Entergy	CONDITION REPORT	CR-PNP-2009-00879

Originator: Scheffer,Jacob J
Originator Group: Tech Chemistry Mgmt PNP
Supervisor Name: McElhinney,Thomas F
Discovered Date: 03/12/2009 11:29

Originator Phone: 8323
Operability Required: N
Reportability Required: N
Initiated Date: 03/12/2009 11:35

Condition Description:

In late 2008 an assessment of the nuclear fleet?s compliance with the NEI Groundwater Protection Initiative (GPI) was performed. This assessment identified gaps in each site?s compliance with NEI guidance on the GPI. The gaps identified at Pilgrim are as follows:

a) Pilgrim needs to perform additional risk assessments of SSCs which have the potential to leak radioactive liquids
b) Pilgrim needs to prepare a Groundwater Monitoring Plan, a Buried Pipe Monitoring and Inspection Plan and a remedial Action Plan.
c) Although four wells were installed in 2007, the linear orientation of the wells prevents the calculation of hydraulic gradients and reliable interpretation of groundwater flow directions.
d) The lack of deep monitoring wells prevents monitoring of potential contaminant migration within the deeper geological sand unit at the site, as well as prevents the calculation of vertical groundwater gradients and flow directions.
e) The lack of sentinel wells prevents a determination of the impact of the permeable backfill around buildings and SSCs.

Immediate Action Description:

Initiated URT form to request funding for the installation of additional wells.

Suggested Action Description:

Engineering should perform a risk assessment of Systems, Structures and Components which have the potential to release radioactive liquids to the groundwater.
Prepare a formal Groundwater Monitoring Plan, a Buried Pipe Monitoring and Inspection Plan and a remedial Action plan.
Install additional monitoring wells and sentinel wells. The contractor that performed the assessment has recommended that six additional wells be installed.

TRENDING (For Reference Purposes Only):

Trend Type	Trend Code
AD	CYMG
HEP FACTOR	P
REPORT WEIGHT	1
INPO BINNING	CY1
KEYWORDS	KW-ENVIRONMENTAL MONITORING
INPO BINNING	CO2

L-6

2010-May-03 12:57 PM Pilgrim Resident Office 5087472246 12/47

Entergy	ADMIN	CR-PNP-2009-00879

Initiated Date: 3/12/2009 11:35 **Owner Group :**Tech Chemistry Mgmt PNP

Current Contact: +

Current Significance: C

Closed by:

Summary Description:

In late 2008 an assessment of the nuclear fleet?s compliance with the NEI Groundwater Protection Initiative (GPI) was performed. This assessment identified gaps in each site?s compliance with NEI guidance on the GPI. The gaps identified at Pilgrim are as follows:

a) Pilgrim needs to perform additional risk assessments of SSCs which have the potential to leak radioactive liquids
b) Pilgrim needs to prepare a Groundwater Monitoring Plan, a Buried Pipe Monitoring and Inspection Plan and a remedial Action Plan.
c) Although four wells were installed in 2007, the linear orientation of the wells prevents the calculation of hydraulic gradients and reliable interpretation of groundwater flow directions.
d) The lack of deep monitoring wells prevents monitoring of potential contaminant migration within the deeper geological sand unit at the site, as well as prevents the calculation of vertical groundwater gradients and flow directions.
e) The lack of sentinel wells prevents a determination of the impact of the permeable backfill around buildings and SSCs.

Remarks Description:

Closure Description:

Entergy	ASSIGNMENTS	CR-PNP-2009-00879

Version: 1

Significance Code: C

Classification Code: CORRECT/ADDRESS

Owner Group: Tech Chemistry Mgmt PNP

Performed By: Buckley,Patricia A 03/18/2009 12:33

Assignment Description:

Responsible Manager - Scheffer

Entergy	CORRECTIVE ACTION	CR-PNP-2009-00879

CA Number: 1

	Group	Name
Assigned By:	CRG Mgmt PNP	
Assigned To:	Tech Chemistry Mgmt PNP	Scheffer,Jacob J
Subassigned To :		

Originated By:	Buckley,Patricia A	3/18/2009 12:09:38
Performed By:	Scheffer,Jacob J	3/30/2009 17:46:11
Subperformed By:		
Approved By:		
Closed By:	Scheffer,Jacob J	3/30/2009 17:46:11

Current Due Date: 04/01/2009 **Initial Due Date:** 04/01/2009

CA Type: DISP - CA

Plant Constraint: NONE

CA Description:

NOTE: This CA cannot be extended without permission from the GMPO.
"CRG has assigned you as the Responsible Manager to ensure the described condition is corrected in accordance with EN-LI-102. Validate the problem statement and determine corrective actions as needed to resolve the adverse condition(s).

If a CR/CA is closed to an existing CR, concurrence first needs to be obtained from the owner of the CR remaining open. A CA needs to be assigned to the owner of the CR remaining open stating that the CR has been closed to the CR remaining open and that the CR being closed must be addressed within the CR remaining open.

Response:

The problem statement has been validated. Corrective Action #2 to this CR has been issued to complete the updated hydrogeological study and determine the recommended final locations for the additional wells recommended to comply with NEI Guidance.

LO-HQNLO-2008-00048 CA#47 due 5/12/09 addresses the issue of obtaining funding for installation of additional wells.

LO-HQNLO-2008-00048 CA#55 due 5/26/09 requires that an asset management plan be developed with installation dates for the wells.

LO_HQNLO-2008-00048 CA#9 due 6/23/09 requires the development of a site-specific basis document.

This CR should not be closed until the LOs are closed.

