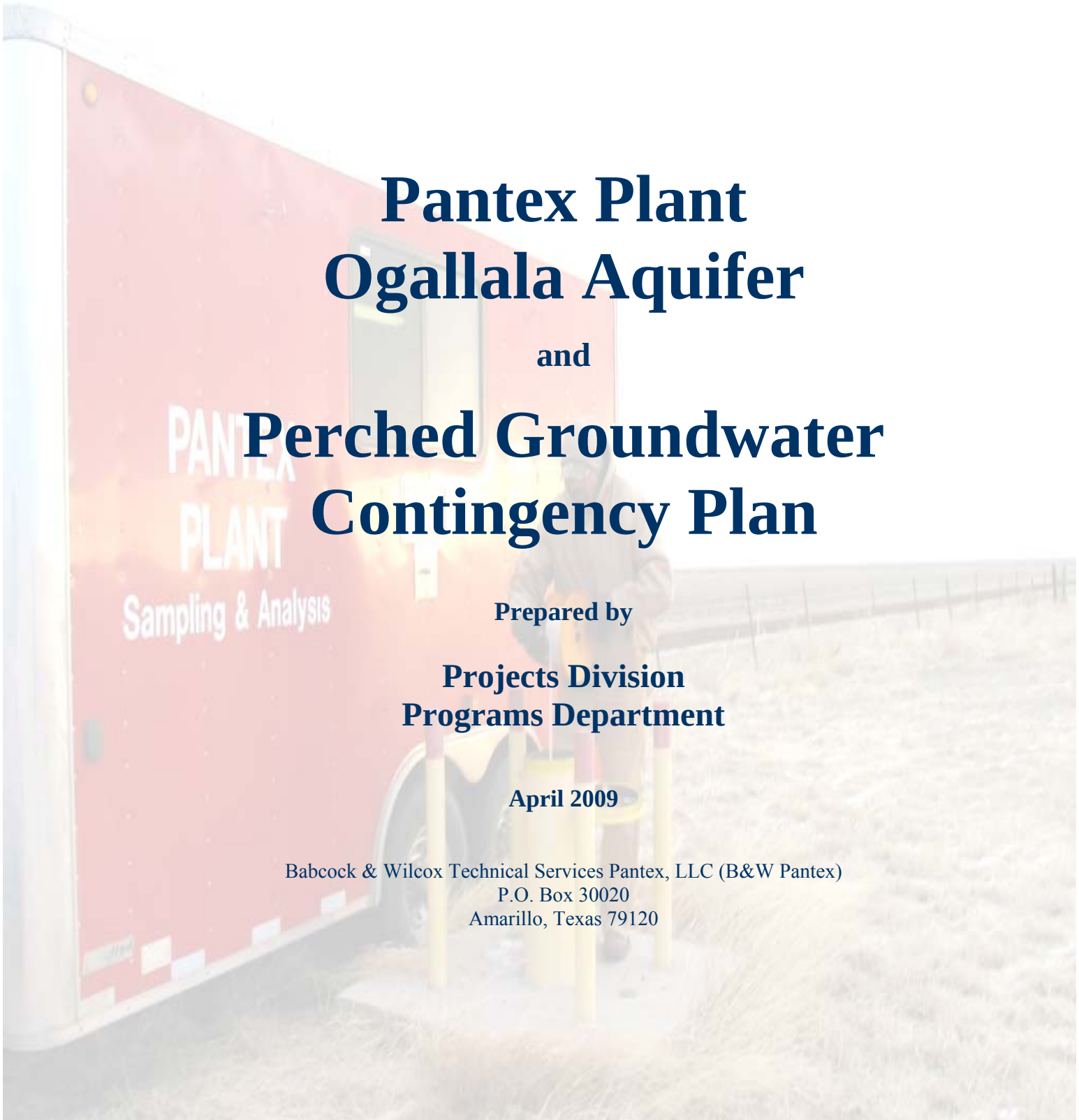

Pantex Plant
Ogallala Aquifer

and

Perched Groundwater
Contingency Plan

Prepared by

Projects Division
Programs Department

April 2009

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Executive Summary

The Pantex Plant Ogallala Aquifer and Perched Groundwater Contingency Plan (Plan) has been developed in accordance with the requirements identified in the:

- *Interagency Agreement for the Pantex Superfund Site, Article 8.5 Work to be Performed,*
- *Compliance Plan 50284, Section IX Interim Stabilization Measures Program and Section X Compliance Schedule,* and
- *Record of Decision for Groundwater, Soil, and Associated Media, Pantex Plant.*

A Long-Term Monitoring Well System has been designed to monitor conditions in the perched groundwater including changes in the perched aquifer as a result of implementing the response actions. Monitoring is required for verifying the effectiveness of perched groundwater response actions (i.e., conditions in the perched aquifer are being affected as intended) and for confirming that the perched aquifer and Ogallala characterization as defined in the RFIR and the CMS/FS remains accurate. If monitoring results obtained through the monitoring network identify an unexpected condition or deviation, contingent actions will be considered and implemented as necessary to ensure continued protection of the Ogallala Aquifer and human health and the environment.

Potential deviations to expected technology performance may be encountered for each of the four response actions that compose the selected remedy for perched groundwater; Playa 1 Pump and Treat System, Southeast Pump and Treat System, Southeast *In-Situ* Bioremediation System, Zone 11 *In-Situ* Bioremediation System. Monitoring will also be conducted to determine if there are deviations to the expected characterization, e.g., contaminants not expected as a result of the RFI characterization. Deviations to expected conditions in the Ogallala Aquifer could also be encountered if the response actions in the perched groundwater are not performing as expected, i.e., preventing contaminants from migrating to the Ogallala Aquifer.

This Plan was developed to identify the contingent action modifications necessary to mitigate impacts to the implemented response actions resulting from deviations to site conditions or response action performance. The Plan defines the environmental problem being addressed by the response actions, clarifies the expected conditions and objectives of the response actions, and identifies the potential deviations to the response actions (due to site conditions or technology performance) that could be encountered. The deviations were evaluated to determine the potential impact and time to respond to avoid impact. The Plan also identifies the monitoring outlined in the LTM System Report and SAP that will be used to detect the deviations. Lastly, the Plan specifies the contingent actions that could be implemented in response to the deviations.

Because each response focuses on a discrete portion of the perched aquifer and contaminant plume, each response action has a different set of expected conditions, and therefore differing impacts from deviations to the site and technology expectations. As a result, the contingent actions are identified for each response action and potential deviation including specific constituents, location, and conditions. If deviations are encountered that impact the ability of the response action to meet performance objectives, contingent actions will be necessary to ensure the response action can meet the performance objective. Contingent actions may be implemented as interim actions (ISMs/removal actions) in accordance with the ROD, IAG, and CP-50284, if warranted by the specific circumstances.

For deviations to site characterization expected conditions, the contingent action will likely focus on determining the source of the deviation; additional work must be completed to evaluate the problem and

determine the appropriate response. However, if the deviation to characterization impacts the performance of the response action, the contingent action will again focus on ensuring performance objectives can be met.

Early source term removals and cleanup actions have been implemented to protect the Ogallala Aquifer. Because of these actions and based on modeling results, the expected conditions in the Ogallala Aquifer are that constituents of concern will not be detected above the GWPS nor will they reach potential points of exposure above the GWPS. The primary deviation of concern for the Ogallala is if constituents are detected in the Ogallala Aquifer near or above GWPSs. If it occurs, this change in expected conditions would require further evaluation of site and contaminant characteristics to determine an appropriate course of action. The evaluation would include additional monitoring, source identification, implementation of interim protective measures (if necessary), and delineation of extent. These evaluations would be necessary to determine an appropriate response action for the Ogallala.

The primary goal of the Plan is to provide for the continued protection of the Ogallala Aquifer and the health of its consumers. In recognition, this Plan presents a flexible and rational approach for making future decisions associated with confirming the change in perched and Ogallala aquifer conditions and response (technical activities, changes to response actions, regulatory oversight, and public involvement).

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Acronyms

ATSDR	Agency for Toxic Substances and Disease Registry
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CM	Corrective measure
CMS/FS	Corrective Measure Study/Feasibility Study
COC	Contaminant of Concern
CP	Compliance Plan
Cr	Chromium
CSMs	Conceptual site models
DCE	Dichloroethene
DOE	U.S. Department of Energy
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
EW	Extraction well
FGZ	Fine-grained zone
FM	Farm-to-Market
GAC	Granular activated carbon
gpd	Gallons per day
gpm	Gallons per minute
GWPS	Ground Water Protection Standard
HE	High explosive
IAG	Interagency Agreement
ISB	*In-Situ* Bioremediation
ISM	Interim Stabilization Measure
LTM	Long-Term Monitoring
MSC	Medium Specific Concentration
NCP	National Contingency Plan
NNSA	National Nuclear Security Administration
PGWCD	Panhandle Groundwater Conservation District
ppb	Parts per billion
ppmv	Parts per million by volume
PQL	Practical Quantitation Limit
PXSO	Pantex Site Office
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RDX	Hexahydro-1,3,5-Trinitro-1,3,5-Triazine
RFI	RCRA Facility Investigation
RFIR	RCRA Facility Investigation Report
ROD	Record of Decision
RRS	Risk Reduction Standard
SAP	Sampling and Analysis Plan
SE ISB	Southeast In-Situ Bioremediation
SEP/CBP	Solvent evaporation pit/chemical burn pit
SEPTS	Southeast Pump & Treat System
SWMU	Solid Waste Management Unit
TCEQ	Texas Commission on Environmental Quality
TLAP	Texas Land Application Permit
VOC	Volatile organic compound
VC	Vinyl Chloride

1. Introduction

1.1 Purpose

The primary purpose of the Pantex Plant Ogallala Aquifer and Perched Groundwater Contingency Plan (Plan) is twofold; first to describe appropriate and immediate contingent actions (i.e., actions taken to compliment response actions) to be taken if unexpected results are identified in the perched groundwater underlying or within the control or responsibility of the U.S. Department of Energy/National Nuclear Security Agency (USDOE/NNSA) Pantex Plant; second, to define the process for responding to the unexpected result of contamination associated with past Pantex releases discovered in the Ogallala Aquifer. The objective of this document is to provide a clear but flexible process for determining the significance and subsequent actions to be taken if unexpected conditions/deviations are identified in the perched groundwater or Ogallala Aquifer. Such actions would be implemented in accordance with applicable regulations, the *Pantex Plant Record of Decision (ROD)*, *Interagency Agreement (IAG),* and *Compliance Plan No. 50284 (CP-50284)*, as required to protect human health and the environment.

The Pantex Plant has been the focus of defense-related industrial operations since 1942. Historical waste management practices at Pantex included discharges of contaminated wastewater to unlined ditches and playas. These practices resulted in high explosive, solvent, and metal contamination of the subsurface soil and perched groundwater.

In accordance with the ROD, IAG and CP-50284, various regions of the perched groundwater and overlying vadose zone are undergoing active remediation by pump and treat, soil vapor extraction, and in-situ bioremediation. The overall goal of the stabilization and remediation measures is to protect the underlying Ogallala Aquifer, which is a major water resource for the region.

1.2 Integration with Long Term Groundwater Monitoring System

As part of implementing the selected remedy, a Long Term Monitoring (LTM) System has been developed to monitor the effectiveness of the response actions, determine if the perched groundwater plume is being stabilized, provide early detection of constituents in the Ogallala Aquifer, and confirm expected aquifer conditions at locations downgradient of waste management units (both perched groundwater and Ogallala Aquifer). The specific requirements for monitoring are detailed in the *Sampling and Analysis Plan* (SAP) and the supporting *Long-Term Monitoring System Design Report* developed for CP-50284 and the IAG. Pantex has established a program to sample, analyze, and review analytical data in accordance with the SAP, CP-50284 and the IAG to ensure that monitoring objectives are met and unexpected conditions are identified.

The Plan has been developed to identify what contingent actions are necessary if unexpected conditions resulting from changes in technology performance or conceptual site models are encountered during the remediation of the perched groundwater and will cause unacceptable impacts to the ability of the response action to meet performance objectives. The Plan defines the problem being addressed by the response actions, the expected conditions and objective of the response actions and identifies the potential deviations to the response actions. The deviations were evaluated in the Plan to determine the potential impact and time to respond to avoid impact. The Plan identifies the monitoring outlined in the SAP to identify deviations. Finally the Plan specifies the contingent actions that could be implemented in response to the deviations.

The SAP, LTM System Design Report, and Contingency Plan are interrelated; that is the information collected through implementation of the SAP will be used to determine if a deviation is occurring that

would result in the implementation of a contingent action. The LTM System Design Report will be used during progress evaluations as part of the basis for the expected conditions against which monitoring data will be compared to determine deviations for the systems.

1.3 Regulatory Requirements

Monitoring is required to confirm future expected conditions within the perched groundwater and the Ogallala Aquifer at the Pantex Plant and to determine if the response actions are achieving performance goals and remedial action objectives (RAOs). This Plan is being provided in accordance with Article 8.5 of the IAG as part of the Remedial Design (RD) Submittal Package and in accordance with CP-50284.

1.4 Roles and Responsibilities

The Pantex Plant is owned by the USDOE/NNSA, and managed and operated by B&W Pantex Technical Services, LLC (B&W Pantex). The Texas Commission on Environmental Quality (TCEQ) has authority under the Resource Conservation and Recovery Act (RCRA) process; and, the Environmental Protection Agency (EPA) has authority under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Both TCEQ and EPA will review and approve the Plan as a part of the RD Submittal Package.

The Agency for Toxic Substances and Disease Registry (ATSDR) is a public health agency that reviews, assesses, and provides information to the public on the effects of hazardous substances at waste sites. The ATSDR has completed a public health assessment for Pantex and will be provided with future information that is substantially different than the basis for the original assessment. Off-site landowners are provided monitoring results for Pantex wells located on their property.

B&W Pantex, as contracted by the USDOE/NNSA, is responsible for implementing all requirements of the Pantex Plant ROD, IAG, and CP-50284, including actions listed in this Plan. The CP-50284 has specific reporting requirements relative to detections of contaminants in the Ogallala Aquifer or if unexpected results are identified in the perched groundwater. These reporting requirements, as well as others, are further presented in Appendices B and C. As contracted by USDOE/NNSA, B&W Pantex is also responsible for confirming that training is periodically conducted to ensure readiness and that this Plan is reviewed and updated at least every five (5) years.

