Contents: Groundwater Protection Contingency Plan

Effective Date: **September 2003**
Point of Contact: Groundwater Technical Lead

Section	Overview of Content (see section for full process)
Introduction	
1. Categorizing and Following up on Groundwater Monitoring Results	• Review groundwater-monitoring results. • Categorize results according to action levels. • Track, trend, and document results. • Notify management or regulators, when appropriate. • Initiate corrective action, as appropriate.

Exhibits
Groundwater Contingency Plan Flowchart
Guideline Action Levels for Contaminants of Potential Concern
Items to Address in Fact Sheet

Forms
Worksheet for Groundwater Contingency Plan: Category 2 Chain of Events and Checklist

Worksheet for Groundwater Contingency Plan: Category 3 Chain of Events and Checklist

Worksheet for Groundwater Contingency Plan: Category 4 Chain of Events and Checklist

Training Requirements and Reporting Obligations

This subject area does not contain training requirements.

This subject area contains reporting obligations. See the section on Categorizing and Following up on Groundwater Monitoring Results.

References

Community Involvement in Laboratory Decision-Making Subject Area

Corrective and Preventive Action Subject Area

Nonconformances, Identifying and Reporting Subject Area

Occurrence Reporting and Processing System (ORPS) Subject Area

Standards of Performance

Managers shall ensure that work is planned to prevent pollution, minimize waste, and conserve resources, and that work is conducted in a cost-effective manner that eliminates or minimizes environmental impact.

BNL shall provide timely, accurate, and appropriate information related to its activities to staff and to the public.

Management System

This subject area belongs to the **Environmental Management System** management system.

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Introduction: Groundwater Protection Contingency Plan

Effective Date: **September 2003**

Point of Contact: Groundwater Technical Lead

This subject area provides general guidance on responding to the detection of unexpected levels of contamination in wells that are owned and sampled by BNL. These wells include BNL potable water supply wells, Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and non-CERCLA groundwater monitoring wells. This plan is **not** applicable to off-site Suffolk County Department of Health Services (SCDHS) sentinel wells monitoring SCWA supply well fields. This subject area describes specific actions to be taken if validated/verified groundwater monitoring results are above certain off-normal and unusual occurrence action levels.

The primary goal of this subject area is to ensure that appropriate and timely corrective actions are taken to protect groundwater quality. This subject area provides a process for ensuring thorough evaluation of the situation and consistency in actions taken (as opposed to treating all results on a case-by-case basis). It includes steps for informing stakeholders about the monitoring results and any follow-up actions. This subject area will be critiqued and updated as necessary.

This subject area establishes a systematic approach to assess and report on new groundwater monitoring results that indicate the need for a dramatically different corrective action, present a real or potential threat to a potable water supply, present a significant threat to the sole source aquifer quality, constitute a regulatory violation, or pose an imminent threat to public health. Determining the action levels is complex. They are based on a review of regulatory standards, professional judgment, practical experience at BNL and other Department of Energy (DOE) sites, and input from our stakeholders. There is a matrix of information needed to select a proper action level. These include baseline results, regulatory standards, the type of well, well location, the type of contaminant, and analytical measurement uncertainty factors.

There are four stages to implementing this subject area: Discovery of Groundwater Contamination, Confirmation Sampling, Near-term Follow-up and Reporting, and Long-term Follow-up and Reporting. See the Groundwater Contingency Plan Flowchart for an overview of these processes.

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Subject Area: ***Groundwater Protection Contingency Plan***

1. Categorizing and Following up on Groundwater Monitoring Results

Effective: **September 2003**
Point of Contact: Groundwater Technical Lead

Applicability

This information applies to BNL staff (e.g., hydrogeologists, environmental scientists/engineers, and groundwater project managers) who monitor, analyze, and report groundwater quality monitoring data.

Required Procedure

The Categorizing and Following up on Groundwater Monitoring Results contains five subsections:

1.1 Categorizing Results
1.2 Category 1 Actions
1.3 Category 2 Actions
1.4 Category 3 Actions
1.5 Category 4 Actions

1.1 Categorizing Results

Groundwater Project Managers (PM) review new groundwater monitoring results regularly. The Groundwater Technical Lead must document the yearly use of the Groundwater Protection Contingency Plan through a memo written to the managers charged with groundwater protection.

Step 1	Review verified or validated analytical results.
Step 2	Categorize results in accordance with the exhibit Guideline Action Levels for Contaminants of Potential Concern. The timing of categorization must be consistent with reporting requirements under the Occurrence Reporting and Processing System (ORPS). See the Occurrence Reporting and Processing

	Processing System (ORPS). See the Occurrence Reporting and Processing System (ORPS) Subject Area for information.

1.2 Category 1 Actions

Category 1 results are routine, and not considered cause for undue concern. Hydrogeologists and Project Managers track, trend, and document these results.

Step 1	Continue with routine monitoring and reporting. **Note:** Routine review of groundwater data should be conducted within 30 days of receipt from the analytical laboratory. No additional actions are required.

1.3 Category 2 Actions

Category 2 results are above Category 1, and may have some level of uncertainty. When Category 2 results are discovered, the Project Manager (PM) tracks, trends, and documents the results. The PM does the following:

Step 1	Notify the line organization and Department of Energy (DOE) of the findings.
Step 2	Continue with routine reporting. Consider notifying the regulatory agencies as a courtesy.
Step 3	Continue monitoring with modifications, as necessary, and evaluate the next set of data more closely.
Step 4	Evaluate the source (e.g., potential failure in administrative/engineered controls).
Step 5	Document the action taken. The exhibit Worksheet for Groundwater Contingency Plan: Category 2 Chain of Events and Checklist can be used record these actions.