Subresponse :

Closure Comments:

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Entergy	CORRECTIVE ACTION	CR-PNP-2009-00879

CA Number: 2

	Group	Name
Assigned By:	Tech Chemistry Mgmt PNP	Scheffer,Jacob J
Assigned To:	Tech Chemistry Mgmt PNP	Scheffer,Jacob J
Subassigned To :		

Originated By:	Scheffer,Jacob J	3/30/2009 17:31:54
Performed By:	Scheffer,Jacob J	9/8/2009 12:53:08
Subperformed By:		
Approved By:		
Closed By:	Scheffer,Jacob J	9/8/2009 12:53:08

Current Due Date: 09/10/2009 **Initial Due Date:** 09/10/2009

CA Type: ACTION

Plant Constraint: NONE

CA Description:

Obtain funding approval and initiate hydrogeological assessment to determine final locations for recommended groundwater monitoring wells to comply with NEI guidance.

Response:

Funding was approved and the updated hydrogeological study has been initiated under contract #10247648.

Corrective Action #3 under this CR with a due date of November 30, 2009 has been generated to track completion of the hydrogeological assessment.

Subresponse :

Closure Comments:

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Entergy	CA DUE DATE EXTENSION	CR-PNP-2009-00879

Corrective Action : CR-PNP-2009-00879 CA-00002

Version: 1 **Approved:** ☑

Requested Duedate: 11/15/2009 **Previous Duedate:** 08/31/2009

Requested By: Scheffer,Jacob J 08/20/2009

Approved By: McElhinney,Thomas F 08/20/2009

Request Description:

It is acceptable to extend the duedate since it will not impact unit operations and it will not delay the installation of the wells since that is not scheduled to occur until next year (2010).

It is necessary to extend the date since due to resource issues the contract for the project was not issued until August 17th., and the project will not be able to get started until the first week in September. Since the project will take approximately two months to complete the due date must be extended.

Approved Description:

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Entergy	CORRECTIVE ACTION	CR-PNP-2009-00879

CA Number: 3

	Group	Name
Assigned By:	Tech Chemistry Mgmt PNP	Scheffer,Jacob J
Assigned To:	Tech Chemistry Mgmt PNP	Scheffer,Jacob J
Subassigned To :		

Originated By:	Scheffer,Jacob J	9/8/2009 12:48:44
Performed By:	Scheffer,Jacob J	12/29/2009 14:35:28
Subperformed By:		
Approved By:		
Closed By:	Scheffer,Jacob J	12/29/2009 14:35:28

Current Due Date: 12/30/2009 **Initial Due Date:** 12/30/2009

CA Type: ACTION

Plant Constraint: NONE

CA Description:

Complete updated hydrogeological assessment to determine final locations for additional recommended NEI GPI monitoring wells.

Response:

Updated hydrogeological report has been completed and is attached.

This CA can be closed.

Subresponse :

Closure Comments:

Attachments:

Response Description
Updated Hydrogeological Report

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Attachment Header

Document Name:

untitled

Document Location

Response Description

Attach Title:

Updated Hydrogeological Report

GZA
GeoEnvironmental, Inc.

Engineers and
Scientists

December 29, 2009
File No. 09.0025576.20

Mr. Jacob Scheffer
Entergy Nuclear Operations, Inc.
Pilgrim Nuclear Power Station
600 Rocky Hill Road
Plymouth, MA 02360

Re: Summary Report of Findings
Additional SSC and Work Place Practices Review
In Support of Groundwater Protection Initiative at
Pilgrim Nuclear Power Station
Plymouth, Massachusetts

4 Free Street
Portland, Maine
04101
207-879-9190
207-879-0099 fax
www.gza.com

Dear Jay:

GZA GeoEnvironmental, Inc. (GZA) is pleased to submit to Entergy Nuclear Operations, Inc. (Entergy), the attached report of our supplemental risk assessment[1] activities at the Pilgrim Nuclear Power Station (PNPS) in Plymouth, Massachusetts. Please note that a work plan for installation of proposed groundwater monitoring wells at the plant is provided as **Appendix B.**

We hope this report is consistent with your needs and expectations. However, please do not hesitate to call if you have any questions. We thank you for this opportunity to provide additional services to Entergy and PNPS.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

John R. Paquin, P.G.
Senior Project Manager

Michael M. Shaw, LSP
Principal

Matthew J. Barvenik, LSP
Senior Principal - Consultant/Reviewer

JRP/MMS/MJB/itm

[1] The term Risk Assessment is used in this report in a manner consistent with that described in Objective 1.2 of the NEI 07-07 Industry Ground Water Protection Initiative – Final Guidance Document.

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6.0	REVIEW OF HISTORICAL TRANSFORMER RELEASE REPORT	4
7.0	WORK PLAN FOR INSTALLATION OF ADDITIONAL MONITORING WELLS	4

TABLE

Table 1 - Additional Risk Assessment Activities

FIGURE

Figure 1 - Site Plan Showing Proposed Groundwater Monitoring Well Locations

APPENDICIES

Appendix A Report and Project Limitations
Appendix B Work Plan

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1.0 EXECUTIUVE SUMMARY

This report presents a summary of the findings of additional risk assessment[1] and data review in support of the ongoing Groundwater Protection Initiative (GPI) activities at the Pilgrim Nuclear Power Station (PNPS) located in Plymouth, Massachusetts. In addition, this report includes a work plan for installation of additional groundwater monitoring wells at the PNPS site. The proposed groundwater monitoring wells, combined with those already existing at the plant, are expected to satisfy PNPS's requirement for establishment of a groundwater monitoring network at the site and development of a groundwater monitoring plan. This design-phase work was performed to address data gaps identified during previous GPI related studies at the site, as follows:

The results of the additional risk assessment are consistent with the previous studies. The only work place practices identified as having a potential to result in direct contaminant pathways to the ground were related to the Condensate Storage Tanks and the use of buried piping.

A total of six additional groundwater monitoring wells are proposed for the PNPS site to fill identified data gaps. These wells include both perimeter wells and sentinel wells. The combined data from the existing and proposed new wells will be used to assess horizontal and vertical groundwater flow gradients as well as contaminant migration pathways in groundwater.

2.0 INTRODUCTION

GZA has prepared this summary report of our findings related to recent additional studies performed in support of the GPI at PNPS in Plymouth, Massachusetts. This work was performed in accordance with our executed contract with Entergy dated August 6, 2009[2].