2. Expected Conditions for Perched Aquifer Response Actions

The Plan has been developed to identify contingent actions necessary if unexpected conditions resulting from changes in expected conditions are encountered during the remediation of the perched groundwater and cause unacceptable impacts to the ability of the response action to meet performance objectives; deviations exist for both technology performance and site characterization.

The expected conditions for site characterization are identified in the Pantex Plant RFIRs, Risk Assessment, and CMS/FS[1]. Therefore, this section focuses on identifying the expected conditions of technology performance for each of the response actions. Deviations to these technical expected conditions will impact the ability of the selected groundwater remedy to meet the remedial action objectives (RAOs) defined in the ROD. The RAOs for perched groundwater are:

- Reduce the risk of exposure to perched groundwater through contact prevention.
- Achieve cleanup standards for the perched groundwater COCs, i.e., restoration of the perched groundwater.
- Prevent growth of perched groundwater contaminant plumes.
- Prevent contaminants from exceeding cleanup standards in the Ogallala Aquifer.

There are four major response actions that were constructed to address the problems identified in the perched groundwater; Playa 1 Pump and Treat System, Southeast Pump and Treat System, Southeast *In-Situ* Bioremediation System, and Zone 11 *In-Situ* Bioremediation System. The response actions are located downgradient of Playa 1 and Zones 11 and 12. Each response action was developed to meet one or more of the RAOs. In addition to identifying which RAO the action was developed to address, the function and expected conditions for each system are defined below.

2.1 Playa 1 Pump and Treat System

The function of the Playa 1 Pump and Treat System is to remove affected perched groundwater in the Playa 1 area and treat it for industrial and/or irrigation reuse. The primary intent of the response action is the removal of water from this area resulting in a gradual decrease in the volume of perched groundwater moving radially away from Playa 1. The response action will also result in a decrease in the volume of perched groundwater moving down gradient (south) towards the Southeast Pump and Treat System. An additional benefit to this action will be a reduction in the head (driving force) for vertical migration of perched groundwater into the fine-grained zone in the Playa 1 area. While some reduction of the mass of contaminants in the perched aquifer will occur through this action, this benefit is secondary to that afforded through reducing the mounded perched groundwater beneath Playa 1. Targeted constituents to be addressed by the treatment system are RDX and its breakdown products, and the other high explosive constituents of concern. The goals of the Playa 1 Pump and Treat are consistent with the RAOs of preventing the growth of perched groundwater contaminant plumes and achieving cleanup standards for the perched groundwater.

The primary metric for successful operation of this system is reduction of the mounded water beneath the Playa 1 area and corresponding reduction in the flux of water leaving this region of the perched groundwater moving towards the Southeast Pump and Treat System. Accordingly, perched groundwater thickness is expected to decline at a rate of one to two feet per year from the 2008 perched groundwater

[1] Expected conditions for the Pantex Plant soils and groundwater were identified throughout the environmental restoration project in several documents including investigation, risk assessment reports and decision reports. These reports are listed in the *Pantex Plant Site-Wide Proposed Plan.*

potentiometric surface contours during the first five years of implementation and more slowly thereafter. This will be a function of reduced yield from the extraction wells over time. Contaminant concentrations are expected to decrease after five to ten years of operation through treatment of the extracted water; the overall mass of contaminants in the perched aquifer will be reduced as the volume of water decreases. However, the rate of contaminant mass reduction will decrease as the water yield decreases.

The following is a summary of the Playa 1 Pump and Treat System:

Treatment System
(Capacity = 250 gpm or 324,000 gpd/118 million gal/yr at a 90% operational efficiency)

- Granular Activated Carbon
- Boron Ion Exchange (for irrigation quality)

Extraction Wells and Conveyance Lines

- 10 Extraction Wells
- Two miles of conveyance line connecting extraction wells to the treatment units
- Discharge line to the subsurface irrigation holding lagoon

This system and its components are described in detail in the *Construction Completion Report – Playa 1 Perched Aquifer Dewatering Project, December 2008* and *Final Design Basis Document– Playa 1 Perched Aquifer Dewatering Project*, March 2007.

2.2 Southeast Pump and Treat System

The function of the Southeast Pump and Treat System is to remove perched groundwater and treat it for industrial and/or irrigation reuse. The primary intent of the response action is the removal of water from this area resulting in a gradual decrease in the volume of perched groundwater moving down gradient (south) towards the Southeast In-Situ Bioremediation treatment zone. This will achieve two important goals; gradual reduction of the volume of perched groundwater moving downgradient toward the southeast, and a reduction in the head (driving force) for vertical migration of perched groundwater into the fine-grained zone in this area. These goals are consistent with the RAO of preventing the growth of perched groundwater contaminant plumes.

The secondary benefit of this action is to reduce the mass of contaminants in the perched aquifer. Fifteen extraction wells were added to the system recognized as an Interim Stabilization Measure in Compliance Plan No. 50284. The addition of these wells served to improve extraction capability and stabilization of the perched groundwater adjacent and east of FM 2373 and within the hexavalent chromium plume moving southeast of Zone 12. Targeted constituents addressed by the treatment system are RDX and its breakdown products, the other high explosive constituents of concern, hexavalent chromium, and volatile organic constituents of concern. Treating the contaminated perched groundwater will attain the RAO of achieving cleanup standards for the perched groundwater COCs, i.e., restoration of the perched groundwater.

Reduction of perched groundwater saturation and contaminant mass are the most important metrics to determine if the system is achieving objectives. Perched groundwater thickness is expected to decline at an average rate of 0.5 feet per year for the first three to five years. Perched groundwater thickness should decline a total of five feet from the 2008 perched groundwater potentiometric surface contours. Contaminant concentrations are expected to remain stable for the first five to ten year period following implementation of the final remedy phase of this system; the overall mass of contaminants in the perched

groundwater will be reduced as the volume of water decreases. However, the rate of contaminant mass reduction will decrease as the water yield decreases.

The following is a summary of the Southeast Pump and Treat System:

Treatment System
(Capacity = 300 gpm or 389,000 gpd/142million gal/yr at a 90% operational efficiency)

- Granular Activated Carbon
- Chromium Ion Exchange
- Boron Ion Exchange (for irrigation quality)

Extraction Wells and Conveyance Lines

- 62 Extraction Wells
- Seven miles of conveyance line connecting extraction wells to treatment units
- Discharge lines from the treatment system to:
    - Subsurface irrigation holding lagoon
    - Four injection wells completed into the perched groundwater

This system and its components are described in detail in the *Southeast Pump & Treat Implementation Report, February 2009*.

2.3 Southeast In-Situ Bioremediation System

The function of the Southeast In-Situ Bioremediation System is to establish an anaerobic biodegradation treatment zone capable of reducing contaminants to drinking water standards (MCLs/MSCs) by injecting the necessary amendments and nutrients. The primary intent is to reduce the concentration of contaminants in the southeast area of the perched groundwater that is more susceptible to vertical migration, i.e., reduce potential breakthrough to the Ogallala Aquifer. This action is consistent with the RAOs of achieving cleanup standards for the perched groundwater and preventing contaminants from exceeding cleanup standards in the Ogallala Aquifer.

The injection wells were drilled in a line perpendicular to the gradient so water that flows through this zone will be treated before it reaches an area on Texas Tech property where the FGZ becomes less resistant to vertical migration than beneath the majority of the Pantex Plant. Based on the current rate of perched groundwater flow and amendment longevity, injections will be necessary about every eighteen to twenty-four months. As perched groundwater is removed from the subsurface, the frequency of injections and volume of amendment to be injected could gradually decrease. Targeted constituents for this system are RDX and its breakdown products, other high explosive constituents of concern, and hexavalent chromium.

Reduction of contaminant concentrations in the treatment zone is the most important metric to determine if the system is achieving its objective. RDX (and other high explosives) and hexavalent chromium approximately 200 feet downgradient of the treatment zone are expected to be meet cleanup standards within two years of implementation. Residual concentrations of breakdown products may persist, but should also be treated resulting in declining concentration trends within five years of implementation.

The following is a summary of the Southeast In-Situ Bioremediation System:

Amendment Injection Delivery Trailer

- Designed to allow for transport to other locations for use, as necessary.

Injection Wells and Conveyance System

- 42 Injection Wells
- Injection pad, conveyance lines and distribution vaults provided for use in periodic injections

This system and its components are described in the *Final Implementation Report, Southeast Perched Groundwater In-Situ Bioremediation Corrective Measures Design and Construction,* June 2008 and the *Final Design Basis Document – In-Situ Bioremediation Corrective Measures Design,* May 2007.

2.4 Zone 11 In-Situ Bioremediation System

The objective of the Zone 11 In-Situ Bioremediation System is to establish an anaerobic biodegradation treatment zone capable of reducing contaminants to drinking water standards (MCLs/MSCs) by injecting the necessary amendments and nutrients. The primary intent is to reduce the highest concentration of contaminants in the perched groundwater underlying Zone 11. This action is consistent with the RAO of achieving cleanup standards for the perched groundwater.

The injection wells were drilled in a line perpendicular to the gradient so water flowing through this zone is treated before it reaches the area beneath Texas Tech property near Playa 4. Based on the current rate of perched groundwater flow and amendment longevity, injections will be necessary about every twelve to twenty-four months. Targeted constituents for this system are perchlorate, trichloroethene and its breakdown products, and RDX and its breakdown products.

Reduction of contaminant concentrations in the treatment zone is the most important metric to determine if the system is achieving objectives. TCE and perchlorate are expected to be treated within about 200 feet of the treatment zone to cleanup standards within two years of implementation. Residual concentrations of TCE breakdown products may persist, but should also be treated resulting in declining concentration trends within five years of implementation.

The following is a summary of the Zone 11 In-Situ Bioremediation System:

Amendment Injection System

- The Amendment Injection Delivery Trailer constructed for the Southeast ISB System will be used to inject amendments into the Zone 11 ISB injection wells.

Injection Wells and Conveyance System

- 23 Injection Wells
- Injection pad and connection hoses will be used for periodic injections

This system and its components are described in the *Design Basis Document, In-Situ Bioremediation Corrective Measure Design,* November 2008.

3. Process for Identifying Potential Deviations

Potential deviations may be encountered for each of the four response actions that compose the selected remedy for perched groundwater, resulting from performance or characterization uncertainties. Deviations could also be encountered in the Ogallala if the response actions are not meeting the expected condition of protecting the Ogallala Aquifer.

Monitoring is important for confirming the effectiveness of perched groundwater response actions, for monitoring for uncertainties defined in the RFI and CMS/FS, and for confirming future expected conditions within the perched groundwater and Ogallala Aquifer. If monitoring results obtained through the monitoring network identify an unexpected condition or deviation, contingent actions will be considered and implemented (if necessary) to ensure continued protection of the Ogallala Aquifer and human health and the environment.

Figure 3.1 provides an overview of the process that will be followed to validate the monitoring data to determine whether deviations have been identified during the monitoring process. The process consists of monitoring, evaluation of monitoring data, identification of deviations, then determination of whether contingency actions are needed. Appendices A, B, and C describe the validation and interpretation processes that will be used to evaluate the data and the administrative actions required for notification if unexpected conditions are found.

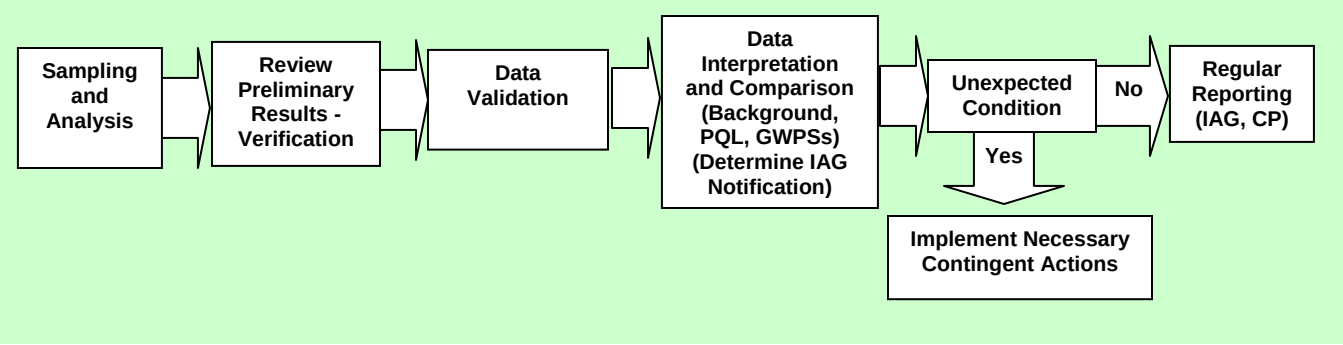

Figure 3-1. Flowchart of Groundwater Data Review Process

3.1 Perched Groundwater Monitoring Well Network

Key objectives evaluated by the perched groundwater monitoring network are plume stability, response action effectiveness, and uncertainty management. These objectives were selected because they will provide the best indicators to determine if the selected remedy is achieving RAOs.

In the LTM System Design Report, the monitoring wells were assigned an objective (plume stability, response action effectiveness, and uncertainty management wells) to ensure the system was designed with enough wells to provide information for each objective. However, each type of monitoring well (regardless of classification) will be able to provide information to determine if the four remedial systems are achieving specific performance objectives, resulting in overall RAOs for the selected remedy being achieved. In the event deviations are discovered through the perched groundwater monitoring system, contingent actions will be implemented based on a thorough examination (including location, nature and extent of the event and the potential impact on public health, safety and the environment) and evaluation of the deviation. Results of evaluation will be utilized to determine potential consequences and establish

logical, rational steps needed to respond, mitigate, and implement the appropriate contingent action in conjunction with the requirements of the Record of Decision (ROD) and CP-50284.

Another important role of the information collected from the monitoring wells is to determine if contaminants are being detected in areas where they are not expected based on the RFI. These results could indicate the problems have not been accurately defined, the extent of contamination may be larger than expected and additional investigations may be necessary to determine the appropriate response to the newly discovered contamination. This monitoring will be conducted for uncertainty management purposes, to determine if uncertain conditions (as defined in the RFIs) are occurring. Figure 3-2 depicts the perched groundwater monitoring network well locations and objectives.

