

**EPA Superfund
Record of Decision Amendment:**

**APACHE POWDER CO.
EPA ID: AZD008399263
OU 01
SAINT DAVID, AZ
09/20/2005**

**AMENDMENT TO RECORD OF DECISION
APACHE POWDER SUPERFUND SITE
Benson, Arizona
September 2005**

PART I INTRODUCTION AND PURPOSE

A. SITE NAME AND LOCATION

Apache Powder Superfund Site (CERCLIS ID # AZD008399263)
St. David, Arizona (7 miles south of Benson, Arizona)

B. STATEMENT OF PURPOSE

The United States Environmental Protection Agency (EPA) is updating the Superfund cleanup plan for the Apache Powder Superfund Site (Site) in St. David, Arizona by amending the Record of Decision (ROD) remedies for the Southern Area Groundwater and Soils areas at the Site (see Figure 1). New soils data and the discovery of perchlorate in the Southern Area Groundwater led EPA to re-evaluate the remedial actions originally selected in 1994 for these areas. EPA has concluded that specific fundamental changes are needed to the original cleanup plan, including a change to the remedy for groundwater in the Southern Area. Additionally, in this ROD amendment, EPA is updating the Site cleanup plan by establishing standards for the discharge of treated effluent from the Northern Area Remediation System (NARS) to an alternate discharge location (when necessary), establishing a cleanup standard for perchlorate, and adopting specific risk assessment procedures for evaluating contaminants in soils.

The original remedies for both the Northern and Southern Groundwater Areas and the Soils Areas were selected in EPA's September 1994 Record of Decision (ROD), which was subsequently amended by EPA's April 1997 Explanation of Significant Difference (ESD) and December 2000 ESD.

EPA is amending the prior remedy decisions in accordance with Section 117 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 (CERCLA), as amended, and pursuant to 40 C.F.R. Section 300.435(c)(2)(ii)(A) through (H), Federal Register 8666, 8852 (March 1990).

The remedy changes for the Southern Area Groundwater and Soils were evaluated using the nine criteria established in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300, focusing on those central to the rationale of the selected remedy

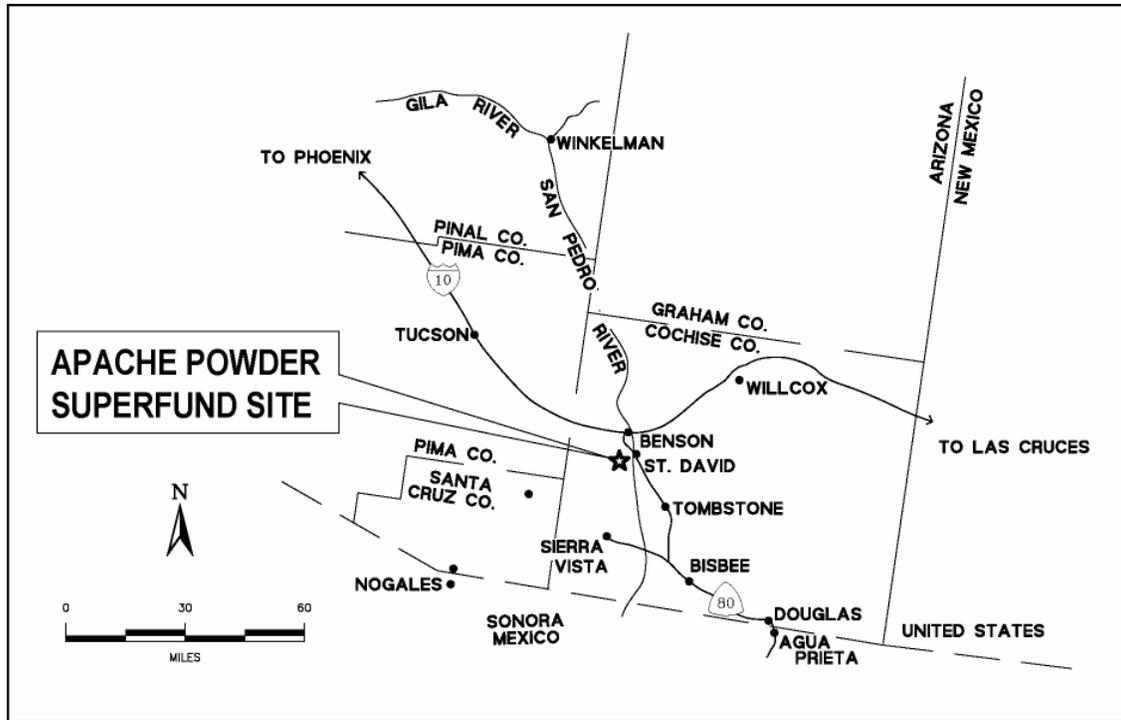


Figure 1. Location of Apache Powder Superfund Site, Cochise County, Arizona

(see Figure 2). The new updated remedies are protective and more cost-effective than previously selected remedies. The description and evaluation of these changes is described in detail in Part IV of this document.