1.4 Category 3 Actions

Category 3 results

- Are unexpected;
- May indicate the need for a different corrective (remedial) action than the one currently in place or planned for;
- Indicate a potential threat to a potable well;
- Indicate a potentially significant, long-term threat to aquifer quality;
- Indicate a possibility for off-site migration; or
- Represent a significant increase over the baseline.

Step 1	The Project Manager (PM) can use the exhibit Worksheet for Groundwater Contingency Plan: Category 3 Chain of Events and Checklist to record the actions taken.

1.5 Category 4 Actions

Category 4 results

- Are unexpected and generally indicate a potential regulatory violation;
- Indicate the presence of a new significant source area;
- Require dramatically different changes to a current or planned corrective (remedial) action;
- Represent a significant increase over the baseline; or
- Indicate an imminent threat to human health.

When Category 4 results are discovered, this subject area is fully implemented.

Step 1	The Project Manager (PM) can use the exhibit Worksheet for Groundwater Contingency Plan: Category 4 Chain of Events and Checklist to record the actions taken.

References

Occurrence Reporting and Processing System (ORPS) Subject Area

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GUIDELINE ACTION LEVELS FOR CONTAMINANTS OF POTENTIAL CONCERN

This table will be updated periodically to reflect changes in the baseline values, and to address results of application and critiques. (An annual review will be conducted regarding the need for changes.)

Staff, the Technical Team, and the Management Team will need to address exceptions on a case-by-case basis, using their professional judgement.

For Categories 3, 2, or 1, it may be determined that a subset of checklist steps associated with a higher category are warranted. If analytical results are dropped into the next lower category, there should be a technical justification.

Standard = Federal and NYS Drinking Water Standard or NYS Ambient Water Quality Standard.

Primary constituents of concern at BNL would include the following. (Other constituents are regulated and may be sampled for.)

> *Radionuclides*: Gross alpha and beta, tritium, strontium-90, sodium-22, and cobalt-60.
>
> *VOCs*: 1,1,1-tricholorethane, trichloroethylene, tetrachloroethylene, 1,1-dichloroethylene, 1,1-dichloroethane, and carbon tetrachloride.

Examples. Based on the above, the following groundwater monitoring results for tritium (MDL = 350, NYSDWS=20,000 pCi/L) would have fallen into the following categories (with rationale in parentheses).

Category 3: 1999 HFBR results of 5,000,000 pCi/L (2.5x baseline, but increase in concentration and stakeholder sensitivities resulted in upper management, DOE, and regulatory agency notifications).

Category 4: 1997 BMRR results of 12,000 pCi/L (no baseline, < standard but no contamination expected).

Category 3: 1998 BLIP results of 14,000 pCi/L (7x baseline, < standard; concentration increase and location of well indicated significant on-going release).

Category 4:1997 initial HFBR results of 2, 000 pCi/L (no baseline, < standard but no contamination expected).

Category 2: 1999 initial AGS results of 5,800 pCi/L in new well locate downgradient of E-20 Catcher (no baseline, < standard concentration level was anticipated by modeling).

TYPE OF WELL	ACTION LEVEL			
	CATEGORY 4: Results fall into this category if they • Are unexpected and generally indicate a potential regulatory violation; • Indicate the presence of a new significant source area; • Require dramatically different changes to a current or planned corrective (remedial) action; • Represent a significant increase over the baseline; or • Indicate an imminent threat to human health. **Action:** Fully implement plan (immediate confirmation sampling, form Technical Team, convene Management Team, develop communications plan.) For potable wells, shutdown affected well(s), and notify users.	**CATEGORY 3:** Results fall into this category if they • Are unexpected; • May indicate the need for a different corrective (remedial) action than the one currently in place or planned for; • Pose a potential threat to a potable well; • Indicate a potentially significant, long-term threat to aquifer quality; • indicate a possibility for off-site migration; or, • Represent a significant increase over the baseline. **Action**: Implement category 3 elements of the plan (immediate confirmation sampling, convene Technical Team, notify Management Team as necessary, develop communications plan, as appropriate). For potable wells, possible shutdown of affected well(s).	**CATEGORY 2:** Results are above Category 1, and may have some level of uncertainty. **Action**: Track, trend, document as appropriate. Routine reporting, but consider option of courtesy notification to regulators. Continue monitoring with modifications as necessary. Evaluate next set of data more closely. Evaluate source (e.g., potential failure in administrative/engineered controls). Discuss next steps (including need for corrective action) w/ DOE counterpart.	**CATEGORY 1:** Results are routine, and not considered cause for undue concern. **Action**: "Watch" at the hydrogeologist/project manager level. Track, trend, document as appropriate. Routine reporting. Continue with routine monitoring. If source is unidentified, explore.
Contaminants in Potable Wells	> standard (post treatment).	> 50% but <100% of standard (post treatment).	>25% but <50% of standard (post-treatment).	> MDL but < 25% of standard (before or after treatment)
Contaminants in (non-CERCLA) active facility monitoring wells	> standard OR contamination is indication of a new release, unexpected release rate, previously unknown source, OR >10x baseline for existing plume.	>50% but <100% of standard, OR contamination is indication of unexpected release rate, OR >5x to 10x baseline for existing plume.	>25% but <50% of standard, OR >2x to 5x baseline for existing plume.	<25% of standard. Results are consistent with baseline.