3.1.1 Perched Groundwater Remedy System Interactions

As described in Section 2, the four components of the selected remedy for perched groundwater are intended to work together to create conditions that both stabilize and cleanup the contaminants. The pump and treat systems in the southeast perched groundwater and the Playa 1 area focus on the hydraulics of the system, that is groundwater removal as a means of reducing the potential for both vertical and lateral migration of contaminants. With this understanding, the primary metric for success of the pump and treat systems is perched groundwater thickness, as determined through periodic water level measurements. Routine monitoring for this parameter will provide the basis for determining flow direction, gradient, and thickness. These determinations will aid the prediction of plume movement and rate, as well as vertical flux of contaminants. A secondary benefit of the pump and treat systems is contaminant mass removal. Therefore, chemical analysis is also important as it allows the risk posed by the contaminant plumes to be evaluated periodically.

The southeast and Zone 11 *in-situ* treatment systems target contaminant mass removal as a means of cleaning up the perched groundwater and protecting the underlying Ogallala Aquifer from future degradation that could affect its use as a drinking water source. These systems are on the downgradient side of the perched groundwater plumes, in the areas that pose the greatest potential for vertical migration to the Ogallala Aquifer. Chemical analysis and parameters associated with oxidation/reduction (redox) potential within the treatment zones will provide the most important information for determining the effectiveness of these systems. Figure 3-3 depicts how the components work together in the southeast area to achieve the RAOs.

3.2 Ogallala Monitoring Well Network

The Ogallala Aquifer will be monitored according to the SAP. Early detection monitoring is important for ongoing confirmation of the effectiveness of perched groundwater response measures and monitoring for uncertainties defined in the CMS/FS and ROD. Monitoring results obtained through the implementation of the SAP will be evaluated within the context of the LTM System Design Report to identify an unexpected condition. Actions will be considered and implemented, as necessary, to ensure continued protection of the Aquifer and human health and the environment.

The purpose of monitoring wells in the Ogallala Aquifer is to confirm expected conditions identified in the RFIs, fill potential data gaps, and fulfill long-term monitoring requirements for soil units closed to RRS 3 under the Texas Risk Reduction Rules (30 TAC 335 Subchapter S). The wells will also be used to identify breakthrough of constituents to the Ogallala Aquifer from overlying perched groundwater, where present, or potential source areas in the unsaturated zone before potential points of exposure have been impacted. As was the case for the perched monitoring network wells, the Ogallala monitoring wells were assigned objectives in the LTM System Design Report. These objectives were early detection and

uncertainty management. However, the information from either category of well can be used to determine if expected conditions are not being met. Figure 3-4 shows the locations of the Ogallala Aquifer monitoring network wells and identifies the objectives of each.

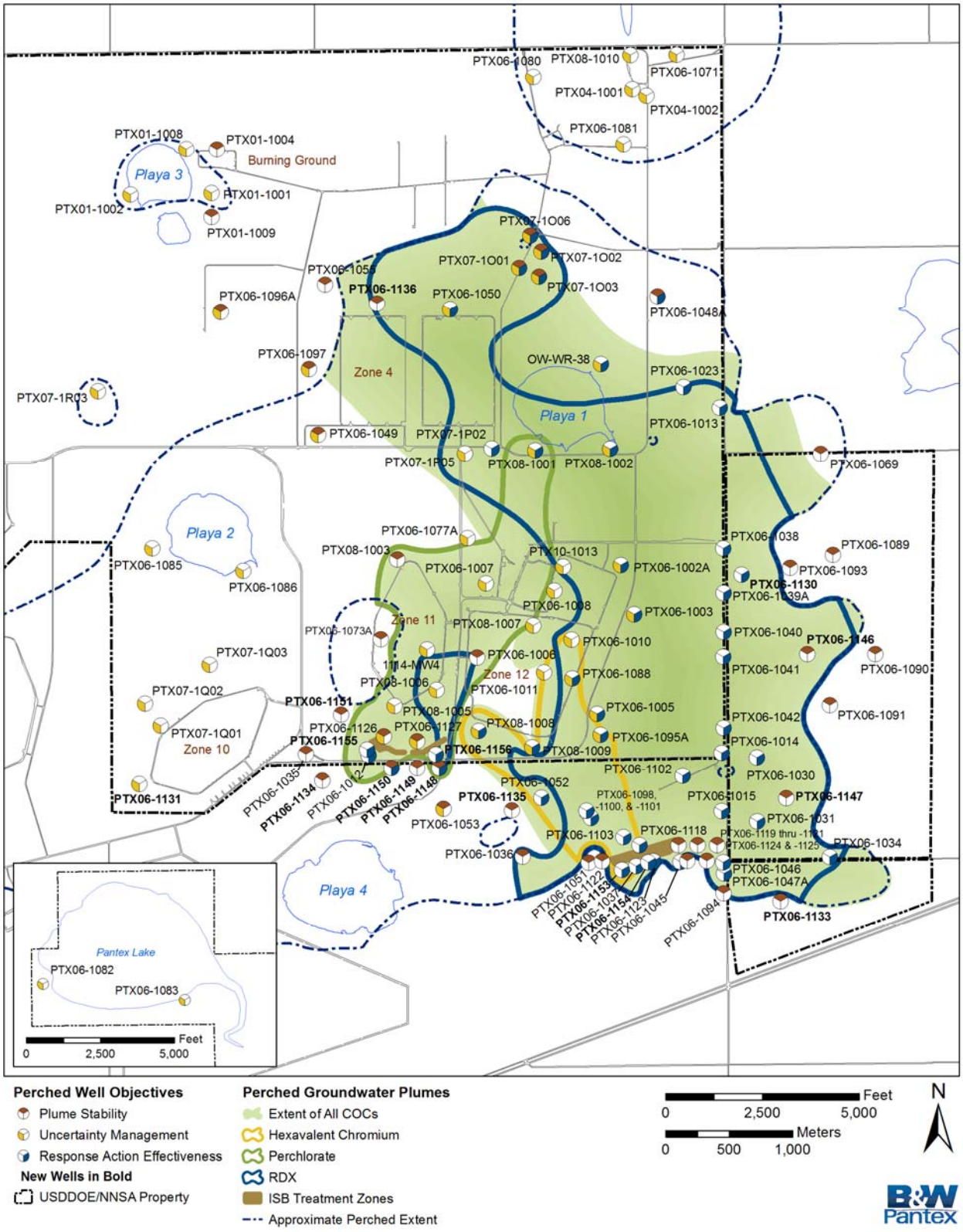

Figure 3-2. Perched Groundwater Monitoring Wells

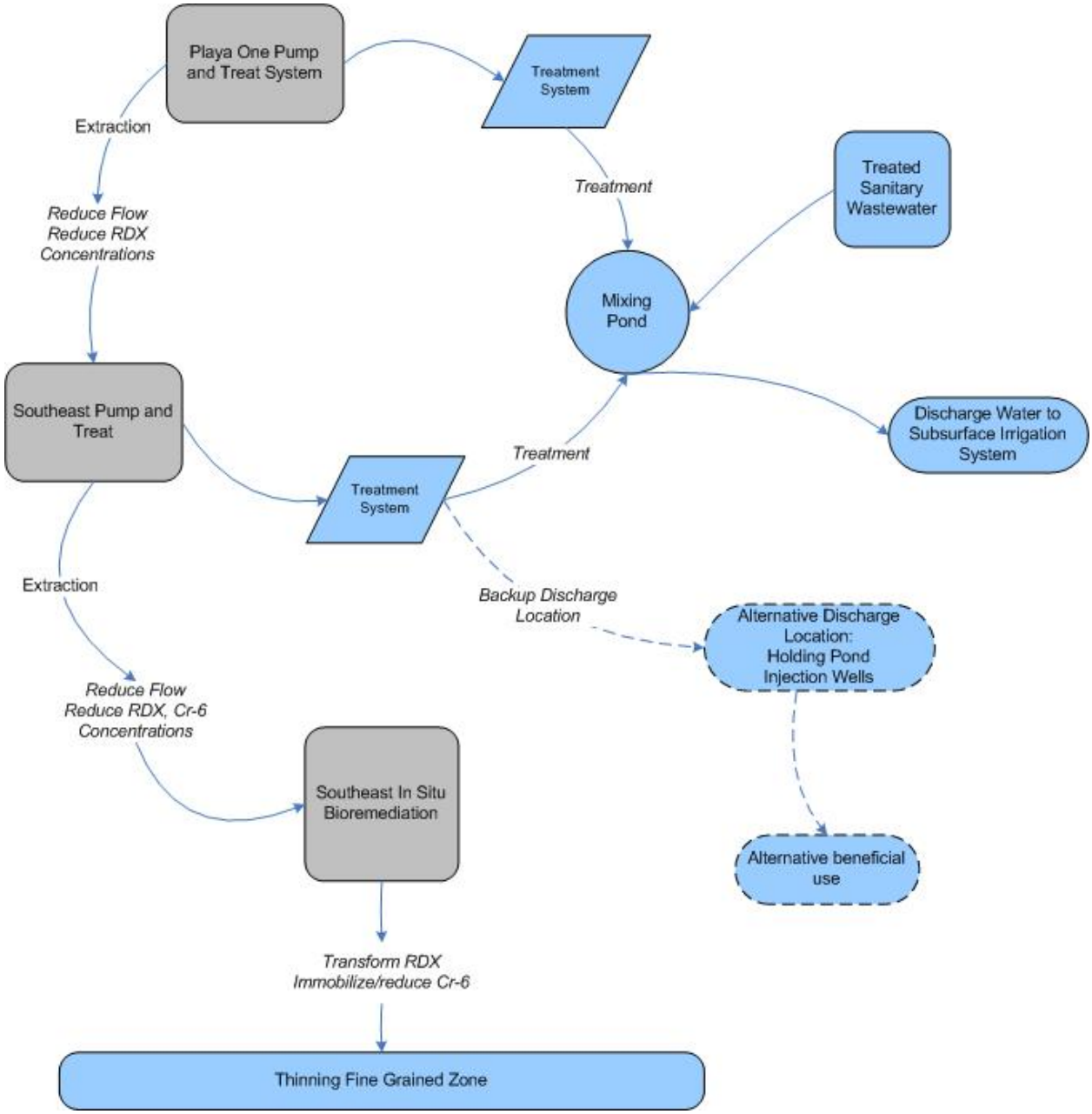

Figure 3-3. Southeast Area Remedies System Interaction

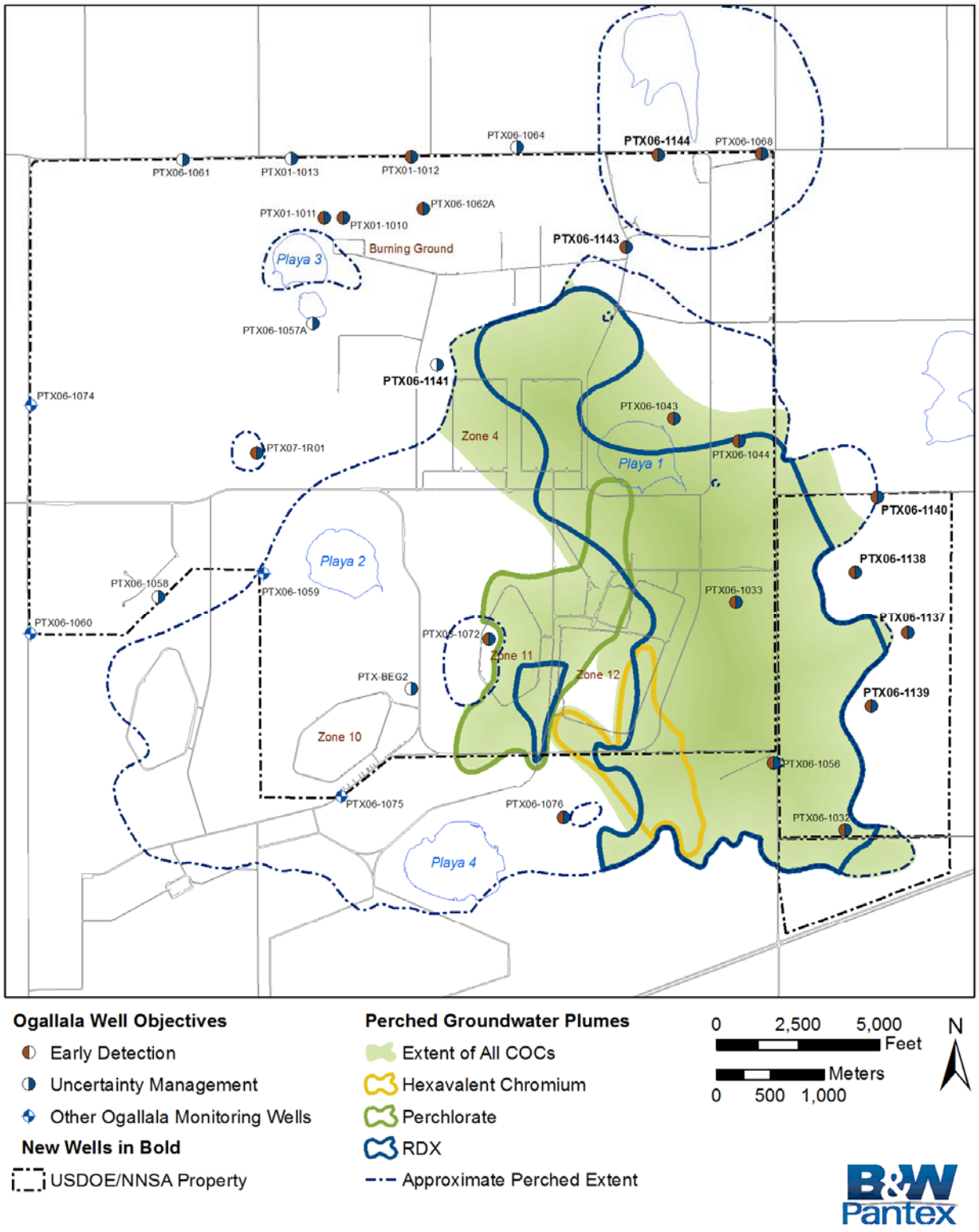

Figure 3-4. Ogallala Aquifer Monitoring Wells

4. Potential Deviations

Potential deviations differ for each of the four remediation systems as does the impact and time to respond for each deviation. These parameters were used to provide an evaluation of each deviation. Impact is defined as the impact the deviation would have on meeting the performance objectives of the remedy and/or the impact to achieving the overall RAOs. Time to respond is based on the timeframe from when the deviation is detected to when the impact would be incurred if a contingent action is not implemented to respond to the deviation.

This section identifies the technological deviations that could be encountered for each of the remediation systems and provides an evaluation of the deviations against the three parameters defined above. The evaluation also will include the type of monitoring data that will be used to determine if the deviation is occurring.