Specifically, this report includes:

- A project background;
- Supplemental risk assessment activities, including an evaluation of certain work place practices associated with radionuclide contaminated materials; and
- A work plan for installation of additional groundwater monitoring wells at the site.

Please note that this report is subject to the limitations provided in **Appendix A.**

3.0 BACKGROUND

In 2007, GZA performed an initial (Phase I) hydrogeologic assessment of the PNPS in support of Entergy's fleet-wide corporate GPI program. This initial work was performed in general accordance with the then evolving GPI guidelines being developed by the Nuclear Energy Institute (NEI) and focused on assessing potential radionuclide pathways in groundwater from impacted or potentially impacted, plant systems, structures, and components (SSCs). The

[1] The term Risk Assessment is used in this report in a manner consistent with that described in Objective 1.2 of the NEI 07-07 Industry Ground Water Protection initiative – Final Guidance Document.

[2] Entergy Short Form Contract No. 10247648, Effective date August 6, 2009.

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findings of GZA's initial GPI study are presented in a report dated January 30, 2007 (Phase I Report)[3].

Subsequent to the completion of the Phase I study:

- NEI issued the final GPI guidance document number 07-07[4];
- PNPS/Entergy installed additional groundwater monitoring wells at the site along the shore of Cape Cod Bay;
- PNPS/Entergy conducted groundwater monitoring of the new wells and several pre-existing wells;
- Entergy retained GZA to review the available GPI data for the PNPS site (as part of a fleet-wide GPI review) relative to compliance with the final NEI 07-07 guidance document. The findings of GZA's review are presented in a report dated April 2009 (Phase II report)[5]; and
- GZA was retained by Entergy to update a pre-existing summary matrix of GPI data for Entergy's fleet of nuclear power plants, including PNPS. This matrix was updated to include summaries of GZA's Draft Phase II reports, as well as conceptual locations and rationale for potential additional monitoring wells required to fill identified data gaps. This matrix and the associated potential well location maps were transmitted to Entergy on December 31, 2008.

The current study was performed to: 1) supplement the information presented in the 2007 Phase I report and the 2009 Phase II report; and 2) develop a plan for the installation of additional permanent groundwater monitoring wells at the PNPS site.

4.0 OBJECTIVES

The specific objectives of this project were to:

- Assist PNPS with supplementing the existing engineering evaluation of SSCs at the site with regard to evaluating potential contaminant pathways to groundwater;
- Assist PNPS with identification and assessment of workplace practices at the station relative to the potential for releases of radionuclides to groundwater;
- Reassess and refine the proposed locations for additional monitoring wells required to comply with the NEI 07-07 guidance document based on available data; and
- Prepare a work plan for installation of the recommended monitoring wells.

In addition, GZA reviewed a Massachusetts Contingency Plan (MCP) Class A2 Response Action Outcome Statement for an historical remedial action performed at the site in response to a release of transformer oil.[6]

---

[3] GZA and Enercon Services, Inc., January 30, 2007, Site Hydrogeologic Assessment in Support of Entergy GPI, Pilgrim Nuclear Power Station, Plymouth, Massachusetts.

[4] NEI, August 2007, Industry Ground Water Protection Initiative – Final Guidance Document.

[5] GZA, April 2009, GPI Data Review, Plymouth Nuclear Power Station, Plymouth, Massachusetts.

[6] Ram Environmental, February 18, 1998, Draft Immediate Response Action Completion Statement and Documentation Supporting A-2 Response Action Outcome Statement, Transformer Oil Release, Boston Edison Power Plant, 600 Rocky Hill Road, Plymouth, Massachusetts, RTN 4-12893.

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5.0 ADDITIONAL RISK ASSESSMENT ACIVITIES

This section presents the results of additional risk assessment activities performed to supplement the tasks previously presented in the Phase I report. Specifically, this evaluation included:

- Additional review of plans specific to buried portions of SSCs identified in the Phase I study as being potential sources or release points for radionuclides; and
- An initial assessment of operational work practices at the plant.

Our evaluation was based on:

- Interviews with key PNPS plant personnel;
- A review of supplemental information provided by PNPS; and
- A plant reconnaissance performed on November 18, 2009.

As a result of the additional review of buried SSCs, a number of additional plant utility and/or construction drawings were also reviewed. Based on this work, no substantive changes to the initial impacted systems assessment, presented in the Phase I report, were deemed necessary.

The key findings of the additional risk assessment activities are summarized in **Table 1**. The work practices considered during this assessment are generally consistent with those identified in the EPRI Groundwater Protection Guideline[7] and the US NRC Regulatory Guide 4.21[8]. Consistent with the initial impacted systems assessment presented in the Phase I report, the operational items identified during the current review were evaluated as to whether the practice presents either a direct or potential direct pathway or secondary pathway to ground. The definition of a direct pathway to ground, as used in **Table 1**, relates to whether the practice in and of itself has the potential to introduce radiological constituents into the subsurface by means of direct contact with the ground. Secondary pathways refer to other practices with the ability to introduce constituents to ground via an alternative pathway (e.g. if a potential pathway exists only in the event of a failure of one or more control systems).

As shown in **Table 1**, the only practices identified as having a potential direct pathway to ground were related to the:

- Use of condensate Storage Tanks; and
- Use of buried piping.

Each of the SSCs associated with these practices were previously identified in the Phase I report as having a potential direct pathway to the ground.

In general, only secondary pathways were found for the remaining practices; thus requiring a failure of multiple control systems to complete a pathway to the ground.

---

[7] Electric Power Research Institute (EPRI), November 2007, Groundwater Protection Guidelines for Nuclear Power Plants.

[8] U.S. Nuclear Regulatory Commission, June 2008, Minimization of Contamination and Radio Active Waste Generation; Life Cycle Planning, Regulatory Guide 4.21.