Contaminants in CERCLA Monitoring Wells	Results are significantly above baseline (>10x) and unexpected. OR Results are inconsistent with the initial characterization of the area. OR Results indicate that current remediation system performance objectives or cleanup objectives may be affected. Significantly different corrective actions or modifications to remediation systems may be required. OR Results indicate significant or new contaminant indicating a new or unknown source.	Results are 5x to 10x baseline and are unexpected. OR Results indicate that current or planned remediation system performance objectives or cleanup objectives may be affected. Minor modifications to current or planned corrective actions may be required.	Results are >2x to <5x baseline but are consistent with the initial characterization of the area and are consistent with the knowledge of the source areas, groundwater flow directions, distribution of contaminants, and groundwater modeling.	<2x baseline.
Contaminants in monitoring wells located within (modeled) two-year capture zone of potable supply well	Meets Category 4 requirement for CERCLA or non-CERCLA wells, AND concentration is >5x standard AND there is a potential for immediate, near-term (< six-month) impact to potable well.	Meets Category 3 requirements for CERCLA wells, AND concentration is >5x standard AND estimated potential impact to potable well is > six-months but < one year away.	Meets Category 2 requirements for CERCLA wells, AND concentration is >10x standard AND estimated potential impact to potable well is > one year away.	Meets Category 1 requirements for CERCLA or non-CERCLA wells, AND concentration is <10x standard AND estimated potential impact to potable well is > one year away.

Brookhaven National Laboratory
Groundwater Protection Contingency Plan
Category 2 Chain of Events and Checklist

Project: _____

Date: _____

STEP # and STAGE #	ACTION	RESPONSIBLE POSITION	ACTION TAKEN, DATE AND TIME
Stage I (Discovery)			
1 Stage I	Receive and review verified or validated analytical results.	Project Manager[1]	
2 Stage I	Review existing and historical data for affected well, and wells in vicinity.	Project Manager	
3 Stage I	Categorize results in accordance Guideline Action Levels for Contaminants of Potential Concern.	Project Manager	
4 Stage I	Internal notification (verbal or e-mail) to Division Manager, Line Organization, and Technical Team[2] (existing or created for this situation) of the results.	Project Manager	
5 Stage I	Request that the analytical lab reanalyze any remaining sample.[3]	Project Manager	
6 Stage I	If the well is located within the two-year capture	Project Manager	

[1] This person may also be the program hydrogeologist, or may be potable water compliance subject matter expert.
[2] Technical Team generally consists of the project hydrogeologist/engineer, line organization subject matter experts, and DOE-BAO Groundwater Protect. Lead.
[3] Some analytical laboratories do not retain excess sample. If holding times have been missed, analytical results are qualified.

STEP # and STAGE #	ACTION	RESPONSIBLE POSITION	ACTION TAKEN, DATE AND TIME
	zone of a potable water supply well, initiate sampling of the potentially impacted supply well.		
7 Stage I	If the results are from a temporary well being used to characterize a known plume, proceed with CERCLA process in accordance with the provisions of the IAG, and **stop plan implementation** here.	Project Manager	
8 Stage I	Proceed to Stage II	Project Manager	
Stage II (Confirmation Sampling)			
9 Stage II	Consider collecting new samples from the affected well (and nearby wells, if appropriate). The next set of routine samples can be used for confirmation if they are scheduled to be collected within the next calendar quarter. In consultation with the technical team, Project Manager determines whether spilt samples should be sent to two different analytical laboratories.[4]	Project Manager	
10 Stage II	Ship samples to the analytical laboratories overnight (or hand deliver). Request expedited turnaround, with results to be faxed back to the Project Manager. Request reanalysis for chemical or category of concern only. Use same test method performed on original sample.	Project Manager	

[4] Decision can be based upon contaminant concentration, uncertainties associated with the analytical method, or historical QA performance of the laboratory that performed the initial analysis.

STEP # and STAGE #	ACTION	RESPONSIBLE POSITION	ACTION TAKEN, DATE AND TIME
	Request additional testing/methods on a case-by-case basis.		
11 Stage II	Results received by BNL and validated/verified. Determine whether new analytical data verify or contradict the original results. Proceed to appropriate sub Step 12.	Project Manager and QA SME	
12a Stage II	**Results**: **No detects** in any of the confirmatory samples: - Notify all parties who received prior notification. - Follow-up on any QA/QC issues associated with original results. - **PLAN IMPLEMENTATION STOPS HERE**—return to routine monitoring program. - Carefully review next set of routine monitoring data.	Project Manager	
12b Stage II	**Results Indicate Conclusive detect:** Confirms original result. If analytical results for split samples are contradictory, treat as confirmation of original results. - Technical Team meets to assess. - Determine whether results warrant change in Contingency Plan Category. - Notify (verbal / e-mail) Division Manager, Line Organization and CEGPA.	Project Manager, Technical Team, Level II Manager, ORPS Categorizer.	

[5] Report owner is the Department Chair/Division Manager associated with the well(s) involved. ORPS Categorizer and Project Manager provide support in preparing the report.

