EPA
Phoenix-Goodyear Airport Superfund Site: North Area
U.S. Environmental Protection Agency • Region 9 • San Francisco, CA • January 2014

EPA Seeks Comments on Proposed Additions to Site Cleanup Plan

Introduction

This Proposed Plan describes the Environmental Protection Agency's (EPA) enhanced cleanup strategy at the Phoenix-Goodyear Airport – North (PGA-North) Superfund Site (Figure 1). EPA, in conjunction with the Arizona Department of Environmental Quality (ADEQ), is proposing this remedy enhancement to shorten the cleanup time for both contaminants of concern – trichloroethylene (TCE) and perchlorate in the shallow groundwater aquifer at the Main Drywells Source Area (Source Area) at PGA-North (Figure 2). Additionally, in this plan, EPA is selecting treatment for perchlorate in the aquifer. EPA is seeking public input on the cleanup plan described in this document.

The Superfund process requires EPA to evaluate several cleanup alternatives to address Site contamination prior to recommending a cleanup plan. This Proposed Plan summarizes seven cleanup alternatives that were evaluated in the Focused Feasibility Study (FFS) as methods to treat contaminated groundwater within the shallow aquifer in the Source Area at the PGA-North.

During and after the implementation of this improved cleanup plan, EPA will oversee groundwater monitoring to ensure treatment is effective and contaminants are contained and reduced.

About the Site

The PGA Superfund Site was originally listed on the National Priorities List (NPL) in September 1983 as the Litchfield Airport Area Superfund Site. After the airport was transferred to the ownership of the City of Phoenix, the Site was renamed the PGA Area Superfund Site. Groundwater investigations later identified two different sources of contamination and the Site was divided into two areas, PGA-North and PGA-South. This proposed improved cleanup plan pertains to PGA-North only.

The PGA-North Source Area is located on the former Unidynamics-Phoenix, Incorporated (UPI) facility in Goodyear, AZ. The UPI facility operated as a research, design, development, testing, assembly, and manufacturing plant of ordnance components and related electromechanical devices from 1963 to 1993. Site contamination resulted from past disposal of waste materials from facility operations into a series of drywells. Contaminants from these wells travelled down through the soil to the shallow and deep groundwater aquifers of the Upper Alluvial Unit and have spread over time through the aquifers.

Dates to Remember

Public Comment Period

January 23, 2014 – February 24, 2014

EPA will accept both oral and written comments on the Proposed Plan during the comment period.

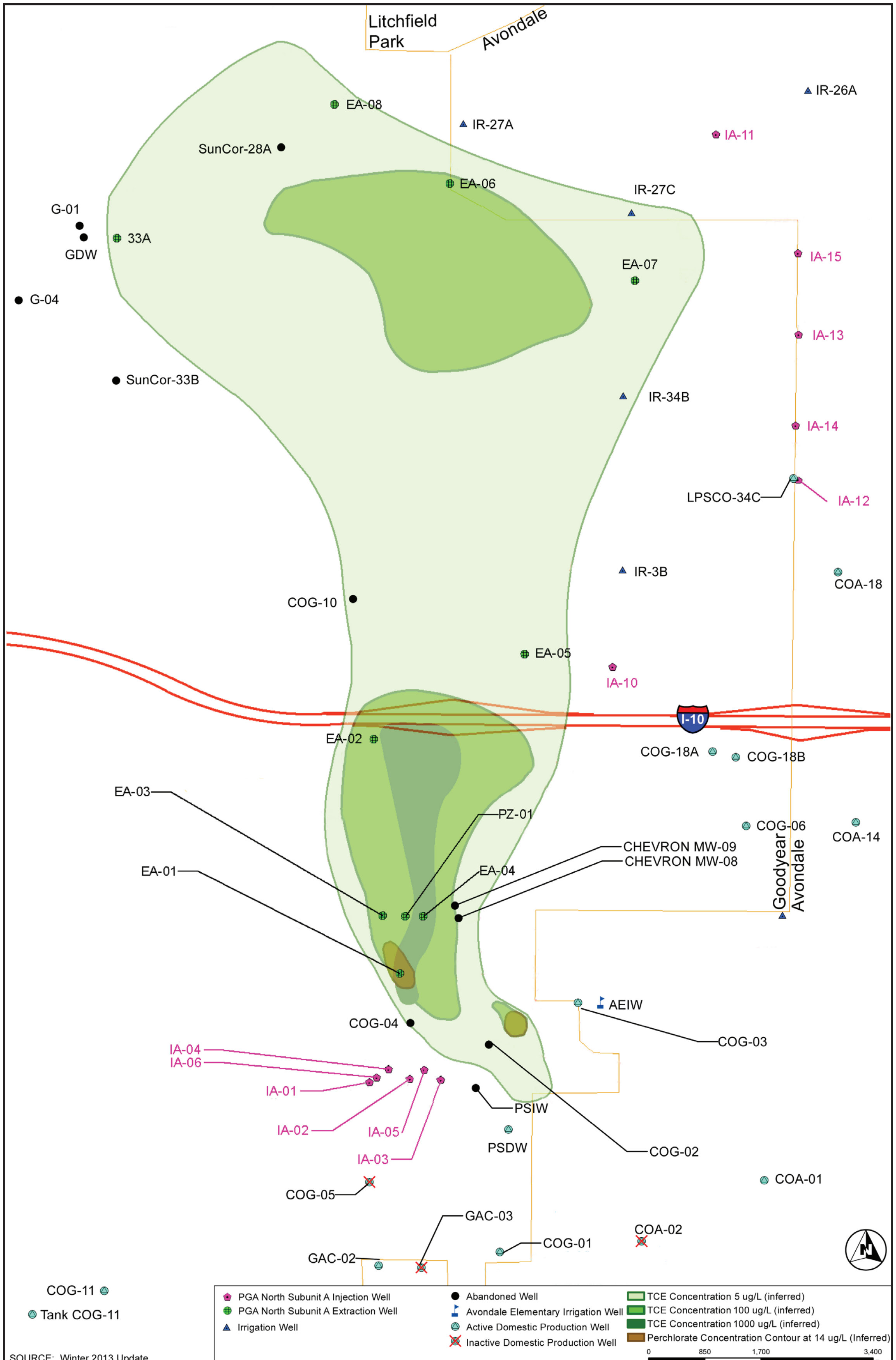
Public Meeting on Proposed Plan

Wednesday, February 5, 2014
6:00 pm – 9:00 pm

Estrella Mountain Community College
Conference Center

This public meeting will explain the Proposed Plan and all the alternatives presented in the Focused Feasibility Study, including EPA's preferred alternative. Oral and written comments from the public will be accepted at the meeting. Written comments can also be sent to Amanda Pease at EPA before the end of the public comment period (see contact information on Page 11).

