Organization Chart

9.2 Example Ground Water Action Levels and Definitions



8.1

EXAMPLE GROUND WATER ORGANIZATION CHART





8.2

EXAMPLE GROUND WATER ACTION LEVELS

Definitions

Investigation Level – Level at which IPEC Management, NRC and stakeholders are notified and investigation/characterization measures are considered.

Trigger Level – Level at which IPEC Management, NRC and stakeholders are notified and remediation/intervention measures should be considered.

Well Type	Action Level 1		Action Level 2	
	H-3 pCi/L	Sr-90 pCi/L	H-3 pCi/L	Sr-90 pCi/L
Off-Site Boundary Wells (e.g., LaFarge)	N/A	N/A	500	1.5
On-Site Boundary Wells	500	1.5	5,000	2
River Front Boundary	Member of Public Dose >0.03 mrem Total Body Or >0.1 mrem Organ		Member of Public Dose >0.3 mrem Total Body Or >1 mrem Organ	
Indicator Wells	> 100% Increase		>300% Increase	



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Procedure Use Is:

- Continuous
- Reference
- Information

Control Copy: _____

Effective Date: _____

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NON-QUALITY RELATED

0-CY-2775 Revision 0

GROUND WATER SAMPLING

Note: 0-CY-2775 has been programmatically excluded from the ENN-LI-100 Process Applicability Determination Process.

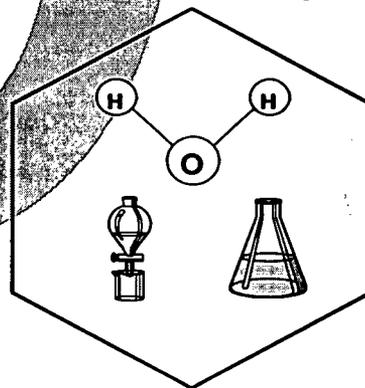
APPROVED BY:

Patrick Donahue November 2, 2006

Procedure Writer / Date

Procedure Owner / Date

Indian Point



Chemistry

NEW PROCEDURE

REVISION SUMMARY

1.0 REASON FOR REVISION

1.1 New procedure to support the Ground Water Monitoring Program.

2.0 SUMMARY OF CHANGES

N/A

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Attachments

ATTACHMENT 1 - GROUND WATER FIELD PARAMETER DATA SHEET

ATTACHMENT 2 - WELL SAMPLING PARAMETERS

1.0 PURPOSE

- 1.1 This procedure provides a method for collecting water samples from site investigation and long term monitoring wells using both the purge and the low flow sampling method.
- 1.2 This procedure applies to monitoring of ground water.

2.0 PRECAUTIONS AND LIMITATIONS

- 2.1 Each sample container or bottle will be new.
- 2.2 New latex or nitrile gloves will be used for each sample.
- 2.3 Sample bottles or sample collection containers should be placed on clean or protective surfaces such as drop cloths, plastic to protect against sample cross contamination.
- 2.4 Ensure contamination control measures are implemented to avoid cross contamination.
- 2.5 Used materials, including gloves, drop cloths, disposable hoses will be placed in a separate bag to prevent cross contamination.
- 2.6 Security tape or other methods of positive control will be used with sample containers after filling.
- 2.7 Any equipment that will be introduced into multiple wells will be decontaminated using a potable water rinse/scrub, followed by a detergent wash and final rinse.
- 2.8 Sampling should be done from low contamination wells to high contamination wells .
- 2.9 Water level measurement should be taken from a permanent reference point .
- 2.10 Any portable sampling device should be slowly and carefully lowered to the middle of the screened interval or slightly above the middle (e.g. 1-1.5 m below the top of a 3 m screen.)
- 2.11 IF dedicated pumps are not employed, THEN the placement of the pump intake should be positioned with a calibrated sampling pump hose sounded with a weighted tape or using a pre-measured hose. Lead weights should not be used.
- 2.12 IF an activity disturbs the material at the bottom of the well, THEN a minimum of 24 hours should be allowed prior to sampling the well to reduce turbidity interference.