STEP # and STAGE #	ACTION	RESPONSIBLE POSITION	ACTION TAKEN, DATE AND TIME
	- Project Manager in consultation with the Division Manager completes the Checklist for Identifying Issues/Decisions That May Require Community Involvement in the Community Involvement in Laboratory Decision-Making Subject Area. Typically Category II results do not require the development of a Community Involvement/Communication Plan. - Consider preparing a Fact Sheet. Use the exhibit Items to Address in Fact Sheet. - Make recommendation regarding preliminary notification to regulators. - Determine ORPS category and reporting requirements. Typically, Category II Results are not ORPS reportable.[5] - Proceed to Stage III.		
Stage III (Near-term Follow-up and Reporting)			
13 Stage III	Technical Team attempts to identify the source of the contamination. Evaluate effectiveness of current engineered and operational controls at suspected source area.	Technical Team	

STEP # and STAGE #	ACTION	RESPONSIBLE POSITION	ACTION TAKEN, DATE AND TIME
14 Stage III	If the results for the new samples are contradictory or confirmatory, evaluate the need to collect and ship additional samples for analysis following the same protocols as used in Stage II. Implement as appropriate.	Project Manager	
15 Stage III	Consider using computer models or other methods, as appropriate, to evaluate potential impacts to receptor wells (e.g., potable supply wells).	Project Manager	
16 Stage III	Receive validated/verified analytical results from Stage III sampling, if conducted. Evaluate, and make recommendations or re-categorize, as appropriate. If consistent with Category I, return to routine sampling, but review next sample results carefully.	Project Manager and Technical Team	
17 Stage III	Technical Team prepares summary report. Report contains summary of results, conceptual model, and recommendations for any follow up actions. Follow up actions are added to ATS for tracking.	Technical Team	
Stage IV (Long-term Follow-up) – NONE			

ITEMS TO ADDRESS IN FACT SHEET

Title
Date, Time
Points-of-Contact

Summary (1 paragraph):

Background:

?? BNL has a comprehensive Environmental Management System (EMS) groundwater protection and monitoring program in place.

Present Facts and Status:

- Analytical results
- Depth to groundwater and direction of groundwater flow
- Sequence of events associated with these results
- What does the data say? Contaminants and levels (relative to applicable standards)
- What is level of uncertainty?
- What do we think the data mean?
- Where do we think the contamination came from?
- Provide maps if available
- Corrective Actions being taken

Acknowledge and Respond to Public Concerns:

- Will this affect existing public drinking water supplies (on or off site?)
- How fast is the contamination expected to move off site?

Conclusion:

- Summarize situation (up to 3 key points).
- Future Actions (next steps, more information). Include statements about what is being done.
- Arrange for or provide third-party validation/independent review, if appropriate.

Brookhaven National Laboratory
Groundwater Protection Contingency Plan
Category 3 Chain of Events and Checklist

Project: _____

Date: _____

STEP # and STAGE #	ACTION	RESPONSIBLE POSITION	ACTION TAKEN, DATE AND TIME
1 Stage I	Receive and review verified or validated analytical results.	Project Manager[1]	
2 Stage I	Review existing and historical data for affected well, and wells in vicinity.	Project Manager	
3 Stage I	Categorize results in accordance with the exhibit Guideline Action Levels for Contaminants of Potential Concern.	Project Manager	
4 Stage I	Internal notification (verbal or e-mail) to Division Manager, affected Line Organization, and Technical Team[2] (existing or created for this situation) of the results. Notify Management Team as appropriate to discuss path forward. Stress that information is preliminary, and as such is to be shared on a need-to-know basis only at this stage.	Project Manager and Division Manager	
5 Stage I	Request that the analytical laboratory reanalyze any remaining sample.[3]	Project Manager	

[1] This person may also be the program hydrogeologist, or may be potable water compliance subject matter expert.
[2] Technical Team generally consists of the project hydrogeologist/engineer, line organization subject matter experts, and DOE-BAO Groundwater Protect. Lead.
[3] Some analytical laboratories do not retain excess sample. If holding times have been missed, analytical results are qualified.

STEP # and STAGE #	ACTION	RESPONSIBLE POSITION	ACTION TAKEN, DATE AND TIME
6 Stage I	If results are within the two-year capture zone of a potable well, initiate sampling of potentially impacted supply well, notify PE Utilities Manager, and verify that appropriate water treatment system is in place). In consultation with Utilities Manager, determine whether supply wells should be taken out of service as a precaution.	Project Manager	
7 Stage I	As appropriate, the Division Manager and/or Management Team evaluates the need to inform regulatory agencies that unconfirmed results for "Constituent X" have been received, and that a confirmation round of sampling is going to be conducted immediately. Typically, regulatory agencies are notified of Category 3 results after confirmation of original results. Consideration should be given to communicating issue to internal and other external stakeholders.	BNL/DOE Management Team	
8 Stage I	Proceed to Stage II	Project Manager	
Stage II (Confirmation Sampling)			
9 Stage II	Resample the affected well (and nearby wells, if appropriate). In consultation with technical team, determine whether split samples need to be sent	Project Manager	

STEP # and STAGE #	ACTION	RESPONSIBLE POSITION	ACTION TAKEN, DATE AND TIME
	to two separate labs (and a third lab if necessary) for analysis.[4]		
10 Stage II	Ship samples overnight (or hand deliver). Request expedited turnaround, with results to be faxed back to the Project Manager. Request reanalysis for chemical or category of concern only. Use same test method as performed on original sample. Request additional testing/methods on a case-by-case basis.	Project Manager	
11 Stage II	Results received by BNL and validated/verified. Determine whether new analytical results verify or contradict the original results. Proceed to appropriate sub-Step 12.	Project Manager	
12a Stage II	**Results indicate no detects** in any of the confirmatory samples: - Notify <u>all</u> parties who received prior notification. - Return potable well to service, if applicable. - Follow-up on any QA/QC issues associated with first round of results. - **PLAN IMPLEMENTATION STOPS HERE**—return to routine monitoring program. - Carefully review next set of routine monitoring data.	Project Manager, Division Manager, Utilities Manager	

[4] Decision to analyze spit samples can be based upon contaminant concentration, uncertainties associated with the analytical method, or historical QA performance of the laboratory that performed the initial analysis.