For more information, see the Superfund Site Information repositories listed on Page 11.



Phoenix-Goodyear Airport (PGA) Superfund Site
Goodyear, Arizona
Proposed Plan

Figure 1
PGA North Subunit A Plume Map

All on-site buildings, other than those that are part of the Superfund cleanup (i.e., pump and treat and soil vapor extraction [SVE] operations), were demolished in 2009. Crane Co. remains the property owner and is conducting the investigation and cleanup under EPA oversight with support from ADEQ.

EPA has overseen investigations performed in the Source Area in soil, soil gas, and groundwater. Results from these investigations indicate that the soil contamination is primarily located in the vicinity of the drywells. Through extensive soil and groundwater investigations (see the "Past Investigations" section of this document), EPA determined that the primary contaminant of concern for remediation is the chlorinated volatile organic compound TCE. To date, soil vapor extraction has removed most of the TCE in soils (more than 11,700 pounds), mainly near the Source Area. Based on later investigations, EPA added the inorganic compound perchlorate as a Site contaminant of concern.

In 2003, groundwater treatment for perchlorate began for water pumped from the aquifer. Site groundwater is contaminated by TCE and perchlorate at depths from 90-300 feet below the ground surface. TCE and perchlorate in the groundwater are currently being pumped and treated by air stripping (for TCE) and ion exchange (for perchlorate), at the Main Treatment System. These remedies for TCE and perchlorate are documented in the 1989 Record of Decision, several Explanations of Significant Differences, and the 2006 Removal Action Memorandum. The goal of the cleanup plan selected in the 1989 Record of Decision is restoration of the aquifer to drinking water standards. This Proposed Plan seeks to accelerate treatment of both contaminants in the Source Area in order to shorten the time needed to reach this goal of aquifer restoration.

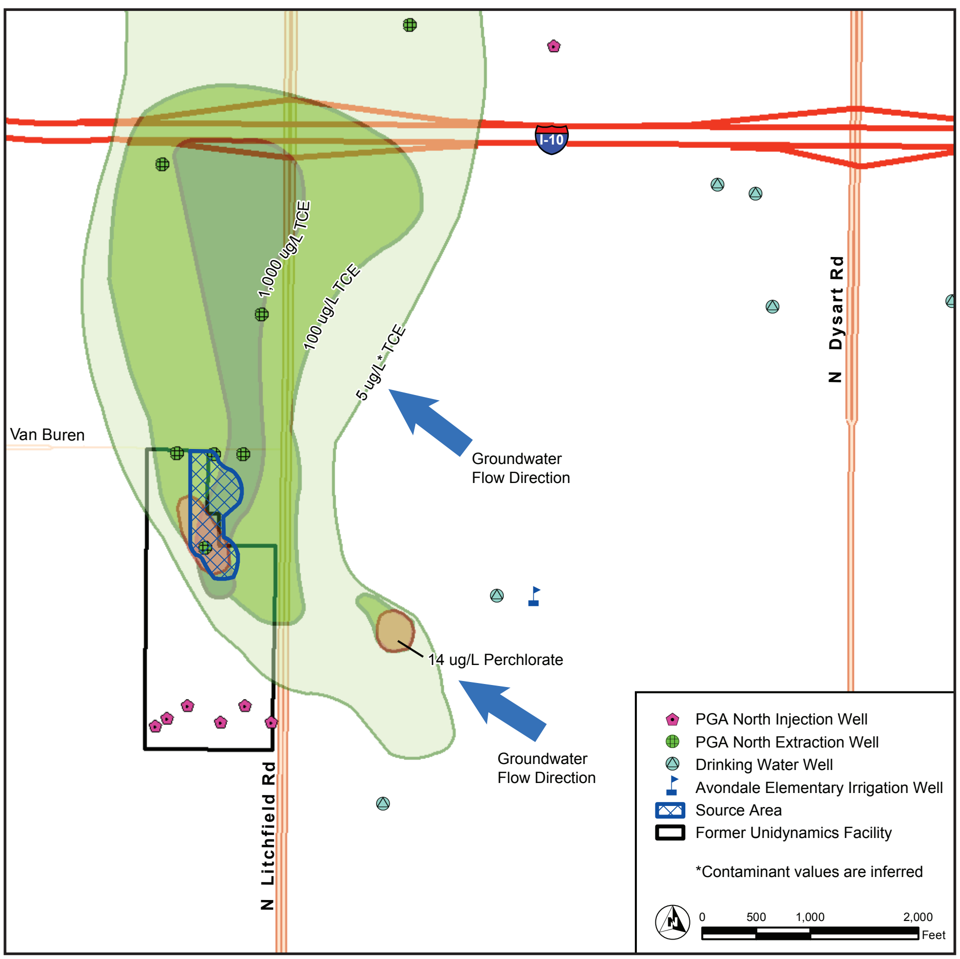


Figure 2: PGA North Source Area

Site Characteristics

PGA-North is located within the West Salt River Valley sub-basin of the Salt River Valley in central Arizona. The regional geology of the West Salt River Valley consists of a deep alluvial basin bounded by bedrock mountain ranges. These surrounding mountain ranges are nearly impermeable barriers to ground water flow.