The perched monitoring network is also monitoring the perched groundwater to confirm expectations of site characterization. Deviations from site characterization expectations could be encountered in the monitoring wells; the results will be evaluated to determine the effect. The characterization deviations could impact the operation of the response actions, but more than likely will indicate the existence of a new problem.

Deviations could also be encountered for the Ogallala Aquifer, specifically, constituents detected by the monitoring network that are approaching or above GWPS. As further discussed in Section 6, the actions taken for the Ogallala Aquifer will differ from the perched groundwater because active remediation systems are not a necessary part of the Selected Remedy.

4.1 Playa 1 Pump and Treat System

The system could encounter two major types of technical deviations; deviations related to pumping and extraction and deviations related to treatment and discharge of extracted water.

Pumping and Extraction Deviations

As described in Section two, it is expected that the Playa 1 Pump and Treat system will remove the mounded perched groundwater beneath Playa 1 in sufficient volume to decrease the flux of groundwater moving radially out from the Playa 1 area. Removing the water will also reduce the flux of groundwater moving to the Southeast Pump and Treat System (SEPTS) and the head that could cause vertical migration to the Ogallala Aquifer. This is possible because future infiltration to the perched is expected to be negligible.

The main potential deviation related to this expected condition is that the mounding beneath Playa 1 is not reduced because the rate of infiltration is much greater than expected. This condition will be detected by monitoring water levels in the perched monitoring wells identified in the SAP. Also, if the deviation were to occur, the gradient of water moving towards the SEPTS will not decline in two years as is expected. The time to respond to the deviation is approximately five to ten years; in the short term (within five years) the inability to reduce flux will not impact the overall ability of the SE Pump and Treat and ISB systems to meet the RAOs. If the mounding persists for over five years, the SE Pump and Treat and ISB systems will be unlikely to meet the goal of restoration, if the deviation is not addressed.

It is expected that by extracting groundwater contaminated with RDX, RDX mass removal will also be accomplished. Since new sources of RDX are not expected and mass is being removed, the RDX

concentration is expected to decrease in the Playa 1 area. As more water is removed, it is also expected the rate of RDX mass removal will decrease, primarily due to decreasing saturated thickness of the perched aquifer. The main potential deviation is that perchlorate is present at levels that exceed the discharge criteria (12 ppb). Perchlorate will likely first be detected in the area southwest of Playa 1, which is closest the to the migrating perchlorate plume. Monitoring will be performed at the extraction wellheads and the treatment system as specified in the SAP. The time to respond to the deviation is short (less than six months) because the impacted extraction well will need to be taken offline or extraction rates will need to be modified until the treatment system can be modified to address perchlorate and continue to meet discharge requirements. This will have a low impact on overall extraction rates.

Treatment and Discharge Deviations

It is expected that the extracted groundwater will contain RDX. Treatment to remove RDX requires GAC. Boron is also treated via selective ion exchange. COCs requiring treatment other than GAC are not expected. The potential deviation exists that perchlorate will be detected in the extracted water at levels that exceed discharge standards (12 ppb). Monitoring for perchlorate is performed at the extraction wells and the influent stream of the treatment system as specified in the SAP. If perchlorate is detected, the time to respond is short (less than six months) and the impact would be high if the discharge limits are exceeded.

The expected condition for the treated water is that it will meet discharge criteria downstream of the holding pond noted in the TLAP and will be discharged to the soil via subsurface irrigation. It is expected the volume of discharge water will not exceed crop usage/evapo-transpiration rates, preventing any deep percolation into the underlying vadose zone. Treated sewage effluent will also discharge to the holding pond noted in the TLAP, mixing with the treated water from Playa 1 Pump and Treat prior to discharge to the subsurface irrigation system. A deviation would occur if discharge to the subsurface irrigation exceeds crop usage/evapo-transpiration rates. Soil borings would be used to determine if discharged water is infiltrating the vadose at a rate greater than expected. The response time for this deviation is one month for changes to discharge methods and extraction rates, but one year for changes to high demand crops at the subsurface irrigation system. The impact of this deviation is medium.

4.2 Southeast Pump and Treat System

The system could encounter two major types of technical deviations; deviations related to pumping and extraction and deviations related to treatment and discharge of extracted water.

Pumping and Extraction Deviations

It is expected that the SEPTS will remove perched groundwater in the southeast area in sufficient volume to decrease the flux of groundwater moving towards the Southeast In-Situ Bioremediation System (SE ISB). This will also reduce the head, reducing the potential for vertical migration to the Ogallala Aquifer. Perched groundwater will be removed in sufficient volume such that the RDX and chromium plumes are stabilized and the contaminant center of mass is not moving. This is possible because infiltration to the perched is negligible and the Playa 1 Pump and Treat system is decreasing the flow to the southeast area. There are three potential deviations to the above expected conditions

1. The Playa 1 Pump and Treat System does not remove sufficient flow and the SEPTS is overloaded. Monitoring of the Playa 1 Pump and Treat performance will determine if the deviation is occurring. The time to respond to this deviation is less than two years and the impact

is high because the SE ISB will require modification if the lateral flux is not sufficiently reduced by the pump and treat systems.

2. Infiltration from the 5/12a Ditch is greater than expected and the SEPTS is overloaded and cannot sufficiently reduce lateral flux. Potentiometric surface measurements will be collected from the system and perched groundwater monitoring wells, as identified in the SAP, to determine if the deviation is occurring. The time to respond to the deviation is less than two years and the impact is high because the SE ISB will likely require modification if the lateral flux is not sufficiently reduced by the pump and treat systems.
3. The subsurface irrigation system fails which requires injection of treated water into the SEPTS area. Monitoring of the subsurface irrigation performance will determine if the deviation is occurring. The time to respond to this deviation is less than two years and the impact is high because the SE ISB will require modification if the lateral flux is not sufficiently reduced by the pump and treat systems.

It is expected that by extracting groundwater contaminated with RDX and chromium, RDX and chromium mass removal will also be accomplished. Since new sources of RDX and chromium are not expected and mass is being removed, the RDX and chromium concentrations are expected to decrease in the SE area over several decades. Yield from the perched should decline as extraction continues, and this impact will first be seen in the southern wells in less than five years. The decreased yield will cause the RDX and chromium mass removal rate to decrease. The main deviation is that perchlorate could move into the wellfield causing levels to exceed the discharge criteria (12 ppb). Perchlorate could move into extraction wells closest to the migrating perchlorate plume, i.e., those in the farthest southwest region of the SEPTS wellfield. Monitoring will be performed at the extraction wellheads and the influent stream of the treatment system as specified in the SAP. The time to respond to the deviation is short (less than a year) because the impacted extraction well will need to be taken offline or extraction rates will need to be modified until the treatment system can be modified to address perchlorate and continue to meet discharge requirements. This will have a high impact because the extraction wells that would first encounter perchlorate from Zone 11 are used to stabilize the chromium plume and cannot be taken offline for an extended period.

Treatment and Discharge Deviations

It is expected that the extracted groundwater will contain RDX. Treatment to remove RDX will require GAC. Boron is also treated via selective ion exchange. COCs requiring treatment other than GAC are not expected. The deviation exists that perchlorate will be detected in the extracted water at levels that exceed discharge standards (12 ppb). Monitoring for perchlorate is performed at the extraction wells and the influent stream of the treatment system as specified in the SAP. If perchlorate is detected, the time to respond is short (less than a year) and the impact would be high if the discharge limits are exceeded.

The expected condition for the treated water is that it will meet discharge criteria downstream of the holding pond noted in the TLAP and will be discharged to the soil via subsurface irrigation; the volume of discharged water should not exceed crop usage/evapo-transpiration rates, preventing any deep percolation into the underlying vadose zone. Treated sewage effluent will also discharge to the holding pond noted in the TLAP, mixing with the treated water from Playa 1 Pump and Treat prior to discharge to the subsurface irrigation system. Discharge to the subsurface irrigation could exceed crop usage/evapo-transpiration rates. Soil borings would be used to determine if discharged water is infiltrating the vadose at a rate greater than expected. The response time for this deviation is one month for changes to discharge methods and extraction rates, but one year for changes to high demand crops at the subsurface irrigation system. The impact of this deviation is medium.

4.3 Southeast In-Situ Bioremediation System

The system could encounter two major types of deviations; deviations related to the treatment zone and deviations related to the effectiveness of treatment.

Treatment Zone Uncertainties

As described in Section two, the SE ISB will establish an anaerobic treatment zone on the southeast edge of the perched aquifer susceptible to vertical migration that will treat/transform RDX and hexavalent chromium to drinking water standards. The volume of water moving into the area will have been reduced by the Playa 1 and Southeast Pump and Treat Systems so the treatment zone will be easier to maintain, e.g., less water makes the zone easier to maintain and allows for greater confidence the ISB will provide protection to the Ogallala. However, there are three potential deviations to the expected conditions:

1. The treatment zone cannot be maintained because the volume of water in the area is greater than expected because the upstream Pump and Treat Systems are not meeting expected conditions to reduce lateral flux. The deviations will be detected by evaluating the potentiometric surface measurements from the monitoring wells upstream of the treatment zone to calculate the treatment zone area and the flow gradient. The time to respond would be approximately two years. The deviation would have a high impact on the resources necessary to establish the treatment zone because additional amendment injections would be necessary.
2. Injection wells that are currently dry (to the west and east of the existing system) become saturated and require injections to maintain the treatment zone. The deviation will be detected by collecting information about water levels in the dry monitoring wells twice a year. The time to respond to the deviation is one year. The overall impact will be low as the newly saturated wells would require injection of amendment to expand the treatment zone.
3. The treatment zone cannot be maintained due to biofouling, resulting in the amendment not being distributed effectively. Biofouling could result from plugged injection wells or the pore spaces becoming plugged in the geologic formation. The deviation will be detected for injection wells if the extraction rates for sampling the wells decrease. If the geologic formation is plugged, the potentiometric surface upstream of the injection wells will rise. The time to respond to the deviation is approximately one year. The overall impact will be high because it would result in ineffective distribution of the amendment and a poorly established treatment zone.

Treatment Uncertainties

It is expected that the Southeast ISB will treat/transform RDX and hexavalent chromium (and other COCs) to the cleanup standards in the perched in and downgradient of the anaerobic treatment zone. As a result of changing redox conditions, it is expected there will be a temporary elevation of the metals concentrations in the treatment zone following the amendment injection (up to six months). However, metals concentrations are expected to meet cleanup standards downgradient of the treatment zone in the long term (within two years) where measurements will be collected by the monitoring wells. It is also expected the concentration of RDX breakdown products will increase in the treatment zone in the short term (up to six months) following the injection of amendment as a result of the breakdown of RDX. These levels will also decrease and will meet cleanup standards downgradient of the treatment zone. The expected conditions also include encountering low levels (four times the drinking water standard) of TCE and TCE breakdown products in the treatment zone.

There are three potential deviations to the expected conditions for the treatment at the SE ISB system:

1. RDX and/or breakdown products are not treated to cleanup standards downgradient of the treatment zone. The deviation would be detected by collecting contaminant concentration information from the monitoring wells that are located downgradient of the treatment zone. The time to respond to the deviation is less than two years and the overall impact of the deviation is high because the RDX above groundwater protection standards could migrate to the Ogallala aquifer.
2. Cr and other metals are not reduced to cleanup standards downgradient of the treatment zone. The deviation will be detected by collecting contaminant concentration information from the monitoring wells downgradient of the treatment zone. The time to respond to the deviation is less than two years. The overall impact of the deviation is high because it will impact the ability of the system to meet restoration goals to reduce the levels of hexavalent chromium, which could eventually reach the Ogallala Aquifer if it is not treated.
3. TCE and breakdown products are encountered at concentrations higher than expected. The deviation would be detected by collecting information from the monitoring wells downgradient of the treatment zone. The time to respond to the deviation is less than two years. The overall impact of the deviation is medium because it could impact the ability of the system to meet restoration goals to reduce the levels of TCE and its breakdown products which could eventually reach the Ogallala Aquifer if they are not treated.

4.4 Zone 11 In-Situ Bioremediation System

The system could encounter two major types of deviations; deviations related to the treatment zone and deviations related to the effectiveness of treatment.

Treatment Zone Uncertainties

As described in Section two, the Zone 11 In-Situ Bioremediation System (Zone 11 ISB) will establish an anaerobic treatment zone in the perched aquifer on the edge of Zone 11 in the area of high TCE and perchlorate concentrations to treat/transform TCE and perchlorate to meet drinking water standards. However, there are two deviations to the expected conditions:

1. The treatment zone cannot be maintained because the volume of water in the area is greater than expected. The deviations will be detected by evaluating the potentiometric surface measurements from the monitoring wells upstream of the treatment zone to calculate the treatment zone area and the flow gradient. The time to respond would be approximately three years. The deviation would have a high impact on the resources necessary to establish the treatment zone because additional amendment injections would be necessary more frequently.
2. The treatment zone cannot be maintained due to biofouling, resulting in the amendment not being distributed effectively. Biofouling could result from plugged injection wells or the pore spaces become plugged in the geologic formation. The deviation will be detected for injection wells if the extraction rates for sampling the wells decrease. If the geologic formation is plugged, the potentiometric surface upstream of the injection wells will rise. The time to respond to the deviation is approximately one year. The overall impact will be high because it would result in ineffective distribution of the amendment and establishment of the treatment zone.

Treatment Uncertainties

It is expected that the Zone 11 ISB will treat/transform TCE and perchlorate to the cleanup standards in the perched groundwater in and downgradient of the anaerobic treatment zone. There are two potential deviations to the expected conditions for the treatment at the Zone 11 ISB system:

1. Perchlorate is not treated to cleanup standards downgradient of the treatment zone. The deviation will be detected by collecting information from the monitoring wells downgradient of the treatment zone. The time to respond to the deviation is less than two years. The overall impact of the deviation is high because it could impact the ability of the system to meet restoration goals to reduce the levels of perchlorate which could eventually reach the Ogallala Aquifer, if not treated.
2. TCE and/or breakdown products persist at concentrations greater than drinking water standards. The deviation will be detected by collecting information from the monitoring wells downgradient of the treatment zone. The time to respond to the deviation is less than two years. The overall impact of the deviation is high because it could impact the ability of the system to meet restoration goals to reduce the levels of TCE and its breakdown products which could eventually reach the Ogallala Aquifer if not treated.