STEP # and STAGE #	ACTION	RESPONSIBLE POSITION	ACTION TAKEN, DATE AND TIME
12b Stage II	**Results Indicate Conclusive detect -** Confirms original result. If analytical results for split samples are contradictory, treat as confirmation of the original results. - Technical Team meets to assess. - Determine whether results warrant change in Contingency Plan Category. - Notify all parties who received prior notification, including the Management Team. - Project Manager in consultation with the Division Manager completes the Checklist for Identifying Issues/Decisions That May Require Community Involvement in the Community Involvement in Laboratory Decision-Making Subject Area. - Prepare draft Fact Sheet. See the exhibit Items to Address in Press Release/Fact Sheet. - Make recommendation regarding preliminary or follow-up notification to regulators. - Determine ORPS category and reporting requirements.[5] Typically a Category 3 event is ORPS reportable. - Proceed to Stage III.	Project Manager, Division Manager, Utilities Manager if Potable Well. Fact sheet: Technical Team. Press release: CEGPA in consultation with Technical Team.	

[5] Report owner is the Department Chair/Division Manager associated with the well(s) involved. ORPS Categorizer and Project Manager provide support in preparing the report.

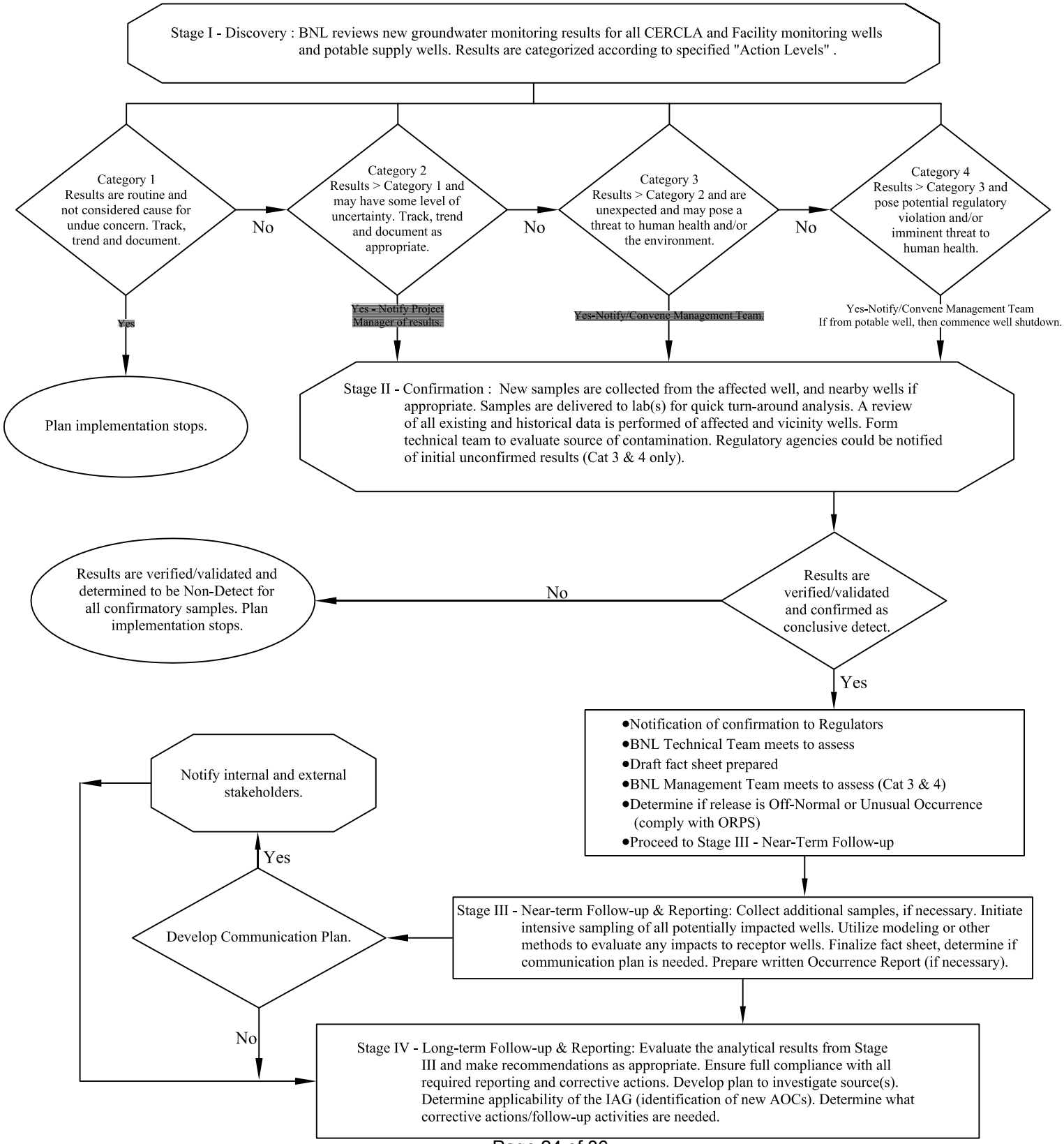
STEP # and STAGE #	ACTION	RESPONSIBLE POSITION	ACTION TAKEN, DATE AND TIME
Stage III (Short-term Follow-up and Reporting)			
13 Stage III	Technical Team attempts to identify the source of the contamination. Evaluate effectiveness of current engineered and operational controls at suspected source area.	Technical Team	
14 Stage III	Evaluate need to collect and ship additional samples, following the same protocols as Stage II. Implement as appropriate.	Project Manager Technical Team	
15 Stage III	Consider using groundwater model or other methods, as appropriate, and available data to evaluate potential impacts to receptor wells, etc.	Project Manager	
16 Stage III	Make recommendation to DOE on whether neighboring potable wells should be sampled.	Program Division Manager	
17 Stage III	Finalize fact sheet.	Project Manager	
18 Stage III	Determine whether a Communications Plan is needed for internal and external stakeholders, including: employees, regulatory agencies, elected officials, Brookhaven Executive Roundtable, Community Advisory Committee, and other key stakeholders.	Management Team	
Stage IV (Long-term Follow-up)			
19 Stage IV	All follow up actions defined in the implementation of Stage IV shall be entered into ATS for tracking completion.	Project Manager	