The lead agency for this Site is EPA Region 9 and the support agency is the Arizona Department of Environmental Quality (ADEQ).

EPA is issuing this ROD Amendment to satisfy its public participation responsibilities under Section 117(c) of CERCLA and Section 300.435(c)(2)(i) and 300.825(a)(2) of the NCP.

This ROD Amendment will become part of the Administrative Record file for the Apache Powder Superfund Site, in accordance with Section 300.825(a)(2) of the NCP and will be available to the public at the following locations:

Benson Library
 302 South Huachuca
 Benson, Arizona 85602
 (520) 586-9535

Superfund Records Center
 95 Hawthorne Street, Suite 403S
 San Francisco, California 94105
 (415) 536-2000

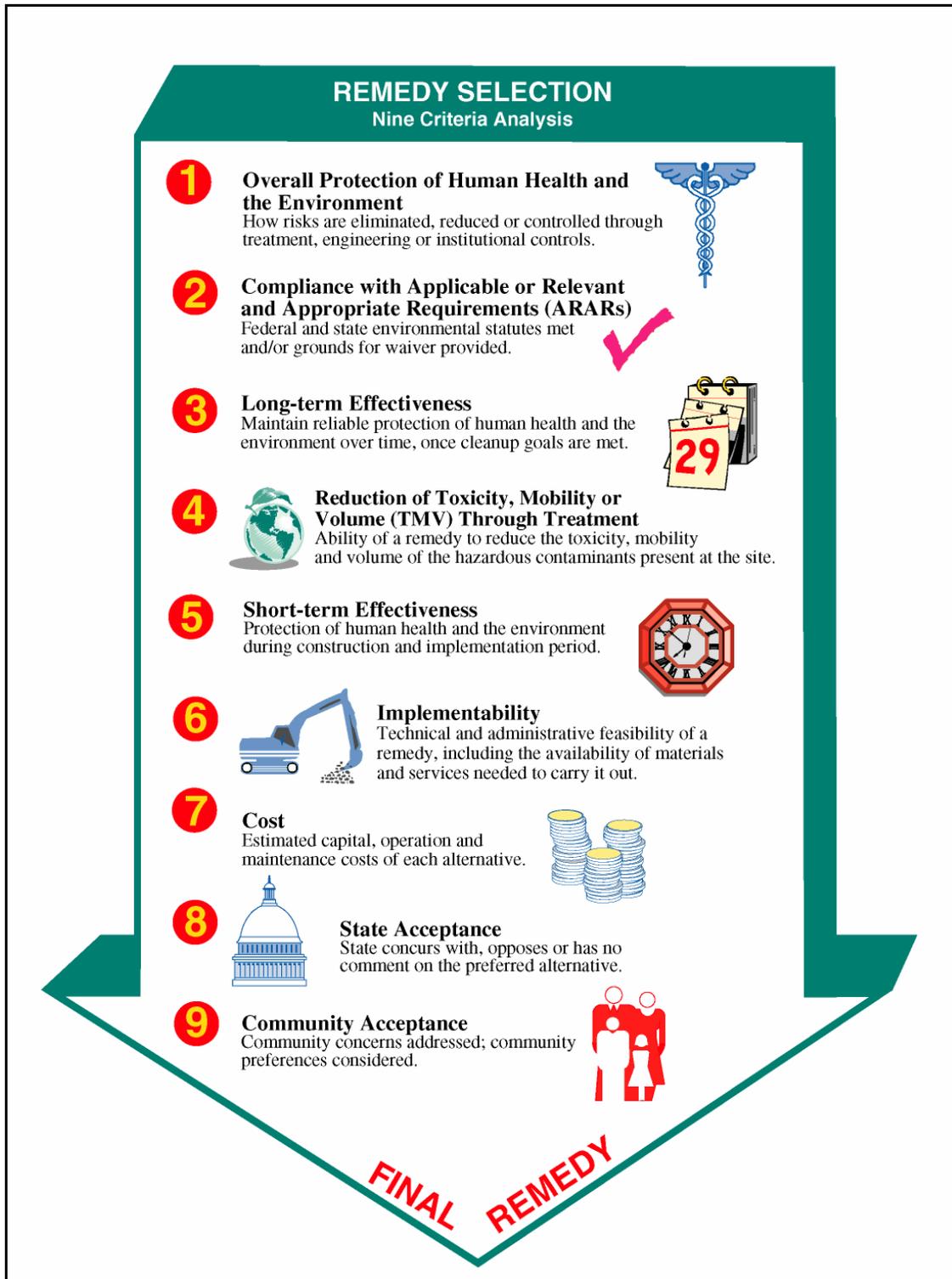


Figure 2. Nine Criteria Chart

For hours of operation, interested parties may call the libraries at the numbers listed above. The ROD Amendment is also available on EPA's web site under the Apache Powder heading at <http://epa.gov/region09/waste/sfund>.