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6.0 REVIEW OF HISTORICAL TRANSFORMER RELEASE REPORT

During this project, GZA was provided with a copy of a draft report of remedial actions performed by RAM Environmental (RAM) in response to a release of transformer oil adjacent to the Turbine Building at the site[9]. Our review of this report was limited to the data related to the subsurface hydrogeologic conditions at the site.

On March 7, 1997, approximately 15,465 gallons of transformer oil was released from the main transformer at the site, of which approximately 130 gallons of oil were estimated to have been released to the soil surrounding the transformer. Immediate Response Action (IRA) activities included:

- Oil recovery;
- Oil-contaminated soil removal and disposal;
- Installation of 4 microwells (designated MW-1 through MW-4);
- Laboratory testing of oil, soil, and groundwater samples; and
- Preparation of groundwater contour plans in the vicinity of the release.

The locations of each of the microwells installed by RAM are shown on **Figure 1**. The microwells are constructed of five to ten-foot sections of ¾ inch PVC well screen attached to 3/4" solid, Sch. 40 well casings advanced to depths between 22 and 23 feet below ground surface. Subsurface soil samples, collected from the top 10 feet of each boring, indicates that the soil is engineered fill consisting of fine to medium sand with gravel and cobbles. RAM reported the soil was highly compacted and likely to exhibit low permeability. Groundwater was encountered at approximately 15-18 feet below the ground surface.

Groundwater contour plans were generated using groundwater elevation data measured in April 1997, September 1997, and December 1997. Each of these contour plans indicates a shallow groundwater flow gradient towards the southeast, rather than easterly towards Cape Cod Bay as would be expected based on regional topography and drainage conditions. RAM concluded that because the foundation for the turbine building extends below the groundwater table, groundwater levels and flow direction were likely impacted by effects of groundwater mounding. These data suggest that the backfill surrounding the PNPS power block may not be a preferential groundwater flow pathway. The findings of the RAM report are generally consistent with GZA's existing Conceptual Site Model (CSM) for the PNPS site.

7.0 WORK PLAN FOR INSTALLATION OF ADDITIONAL MONITORING WELLS

A work plan for installation of additional groundwater monitoring wells, including the rationale for each well, is provided in **Appendix B**.

[9] RAM Environmental, op. cit.

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TABLE

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TABLE 1

ADDITIONAL RISK ASSESSMENT ACTIVITIES
Pilgrim Nuclear Power Station
Plymouth, Massachusetts

Work Practice	Applicable PNPS Procedure(s)	Comments	Potential Direct Pathway to Ground	Potential Secondary Pathway to Ground
Filling, draining, and venting water filled process systems	■ System Fill, Vent, and Drain Instructions (Procedure 2.1.11.1, Rev. 21)	■ Procedure applies to all plant operations involving water transfers. ■ A procedure-generated permit must be obtained from the plant's chemistry department prior to all discharges to the environment.	N/A	N/A
Liquid Radioactive Discharges	■ Radwaste Collection System (Procedure No. 2.5.2.71, Rev. 31) ■ Processing Liquid Radioactive Discharges (Procedure 2.5.2.17)	■ All liquids in the plant, except sanitary wastes, oily wastes, and seawater wastes, are processed through the plant's radwaste facility. ■ The plant uses a Neutralizing Sump as part of its operations. This sump is located within the Aux Bay area and has a total capacity of 16,700 gallons. Water from this sump is discharged through the plant's storm drain system. The water level within this sump must be maintained within certain criteria to prevent overflow. ■ System includes underground components (potential secondary pathway)	No	Yes

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TABLE 1

ADDITIONAL RISK ASSESSMENT ACTIVITIES
Pilgrim Nuclear Power Station
Plymouth, Massachusetts

Work Practice	Applicable PNPS Procedure(s)	Comments	Potential Direct Pathway to Ground	Potential Secondary Pathway to Ground
Condensate Liquid storage and transfer to/from the Condensate Storage Tank (CST)	■ Condensate Storage and Transfer System (Procedure No. 2.2.35, Rev. 43) ■ Condensate and Feedwater System (Procedure No. 2.2.96, rev. 89) ■ Condensate Demineralizer Operations (Procedure 2.5.2.127, Rev 68)	■ CST system includes two 275,000 gallon storage tanks and associated transfer pumps and piping. ■ These tanks receive water from the Demineralized Water Transfer System as well as treated water from the Radwaste building. ■ Liquid transfers to the CSTs are performed by manually operating control valves. The tanks are equipped with high level control alarms. ■ Each tank is equipped with overflow piping that diverts overflow to the radwaste building through the reactor Building Equipment Drain sump. ■ The CSTs are not equipped with a leak detection system or secondary containment (potential direct pathway).	Yes	No
Transferring of spent resin and spent resin dewatering water	■ Dewatering the Spent Resin Storage Tank (SRST) From the Radwaste Truck Lock (Procedure No. 2.5.1.6, Rev. 10) ■ Transferring of resin and Dewatering Liners Using Studsvik Processing Facility Thor Dewatering System (Procedure No. 2.5.10, Rev 18)	■ The SRST is incapable of being dewatered through its installed drainage line. The tank must be dewatered by manual pumping freestanding water from the tank to the Radwaste floor drain system. ■ Liquid and Resin transfer is conducted using a Thor Fillport system which interfaces with Studsvik containers. ■ Transfer activities are monitored with a control panel which includes CCTV monitor, level alarm, and valve controls. ■ Potential secondary pathway through paved surfaces	No	Yes.