- 2.13 For wells that can be pumped or bailed to dryness with the equipment being used, the well should be evacuated and allowed to recover prior to collecting a sample. IF the recovery rate is fairly rapid and time allows, THEN evacuation of more than one volume of water is preferred. IF recovery is slow, THEN sample the well upon recovery after one evacuation.
- 2.14 When using a bailer, be careful not to drop the bailer into the water causing turbulence.
- 2.15 When determining well depth, IF the total well depth is greater than 200 feet, THEN stretching of the tape must be considered.
- 2.16 Contact of the level instrument or pumping/sampling equipment with the bottom of the well may cause erroneous results due to suspension of particles.
- 2.17 The preservatives shall be transferred from the chemical bottle to the sample container using a disposable polyethylene pipet. The disposable pipet should be used only once and then discarded.

3.0 PREREQUISITES

3.1 Equipment and materials

- Latex or nitrile gloves
- Appropriate sample containers
- Drums / waste water containers
- Flow-through-cell, Horiba or equivalent combination meter and water level meter
- Concentrated acid
- Power supply
- Decontamination equipment
- Additional equipment and materials such as wrenches, sockets, knives, pumps, tubing, filtering equipment etc., may be needed for particular sampling rounds.

3.2 Perform the following as applicable:

- Review previous sample record for the sample locations.
- For wells not to be sampled by the low flow method, estimate the volume of water in the well for purging.
- IF in the field decontamination is required, THEN obtain 2 spray bottles. Fill one with de-ionized water and Alconox, or equivalent. Fill the second bottle with de-ionized water.

4.0 PROCEDURE

- 4.1 Stage all necessary equipment (e.g. pumps, tubing, meters, drums) at the well.
- 4.2 Prior to well purging and sample collection determine the depth to the ground water surface.
 - 4.2.1 Open the well cover and loosen the well cap carefully to relieve any built up pressure that may be present due to fluctuating hydraulic gradients.
 - 4.2.1.1 IF a relief of pressure is noted, THEN wait 15 minutes before taking water level measurements and record on the observations section of Attachment 7.1.
 - 4.2.2 Record the sample date and sampler's name(s) on Attachment 1.
 - 4.2.3 Turn on the water level meter and slowly lower the probe into the well until contact with the water surface has been made.
 - 4.2.4 Repeat raising and lowering the probe until the water level surface can be determined to the nearest one-hundredth of a foot (0.01') from the top of the riser pipe. Repeat twice to confirm the measurement.
 - 4.2.5 Record the well ID and depth to the water surface on Attachment 1.
- 4.3 Select Low Flow Well Purging OR Non-Low Flow Well Purging, as directed by Chemistry Management.
 - 4.3.1 IF Low Flow Well Purging is desired, THEN perform the following:
 - 4.3.1.1 Start the pump at its lowest speed setting and slowly increase the speed until water discharge occurs.
 - 4.3.1.2 Check the water level.
 - 4.3.1.3 Adjust pump speed until there is little or no water level drawdown (less than 0.3 feet).
 - 4.3.1.4 Monitor and record pumping rate and water level during purging on Attachment 1. Record any adjustments made to the pumping rate or water level within the well. Pumping rate is not to exceed 0.5 L/min.
 - 4.3.1.5 Maintain the water level above the pump intake level.

4.3.1.6 Monitor the field water quality parameters as follows:

- a) Pass the effluent from the pump through a flow-through-cell and measure parameters of interest for stabilization.
- b) Take measurements every 3 to 5 minutes.
- c) The parameters of interest are turbidity, dissolved oxygen (DO), specific conductance, temperature, pH, and Oxidation-Reduction Potential (ORP/Eh).
- d) Stabilization occurs when the last three consecutive readings show that turbidity and DO are within 10 percent, specific conductance and temperature are within 3 percent, pH readings are within 0.1 standard units and ORP/Eh is within +/-10 millivolts.
- e) Record the field parameters and instrumentation data on Attachment 1.

4.3.1.7 Once stability has been achieved, either remove or bypass the flow-through-cell from the effluent line.

4.3.1.8 Go to Step 4.5.

4.3.2 IF Non-Low Flow Well Purging is desired, THEN perform the following:

NOTE

Purging the well should be at a rate that does not cause aeration of the water column and does not exceed the development rate.

4.3.2.1 Start the pump and direct the discharge to the drum or other approved container or location.

4.3.2.2 Continue purging the well until 1.5 to 3 well water volumes has been discharged or as directed by the Ground Water Sampling Coordinator.