4.5 Uncertainty Management Monitoring

The monitoring well network will also be used to confirm expected conditions identified during site characterization. A characterization deviation would occur if monitoring results indicate new contaminants not expected as a result of the site characterization; these results would potentially signal a previously unidentified problem has been detected. The new problem may require a new response action, or it could potentially be addressed by changing the existing response action.

Additional assessments or investigations may be performed to fill potential data gaps or address areas of perceived risk; these steps are necessary to determine what contingent actions may be necessary. The actions that will be implemented to further evaluate the deviation are described in Section 5.

4.6 Ogallala Aquifer

The response actions described above have been implemented to protect the Ogallala Aquifer. Because of these actions, the expected conditions are that constituents will not be detected above the GWPS and those constituents will not reach potential points of exposure above the GWPS. If constituents are detected by the Ogallala Aquifer monitoring system near or above GWPSs and are confirmed through repeated sampling results and/or trending as discussed in Appendix A, then further actions will be implemented that are commensurate with the potential consequences and risks. These actions are described in Section 6.

5. Perched Contingent Actions

As discussed in the previous sections, deviations for the four response actions will differ. Therefore, the contingent actions considered when a deviation arises will be dependent on the specific constituents, location, and conditions associated with the deviation. Contingent actions may be implemented as interim actions (ISMs/removal actions) in accordance with the ROD, IAG, and CP-50284, if warranted by the specific circumstances.

Following confirmation and evaluation of the deviation, defining a response will require interpretation of the detection with regard to the location of the monitoring well relative to potential sources and available migration mechanisms. The Pantex Groundwater Media Scientist will determine probable causes of deviations and recommend contingent actions appropriate for specific situations to Pantex Plant Management. The Pantex Groundwater Media Scientist will validate usability of results with respect to data needs for interpreting the deviation (Appendix A). If newly detected constituents are confirmed or changes occur at a much greater rate than expected, written and oral notifications will be made (See Appendix B).

If characterization deviations are detected as part of uncertainty management activities, actions will need to be implemented to determine the source of detections. The actions that will be instigated in response to deviations to site characterization are identified in this section.

5.1 Playa 1 Pump and Treat System

The overall objective of the Playa 1 Pump and Treat System is to reduce mounding beneath Playa 1 to reduce radial flow and the volume of water flowing to the SEPTS and to the Ogallala Aquifer through vertical migration. The system will also remove RDX mass in the perched aquifer working towards restoration; RDX and boron also will be treated sufficiently to meet discharge requirements and the treated water will be discharged in a manner that will not impact the vadose zone. The deviations evaluated in Section 4 will be addressed by potential contingent actions.

If the mounding of groundwater underneath Playa 1 is not reduced because the infiltration rate is greater than expected, then contingent action would include adding extraction wells in the Playa 1 area to increase the extraction rate. If the extraction rate is increased with additional wells, then the treatment system will also need to be expanded. An additional contingent action would be to use the SEPTS to extract the additional volume of water.

If perchlorate is detected in the extraction wells (EW), specifically in PTX06-EW72 at levels that exceed discharge criteria, then the extraction from PTX06-EW72 will need to be modified until the treatment system can be modified to treat perchlorate. The treatment system will need to be modified through a building modification and addition of treatment vessels and ion exchange to appropriately treat perchlorate to discharge criteria.

If discharge is greater than the crop usage/evapo-transpiration rates at subsurface irrigation plots impacting the vadose zone, then alternative discharge methods including injection back into the perched groundwater or modification of the rate of extraction will be necessary; additionally, the type of crop being raised using the discharge water could be changed to one with a higher water demand.

5.2 Southeast Pump and Treat System

The overall objective of the SEPTS is to reduce lateral flux and the volume of water flowing to the Southeast ISB and vertical flux to the Ogallala Aquifer. The system will also remove RDX and chromium mass in the perched aquifer working towards restoration; RDX, chromium and boron will be treated sufficiently to meet discharge requirements and the treated water will be discharged in a manner that will not impact the vadose zone. The deviations evaluated in Section 4 will be addressed by potential contingent actions.

There are three conditions that would lead to lateral flux not being reduced and all have different contingent actions:

1. If the Playa 1 Pump and Treat is not removing sufficient flow, the SEPTS will become overloaded and will be unable to reduce lateral flux. The contingent action would include adding extraction wells in the Playa 1 area to increase the extraction rate. If the extraction rate is increased with additional wells, then the Playa 1 Pump and Treat treatment system will also need to be expanded.
2. Infiltration from the 5/12a Ditch could be greater than expected, overloading the SEPTS. In this case, the contingent action would involve re-grading or lining portions of the 5/12a Ditch to reduce infiltration.
3. The subsurface irrigation system could fail, which would require treated water be injected back into the perched groundwater, increasing infiltration and overloading the SEPTS. To address this deviation, the treatment system would need to be modified so that surface irrigation or other beneficial use could be implemented.

If perchlorate is detected in the extraction wells at levels that exceed discharge criteria, then the extraction from wells closest to the perchlorate migrating from Zone 11 will need to be modified temporarily until the treatment system can be upgraded to treat perchlorate. The treatment system will need to be modified through a building modification and addition of treatment vessels and ion exchange to appropriately treat perchlorate to discharge criteria.

If discharge to the subsurface irrigation system is greater than the crop usage/evapo-transpiration rates, impacting the vadose zone, then alternative discharge methods including injection back into the perched groundwater or modification of the rate of extraction will be necessary; additionally, the type of crop being raised using the discharge water could be changed to one with a higher water demand.

5.3 Southeast *In-Situ* Bioremediation System

The objective of the SE ISB is to treat or transform RDX and hexavalent chromium to prevent vertical migration of RDX and hexavalent chromium to the Ogallala. The system will meet cleanup standards of RDX and hexavalent chromium and other COCs downgradient of the treatment zone, working towards restoration. The deviations evaluated in Section 4 will be addressed by potential contingent actions.

Three conditions would lead to the inability of the system to meet the objective of treating and transforming RDX and hexavalent chromium through the formation of a treatment zone.

1. The treatment zone cannot be maintained because the volume of water in the southeast area has not been reduced enough by the Playa 1 Pump and Treat and the SEPTS. The contingent action would involve increasing the extraction rates from the Playa 1 and SEPTS to reduce the flow to the SE ISB area.

2. The treatment zone cannot be maintained due to biofouling either in the injection wells or in the geologic formation. To reduce the likelihood of the injection wells becoming biofouled, a rigorous well maintenance program will be developed and implemented. If the geologic formation is blocked through biofouling, the treatment zone will need to be expanded beyond the plugged area.
3. Injection wells that are currently dry (to the west and east of the existing system) become saturated and require injections to maintain the treatment zone. The contingent action would be to inject amendment into the wells west and east of the treatment zone.

There are also three conditions that will not allow the system to meet the cleanup standards for RDX, hexavalent chromium and other COCs downgradient of the treatment zone.

1. RDX and/or breakdown products are not treated to cleanup standards downgradient of the treatment zone. One contingent action would be to change the type of amendment to one that treats RDX and breakdown products to meet cleanup standards. Another approach would be to inject a greater amount of amendment into the treatment zone.
2. Chromium and other metals are not reduced to cleanup standards downgradient of the treatment zone. In this case, a contingent action would be to change the type of amendment to one that will treat chromium and other metals to meet cleanup standards. If the levels that are entering the treatment zone are too high, levels could be lowered by increasing extraction through the SEPTS in the chromium hotspot upgradient of the Southeast ISB system.
3. TCE and breakdown products are encountered at concentrations higher than expected. The contingent action would be bioaugmentation of the treatment zone with dehalococcoides if the levels of TCE remain greater than those protective of the Ogalllala Aquifer and/or the treatment stalls resulting in increasing concentrations of breakdown products (DCE and VC) that exceed the drinking water standard.

5.4 Zone 11 *In-Situ* Bioremediation System

The objective of the Zone 11 ISB is to establish an anaerobic biodegradation treatment zone capable of reducing contaminants to drinking water standards (MCLs/MSCs) by injecting the necessary amendments and nutrients. If the deviations described in Section 4 were to occur, the potential contingent actions would differ based on the results from the monitoring network.

Two conditions would lead to the inability of the system to meet the objective of treating and transforming RDX and hexavalent chromium through the formation of a treatment zone.

1. The treatment zone cannot be maintained because the volume of water in the area is greater than expected. The contingent action would be to install extraction wells upstream of the treatment zone to reduce flow into the treatment zone.
2. The treatment zone cannot be maintained due to biofouling either in the injection wells or in the geologic formation. To reduce the likelihood of the injection wells becoming biofouled, a rigorous well maintenance program will be developed and implemented. If the geologic formation is blocked through biofouling, the treatment zone will need to be modified, including possible expansion beyond the plugged area.

Two conditions will not allow the system to meet the cleanup standards for TCE and perchlorate downgradient of the treatment zone.

1. Perchlorate is not treated to cleanup standards downgradient of the treatment zone. One contingent action would be to change the type of amendment. Another approach would be to

inject a greater amount of amendment into the treatment zone or increase the frequency of injections.

2. TCE and/or breakdown products are encountered at concentrations higher than expected. The contingent action would be bioaugmentation of the treatment zone with dehalococcoides if the levels of TCE or breakdown products (such as DCE and VC) persist at concentrations greater than the drinking water standards.

5.5 Uncertainty Management Monitoring

Monitoring requirements include monitoring to confirm expected conditions identified during site characterization. If results indicate a significant characterization deviation from expected conditions, additional assessments, or investigations may be taken to fill potential data gaps or address areas of perceived risk. Information received from these wells will be utilized to update the hydrological model and determine whether additional contingent actions are warranted. Figure 5-1 shows a logic flow diagram for how contingent actions will be evaluated if deviations are encountered.

If contaminants are detected in previously unaffected wells, the following actions will be considered:

- Conditions will be evaluated to determine if the detection is related to a new or existing contaminant source:
  - If conditions are determined to be from a new source, then conditions of upgradient SWMUs will be evaluated.
  - If conditions are determined to be from an existing source, then conditions affecting plume movement will be reviewed to determine the root cause.
- Evaluate need for additional response actions

If previously undetected contaminants are discovered, the following process will be used to determine if contingent actions are necessary:

- Determine probable source/cause.
- Evaluate upgradient SWMU conditions.
- Evaluate perched groundwater flow, gradient, and analytical data.
- Evaluate potential for previously unidentified SWMUs using fate and transport tools, as necessary and appropriate.
- Evaluate need for modification of existing remedies (including in-situ and ex-situ treatment processes).
- Evaluate need for additional response actions, to be implemented in the perched groundwater as appropriate.

Further evaluations will be made to determine if additional response actions are appropriate for the perched groundwater. These actions could include enhancing the existing response actions or identifying new response actions.

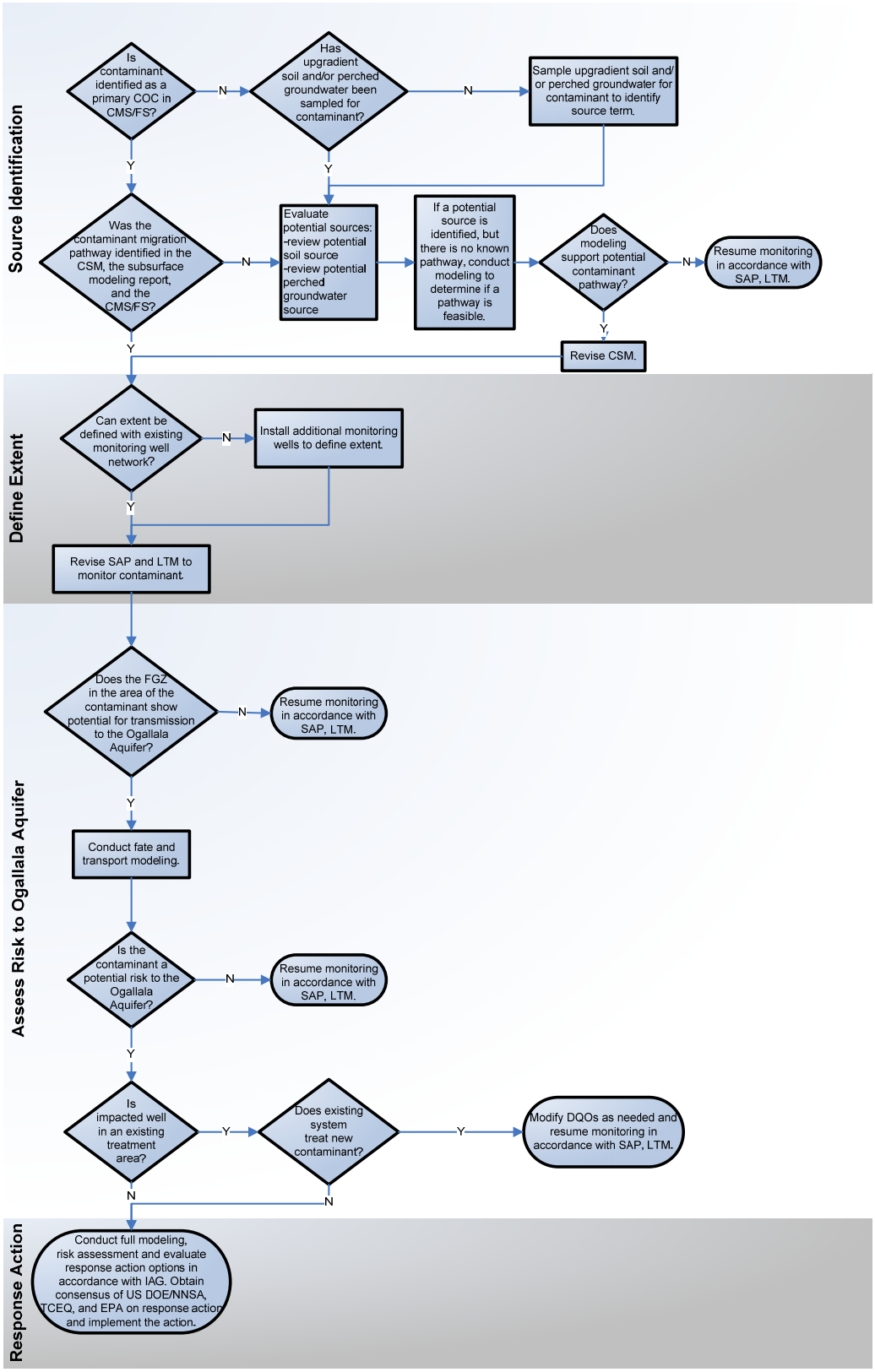

Figure 5-1. Flowchart of Perched Uncertainty Management Contingency Action Process

6. Ogallala Actions

Early removals and cleanup actions have been implemented to protect the Ogallala Aquifer. Because of these actions, the expected conditions are that constituents will not be detected above the GWPS and those constituents will not reach potential points of exposure above the GWPS. If constituents are detected in the Ogallala Aquifer near or above GWPSs and are confirmed through the data validation process (Appendix A) then actions will be implemented that are commensurate with the potential consequences and risks. The actions would include additional monitoring, source identification, implementation of interim protective measures (if necessary), and delineation of extent. These actions are necessary to determine if contingent actions can be considered. Figure 6-1 shows a logic flow diagram for how actions will be evaluated if deviations are encountered in the Ogallala Aquifer monitoring network.