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TABLE 1

ADDITIONAL RISK ASSESSMENT ACTIVITIES
Pilgrim Nuclear Power Station
Plymouth, Massachusetts

Work Practice	Applicable PNPS Procedure(s)	Comments	Potential Direct Pathway to Ground	Potential Secondary Pathway to Ground
Exterior Storage of Contaminated Equipment or Materials	N/A	■ Exterior storage of contaminated equipment or materials with exposure to the weather is not allowed at the site.	N/A	N/A
Buried Piping and Tanks Inspection Monitoring Program	■ Buried Piping and Tanks Inspection and Monitoring program (EN-DC-343) ■ Entergy Nuclear Operations Buried Piping/Tanks action Plan	■ PNPS has initiated a buried piping and tank inspection program. A field-level underground component assessment is planned for 2010.	Yes	

Notes:

1. The definition of a potential direct pathway to ground as used in Table 1 relates to whether the practice in and of itself has the potential to introduce radiological constituents directly to the ground.
2. Potential secondary pathways refer to other practices with the ability to introduce constituents to ground via an alternative pathway (e.g. if a potential pathway exists only in the event of a failure of one or more control systems).
3. N/A indicates practice is not applicable to the PNPS Plant

FIGURE

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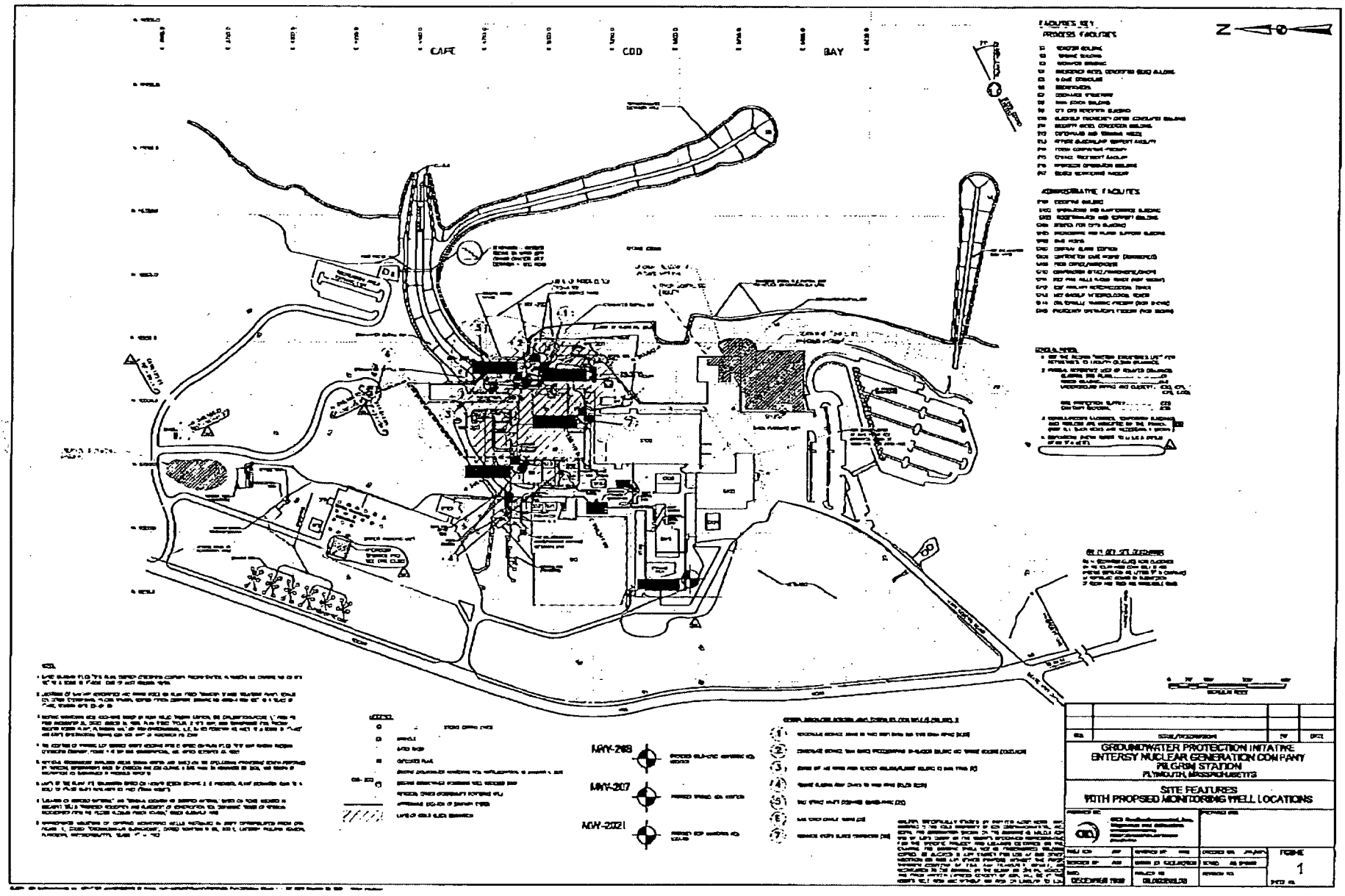
CAPE
COD
BAY
GROUNDWATER PROTECTION INITIATIVE
ENTERSY NUCLEAR GENERATION COMPANY
PILGRIM STATION
PLYMOUTH, MASSACHUSETTS
SITE FEATURES
WITH PROPOSED MONITORING WELL LOCATIONS
FIGURE
1

APPENDIX A

REPORT AND PROJECT LIMITATIONS

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APPENDIX A

REPORT AND PROJECT LIMITATIONS

1. This focused report was prepared for use by the Client at the subject Facility, for the limited technical and legal purposes stated in the report. We take no responsibility for other uses of this report, or for use by other parties.

2. By agreement with the Client, we reviewed and relied on information provided by the Client and Facility to develop our opinions. We also relied upon public sources of information to help develop our understanding of the Facility's hydrogeologic setting. Local subsurface conditions or soil heterogeneities may exist and may subsequently be shown to have an unanticipated effect on groundwater flow patterns. These were initial reviews; we did not attempt to verify or validate information, oral or written.

3. Unidentified and/or unanticipated conditions may exist. Should such conditions become obvious, it may be necessary for us to reevaluate the opinions expressed in this report.

4. Our findings and conclusions are provided as professional opinions, and not as statements of fact.

5. Our services were provided with the degree of skill and care ordinarily used by qualified professionals performing the same or similar services, at the same time, under similar circumstances, in the same or similar locations. No other warranty expressed or implied is made.