The West Salt River Valley alluvial deposits have been subdivided into three hydrogeologic units which are designated in descending order as: 1) the Upper Alluvial Unit, 2) the Middle Alluvial Unit, and 3) the Lower Alluvial Unit. Groundwater contamination at PGA-North is limited to the UAU, the shallow aquifer. Groundwater in the vicinity of the Source Area flows mostly northward at an average rate of 1.6 feet per day.

In the vicinity of PGA-North, the Upper Alluvial Unit is further divided into subunits:

- Subunit A is generally composed of interbedded sands, silty sands, and clayey sands that can locally contain sequences of gravel and cobbles. Subunit A typically extends from ground surface to approximately 160 – 180 feet below ground surface in the vicinity of the Site. Approximately one-third to one-half of the lower portion of Subunit A is saturated and is considered an unconfined aquifer.
- Subunit B is generally composed of unconsolidated silt and clay dominant deposits with interbedded lenses of fine- to coarse- sand and acts as an aquitard. Subunit B generally has variable thickness (15 – 40 feet thick near the Site) with depths extending from approximately 165 to 220 feet below ground surface and is fully saturated.
- Subunit C is composed of unconsolidated and interbedded mixtures of silty sands, clayey sands, and fine- to coarse-grained sands. On average Subunit C is approximately 150 feet thick and extends from approximately 200 to 350 feet below ground surface in the vicinity of the PGA-North Site. Subunit C is fully saturated and is considered to be a leaky—to confined—aquifer.

Local water supply wells in the vicinity of the PGA-North Site withdraw water from Subunit C and the deeper Middle Alluvial Unit, although some water supply wells may also partially withdraw water from Subunit A. Thus, drinking water supply wells pump from between 100 and 600 feet deep.

The current PGA-North cleanup consists of extraction of contaminated groundwater and re-injection of treated water. This system of extraction and injection prevents groundwater contamination from spreading, thereby protecting the public water supply wells in the area. This system for containing groundwater contamination is called a hydraulic barrier.

Scope and Role of This Proposed Plan

This Proposed Plan supplements treatment of Site contamination in groundwater at the PGA-North Source Area in order to improve the current cleanup at the Site, address both TCE and perchlorate in groundwater at and near the Source Area, and shorten the time to full aquifer restoration. While cleanup is already occurring at PGA-North, EPA recognizes that water is scarce in the southwest and is proposing additional treatment to speed the process of cleaning this valuable resource.

Summary of Site Risks

There is no current health risk at the Site because contaminated groundwater is not being used as a drinking water source. Also, there is no current health risk from exposure to soil vapor contamination because soil vapor is being treated around the Source Area.

Groundwater contamination at the Site could pose a risk to human health in the future due to potential effects on local sources of drinking water. In the area around the Site, groundwater is the primary source of drinking water, as well as a source of water for industrial and irrigation uses. The State of Arizona has identified groundwater within this area as a potential drinking water source. Therefore, the cleanup goal for the Site is to reduce contamination in groundwater to comply with drinking water standards, specifically the Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act.

Groundwater contamination in the Source Area has spread both vertically to deeper aquifers and horizontally in the direction of other drinking water resources. Although the groundwater is currently being treated and contained, decreasing or eliminating the contaminants in the Source Area groundwater can dramatically reduce the amount of time necessary to clean up to drinking water standards, not only in the Source Area but also throughout the contamination plume.

Contaminants

The two major groundwater contaminants at the Site are TCE and perchlorate. TCE has been identified by U.S. EPA as a known cause of cancer in humans and perchlorate causes non-cancer effects on the thyroid gland. A total of eleven contaminants (benzene, carbon tetrachloride, chloroform, 1-1-dichloroethene, cis-1,2-dichloroethene, 1,2-dichloropropane, perchloroethylene [PCE], toluene, trichloroethylene [TCE], m,p-xylenes and perchlorate) have been detected in Source Area groundwater over the course of multiple Site investigations.

Human Health Risks

A detailed analysis of human health risks associated with groundwater contamination at PGA-North is presented in the report 'Final Source Areas, Soil, and Facility Structures Human Health Risk Assessment' (November 2012). The risk assessment confirms that there are no current health risks at the site as contaminated groundwater is not being used as a drinking water source and soil vapor contamination levels are being treated. However, this risk assessment calculates the risk that would occur due to exposure to contaminated groundwater if the groundwater were to be used as a drinking water source.

In the baseline Risk Assessment—contained in the report mentioned above—the estimated lifetime excess cancer risks that would be associated with drinking contaminated tap water from Source Area groundwater were calculated for someone living near the Site. Cancer risks were estimated for two scenarios: (1) a reasonable maximum exposure (RME) scenario which estimates risk for members of the population who could, because of their personal situation and behavior, experience the highest exposure that can reasonably be expected to occur, and (2) a central tendency exposure (CTE) scenario which estimates risk for those who could experience a more typical or average exposure to site-related contamination. For a drinking water exposure, the RME scenario assumes an individual consumes 2 liters of contaminated water per day, 350 days per year for a 30 year period and estimates risk from this assumed exposure. Superfund remediation decisions focus primarily on protection against risk from RME-type exposures.

The RME scenario risk is 9×10^{-3} or 9,000 excess cancer cases per one million people if there was exposure to contaminated groundwater as described above. The CTE scenario risk is 9×10^{-4} or 900 cancer cases in one million based on the exposure described above. In both scenarios, TCE contributed greater than 99% of the cancer risk. Risk estimates for both the RME and CTE scenarios are well above the Superfund acceptable risk range of 10^{-6} (approximately 1 in one-million) to 10^{-4} (approximately 100 in one-million). Non-cancer Hazard index values were also estimated as part of the risk assessment. These values were calculated at 1,000 for the RME scenario and 300 for the CTE scenario; both are well above EPA's target value of 1.

Note: These risk estimates assume the use of untreated groundwater as a drinking water source. It is important to remember that untreated groundwater is <u>not</u> used as a source of drinking water, and therefore there is no current exposure or risk.