4.3.2.3 Record the time and approximate purge volume on Attachment 1.

- 4.4 Collect the samples.
- 4.4.1 Open / uncap a single container.
 - 4.4.2 Allow the flow of liquid down the inside wall of the container with minimum turbulence into the container. This technique minimizes loss of volatile materials from the sample through aeration.
 - 4.4.3 Cap, seal and label the sample container.
 - 4.4.4 Continue filling additional containers as necessary.
 - 4.4.5 Maintain physical / visual custody of the sample(s).
 - 4.4.6 Record the sample ID(s) on Attachment 7.1.
- 4.5 Upon completion of sampling at the well, secure the area.
- 4.5.1 Measure the well depth to the nearest 0.1 ft., at least twice to confirm the measurement.
 - 4.5.2 Remove sampling equipment from the well, if applicable.
 - 4.5.3 Replace well cover.
 - 4.5.4 Discard disposable materials.
 - 4.5.5 Return reusable materials to approved storage locations.
 - 4.5.6 IF necessary, THEN add sufficient reagent grade acid (typically 20 mL HNO₃) to the sample container to reduce the pH to <2 in the Chemistry Lab fume hood within 8 hours of sampling.
 - 4.5.7 Place security tape or equivalent on the container.
 - 4.5.8 Place samples in approved storage locations.
 - 4.5.9 IF required, THEN decon the sampling equipment as follows:
 - Spray the equipment with the de-ionized water andalconox soap solution, or equivalent.
 - Rinse the equipment with de-ionized water from a second spray bottle.
- 4.6 Update the database and any other logs with the collection information.
- 4.7 Forward records to the Ground Water Sampling Coordinator for filing.

5.0 REFERENCES**5.1 Commitment Documents**

None

5.2 Development Documents

5.2.1 EPA/540/S-95/504 "Low Flow (Minimal Drawdown) Ground-Water Sampling Procedure

5.2.2 EPA SOP#2007 "Groundwater Well Sampling"

5.2.3 EPA SOP# 2006 "Sampling Equipment Decontamination"

5.2.4 EPA 542-S-02-001 Gourn water Sampling Guidelines for Superfund and RCRA Project Managers"

5.2.5 SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods Chapter 3, Inorganic Analytes*

5.3 Interface Documents

5.3.1 IP-SMM-CH-105, Radiological Ground Water Protection Program

6.0 RECORDS AND DOCUMENTATION**6.1 Records**

The following records generated by this procedure shall be maintained in accordance with IPEC Records Retention Schedule.

6.1.1 Attachment 1, Ground Water Field Parameter Data Sheet

6.2 Documentation

NONE

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ATTACHMENT 1

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GROUND WATER FIELD PARAMETER DATA SHEET

Well ID: _____ Sample Date: _____ Sampled by: _____

Well Sample ID(s): _____ Pump set depth (ft): _____

Initial Distance to Water (ft): _____ Final Distance to Water (ft): _____

Time	Discharge Rate (mL/min)	Cumulative Purge Volume (gallons)	Depth to water (ft)	Turbidity (NTU)	DO (mg/L)	ORP/Eh (mv)	pH	Specific Conductance (uS/cm)	Temp (deg C)	Comments

Instrument Model / Serial Number(s): _____ Calibration Date(s): _____

Observations:

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ATTACHMENT 2

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WELL SAMPLING PARAMETERS

ANALYTICAL SUITE	MINIMUM VOLUME	SAMPLE CONTAINER	PRESERVATION TECHNIQUES	MAXIMUM HOLDING TIMES
PCBs	1 liter	Amber Glass	Cool to 4 ⁰ C	7/40 days ⁽¹⁾
Gamma Isotopic	4 liters	Polyethylene	Acidify to pH<2 with reagent grade HNO ₃	6 months
Sr-90	2 liters	Polyethylene	Acidify to pH<2 with reagent grade HNO ₃	6 months
HTD radionuclides	2 liters	Polyethylene	Acidify to pH<2 with reagent grade HNO ₃	6 months
H-3 and C-14	2 liters	Polyethylene	None, no headspace	6 months

(1) Extraction within 7 days, analyses within 40 days.