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APPENDIX B

WORK PLAN

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WORK PLAN
FOR
INSTALLATION OF ADDITIONAL
GROUNDWATER MONITORING WELLS

This work plan presents the general approach and technical requirements for installation of additional groundwater monitoring wells at the Pilgrim Nuclear Power Station (PNPS). These wells are needed to fill data gaps identified during PNPS's on-going Groundwater Protection Initiative, and are intended to be permanent groundwater quality monitoring wells which will be incorporated within PNPS's long-term groundwater monitoring plan.

This work plan includes:

- Proposed monitoring well locations and rationale;
- Drilling and monitoring well installation procedures;
- Monitoring well development procedures; and
- Project reporting.

PROPOSED MONITORING WELL LOCATIONS AND PLACEMENT RATIONALE

A summary of monitoring wells to be installed under this work plan and the associated placement rationale are provided below. Proposed well locations are shown on **Figure 1**.

Monitoring Well Type	Proposed Well Location	Rationale
Perimeter Wells	MW-202I	Proposed deeper monitoring well to be installed near existing shallow well MW-202. This well will allow groundwater quality monitoring of the deeper sand deposit and will provide groundwater elevation data for calculation of groundwater gradients and flow directions.
	MW-208S/I (Two wells)	Proposed multi-level well couplet to be screened in the shallow soil and deeper sand deposit. This well couplet will be used to document background groundwater quality and will provide groundwater elevation data for calculation of groundwater gradients and flow directions.
Sentinel Wells	MW-205	Assess groundwater quality in the vicinity of the CSTs and associated buried piping. The data from this well will also be used to assess groundwater gradients and flow directions within the permeable backfill in the power block area.
	MW-206	Assess groundwater quality in the vicinity of the buried components of the radwaste system. Also used to assess groundwater gradients and flow directions within the power block area (when used in conjunction with other proposed sentinel wells).
	MW-207	Assess groundwater quality in the yard piping backfill and allow calculation of groundwater gradients and flow directions within the power block area (when used in conjunction with other proposed sentinel wells).

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WORK PLAN

TASK 1 - PRELIMINARY TASKS

Preliminary tasks to be performed prior to initiation of any subsurface activities shall include:

- Preparation of a proposed project schedule for review and approval by PNPS personnel;
- Preparation of a project-specific Health and Safety Plan (HASP) in accordance with applicable regulations and guidelines for review and approval by PNPS personnel; and
- Clearance of subsurface and above ground utilities by PNPS personnel (Note: if conflicts are identified, alternate well locations will need to be selected by authorized personnel).

TASK 2 - DRILLING AND MONITORING WELL INSTALLATION

Vacuum Excavation

To limit the potential for damage to unknown subsurface utilities, the top 10 feet (or deeper if structures in the area are known or suspected to be below 10 feet) of the boring for each monitoring well shall be advanced using vacuum excavation (VacEx) methods. Down-hole equipment shall be decontaminated or disposed between boring locations.

Drilling and Well Installation

Drilling shall be performed using either drive and wash casing or hollow stem auger drilling methods. If heaving sand conditions are encountered during auger drilling, the drilling method may be switched to drive and wash drilling methods, or approved alternate method. Where drilling fluid is needed, only clean potable water shall be used. Drilling water can be re-circulated at individual well locations unless significant environmental impacts are detected or suspected.

For multi-level well locations, the deepest of the installations will be drilled first, with soil sampling. Soil samples shall be collected at 5-foot intervals and strata changes using a split spoon sampler or similar soil sampling device. The sampler shall be decontaminated between samples. The shallower installations can be drilled without soil sampling. The screened interval of the deep overburden wells are intended to be installed within the lower sand layer encountered below approximately 35 feet at the site. The screened intervals of the shallow overburden wells shall be installed to intersect the water table. Monitoring wells shall not be screened across multiple hydrogeologic units.

Each well shall be constructed of a 10 foot length of 2-inch diameter 0.010 slot schedule 40 NSF-certified PVC well screen attached with flush threaded joints to schedule 40 NSF-certified PVC riser pipe. The screened interval shall be backfilled with clean silica filter sand of an appropriate grain size for the formation encountered to an elevation of approximately 2 feet above the top of the well screen. A minimum 2-foot thick bentonite pellet or chip seal shall be installed above the filter sandpack. The remaining borehole shall be backfilled with a bentonite or bentonite/cement grout installed from the top of the bentonite pellet/chip seal using a tremie pipe.

Each well will be equipped with a vented plug and a protective road box or standpipe. The protective road boxes will be installed in a concrete pad at the ground surface. The concrete pads shall have dimensions of approximately 2 feet x 2 feet x 1-foot thick, and shall be sloped away

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from the protective road boxes. Where constructed in paved surfaces, the edges of the paved surface shall be saw cut prior to the construction of the concrete pad.

Investigation derived wastes (IDWs), including but not limited to drilling cuttings and drilling fluids, shall be containerized in drums to be provided and managed by Entergy. These drums shall be filled and left at the well head for subsequent management and disposal by Entergy.

Drilling activities shall be monitored in the field by a field geologist or engineer experienced with drilling and monitoring well installations. The field geologist or engineer shall prepare drilling and well installation logs, describe and containerize soil samples, describe fill materials encountered, and develop the final design for constructing the groundwater monitoring wells. Wells will be installed in accordance with ASTM standards D2488-93 and D5092-04e1, and the requirements and protocols for groundwater monitoring wells specified by the USEPA [RCRA Groundwater Monitoring Technical Enforcement Guidance Document (TEGD) dated 1986], and other applicable regulatory requirements.

TASK 3 - WELL DEVELOPMENT

Each of the new groundwater monitoring wells shall be developed using surge block, pumping, and/or bailing methods. Well development shall be performed until water pumped from each well is, to the extent practicable, visibly free of sediment. Equipment used to develop wells shall be decontaminated at the well head and decontamination rinse water containerized with well purge water. Along with the other IDWs, this material shall be containerized for future management by PNPS.