STEP # and STAGE #	ACTION	RESPONSIBLE POSITION	ACTION TAKEN, DATE AND TIME
20 Stage IV	Receive validated/verified analytical results from Stage III of sampling (if conducted). Evaluate. Make recommendations as appropriate.	Project Manager Technical Team	
21 Stage IV	Revisit compliance issues associated with the discovery. Ensure full compliance with all required reporting and corrective actions, including complying with requirements in the Nonconformances, Identifying and Reporting and Corrective and Preventive Action Subject Areas.	Program Division Manager	
22 Stage IV	Develop a plan to address long-term follow-up investigations and remedial measures (i.e., investigate source, monitoring, engineering or operational controls, source and/or groundwater remediation). Evaluate whether source can be isolated. Estimate quantity of release, time and location of release.	Project Manager Technical Team	
23 Stage IV	Determine applicability of IAG and need to add new Areas of Concern.	EM Manager and DOE	
24 Stage IV	Determine what corrective/additional follow-up activities are needed. For example, for man-made radiological results <standard in potable wells, evaluate well shutdown.	Project Manager	
25 Stage IV	Identify funding source (e.g., a "Contingency Fund" for Category 4 or 3), prioritize and schedule for follow-up activities.	Program Division Manager and Deputy Dir. for Operations	
26 Stage IV	Prepare technical report, as necessary.	Project Manager	

STEP # and STAGE #	ACTION	RESPONSIBLE POSITION	ACTION TAKEN, DATE AND TIME
27 Stage IV	Explore remedy options. Evaluate potential long-term impact to water supply if potable well is temporarily or permanently removed from service (e.g., explore alternative sources of water such as connection to municipal water supply).	Utilities Manager if potable water supply well and/or Program Division Manager	
28 Stage IV	Communicate updates to stakeholders as necessary	Program or Project Manager CEGPA	
29 Stage IV	Letter report to file with maps, to close out, as necessary	Project Manager	
30 Stage IV	Critique Contingency Plan and revise as necessary.	Program Division Manager and Team	

BNL GROUNDWATER CONTINGENCY PLAN

- Provides guidance on responding to the detection of unexpected levels of contamination in BNL groundwater monitoring and water supply wells.
- Actions are organized into four stages: Discovery, Confirmation, Near-term Follow-up and Reporting, and Long-term Follow-up



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Brookhaven National Laboratory
Groundwater Protection Contingency Plan
Category 4 Chain of Events and Checklists

Project: _____

Date: _____

STEP # and STAGE #	ACTION	RESPONSIBLE POSITION	ACTION TAKEN, DATE AND TIME
1 Stage I	Receive and review verified or validated analytical results.	Project Manager[1]	
2 Stage I	Review existing and historical data for affected well, and wells in vicinity.	Project Manager	
3 Stage I	Categorize results in accordance with the exhibit Guideline Action Levels for Contaminants of Potential Concern.	Project Manager	
4 Stage I	Internal notification (verbal or e-mail) to Division Manager, affected Line Organization, and Technical Team[2] (existing or created for this situation) of the results. Notify Management Team as appropriate to discuss path forward. Stress that information is preliminary, and as such is to be shared on a need-to-know basis only at this stage.	Project Manager and Division Manager	
5 Stage I	Request that the analytical laboratory reanalyze any remaining sample.[3]	Project Manager	

[1] This person may also be the program hydrogeologist, or may be potable water compliance subject matter expert.
[2] Technical Team generally consists of the project hydrogeologist/engineer, line organization subject matter experts, and DOE-BAO Groundwater Prot. Lead.
[3] Some analytical laboratories do not retain excess sample. If holding times have been missed, analytical results are qualified.