6.1 Monitoring

Once detection is verified, validated, and confirmed using the process described in Appendix A, the Pantex Groundwater Media Scientist will make proper management notifications (Appendix C) and gather input and agreement to increase the frequency of continued monitoring to monthly. The increase in sampling frequency will help to more accurately quantify the concentration in the Ogallala Aquifer.

If the detection is upgradient of a potential drinking water or irrigation water source and there is no monitoring well downgradient of the affected well, potentially affected wells will be sampled. The sampling will occur after obtaining agreement from the landowner, if the well if offsite.

6.2 Source Identification

Efforts will be made to make an exact source term determination as reasonably as practicable. Source identification considerations include:

- Review of potential sources based on the location of the detection. This can include review of soil sources (where applicable) and perched groundwater.
- Modeling would be considered with this option to understand the source and extent of contamination.
- Installation of additional monitoring wells would be considered, if needed to understand the source and extent of the contamination.
- Evaluation of the extent of the perched groundwater, the amount of dispersion that will occur over distances traveled, and the spatial variability of contaminant plumes.

6.3 Implementation of Interim Protective Measures

Interim protective measures will be enacted based on concentration of the constituent, location of the exceedance and extent of the constituent measured. The contingent actions listed in the ROD will be considered first to determine if these actions are appropriate with regard to the type of contamination and hydrogeologic conditions. If results in the Pantex Ogallala Aquifer Monitoring Wells indicate contamination above the GWPS, the risk to potential receptors will be evaluated.

If necessary to protect human health or the environment, the following measures would be implemented to control use of Ogallala groundwater.

6.3.1 Discontinue Well Use

If a private or public water supply well is threatened due to its proximity to a contaminant plume, Pantex will contact the owner with a recommendation to discontinue use of the well as long as necessary to prevent the potential for exposure. When the pump is de-energized, it will be locked out with each responsible entity providing a lock. This measure may serve as an interim measure until treatment systems can be installed to allow continued use.

6.3.2 Develop Alternative Water Supply

If monitoring results indicate that private or public water supply wells may be directly threatened due to releases related to Pantex Plant, an alternative water supply will be provided and maintained while long-term response actions are explored.

6.3.3 Treat Water Prior to Use

If monitoring results indicate that private or public water supply wells may be directly threatened due to releases related to Pantex Plant, then localized treatment at a well head will be evaluated as a long-term response action.

6.4 Delineation of Extent

If no downgradient monitoring wells are present, investigative wells may be drilled to determine the extent of newly detected contaminants. Precautions will be taken to avoid additional risk for cross-contamination as an artifact of the well installation process (e.g., ideally these wells will be installed outside of the perched contaminant footprint). If a well must be installed through the perched groundwater and into the Ogallala Aquifer, precautions outlined in the well specifications criteria in CP-50284 will be followed to minimize risk during the investigation process.

6.5 Contingent Actions

The contingent actions would be dependent on the specific constituents, location, and conditions associated with the impact. Contingent actions may include interim protective measures or removal actions. Any actions will be implemented in accordance with the National Contingency Plan (NCP), the CP-50284, the IAG, and the ROD.

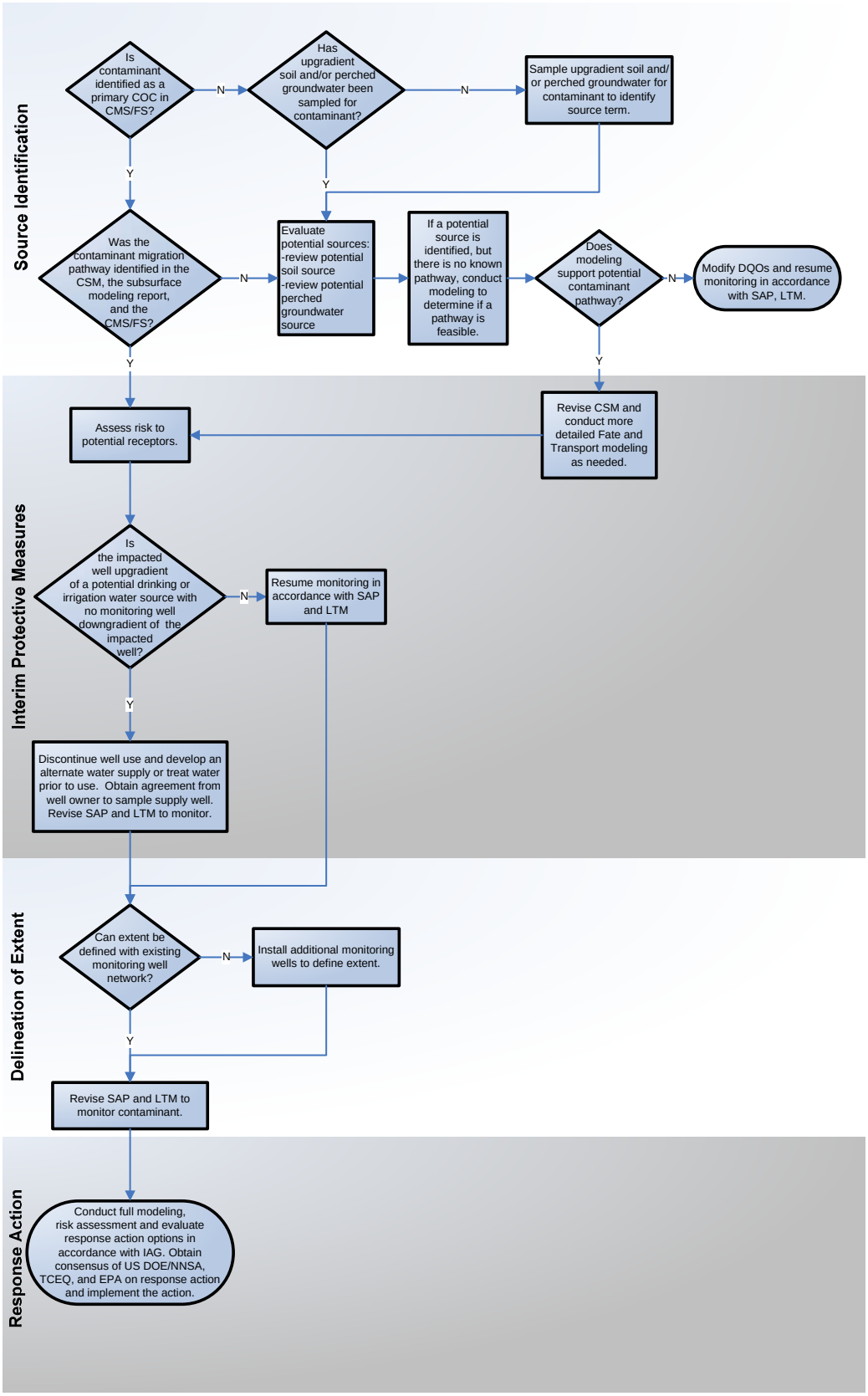

Figure 6-1. Flowchart of Ogallala Monitoring Well Contingent Action Process

7. Summary

The objective of the Plan is to respond to potential technology and characterization deviations detected by the long-term monitoring network in the perched groundwater and Ogallala Aquifer. Implementation of the appropriate contingency actions in response to the deviations will provide for the continued protection of the Ogallala Aquifer and the health of its consumers.

This Plan outlines the objectives of the four perched groundwater response actions and identifies and evaluates the potential deviations that may be encountered. Contingent actions for each of the deviations are also detailed. It also outlines the approach for the perched groundwater, if the long-term monitoring network identifies deviations from the expected conditions identified during site characterization, and for the Ogallala Aquifer if constituents are detected approaching the GWPS.

Table 7-1 summarizes all the information provided in the Plan for each of the four perched response actions. The table provides an evaluation of each potential deviation and the associated contingent actions and can be used as the framework for determining the appropriate action if a deviation is encountered.

Table 7-1. Contingent Actions for Perched Groundwater Response Action Systems

Playa 1 Pump and Treat System

Expected Conditions	Remedy Objective	Uncertainties/ Deviations	Evaluation		Monitoring	Contingent Actions
			Time to Respond	Impact of Occurrence		
Pumping and Extraction Perched groundwater will be removed in sufficient volume to decrease the flux of groundwater moving radially out from Playa 1. This will also reduce the flux of groundwater moving to the SEPTS and the head that could cause vertical migration to the Ogallala Aquifer.	Reduce mounding beneath Playa 1 to reduce radial flow and the volume of water flowing to the SEPTS and to the Ogallala Aquifer through vertical migration.	Mounding is not reduced; primary cause would be that infiltration is much greater than expected.	Five to Ten Years	Low in the short term. Medium in the long term because the SEPTS will become stressed.	Potentiometric surface measurements to indicate saturated thickness is decreasing, estimated radius of influences and temporal plume mapping to determine effects on mounding. Gradient toward the SEPTS should be decreasing within two years.	1. Add extraction wells in the Playa 1 area to increase the extraction rate; expand the treatment system. 2. Use the SEPTS to extract the additional volume of water.
By extracting groundwater contaminated with RDX, RDX mass removal will also be accomplished. Since new sources of RDX are not expected and mass is being removed, the RDX concentration is expected to decrease in the Playa 1 area. As more water is removed, it is also expected that the rate of RDX mass removal will decrease, primarily due to decreasing saturated thickness of the perched.	Reduce RDX mass in perched aquifer working towards restoration.	Perchlorate is present at levels that exceed discharge criteria (12 ppb), most likely in the area of PTX06-EW72.	Less than six months: would need to modify extraction rates from impacted EW until treatment system is modified for perchlorate.	Low impact on overall extraction rates.	Monitoring is performed at the influent stream of the treatment system and at the extraction well heads, as specified in the SAP..	Modify extraction from EW 72 until the treatment process is modified for perchlorate.

Expected Conditions	Remedy Objective	Uncertainties/ Deviations	Evaluation		Monitoring	Contingent Actions
			Time to Respond	Impact of Occurrence		
Treatment and Discharge Extracted groundwater will contain RDX. Treatment to remove RDX will require GAC. Boron is also treated via selective ion exchange. COCs requiring treatment other than GAC are not expected.	Remove RDX and Boron sufficiently to meet discharge requirements.	Perchlorate present at levels that exceed discharge criteria (12 ppb).	Less than six months	High impact if the discharge limits are exceeded for perchlorate.	Monitoring is performed at the influent stream of the treatment system and at the extraction well heads, as specified in the SAP.	Modify the treatment system to treat perchlorate through building modification and addition of treatment vessels and ion exchange.
Treated water will meet discharge criteria downstream of the holding pond as noted in the TLAP and will be discharged to the soil via subsurface irrigation. Volume of discharge water will not exceed crop usage/evapo-transpiration rates, preventing any deep percolation into the underlying vadose zone. Treated sewage effluent will also discharge to the holding pond noted in the TLAP, mixing with the treated water from Playa 1 Pump and Treat prior to discharge to the subsurface irrigation system.	Discharge treated water in a manner that will not impact the vadose zone.	Discharge is greater than crop usage/evapo-transpiration rate.	Month-to-Month for alternative discharge and extraction rate changes. One year on crop selection.	Medium	Soil borings to monitor soil moisture in the subsurface irrigation plots.	1. Implement alternative discharge methods; can include injection back into the perched (not preferred over the long term). 2. Reduce the rate of extraction (a short-term contingent action only). 3. Raise crops with higher water demand or increase irrigation acreage.

Southeast Pump and Treat System

Expected Conditions	Remedy Objective	Uncertainties/ Deviations	Evaluation		Monitoring	Contingent Actions
			Time to Respond	Impact of Occurrence		
Pumping and Extraction Perched groundwater will be removed in sufficient volume to decrease the flux of groundwater moving towards the SE ISB. This will also reduce the head, reducing the potential for vertical migration to the Ogallala Aquifer. Perched groundwater will be removed in sufficient volume such that the RDX and Cr plumes are stabilized and the contaminant center of mass is not moving. This is possible because inflow to the perched is negligible and the Playa 1 Pump and Treat system is decreasing the flow to the southeast area.	Reduce lateral flux and the volume of water flowing to the Southeast ISB and vertical flux to the Ogallala Aquifer.	Playa 1 Pump and Treat is not removing sufficient flow and the SEPTS is overloaded.	Less than two years	High The SE ISB will require modification if the Playa 1 Pump and Treat System or SEPTS cannot efficiently reduce the lateral flux.	Playa 1 Pump and Treat performance and results	Modify Playa 1 Pump and Treat to allow for an increased extraction rate, including additional wells or increased treatment capacity.
		Infiltration from the 5/12a Ditch is greater than expected, overloading the SEPTS.			Potentiometric surface measurements	Regrade or line portions of the 5/12a Ditch.
		Subsurface irrigation system fails which requires injection of treated water into the SEPTS area.			Subsurface irrigation performance and results	Modify treatment system so it can discharge to an unrestricted irrigation system.