Important further findings in the November 2012 risk assessment are:

- Source area groundwater is being actively remediated and is not currently suitable for use as tap water. This groundwater is not currently being used as a drinking water source.
- Potential exposures to contaminants in indoor air in buildings that may be built in the Source Area in the future are within or below the acceptable risk range and are below the acceptable hazard index for commercial/industrial workers. This means that there is no health risk to future workers from breathing air at the Source Area.
- Predicted exposure to soil is within the acceptable risk range for potential trespassers, future construction workers, and future outdoor commercial/industrial workers. This means that there is no health risk to these groups due to breathing air at or ingesting soil at the Source Area.

Remedial Action Objectives (RAOs)

Remedial Action Objectives are specific goals at each Superfund Site that EPA establishes to protect human health and the environment. These goals also assist EPA in measuring the effectiveness of remedial actions in achieving Superfund cleanups. The Remedial Action Objectives established for groundwater and soil in the 1989 Record of Decision for PGA-North are:

- Restoration of Subunits A and C of the aquifer by reduction of groundwater contamination equal to or less than Applicable or Relevant and Appropriate Requirements (ARARS); ARARS are any state or federal environmental laws which apply to on-site remedial actions.
- Reduction of soil contamination in the source area where soil gas samples show VOCs greater than 1 ug/l, an area which may be expanded or reduced to include removal of 99 percent of the contamination;
- For soils, prevent migration of TCE into Subunit A and preserve uses of Subunit C groundwater;
- For groundwater, preserve the current use of Subunit C groundwater and protect future uses.

Overall, EPA's goals with this Proposed Plan are to improve and accelerate cleanup of the Source Area TCE and perchlorate in order to reach the Site Remedial Action Objectives established in 1989. This improved cleanup plan also has Remedial Action Objectives, which are used to evaluate the effectiveness of the cleanup alternatives analyzed in the Focused Feasibility Study:

- Achieve permanent mass reduction within the Source Area of at least 80% for TCE and perchlorate in Subunit A
- Achieve permanent TCE and perchlorate concentration reduction of at least 80% within the Source Area

These RAOs were selected because an 80% reduction in TCE and perchlorate concentrations in the Source Area will result in a major decrease of TCE concentrations and plume size.

The current contaminant removal rates from extraction wells (EA-03 and PZ-01) will be used to evaluate the performance of the cleanup in the Source Area. Contaminant data will be collected before the Source Area cleanup begins, and it will be compared to the change in contaminant levels after cleanup to evaluate performance of the improved cleanup plan. There will be a time lag between cleanup at the Source Area and the change in contaminant levels along West Van Buren Street due to the distance between the two locations. Given this time lag, performance monitoring will be conducted after each phase of cleanup. During design of the Source Area cleanup, multiple strategies to evaluate cleanup effectiveness will be selected to monitor the cleanup process. These strategies will likely include monitoring points downgradient from the treatment area (in the direction of groundwater flow), pumping tests, and groundwater flow and modeling simulation to evaluate mass/concentration/mass flux changes. In addition, confirmation borings will be drilled at select locations within the treatment zone with soil and groundwater samples collected at each boring to evaluate the effectiveness of the cleanup.

Summary of Cleanup Alternatives

Remedial alternatives that were considered in the Focused Feasibility Study are presented below and are summarized on the table that follows. Figure 2 depicts the location of proposed cleanup action at the Source Area in Subunit A, the uppermost aquifer of the Upper Alluvial Unit.

Note: The cost information provided below is based on preliminary estimates and, in accordance with EPA guidance, the cost estimates have an accuracy of plus 50 percent to minus 30 percent.

ALTERNATIVE 1: No Further Action Alternative

The Superfund process requires that a "no action" alternative be considered in each evaluation as a baseline to compare the remaining alternatives. As there is already a groundwater remedy at this Site, the "no action" alternative assumes continuation of the existing groundwater pump and treat and Soil Vapor Extraction but adds no improved remedial measures to speed the cleanup of the Source Area.

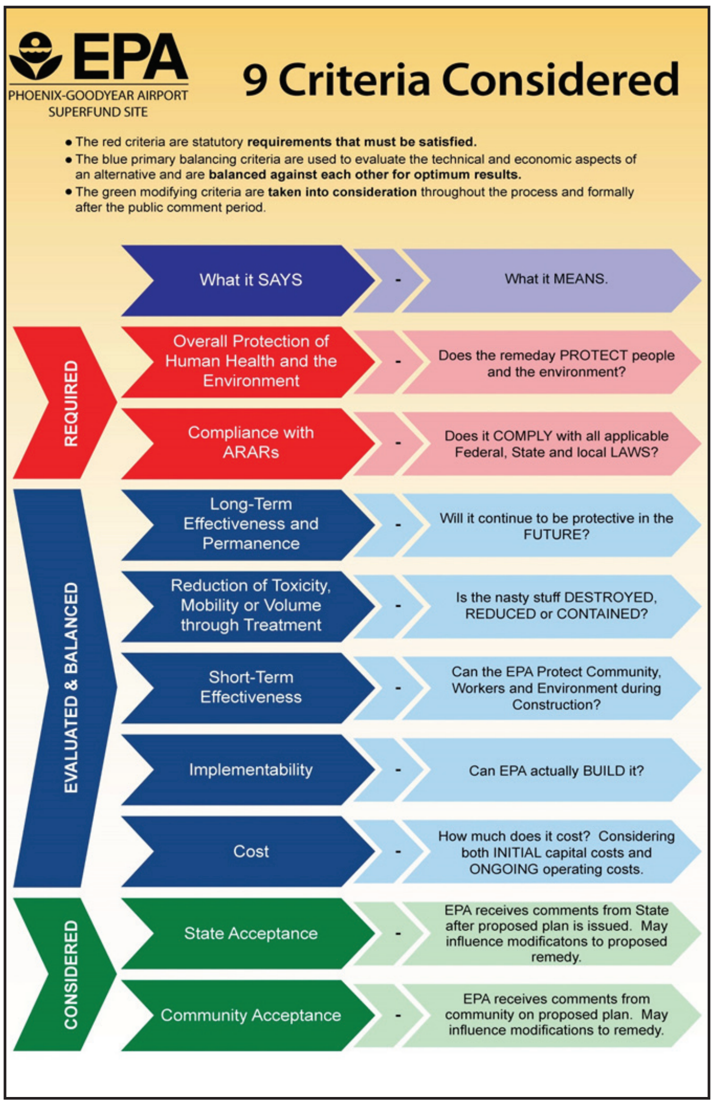
The existing cleanup has created a hydraulic barrier or 'mounding' of groundwater beneath the surface which protects the public water supply wells in the area by preventing the spread of contamination.