TASK 4 – REPORTING

A well completion report shall be prepared following the completion of this work. This report shall include:

- A description of field procedures and methods;
- A description of subsurface conditions encountered at each well location;
- An updated site plan showing final monitoring well locations and elevations;
- Soil boring and monitoring well construction logs; and
- Well development results.

ACTIVITIES TO BE PERFORMED/PROVIDED BY ENTERGY/PNPS

Tasks to be performed or provided by Entergy/PNPS shall include:

- Final underground utility clearance;
- Groundwater sampling and laboratory analysis;
- Surveying of the new wells for location and reference elevation relative to the existing plant datum;
- Groundwater level measurements and preparation of a revised groundwater level contour plan and flow direction map; and
- Management and disposal of IDWs.

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Entergy	CA DUE DATE EXTENSION	CR-PNP-2009-00879

Corrective Action : CR-PNP-2009-00879 CA-00003

Version: 1 **Approved:** ☑

Requested Duedate: 12/30/2009 **Previous Duedate:** 11/30/2009

Requested By: Scheffer,Jacob J 11/19/2009

Approved By: Scheffer,Jacob J 11/23/2009

Request Description:

It is acceotable to extend the due date because the delay of one month will not impact our ability to site the new wells in 2010.

It is necessary to extend the due date because the contractor was delayed in starting the study due to illness and prior commiments at VY.

Approved Description:

Discussed extension request with Chemistry Manager and received his approval.

Entergy	CORRECTIVE ACTION	CR-PNP-2009-00879

CA Number: 4

	Group	Name
Assigned By:	CA&A Staff PNP	
Assigned To:	Tech Chemistry Mgmt PNP	McElhinney,Thomas F
Subassigned To :		

Originated By:	McWilliams,Dorena C	9/23/2009 10:19:19
Performed By:	McElhinney,Thomas F	9/30/2009 13:32:10
Subperformed By:		
Approved By:		
Closed By:	McElhinney,Thomas F	9/30/2009 13:32:10

Current Due Date: 10/07/2009 **Initial Due Date:** 10/07/2009

CA Type: PERIODIC REVIEW

Plant Constraint: NONE

CA Description:

Safety Equipment Related review.

In accordance with EN-LI-102, CR Interim and Periodic Review:

Each open CR associated with Safety Related equipment will be reviewed approximately six months from initial assignment. At least once per year, following the initial review, each open CR associated with Safety Related equipment will be reviewed.

Since the review specifies Safety Related equipment only, if you determine this CR is not Safety Related equipment document this statement in the closure of this CA, no further action required.

If this CR is determined to be Safety Related use the attached form to review.
NOTE: Director and/or GMPO review and signature are required on the form.

The form is used as the means to document the following:

1. Verification that the action plan documented in PCRS will correct the condition.
2. Document expected CR Closure date based on remaining needed actions.
3. Verification, for equipment related CRs, that the documented operability/functionality position remains valid for the current condition of the equipment and is expected to remain valid for the duration of the action plan. Initiate a new CR if the current operability/functionality position is questionable.
4. Verification that administrative performance within the corrective action process has been acceptable to date. (Appropriate approval levels and justifications for DDEs are documented; LTCAs are appropriately flagged, etc).
5. Verification that the risk of not correcting the condition is acceptable for the duration of the action plan.
6. Approval of these reviews and approval for the CR to remain open beyond six months has been obtained and documented from a director level or above.

NOTE: Questions on Safety Related equipment determinations can be discussed at CRG as a 'Bring Back' issue.

Response:

This is not safety related, this CA can be closed.

Subresponse :

Closure Comments:

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Attachments:

CA Description form

Attachment Header

Document Name:

untitled

Document Location

CA Description

Attach Title:

form

CR Interim and Periodic Review

CR Number: _____ Category Level ☐ A ☐ B ☐ C

CR Owner Group: _____

CR Description: _____

CR Review: (All No responses require explanation be included.)

1. Will the existing corrective actions documented in the condition report, when completed, correct the condition report issue? Yes ☐ / No ☐
2. What is the expected CR Closure date based on remaining needed actions? DATE: _____
3. Is the previously documented operability/functionality position still valid for the current condition and expected to remain valid until CR closure? Yes ☐ / No ☐ /N/A ☐

   If the answer is NO, then initiate a new CR to document the concern; CR # _____
4. Are all LI-102 requirements for corrective action administration and control being met, i.e. justifications for Due Date Extensions valid, Long Term Corrective Actions identified, CARB approved CAPRs identified, and appropriate approvals obtained for all?

   Yes ☐/ No ☐
5. What risk to plant operation is imposed by the condition identified and how is risk reduced to an acceptable level for the duration of the action plan?

_____

Review / Approval Required:

Director/GM Title: _____ Date:_____
(Print name & Position title)

NOTE: The expectation is to capture the discussion points of this form in a CA. The form itself need not be used, but all points applicable must be addressed.

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Entergy	CORRECTIVE ACTION	CR-PNP-2009-00879

CA Number: 5

	Group	Name
Assigned By:	CA&A Mgmt PNP	Keyes,James D
Assigned To:	Tech Chemistry Mgmt PNP	McElhinney,Thomas F
Subassigned To :		

Originated By:	McWilliams,Dorena C	12/30/2009 09:52:22
Performed By:	McElhinney,Thomas F	1/13/2010 15:40:25
Subperformed By:		
Approved By:		
Closed By:	McElhinney,Thomas F	1/13/2010 15:40:25

Current Due Date: 01/14/2010 **Initial Due Date:** 01/14/2010

CA Type: CR CLOSURE REVIEW

Plant Constraint: NONE

CA Description:

1. This CA is assigned to you as owner of the condition report to conduct a review of the actions taken and render a determination of whether the CR is adequate for closure. Use the guidance in the attached checklist to ensure expectations of a quality review are performed.