Expected Conditions	Remedy Objective	Uncertainties/ Deviations	Evaluation		Monitoring	Contingent Actions
			Time to Respond	Impact of Occurrence		
By extracting groundwater contaminated with RDX and Cr, RDX and Cr mass removal will also be accomplished. Since new sources of RDX and Cr are not expected and mass is being removed, the RDX and Cr concentrations are expected to decrease in the SE area over several decades. Yield from the perched should decline as extraction continues, and this impact will first be seen in the southern wells in less than five years. The decreased yield will cause the RDX and Cr mass removal rate to decrease.	Reduce RDX and Cr mass in perched groundwater working towards restoration.	Perchlorate migrates from Zone 11 into the SEPTS well field.	Less than six months- need to modify extraction quickly because the extraction wells in this area cannot be taken offline for long as they are being used to stabilize the Cr plume to prevent high Cr concentrations from reaching the SE ISB.	High- the extraction wells that would first encounter perchlorate from Zone 11 are used to stabilize the Cr plume and cannot be taken offline for long.	Monitoring of the influent stream of the treatment system and the extraction well heads closest to the Zone 11 ISB is performed as specified in the SAP.	Temporarily modify extraction from extraction wells impacted by the perchlorate until the treatment process is modified for perchlorate.
Treatment and Discharge Extracted groundwater will contain RDX and other HE breakdown products, Cr, and VOCs. Treatment to remove RDX and Cr will require GAC. Boron is also treated via selective ion exchange. COCs requiring treatment other than GAC are not expected.	Remove RDX and Boron sufficiently to meet discharge requirements.	Perchlorate present at levels that exceed discharge criteria (12 ppb).	Less than six months	High impact if the discharge limits are exceeded for perchlorate	Monitoring of the influent stream of the treatment system and the extraction well heads closest to the Zone 11 ISB is performed as specified in the SAP.	Modify the treatment system to treat perchlorate through building modification and addition of treatment vessels and ion exchange.

Expected Conditions	Remedy Objective	Uncertainties/ Deviations	Evaluation		Monitoring	Contingent Actions
			Time to Respond	Impact of Occurrence		
Treated water will meet discharge criteria downstream of the holding pond noted in the TLAP and will be discharged to the soil via subsurface irrigation. Treated sewage effluent will also discharge to the holding pond noted in the TLAP. Volume of discharged water will not exceed crop usage/evapo-transpiration rates, preventing any deep percolation into the underlying vadose zone.	Discharge treated water in a manner that will not impact the vadose zone.	Discharge is greater than evapo-transpiration rate.	Month-to-Month for alternative discharge and extraction rate changes. One year on crop selection.	Medium	Soil borings to monitor soil moisture in the subsurface irrigation plots.	1. Implement alternative discharge methods; can include injection back into the perched (which is not preferred over the long term). 2. Reduce the rate of extraction (a short-term contingent action only). 3. Raise crops with higher water demand or increase irrigation acreage.

Southeast ISB

Expected Conditions	Remedy Objective	Uncertainties/ Deviations	Evaluation		Monitoring	Contingent Actions
			Time to Respond	Impact of Occurrence		
Treatment Zone An anaerobic treatment zone will be established on the southeast edge of the perched aquifer susceptible to vertical migration that will treat/transform RDX and Cr-6 to drinking water standards. The volume of water moving into the area will have been reduced by the Playa 1 and Southeast Pump and Treat Systems so the treatment zone will be easier to maintain, e.g., less water makes the zone easier to maintain and allows for greater confidence the ISB will provide protection to the Ogallala.	Treat/transform RDX and Cr-6 to work towards restoration and prevent vertical migration of RDX and Cr-6 to the Ogallala.	Not able to maintain the treatment zone because the volume of water in the area is greater than expected (Pump and Treat systems are not meeting expected conditions).	Two years	High impact on resources because additional injections are resource intensive.	Potentiometric surface measurements from the monitoring wells to calculate the treatment zone area and flow gradient.	Increase the extraction rates from the Playa 1 and Southeast Pump and Treat Systems to reduce flow to the SE ISB area.
		The treatment zone cannot be maintained due to biofouling, resulting in the amendment not being distributed effectively. Biofouling could result from ▪ plugged injection wells or ▪ pore spaces become plugged in the geologic formation.	One year	High for both wells and the geologic formation.	If the wells are biofouled, the degree of difficulty in sampling the wells will change. Specifically the extraction (purge) rate will decrease and feedback will be obtained from the sampling technicians. If the geologic formation becomes plugged due to biofouling, the potentiometric surface upstream of the injection wells would rise as indicated through semi-annual water level measurements.	1. Develop and implement a rigorous well maintenance program for the injection wells. 2. If the geologic formation is plugged, the treatment zone may need to be expanded.

Expected Conditions	Remedy Objective	Uncertainties/ Deviations	Evaluation		Monitoring	Contingent Actions
			Time to Respond	Impact of Occurrence		
		Injection wells that are currently dry (to the west and east of the existing system) become saturated and require injections to maintain the treatment zone.	One to two years	Low, the newly saturated wells would require injection of amendment.	Water level measurements are collected for the currently dry wells twice a year.	Inject amendment into the wells west and east of the existing system that have become saturated to expand the treatment zone.
Treatment Treat/transform RDX and Cr-6 and other COCs to the cleanup standards in the perched in and downgradient of the anaerobic treatment zone. Expect a temporary elevation of the metals concentrations in the treatment zone following the amendment injection (up to six months), but expect metals concentrations to meet cleanup standards downgradient of the treatment zone in the long term (within two years) where measurements are collected in monitoring wells.	Meet cleanup standards of RDX and Cr-6 and other COCs downgradient of the treatment zone working towards restoration.	RDX and/or breakdown products not treated to cleanup standards downgradient of the treatment zone.	Less than two years	High	The monitoring wells downgradient of the treatment zone are monitored as specified in the SAP to collect contaminant concentration data. The injection wells in the treatment zone are monitored quarterly.	1. Change the type of amendment to one that treats RDX and breakdown products to meet cleanup standards. 2. Inject a greater amount of amendment into the treatment zone.
		Cr and other metals are not reduced to cleanup standards downgradient of the treatment zone.		High to medium		1. Change the type of amendment to one that treats Cr and other metals to meet cleanup standards. 2. Increase extraction in the SEPTS in the Cr-6 hotspot to reduce the levels of Cr-6 being treated by the SE ISB.

Expected Conditions	Remedy Objective	Uncertainties/ Deviations	Evaluation		Monitoring	Contingent Actions
			Time to Respond	Impact of Occurrence		
Expect the concentration of RDX breakdown products to increase in the treatment zone in the short term (up to six months) following the injection of amendment. Expect to encounter low levels (four times the drinking water standard) of TCE and TCE breakdown products in the treatment zone.		TCE and breakdown products are encountered at concentrations higher than expected.		Medium		Consider bioaugmentation of the treatment zone with dehalococcoides if the levels of TCE remain greater than what would be protective of the Ogallala Aquifer and/or the treatment stalls resulting in increasing concentrations of breakdown products (DCE and VC) that exceed the drinking water standard.

Zone 11 ISB

Expected Conditions	Remedy Objective	Uncertainties/ Deviations	Evaluation		Monitoring	Contingent Actions
			Time to Respond	Impact of Occurrence		
Treatment Zone An anaerobic treatment zone will be established in the perched aquifer on the edge of Zone 11 in the area of high TCE and perchlorate concentrations to treat TCE and perchlorate.	Treat TCE and perchlorate to work towards restoration and prevent migration of contaminated perched groundwater onto the Texas Tech property near Playa 4.	Not able to maintain the treatment zone because the volume of water in the area is greater than expected.	Three years	High impact on resources because additional injections are resource intensive.	Potentiometric surface measurements from the monitoring wells to calculate the treatment zone area and flow gradient.	1. Install extraction wells upstream of the treatment zone to reduce flow to Zone 11 ISB area. 2. Expand the treatment zone.
		The treatment zone cannot be maintained due to biofouling, resulting in the amendment not being distributed effectively. Biofouling could result from ▪ plugged injection wells or ▪ pore spaces becoming plugged in the geologic formation.	One year	High for both wells and the geologic formation.	If the wells are biofouled, the degree of difficulty in sampling the wells will change. Specifically the extraction (purge) rate will decrease and feedback will be obtained from the sampling technicians. If the geologic formation becomes plugged due to biofouling, the potentiometric surface upstream of the injection wells would rise as indicated through semi-annual water level measurements.	1. Develop and implement a rigorous well maintenance program for the injection wells. 2. If the geologic formation is plugged, the treatment zone will need to be expanded.

			Evaluation			
Treatment Treat TCE and perchlorate to the cleanup standards in the perched in and downgradient of the anaerobic treatment zone.	Meet cleanup standards of TCE and perchlorate downgradient of the treatment zone working towards restoration.	Perchlorate is not treated to cleanup standards downgradient of the treatment zone.	Less than two years for perchlorate deviation.	High	The monitoring wells downgradient of the treatment zone are monitored as specified in the SAP.	1. Change the type of amendment to one that treats perchlorate to meet cleanup standards. 2. Inject a greater amount of amendment into the treatment zone or inject amendment more frequently.
		TCE and breakdown products persist at concentrations greater than the drinking water standard	Two to Four years for TCE deviation.	High		Consider bioaugmentation of the treatment zone with dehalococcoides if the levels of TCE or breakdown products (such as DCE and VC) persist at concentrations greater than the drinking water standards.

8. References

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Appendix A: Data Validation and Interpretation Process

It is important that the information collected from the monitoring network be accurate to ensure appropriate implementation of potential contingent actions. B&W has developed a data validation process in accordance with the IAG and CP-50284 to ensure the monitoring data that will be used to make decisions for implementation of contingent actions is properly vetted. Figures A-1 and A-2 are process flow diagrams that represent the data validation process for groundwater monitoring samples collected from the perched and Ogallala monitoring wells that indicate a deviation may be occurring. The process is further described in the following sections.

Sampling and Analysis

Samples are collected in accordance with the approved Sampling and Analysis Plan. Analyses may be performed using both Plant personnel and contracted laboratories. Data are collected, analyzed, and verified within 90 days in accordance with the IAG and CP-50284.

Review Preliminary Results

A preliminary review (verification) of all data packages is performed to evaluate the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural or contractual requirements. The goal of data verification is to ensure that the reported results reflect the outcome of what was actually done (what was sampled and how the analysis was performed) and that deviations from the planned process are understood. When data are determined to be suspect, results will be flagged with qualifier(s). Data are recorded in the Integrated Environmental Database.

If the verification process identifies the source of the detection as laboratory error or laboratory contamination, sampling and analysis of the well will resume as specified in the SAP and LTM. If the result is verified, or if the verification process is inconclusive, re-sampling of the well and/or reanalysis of the original sample will be performed to confirm the original result. Both results will be evaluated in the data interpretation step.

To assist with preliminary review of data, Pantex has developed an automated review algorithm (Suspect Anomaly Report) that has been implemented to flag results with the following anomalies:

- Laboratory solvents above detection
- Organics in Ogallala Aquifer wells above detection
- First time detection of an inorganic
- New minimum level
- New maximum level
- Variation from gross historical trend

If anomalies are revealed through the Suspect Anomaly Report or other data tabulations, then data validation will be performed including review of field logs. The Suspect Anomaly Report, field logs, historic trends and other information needed to evaluate the anomalies are provided to the B&W Pantex Media Scientist to perform data validation.

Data Validation

When the integrity and quality of data is determined usable, it will be provided to the Pantex Groundwater Media Scientist to determine if the data is valid. Data Validation is an analyte and sample specific process that extends the evaluation of data beyond method, procedural, or laboratory contractual compliance (i.e., data verification) to determine the analytical quality of a specific data set. This includes the evaluation of the result against historic trends, known contaminant migration pathways, and site hydrology.

This evaluation will also consider the possibility of cross-contamination of the sample, e.g., as a result of the well construction itself for some metals. This would include reviews of well completion reports, lithologic and geophysical logs, and use of a down-hole camera to check for well casing corrosion.

The goals of data validation are to evaluate whether the data quality goals established during development of the Sampling and Analysis Plan have been achieved, ensure all project requirements are met, determine the impact on data quality of those that were not met, and document the results of the data validation. If the result is validated, or if the validation process is inconclusive, re-sampling of the well and/or re-analysis of the original sample will be performed to confirm the original result. Both results will be evaluated in the data interpretation step.

Data Interpretation and Comparison

Results below background or PQL will not be further considered for reanalysis or resampling. The original sample and subsequent re-sampling and/or re-analysis will be compared to regulatory standards, including established backgrounds, PQLs, and the groundwater protection standard (GWPS). The focus of this evaluation is to determine if there is a threat of endangerment or actual endangerment to the Ogallala Aquifer or if the unexpected conditions warrant contingency actions. Results above background or PQL will be evaluated with respect to the GWPS and proximity to a receptor to determine if immediate action, as specified in Section 6.3, is required to protect human health or the environment. Otherwise, contingency actions will be evaluated and implemented, as needed.

Because protection of the Ogallala Aquifer is a primary goal, verified and validated results above background or the PQL will initiate a more frequent sampling regimen. The affected well will be sampled on a monthly basis to gather more information about the constituent. If three consecutive monthly sampling results show no contamination (no detection of an organic COC; no exceedance of cleanup standards for inorganic COCs), monitoring will resume in accordance with the SAP and LTM. If consecutive sampling shows inconsistent results, or confirms the presence of contamination, the deviation will be evaluated to determine the appropriate contingent actions.

If an unexpected condition is detected in the Ogallala Aquifer or perched groundwater, preliminary notification requirements in the IAG may be implemented if the data indicate there is a threat of endangerment or actual endangerment to the Ogallala Aquifer and the administrative requirements in Appendix B (for Ogallala) or Appendix C (for perched) will be followed. Two factors will be considered in the determination of the threat of endangerment including: (1) proximity to a receptor location (TCEQ defines a threat as a downgradient receptor well within ½ mile of the groundwater contamination – receptor locations may include Pantex production wells, neighbor wells, and/or City of Amarillo production wells), (2) concentration with respect to the GWPS. Further sampling and analysis may be performed to confirm the original concentrations.