Estimated Additional Capital Cost:	***$0***
Estimated Additional Annual O&M Cost:	***$0***
Estimated Additional Closure Cost:	***$0***
Estimated Present Worth Cost:	***$0***
Estimated Timeframe to achieve RAOs:	***Decades***

ALTERNATIVE 2: In-Well Air Stripping + Hydraulic Barrier

The alternative combines In-Well Air Stripping with the existing hydraulic barrier along West Van Buren Street to treat and contain Source Area TCE. In-Well Air Stripping is performed within the water column of a well that is constructed with two well screens that are separated by at least 20 feet. Groundwater is extracted from the bottom screen and pumped to the top of the well, where it is released to free-fall down the well casing. This process aerates the water and enhances the release of the TCE from the extracted water. Vapors are recovered and treated at the surface. This alternative would be effective for TCE removal, but will not treat perchlorate in the groundwater.

Estimated Capital Cost:	***$5,160,000***
Estimated Annual O&M Cost:	***$77,000***
Estimated Closure Cost:	***$675,805***
Estimated Present Worth Cost:	***$7,375,805***
Estimated Timeframe to achieve RAOs:	***20 years (current perchlorate treatment will likely cleanup within same time frame)***



ALTERNATIVE 3: Anaerobic Reductive Dechlorination + Hydraulic Barrier

This alternative combines In-Situ treatment by Anaerobic Reductive Dechlorination with the existing hydraulic barrier along West Van Buren Street to treat and contain TCE and perchlorate. In-Situ treatment refers to the placement of treatment where the contamination exists. Anaerobic Reductive Dechlorination uses indigenous microbial organisms to consume contaminants through a biological reaction. This reduces the contaminants to non-toxic ethene, ethane or carbon-dioxide. Groundwater monitoring for treatment effectiveness will also be conducted. This alternative would treat TCE and perchlorate.

Estimated Capital Cost:	***$7,470,000***
Estimated Annual O&M Cost:	***$102,500***
Estimated Closure Cost:	***$520,860***
Estimated Present Worth Cost:	***$8,810,860***
Estimated Timeframe to achieve RAOs:	***8 years***

EPA's Preferred Alternative

ALTERNATIVE 4: Zero-Valent Iron (ZVI), Nano-Scale Zero Valent Iron (nZVI), Anaerobic Reductive Dechlorination + Hydraulic Barrier

This alternative combines In-Situ treatment (the injection of nZVI, ZVI, and Anaerobic Reductive Dechlorination) with the existing hydraulic barrier along West Van Buren Street to treat and contain TCE and perchlorate. In-Situ treatment refers to the placement of treatment where the contamination exists. This alternative will involve injecting solutions into the groundwater beneath the Source Area so that nZVI and ZVI particles and microbial organisms come into contact with contaminants and reduce them to more stable, less mobile or non-toxic compounds. This particular In-Situ treatment, nZVI and ZVI, consists of small size and large surface area particles of iron that have been tested at PGA-North. The 2010 nZVI Pilot Test showed concentration reduction in the range of 63% to 96% one month after injection based on data from monitoring wells. Groundwater monitoring for treatment effectiveness will also be conducted. This alternative would treat TCE and perchlorate.

Estimated Capital Cost:	***$10,320,000***
Estimated Annual O&M Cost:	***$102,500***
Estimated Closure Cost:	***$454,650***
Estimated Present Worth Cost:	***$11,594,650***
Estimated Timeframe to achieve RAOs:	***8 years***

ALTERNATIVE 5: Zero Valent Iron (ZVI), Anaerobic Reductive Dechlorination + Hydraulic Barrier

This alternative combines In-Situ treatment (the injection of ZVI with Anaerobic Reductive Dechlorination) with the existing hydraulic barrier along West Van Buren Street to treat and contain TCE and perchlorate. In-Situ treatment refers to the placement of treatment where the contamination exists. This alternative will involve injecting solutions into the groundwater beneath the Source Area so that iron particles (ZVI) and microbial organisms come into contact with contaminants and reduce them to more stable, less mobile or non-toxic compounds. The size of the ZVI iron particles is larger than with nZVI. Groundwater monitoring for treatment effectiveness will also be conducted. This alternative would treat TCE and perchlorate.

Estimated Capital Cost:	***$11,290,000***
Estimated Annual O&M Cost:	***$123,636***
Estimated Closure Cost:	***$626,940***
Estimated Present Worth Cost:	***$13,276,940***
Estimated Timeframe to achieve RAOs:	***11 years***

ALTERNATIVE 6: In-Situ Chemical Oxidation with Permanganate + Hydraulic Barrier

This alternative combines In-Situ treatment (chemical oxidation) with the existing hydraulic barrier along West Van Buren Street to treat and contain TCE. In-situ treatment refers to the placement of treatment where the contamination exists. In this alternative, an oxidant such as permanganate is added to groundwater beneath the Source Area enabling a chemical reaction to destroy contaminants and produce more stable, less mobile or non-toxic compounds. Groundwater monitoring for treatment effectiveness will also be conducted. This alternative would not treat perchlorate.