STEP # and STAGE #	ACTION	RESPONSIBLE POSITION	ACTION TAKEN, DATE AND TIME
6 Stage I	If the results are from a potable well sample, immediately notify PE Utilities Manager and initiate formal lock out/tag out procedures to isolate the well from the drinking water supply system.	Project Manager and PE Utilities Manager	
7 Stage I	If results are within the two-year capture zone of a potable well, initiate sampling of potentially impacted supply well, notify PE Utilities Manager, and verify that appropriate water treatment system is in place. In consultation with Utilities Manager, determine whether supply wells should be taken out of service as a precaution.	Project Manager	
8 Stage I	As appropriate, the Division Manager and/or Management Team evaluates the need to inform regulatory agencies that unconfirmed results for "Constituent X" have been received, and that a confirmation round of sampling is going to be conducted immediately. Regulatory agencies should be notified of Category 4 results after confirmation of original results. Immediate regulatory agency notification is required if contaminant is detected in a potable supply well (post treatment sample) at a concentration >DWS (indicating a potential imminent health threat). Consideration should be given to communicating issue to internal and other external stakeholders.	BNL/DOE Management Team	
9 Stage I	Proceed to Stage II	Project Manager	

STEP # and STAGE #	ACTION	RESPONSIBLE POSITION	ACTION TAKEN, DATE AND TIME
Stage II (Confirmation Sampling)			
10 Stage II	Resample the affected well (and nearby wells, if appropriate). Split samples should be sent to two separate labs (and a third lab if necessary) for analysis.[4]	Project Manager	
11 Stage II	Ship samples overnight (or hand deliver). Request expedited turnaround, with results to be faxed back to the Project Manager. Request reanalysis for chemical or category of concern only. Use same test method as performed on original sample. Request additional testing/methods on a case-by-case basis.	Project Manager	
12 Stage II	Results received by BNL and validated/verified. Determine whether new analytical results verify or contradict the original results. Proceed to appropriate sub-Step 13.	Project Manager	
13a Stage II	**Results indicate no detects** in any of the confirmatory samples: - Notify <u>all</u> parties who received prior notification. - Return potable well to service, if applicable. - Follow-up on any QA/QC issues associated with first round of results. - **PLAN IMPLEMENTATION STOPS**	Project Manager, Division Manager, Utilities Manager	

[4] Decision to analyze spit samples can be based upon contaminant concentration, uncertainties associated with the analytical method, or historical QA performance of the laboratory that performed the initial analysis.

STEP # and STAGE #	ACTION	RESPONSIBLE POSITION	ACTION TAKEN, DATE AND TIME
	HERE—return to routine monitoring program. - Carefully review next set of routine monitoring data.		
13b Stage II	**Results Indicate Conclusive detect -** Confirms original result. If analytical results for split samples are contradictory, treat as confirmation of the original results. - Technical Team meets to assess. - Determine whether results warrant change in Contingency Plan Category. - Notify all parties who received prior notification, including the Management Team and regulatory agencies. - Project Manager in consultation with the Division Manager completes the Checklist for Identifying Issues/Decisions That May Require Community Involvement in the Community Involvement in Laboratory Decision- Making Subject Area. - Prepare draft Fact Sheet. See the exhibit Items to Address in Fact Sheet. - Determine ORPS category and reporting requirements.[5] Typically a Category 4 event is ORPS reportable.	Project Manager, Division Manager, Utilities Manager if Potable Well. Fact sheet: Technical Team. Press release: CEGPA in consultation with Technical Team.	

[5] Report owner is the Department Chair/Division Manager associated with the well(s) involved. ORPS Categorizer and Project Manager provide support in preparing the report.

STEP # and STAGE #	ACTION	RESPONSIBLE POSITION	ACTION TAKEN, DATE AND TIME
	- Proceed to Stage III.		
Stage III (Short-term Follow-up and Reporting)			
14 Stage III	Technical Team attempts to identify the source of the contamination. Evaluate effectiveness of current engineered and operational controls at suspected source area.	Technical Team	
15 Stage III	Evaluate need to collect and ship additional samples, following the same protocols as Stage II. Implement as appropriate.	Project Manager Technical Team	
16 Stage III	Consider using groundwater model or other methods, as appropriate, and available data to evaluate potential impacts to receptor wells, etc.	Project Manager	
17 Stage III	Make recommendation to DOE on whether neighboring potable wells should be sampled.	Program Division Manager	
18 Stage III	Finalize fact sheet.	Project Manager	
19 Stage III	Determine whether a Communications Plan is needed for internal and external stakeholders, including: employees, regulatory agencies, elected officials, Brookhaven Executive Roundtable, Community Advisory Council, and other key stakeholders.	Management Team	
Stage IV (Long-term Follow-up)			

STEP # and STAGE #	ACTION	RESPONSIBLE POSITION	ACTION TAKEN, DATE AND TIME
20 Stage IV	All follow up actions defined in the implementation of Stage IV shall be entered into ATS for tracking completion.	Project Manager	
21 Stage IV	Receive validated/verified analytical results from Stage III of sampling (if conducted). Evaluate. Make recommendations as appropriate.	Project Manager Technical Team	
22 Stage IV	Revisit compliance issues associated with the discovery. Ensure full compliance with all required reporting and corrective actions, including complying with requirements in the Nonconformances, Identifying and Reporting and Corrective and Preventive Action Subject Areas.	Program Division Manager	
23 Stage IV	Develop a plan to address long-term follow-up investigations and remedial measures (i.e., investigate source, monitoring, engineering or operational controls, source and/or groundwater remediation). Evaluate whether source can be isolated. Estimate quantity of release, time and location of release.	Project Manager Technical Team	
24 Stage IV	Determine applicability of IAG and need to add new Areas of Concern.	EM Manager and DOE	
25 Stage IV	Determine what corrective/additional follow-up activities are needed. For example, for man-made radiological results <standard in potable wells, evaluate well shutdown.	Project Manager	