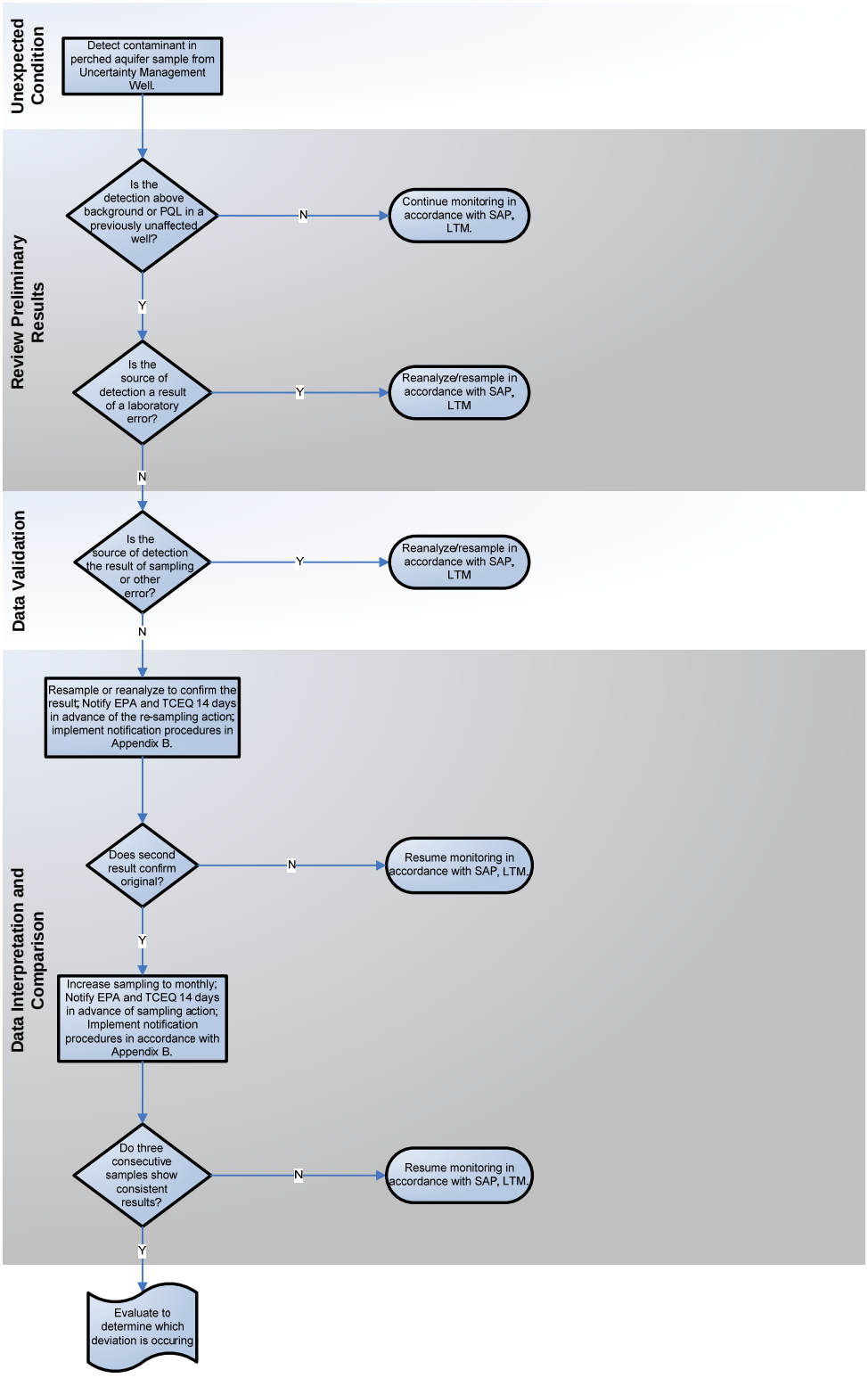

Figure A-1. Flowchart of Perched Contingent Action Process

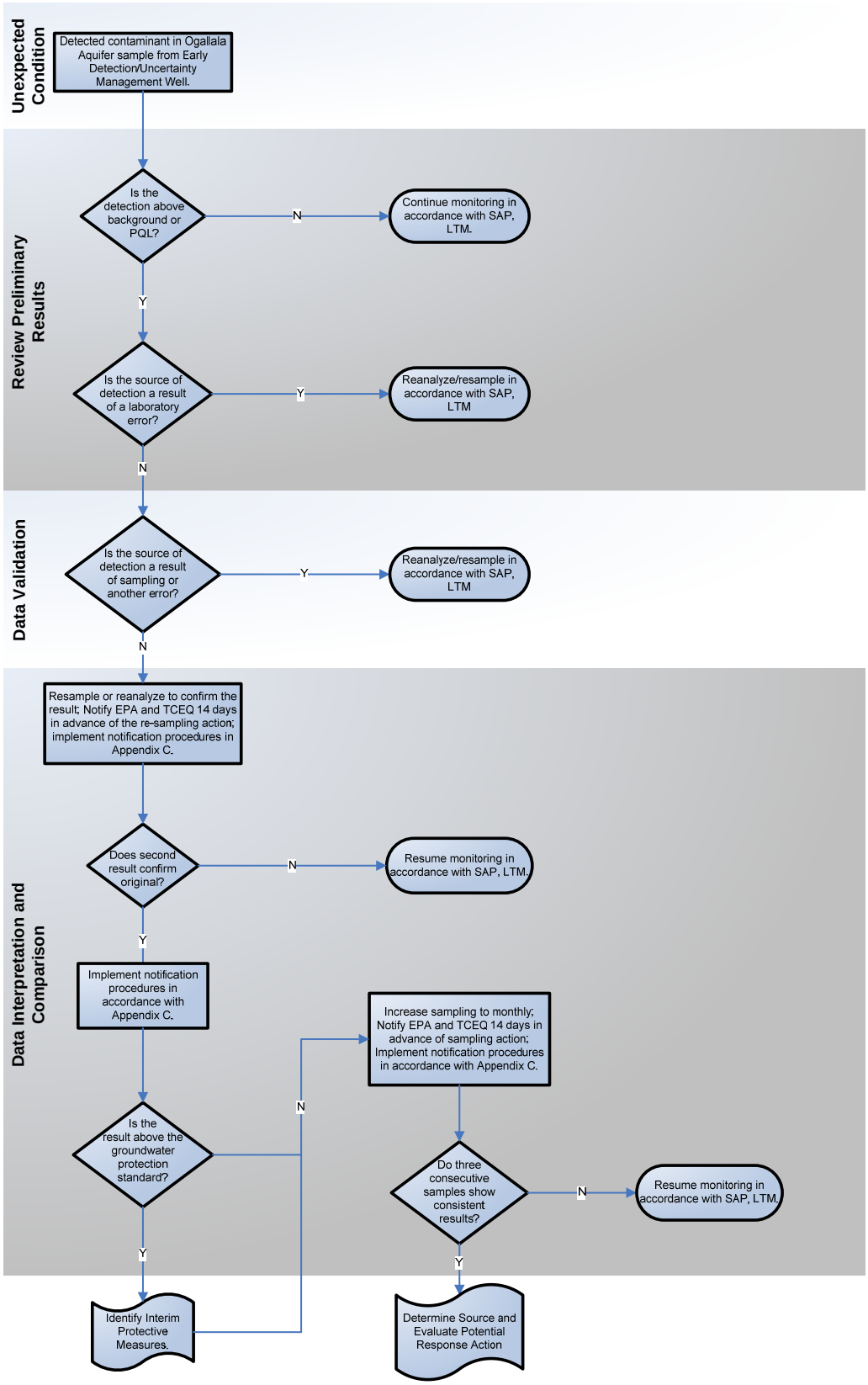

Figure A-2. Flowchart of Ogallala Contingent Action Process

Appendix B – Perched Notification and Reporting Process

The notification process will be used to notify the appropriate people if an unexpected condition in the perched groundwater is encountered, e.g., at or above drinking water standards in an area outside of the previously identified contaminant plume. The process is consistent with the reporting requirements defined in the IAG, the SAP, and the LTM System Report and SAP and should be used in conjunction with the notification table on page B-2.

Perched Groundwater Wells
Notification Process

- The Pantex Groundwater Data Verifier
  - Reviews laboratory data packages and qualifies data as needed
  - Forwards results to the Pantex Groundwater Media Scientist for review

- The Pantex Groundwater Media Scientist
  - Conducts data usability review
  - Informs the Pantex Environmental Program Department Manager of the results of data usability review

If an unexpected condition is determined to exist:

- The Pantex Environmental Program Department Manager
  - Informs the Pantex Environmental Program Division Manager
  - Informs the Pantex Environmental Program Community Liaison

- The Pantex Environmental Program Division Manager
  - Informs the Pantex General Manager
  - Informs the Pantex Law Division Manager
  - Informs the Pantex Management Development & Communications Manager
  - Informs the USDOE/NNSA PXSO Environmental Management Groundwater Representative
  - Informs the USDOE/NNSA PXSO Environmental Manager (who informs the PXSO Site Manager)
  - Informs TCEQ executive director and Region I, and EPA

- The Pantex Environmental Program Community Liaison
  - Coordinates with the Pantex Environmental Program Division Manager to set up meetings with Texas Tech and affected neighbors, as needed

- The Pantex Groundwater Media Scientist
  - Contacts TCEQ executive director and Region I, and EPA to discuss co-sampling requirements

- The Pantex Groundwater Media Scientist
  - Issues a special sample request to confirm exceedances/significant results

(See notification table on next page.)

Perched Groundwater Wells Notification Table		
Result	**Procedure**	**Timeframe**
Result ≥ GWPS; and well(s) outside previously identified contaminant plume	***Inform*** TCEQ executive director and Region I, and EPA of results and intent to resample	10 days
	Resample to confirm exceedance and determine co-sampling requirements with TCEQ executive director and Region I, and EPA	30 days (notify verbally and by e-mail at least 14 days before resample)
	Notify TCEQ executive director and Region I, and EPA if results confirmed	10 days from confirmation, phone (or e-mail) and written
	Report (Hardcopy) results to the TCEQ and EPA	Annual, written
PQL/Background ≤ Result < GWPS	***Report*** (Hardcopy) results to the TCEQ and EPA	Annual, written

GWPS = Groundwater Protection Standard
PQL = Practical Quantitation Limit

Appendix C – Ogallala Aquifer Notification and Reporting Process

The notification process will be used to notify the appropriate people if an unexpected condition in the Ogallala Aquifer is encountered. The process is consistent with the reporting requirements defined in the IAG, the SAP, and the LTM System Report and SAP and should be used in conjunction with the notification tables on pages C-2 and C-3.

Ogallala Wells
Notification Process

- The Pantex Groundwater Data Verifier
  - Reviews laboratory data packages and qualifies data as needed
  - Forwards results to the Pantex Groundwater Media Scientist for review

- The Pantex Groundwater Media Scientist
  - Conducts data usability review
  - Informs the Pantex Environmental Program Department Manager of the results of data usability review

If an unexpected condition is determined to exist:

- The Pantex Environmental Program Department Manager
  - Informs the Pantex Environmental Program Division Manager
  - Informs the Environmental Program Community Liaison
  - Informs the Pantex Utilities Department Manager if potential impact to Plant water supply wells.
  - Informs the OC

- The Pantex Environmental Program Division Manager
  - Informs the Pantex General Manager
  - Informs the Pantex Law Division Manager
  - Informs the Pantex Management Development & Communications Manager
  - Informs the USDOE/NNSA PXSO Environmental Management Groundwater Representative
  - Informs the USDOE/NNSA PXSO Environmental Manager (who informs the PXSO Site Manager)
  - Informs TCEQ Region I and executive director
  - Informs EPA Region 6
  - Informs the Agency for Toxic Substances and Disease Registry (ATSDR) of condition if determined to pose a risk not evaluated in the previous assessment

- The Pantex Environmental Program Community Liaison
  - Coordinate with the USDOE/NNSA Public Affairs Officer, B&W Public Information Coordinator, TCEQ and EPA to notify news media, if needed
  - Prepare notification for potentially affected public and private water well users

- The Pantex Management Development & Communications Manager
  - Prepares facts sheets, news releases and contacts the news media, in accordance with the outcome of the Pantex Environmental Program Community Liaison's coordination activities

- The Pantex Groundwater Media Scientist
  - Contacts TCEQ Region I and EPA to determine co-sampling requirements

- The Pantex Groundwater Media Scientist
  - Issues a special sample request to confirm exceedances/significant results

(See notification table on next page.)

Ogallala Wells Notification Table		
Result	**Procedure**	**Timeframe**
Result ≥ GWPS	***Inform*** TCEQ executive director and Region 1, and EPA Region 6 of a first-time or subsequent new analyte exceedance and intent to resample	*24 hours, phone and 10 days written
	Inform public or private users of affected or potentially affected water wells of a first-time or subsequent new analyte exceedance when the water well is within ½ mile of known contaminant boundary or within ½ mile of property boundary associated with subject result (prepare drinking water survey report in accordance with TCEQ RG-428)	*24 hours, verbal and 10 days written
	Inform the Utilities Department Manager of result	*24 hours
	Coordinate with the USDOE/NNSA Public Affairs Officer, B&W Public Information Coordinator, TCEQ and EPA to notify news media, if needed	7 days
	Resample to confirm exceedance and determine co-sampling requirements with TCEQ Region I and EPA (*Optional - Have lab re-analyze sample*)	30 days (notify verbally and by e-mail at least 14 days before resample)
	Notify (upon confirmation) the Operations Center, public or private users of affected or potentially affected water wells when the water well is within ½ mile of known contaminant boundary or within ½ mile of property boundary associated with subject result	24 hours from confirmation, verbal, 10 days written
	Notify TCEQ executive director and Region I, EPA, and PGWCD No. 3	24 hours from confirmation, verbal, 10 days written
	Notify ATSDR	10 days written
	Submit drinking water survey report in accordance with TCEQ RG-428 to TCEQ executive director and EPA	20 days

* Timeframe begins when the Pantex Groundwater Media Scientist completes data usability review and reanalysis, if possible.

Ogallala Wells Notification Table		
Result	**Procedure**	**Timeframe**
PQL/Background ≤ Result < GWPS	***Notify*** TCEQ executive director and Region 1, and EPA of need to resample to confirm result	14 days before resample verbally and by e-mail
	Resample or re-analyze to confirm result,	30 days
	Inform (upon confirmation) TCEQ and EPA of resample results	24 hours, verbal
	Inform TCEQ executive director and EPA Region 6	10 days written from confirmation, verbal
	Inform Affected or potentially affected public or private water wells if water well is within ½ mile of known contaminant boundary or within ½ mile of property boundary associated with subject result. Utilities Department Manager if Plant water supply well is within ½ mile of known contaminant boundary of significant results that are: • First-time analyte detection • Near GWPS • Significantly higher than historical • Trending significantly higher	10 days written from confirmation, verbal
	Notify TCEQ executive director and Region I, EPA, and PGWCD No. 3	10 days from confirmation, phone or e-mail and written
	Coordinate with the USDOE/NNSA Public Affairs Officer, B&W Public Information Coordinator, TCEQ and EPA to notify news media, if needed	10 days from confirmation
	Report (Hardcopy) results to TCEQ executive director and Region I, and EPA	Annual, written

GWPS = Groundwater Protection Standard
PQL = Practical Quantitation Limit