Estimated Capital Cost:	***$6,210,000***
Estimated Annual O&M Cost:	***$102,500***
Estimated Closure Cost:	***$457,875***
Estimated Present Worth Cost:	***$7,487,875***
Estimated Timeframe to achieve RAOs:	***8 years for TCE***

(current perchlorate treatment will likely take longer)

Comparative Analysis of Alternatives

Evaluation Criteria	Alternative 1 No Action	Alternative 2 In-Well Air Stripping + Hydraulic Barrier	Alternative 3 ARD + Hydraulic Barrier	EPA's Preferred Alternative: Alternative 4 nZVI + ZVI + ARD + Hydraulic Barrier	Alternative 5 ZVI + ARD + Hydraulic Barrier	Alternative 6 ISCO (Per-manganate) + Hydraulic Barrier	Alternative 7 ERH + Steam + Hydraulic Control
Protection of Human Health & the Environment	Low-Moderate	Low-Moderate	Moderate	High	High	High	High
Compliance with ARARs	Low	High	High	High	High	High	High
Long-Term Effectiveness & Permanence	Low	Low-Moderate	Moderate	Moderate-High	Moderate-High	Moderate	High
Reduction of Toxicity, Mobility, or Volume	Low	Low-Moderate	Moderate	Moderate-High	Moderate-High	Moderate-High	High
Short-Term Effectiveness	Low	Low-Moderate	Low	High	Moderate-High	High	High
Implementability	High	Moderate-High	Moderate	Moderate-High	Moderate-High	High	Low-Moderate
Cost	High	Moderate-High	Moderate-High	Low-Moderate	Low-Moderate	Moderate-High	Low
State Acceptance	Expected (EPA has worked closely with the state of Arizona on this plan)						
Community Acceptance	Community acceptance of preferred alternative will be evaluated after the public comment period						

Low · Low-Moderate · Moderate · Moderate-High · High

ALTERNATIVE 7: Electrical Resistance Heating + Steam + Hydraulic Barrier

This alternative combines electrical resistance heating and steam with the existing hydraulic barrier along West Van Buren Street to treat and contain TCE. Electrodes and/or steam injection wells would be installed in the Source Area to heat the subsurface and release contaminants. Vapors are recovered and treated at the surface. Groundwater monitoring for treatment effectiveness will also be conducted. This alternative would not treat perchlorate.

Estimated Capital Cost:	***$10,470,000***
Estimated Annual O&M Cost:	***$15,620,000***
Estimated Closure Cost:	***$4,529,000***
Estimated Present Value Cost:	***$30,619,000***
Estimated Timeframe to achieve RAOs:	***1 year for TCE***

(current perchlorate treatment will likely take longer)

Each of the remedial alternatives is evaluated against nine criteria developed to address Superfund requirements and considerations. The alternatives are analyzed individually against each criterion and then compared against one another to determine their respective strengths and weaknesses and to identify the key trade-offs that must be balanced for the cleanup. In order to be considered by EPA, each alternative must meet the two threshold criteria of protection of human health and the environment and compliance with Applicable or Relevant and Appropriate Requirements (ARARs). All of EPA's nine criteria are summarized in a graphic on page 6. The modifying criteria are taken into consideration following this public input process. The chart on page 7 provides an overview of how the cleanup alternatives compare to each other based on the nine criteria. The detailed analysis of alternatives can be found in the Focused Feasibility Study (FFS) which is available in the EPA Repository at the City of Goodyear Library (address is provided on Page 11).