STEP # and STAGE #	ACTION	RESPONSIBLE POSITION	ACTION TAKEN, DATE AND TIME
26 Stage IV	Identify funding source (e.g., a "Contingency Fund" for Category 4 or 3), prioritize and schedule for follow-up activities.	Program Division Manager and Deputy Dir. for Operations	
27 Stage IV	Prepare technical report, as necessary.	Project Manager	
28 Stage IV	Explore remedy options. Evaluate potential long-term impact to water supply if potable well is temporarily or permanently removed from service (e.g., explore alternative sources of water such as connection to municipal water supply).	Utilities Manager if potable water supply well and/or Program Division Manager	
29 Stage IV	Communicate updates to stakeholders, as necessary.	Program/Project Manager, and CEGPA	
30 Stage IV	Letter report to file with maps, to close out, as necessary	Project Manager	
31 Stage IV	Critique Contingency Plan and revise as necessary.	Program Division Manager and Team	

Subject Area: ***Groundwater Protection Contingency Plan***

Definitions: Groundwater Protection Contingency Plan

Effective Date: **September 2000**

Point of Contact: Groundwater Technical Lead

Term	Definition
action level	The validated analytical result level for a specific constituent that triggers implementation of this subject area.
Ambient Water Quality Standard (AWQS)	Class GA standards in 6NYCRR Parts 700-705. Results from groundwater surveillance wells are compared to these standards.
baseline	The highest value in a range of historical data (taking uncertainty into account) for that particular constituent in that particular well or set of wells monitoring a plume or portion of a plume. If historical data are not available, the expected or calculated/modeled level is used (based on other monitoring data, knowledge of sources).
category	Four categories of results are defined, each with a different set of associated actions. See the exhibit Guideline Action Levels for Contaminants of Potential Concern for the criteria for each category.
Drinking Water Standard (DWS)	Safe Drinking Water Act (SDWA), 40 CFR 141 and 143 and Part 5 of the NYS Sanitary Code. Potable well results are compared to these standards.
Management Team	The Management Team is convened when analytical results fall into Category 4, which triggers full implementation of this subject area. A subset of actions in the plan (including convening the Management Team) may be implemented for Category 3 results (at the discretion of the Technical Team). The Management Team's function is to do a "situation analysis" and evaluate the seriousness of the situation, and then to ensure implementation of this subject area with any modifications they deem appropriate (including authorizing exceptions), based on the specifics of the case. They will determine what additional information/action is needed. They will decide who else needs to be brought in to provide support or information (e.g., program hydrogeologist, legal, both the Environmental Restoration [ER] and Environment Science [ES] Division Managers). Each Management Team member must assign an alternate who is delegated authority

	to act. **Team members:** Deputy Director for Operations - Management Team Lead • Assistant Director for Environmental Management • Assistant Director for ESH&Q • Assistant Director for Facility Operations • Assistant Director for Community Involvement, Government and Public Affairs (CIGPA) Program • (ER or ES) Division Manager Chairperson of the affected line organization (if applicable) • DOE-BHG Assistant Area Manager or Senior Environmental Advisor (as applicable)
potable (water supply) well	A well used to supply drinking water. Certain results are subject to Safe Drinking Water Act (SDWA) notification and action requirements.
production well	A well used to supply water for (non-potable) building and equipment heating and cooling. Analytical results from production wells are compared to the NYS Ambient Water Quality Standards (AWQS), and their action levels are the same as those for existing monitoring wells onsite (Non-CERCLA).
Technical Team	The Technical Team is composed of subject matter experts. They calculate the numerical values for the exhibit Guideline Action Levels for Contaminants of Potential Concern. They make the initial determination of the appropriate Category results fall into. The Technical Team evaluates source areas and potential impacts to groundwater quality. For Category 3 and 4 results, they prepare summary level supporting documentation that the Management Team might need to make an informed decision (e.g., evaluation of baseline conditions and maps) For Category 2 or 3 results, the Technical Team evaluates potential sources of contamination, the appropriateness of the existing monitoring program, and the need for follow-up investigation. They use their professional judgment to make decisions on which procedures of this subject area are appropriate for response to Category 1, 2, or 3 results. **Team members:** Project Manager - Technical Team Lead • Hydrogeologists from ER and ES (may be Project Manager) • DOE Groundwater Protection Lead • ER or ES Division Manager (depending on the monitoring program) • Facility Technical Expert (who can provide information on facility operations) • Potable Water Compliance Subject Matter Expert, for potable wells
validation	Checking the quality assurance/control of analytical results, e.g., ensuring that the chain of custody is complete, tests were conducted properly according to the right method, and holding times were met. "Usability" is another check, done after the data are validated, to determine (from a scientific standpoint) whether the data are representative and support the project-specific data quality objectives.

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Revision History: Groundwater Protection Contingency Plan

Point of Contact: Groundwater Technical Lead

Revision History of this Subject Area

Date	Description	Management System
September 2003	The subject area was reformatted to make it easier to understand and implement. Its scope was not changed. • The title of section 1 was changed from Stage I. Discovery of Groundwater Contamination to Categorizing and Following up on Groundwater Monitoring Results. • The sections on Confirmation Sampling; Near-term Follow-up and Reporting; and Long-term Follow-up and Reporting were deleted and incorporated into the section on Categorizing and Following up on Groundwater Monitoring Results. • The Worksheet for BNL Groundwater Contingency Plan: Chain of Events and Checklist was replaced by separate worksheets for recording category 2, 3 , and 4 results.	Environmental Management

September 2000	This is a new subject area providing guidelines for the specific actions to be taken if validated groundwater monitoring results are above certain off-normal and unusual occurrence trigger levels.	Environmental Management

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