2. You are validating that your review of the closed corrective action(s) resolves the specific condition identified by the CR and that all corrective action items are completed. Refer to the guidance in Section 5.9.1 of LI-102 for additional details.

3. Verify appropriate trend codes have been added. In addition, for any equipment related CR, ensure system numbers, component codes and descriptions have been entered in accordance with EN-LI-121.

4. Should the closure not be satisfactory, issue a new action item(s) to correct the condition(s) that has not been adequately addressed.

Response:

This CA can be closed. CA6 issued to track installing new wells.

Subresponse :

Closure Comments:

Attachments:

CA Description form

Attachment Header

Document Name:

untitled

Document Location

CA Description

Attach Title:

form

ATTACHMENT 9.3 — CHECKLIST FOR LEVEL C CR CLOSURE

Page 1 of 2

☐	1. Read and understand the CR description, immediate actions, and suggested actions.
☐	2. Ensure that the REPORTABILITY TAB and OPERABILITY TAB have been completed if required. If flagged for Operability and / or Reportability review on the front screen, then review the information documented in the REPORTABILITY TAB and OPERABILITY TAB. If the last Operability's code is "Operable-Comp Meas" contact the Control Room STA/SM and Operations DPIC to resolve the issue. If needed, initiate an action with a due date no greater than 14 days to Operations to revise the Operability. If the last Reportability was indeterminate, then initiate an action to Licensing to clarify the status of determining this CR's reportability requirements with a 14 day due date.
☐	3. Review the ASSIGNMENT TAB, noting the screening level, type of evaluation directed, and any screening notes, such as other related CRs to be addressed.
☐	4. Verify no documents identified as Proprietary or Safeguards on the document are contained in the CR.
☐	5. If flagged as ODMI or SDNC, verify that all ODMI or SDNC actions have been completed and the ODMI or SDNC has been closed based on CRG approval.
☐	6. Ensure the following trend codes have been entered into PCRS: • One Report Weight; at least one INPO Bin Code; at least one HEP Factor • At least one Problem Code, along with an associated Work Group Code • One or more Keywords • If the CR was an error of some type, the HU Classification (human error, NCE, or event) with an associated Work Group Code • If an HPER was completed, the HU Attributes with associated Work Group Codes • If and EFE was performed, equipment failure mode and/or INPO ERPOC codes. Refer to Attachment 9.5 for detailed trending guidance.
☐	7. Ensure CR closure has been performed by the responsible manager or designee. The Manager Closure Review can sometimes correct deficiencies found in corrective actions.
☐	8. Have the proper additional reviews, as referenced in the REFERENCE TAB or ADMIN TAB, been performed? If additional reviews are required initiate the actions to the groups and assign a due date requested by the group
☐	Operating Experience (OE) Review Required
☐	QA AFI
☐	Safety Committee Review required
☐	Licensing review required for a Non-cited Violation, Notice of Violation, Non-compliance, NRC finding, NRC minor violation, NRC Violation
☐	Other reviews

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ATTACHMENT 9.3 — CHECKLIST FOR LEVEL C CR CLOSURE

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☐ SAT	9. Very the corrective actions corrected the condition identified in the **Condition Description.**	
☐ SAT	10. Verify that each corrective action identified in the evaluation was completed as intended. Recommendations and Enhancements may be tracked by other processes.	
	☐ SAT	Corrective actions are completed in full and the intent of the action is met. Adequate logic and documentation is provided to justify closure. If action is not completed as stated, detailed documentation shall be provided to explain why and to provide alternate or equivalent actions and CA number for tracking. The Responsible Manager agreement must be documented.
	☐ SAT	Verify the action item was not closed to a "promise" of a future action item.
	☐ SAT	Verify CAs that are to "evaluate", "initiate", or "determine" have follow-up corrective actions issued to resolve the intended subject or clearly state why no further action is needed.
	☐ SAT	When a CA is closed to another CR/CA, ensure the CA is properly referenced in the other CR/CA (traceability). Verify the other CR/CA fully addressed the corrective action.
☐ SAT	11. Recommendations and enhancements can be closed to other processes. If a corrective action was issued that later was determined to be an enhancement ensure the reason the action is considered a recommendation or enhancement and what group made that determination should be documented. Actions addressing the original condition are not enhancements.	
☐ SAT	12. Verify the corrective action is not closed to another process other than WO approved by the CRG.	
☐ SAT	13. Corrective Actions may be closed to an approved WO only with CRG approval. • Verify evidence of CRG approval The following types of CAs shall not be closed to Work Orders or other processes: • Substantially Degraded or Non-Conforming Conditions (SDNCs)	
☐	14. Attach or verify that any additional documentation is attached to the CR as a .PDF file or .DOC file. If documentation cannot be attached (such as a Post Trip Evaluation with lots of charts, computer printouts, etc.), check the "Additional Paper" box at the bottom of the CR ADMIN TAB and include with the hard copy printout that will have to be manually transmitted to Records Management.	
☐	15. If this quality closure review identifies an unsatisfactory closure of a checklist item annotated "SAT", issue a CA using the "UNSAT RESPONSE CA&A" action type, with specific recommendations or identified discrepancies that need further review.	
☐	16. When all items in the checklist are satisfactorily completed, the CR is ready to close.	

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Entergy	CORRECTIVE ACTION	CR-PNP-2009-00879

CA Number: 6

	Group	Name
Assigned By:	Tech Chemistry Mgmt PNP	McElhinney,Thomas F
Assigned To:	Tech Chemistry Mgmt PNP	Scheffer,Jacob J
Subassigned To :		

Originated By: McElhinney,Thomas F 1/13/2010 15:39:27
Performed By:
Subperformed By:
Approved By:
Closed By:

Current Due Date: 06/29/2010 **Initial Due Date:** 06/30/2010
CA Type: ACTION
Plant Constraint: NONE
CA Description:
Complete installation of 6 new groundwater monitoring wells.
Response:
Subresponse :
Closure Comments:

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