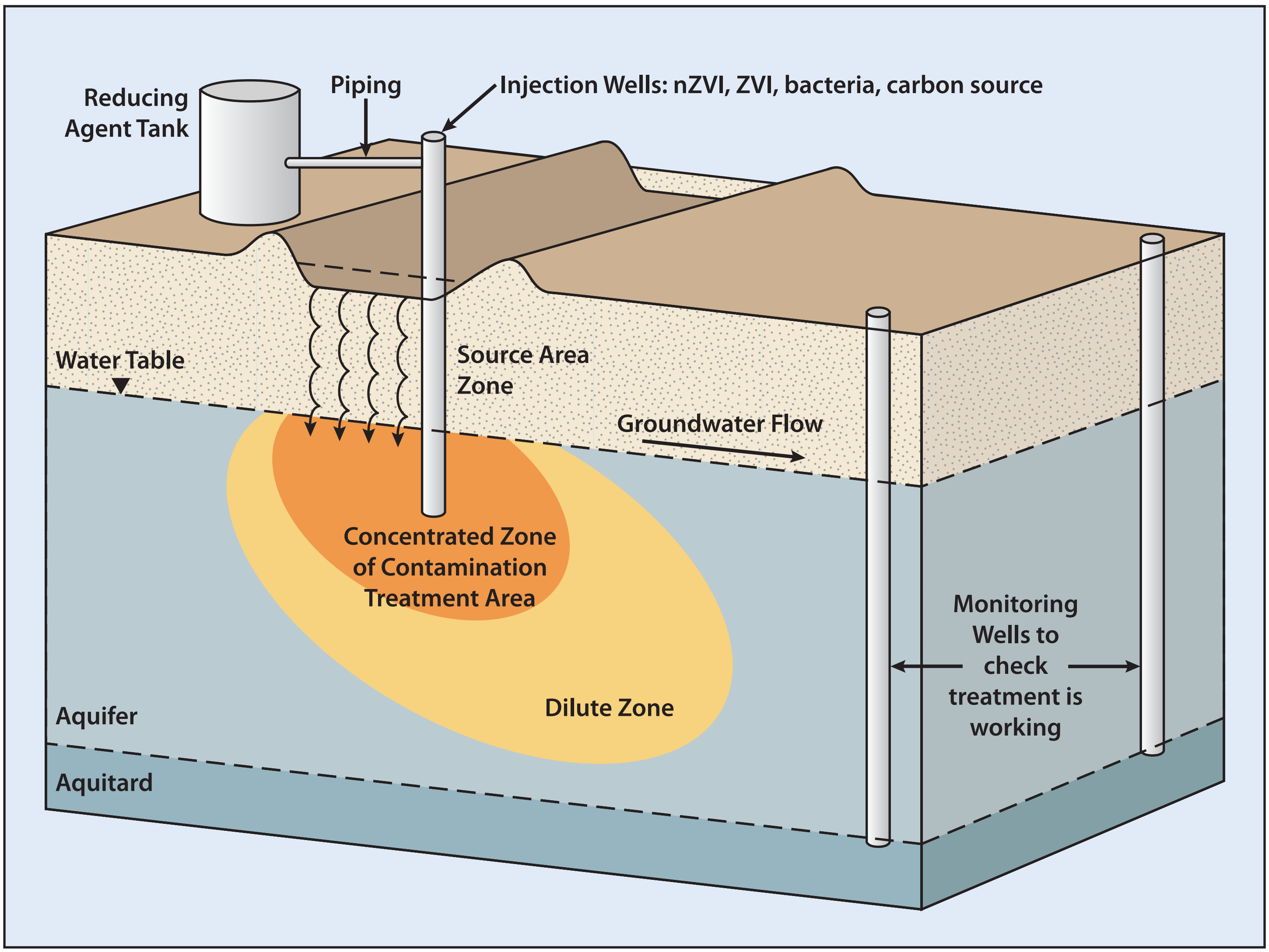


Figure 3: Conceptual model of Source-Area Treatment, PGA North

EPA's Preferred Alternative #4

EPA proposes to treat TCE and perchlorate in the Source Area groundwater through the use of In-Situ treatment (the injection of nZVI, ZVI, and Anaerobic Reductive Dechlorination) with the existing hydraulic barrier along West Van Buren Street. This alternative is preferable to alternatives 2, 6, and 7 because it includes additional treatment of perchlorate. Also, the cost of alternative 7 is significantly higher than the other alternatives. Alternative 4 is preferable to alternative 5 because multiple particle sizes of iron will clean Site contaminants more quickly than just the use of ZVI-size particles alone. Alternative 3 does not create and maintain optimal anaerobic conditions in which the microbial organisms could thrive. This would result in a slower start for the organisms to begin cleaning contaminants. Overall, alternative 4 would have greater short term effectiveness than alternatives 3 or 5 while maintaining similar long term effectiveness.

EPA's preferred alternative meets the two threshold criteria of 1) overall protection of human health and the environment, and 2) complies with federal and state "applicable or relevant and appropriate requirements" (ARARs). Alternative #4 ranked as good or better on the five balancing criteria 1) long term effectiveness and permanence;2) reductions in toxicity, mobility and volume through treatment; 3) short term effectiveness; 4) implementability; and 5) cost. Based on pilot testing listed below on Site and on the ability for treatment of all contaminants of concern, alternative #4 is preferred. The two modifying criteria are 1) potential for state acceptance; and 2) community acceptance which will be evaluated after the close of the public comment period.

Past Investigations in the Source Area

For more information, all listed reports are included in the Administrative Record located at the Site Repositories.

1984 – 1988 Soil & Soil Gas Investigations

- 10 soil borings in the Source Area
- Highest TCE in Soil = 5,585 mg/kg
- Shallow Soil Gas Survey to determine extent of TCE contamination and guide groundwater monitoring well installations

2002 – 2003 Source Area GW Investigations

- High TCE and perchlorate concentrations in Subunit A GW
- Conduit wells identified
- Subunit C groundwater contamination identified
- TCE detected in soil gas at a maximum of 180 ug/l at 50 ft bgs

2004 Bench Scale Test for nZVI to reduce TCE concentration

2005 Main Drywell Source Area Investigation

- Investigate drywell construction
- Highest groundwater contamination is found in Subunit A
- No significant TCE source present in soil beneath Source Area

2005 Phase 1 Source Area Soils, Facilities, & Structures (SASFS) Investigation

- 13 confirmed waste management locations investigated
- 19 potential Source Areas investigated

2005 1st nZVI Pilot Field Test

2007 Phase II SASFS Investigation

- No additional sources of contaminants were identified
- No additional source investigation is warranted

2008 2nd nZVI Pilot Test

2009 – Demolition and Removal of Facility Buildings/ Structures

- Phase I Soil Gas Investigation (Jan 2011)
- Remediation Pilot Tests in Source Area

2010 3rd nZVI Pilot Test

- Jet-assisted injection
- Radius of influence estimated at 15 – 35 feet

Glossary of Terms

Administrative record: A complete collection of the supporting documents that EPA relied upon to make its decision on the selection of a cleanup under Superfund.

Alluvial: Related to sand deposited by flowing water.

Aerobic: Able to live, grow, or take place in an environment where oxygen is present.

Anaerobic: Able to live, grow, or take place in an environment where oxygen is not present.

Applicable or Relevant and Appropriate Requirement (ARARS): ARARs are the requirements that govern a CERCLA cleanup. "Applicable requirements" are those cleanup standards, standards of control, and criteria promulgated under Federal or State law that specifically address a hazardous substance, remedial action, location, or other circumstance at a CERCLA environmental restoration site. "Relevant and appropriate requirements" are standards that, while not directly applicable for the CERCLA action, are determined to be sufficiently relevant to the conditions of the action that they are determined to be well suited for the particular action.

Aquifer: An underground layer of soil, sand or gravel that can store and supply groundwater for wells and springs.

Aquitard: A barrier to the flow of groundwater in an aquifer.

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act (commonly known as Superfund). This law, enacted by Congress on December 11, 1980, created the Superfund program which (1) established prohibitions and requirements concerning closed and abandoned hazardous waste sites, (2) provided for liability of persons responsible for releases of hazardous waste at these sites, and (3) established a trust fund to provide for cleanup when no responsible party could be identified.

Cleanup: The term used for actions taken to deal with a release or threat of release of a hazardous substance that could affect human health and/or the environment. The term is sometimes used interchangeably with the terms remedial action, removal action, response action, or corrective action.

Contaminant of concern (COC): Chemicals that exceed regulatory limits which have been linked to previous activities at the Site and may pose a significant risk to human health and the environment.

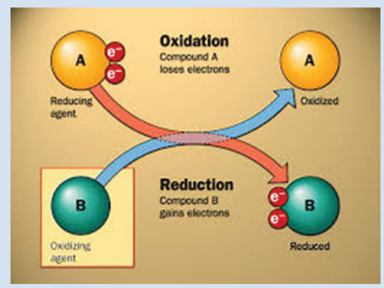
Feasibility study: A study that evaluates options to clean up environmental contamination at a Superfund site.

Groundwater: The supply of fresh water found below the ground surface, usually in an aquifer.

Hydraulic barrier: A general term referring to modifications of a groundwater flow system to restrict or impede movement of contaminants.

Information repository: A location accessible to community members (such as a local library) that houses documents, reports and other Site-related information

National Priorities List (NPL): EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under the Superfund program. The NPL, which EPA is required to update at least once a year, is based primarily on the score a site receives from EPA's Hazard Ranking System.



Oxidation: When a compound loses electrons in a chemical reaction, it is said that oxidation has occurred. See also redox.

Oxidizing agent: The chemical, compound, or ion which causes another chemical, compound, or ion to lose electrons and become more negatively charged than at the start of the reaction. See also redox.

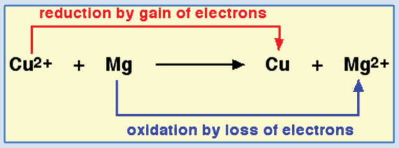
Perchlorate: Perchlorate is both a naturally occurring and man-made chemical that is used to produce rocket fuel, fireworks, flares and explosives. Perchlorate can also be present in bleach and in some fertilizers. Perchlorates have been found in at least 49 of the 1,581 current or former Superfund sites.

Plume: A defined area of contamination in groundwater, soil or the air; often used to describe the area of contamination in soil and/or groundwater.

Record of Decision (ROD): The primary legal document at a site, which sets forth EPA's selected remedy as well as the factors that led to its selection.

Glossary of Terms *(Continued)*

Redox: Since reduction and oxidation happen in the same reaction, this is known as a redox reaction. An example of a redox reaction is shown below:



The reducing agent (elemental magnesium or Mg) reduces the copper (II) ions (Cu2+) by giving the Cu2+ two negatively charged particles called electrons to create elemental copper or Cu. At the same time, the copper (II) ion (Cu2+) acts as the oxidizing agent when it oxidizes or removes electrons from the magnesium (Mg), a neutral element, to create magnesium ions (Mg2+), positively charged ions. Thus, the Cu2+ removed electrons from Mg to create Mg2+, and Mg gave electrons to Cu2+ to create Cu.

Reducing agent: The chemical, compound, or ion which causes another chemical, compound, or ion to gain electrons and become more positively charged than at the start of the reaction. See also redox.

Reduction: When a compound undergoes the gain of electrons in a chemical reaction, it is said that reduction has occurred. See also redox.

Reductive dechlorination: Degradation of chlorinated organic compounds (including TCE and perchlorate) by chemical reduction (see reduction) with release of less toxic inorganic chloride ions.

Remedial Action Objectives: Cleanup objectives that specify the level of cleanup, area of cleanup (area of attainment), and time required to achieve cleanup (restoration time frame).

Remedial Investigation: An in-depth study to determine the nature and extent of contamination at a Superfund site.

Remediation: Cleanup or other methods used to remove or contain a toxic spill or hazardous materials.

Remedy: A long-term action that stops or substantially reduces a release or threat of a release of hazardous substances.

Superfund: The common name for the EPA program established by CERCLA to investigate and clean up abandoned or uncontrolled hazardous waste sites [see "Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)" above]

Trichloroethene (trichloroethylene, TCE): A colorless liquid which is used as a solvent for cleaning numerous materials including metal parts.

Volatile Organic Compounds (VOCs): A large group of carbon-containing compounds that are easily dissolved into water, soil, or the atmosphere and evaporate readily at room temperature. These contaminants typically are generated from metal degreasing, printed circuit board cleaning, gasoline, and wood preserving processes. Examples of VOCs include tetrachloroethylene and trichloroethene.

Community Participation

An Administrative Record for this Proposed Plan has been assembled and documented in the two Site Repositories for PGA-North.

Site Repositories

City of Goodyear Library
14455 West Van Buren St.
Ste C-101
Goodyear, AZ 85338
(602) 652-3000
Hours:
Mon – Wed 10am – 7pm
Thurs – Sat 10am – 5pm

EPA Superfund Records Center
95 Hawthorne St.,
4th Floor
San Francisco, CA 94105
(415) 536-2000
Hours:
Mon – Fri 8am – 5pm

For more information, visit the PGA Site overview at:

www.epa.gov/region09/phoenix-goodyearairport

http://azdeq.gov/environ/waste/sps/phxsites.html#pgana

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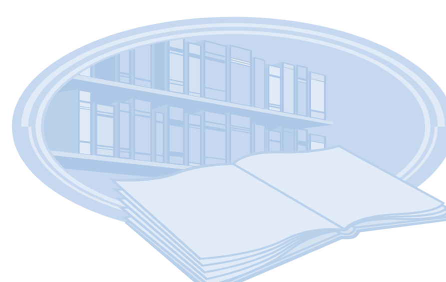

Phoenix-Goodyear Airport Superfund Site: North Area

EPA Seeks Comments on Proposed Additions to Site Cleanup Plan

Dates to Remember

Public Comment Period

January 23, 2014 – February 24, 2014

EPA will accept both oral and written comments on the Proposed Plan during the comment period.

Public Meeting

Wednesday, February 5, 2014
6:00 pm – 9:00 pm
Estrella Mountain Community College
Conference Center

Versión en español adentro

United States Environmental Protection Agency, Region 9
75 Hawthorne Street (SFD-6-3)
San Francisco, CA 94105
Attn: Amanda Pease (PGA 1/14)

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