PART II SITE HISTORY, CONTAMINATION AND SELECTED REMEDY

A. SITE HISTORY

Apache Nitrogen Products, Inc. (ANP) began operations in 1922 as a manufacturer of industrial chemicals and explosives. Currently, ANP manufactures nitric acid, solid and liquid ammonium nitrate, and nitrogenous fertilizer solutions. Prior to 1971, facility wastewater was discharged on-site into dry washes which flow to the San Pedro River, resulting in contamination to the shallow aquifer, both in the Northern and Southern Areas of the Site, and the surface water of the San Pedro River. This wastewater was composed of wash-down and blow-down waters from its power house cooling tower, nitric acid plant, and from the loading, unloading and storage of raw materials and products. During the period of 1971 to 1995, ANP discharged wastewater into unlined evaporation ponds on ANP's property creating a perched groundwater system that contaminated the adjacent shallow aquifer in the Southern Area of the ANP facility.

EPA identified the Apache Powder Superfund Site as an environmental problem in the early 1980s and placed it on the National Priorities List (NPL) or Superfund list in 1990. ANP completed a remedial investigation and feasibility study report (RI/FS) in 1994. EPA signed a Record of Decision (ROD) that same year selecting the Agency's proposed remedies. ANP has been conducting remedial design (RD) and remedial action (RA) during the intervening years under EPA's 1994 Unilateral Administrative Order (UAO). Concurrently, ANP also has been conducting other cleanup actions under a 1994 Consent Decree. In 1997 and 2000, EPA made additional modifications to the original 1994 ROD remedy in two ESDs.

B. REMEDIAL ACTIONS CONDUCTED TO DATE

GROUNDWATER CONTAMINATION

The primary groundwater contaminants at the Apache Powder Superfund Site are nitrate, which was discovered in the early 1980s, and perchlorate which was discovered in 1998. Nitrate is present in the Northern Area of the Site, and both nitrate and perchlorate are contaminants of concern (COCs) in the Southern Area. The groundwater contamination is confined to the shallow aquifer west of the San Pedro River and was initially investigated in the 1990s as one unit. In EPA's 1997 ESD, EPA made the decision to treat the Northern Area and Southern Area Groundwater systems separately. Since then, ANP has continued to conduct in-depth hydrogeological studies to further characterize both the Northern and Southern Areas. The data confirms that the perchlorate contamination is only present in the Southern Area and the aquifer systems are not hydraulically connected.

The following outlines major milestones for groundwater cleanup at the Site.

- In September 1994, EPA issued a ROD selecting a cleanup remedy for both the perched groundwater system in the Southern Area and the entire shallow aquifer (later divided into the Northern and Southern shallow aquifer areas). The ROD selected use of a brine concentrator to treat extracted contaminated water from the perched system and use of constructed wetlands to biologically degrade the nitrate in the entire shallow aquifer.
- In October 1994, ANP completed the construction of eight deep aquifer replacement wells for the households that had been using bottled water since 1989 because of nitrate contamination in the shallow aquifer.
- In 1995, ANP began operating the brine concentrator and ceased discharges to the unlined evaporation ponds. As part of the Southern Area remedy, ANP has continued to dewater the perched system by active extraction and evaporation of residual perched groundwater.
- In April 1997, EPA signed an ESD allowing ANP to construct a Northern Area wetlands treatment system and a separate Southern Area wetlands treatment system or pipe the nitrate contaminated groundwater from the Southern Area to the Northern Area
- In November 1997, ANP completed construction in the Northern Area of a 4.5-acre constructed wetlands to treat nitrate-contaminated groundwater extracted from the Northern Area of the Site (also referred to as Northern Area Extraction System or NARS). ANP completed the establishment phase of the wetlands in 2004 and began full-scale pumping, treatment and discharge in 2005.

Southern Area Cleanup

In 1998, when perchlorate was discovered in the shallow aquifer in the Southern Area, EPA directed ANP to analyze whether constructed wetlands or another remedy would be more appropriate for the Southern Area. ANP conducted an extensive groundwater investigation including resampling of the San Pedro River. The investigation indicated that nitrate and perchlorate contamination is hydraulically confined to the Southern Area in the Molinos Creek Sub-Aquifer (see Figure 3). A portion of the contamination has migrated beyond the ANP facility boundary underneath private property. In 2000-2003, ANP completed several studies, including a monitored natural attenuation study, culminating in a Supplemental Feasibility Study for the Southern Area Groundwater.

As a result of these studies, EPA has determined that Monitored Natural Attenuation (MNA) will address both nitrate and perchlorate and is the more appropriate remedy for the Southern Area.

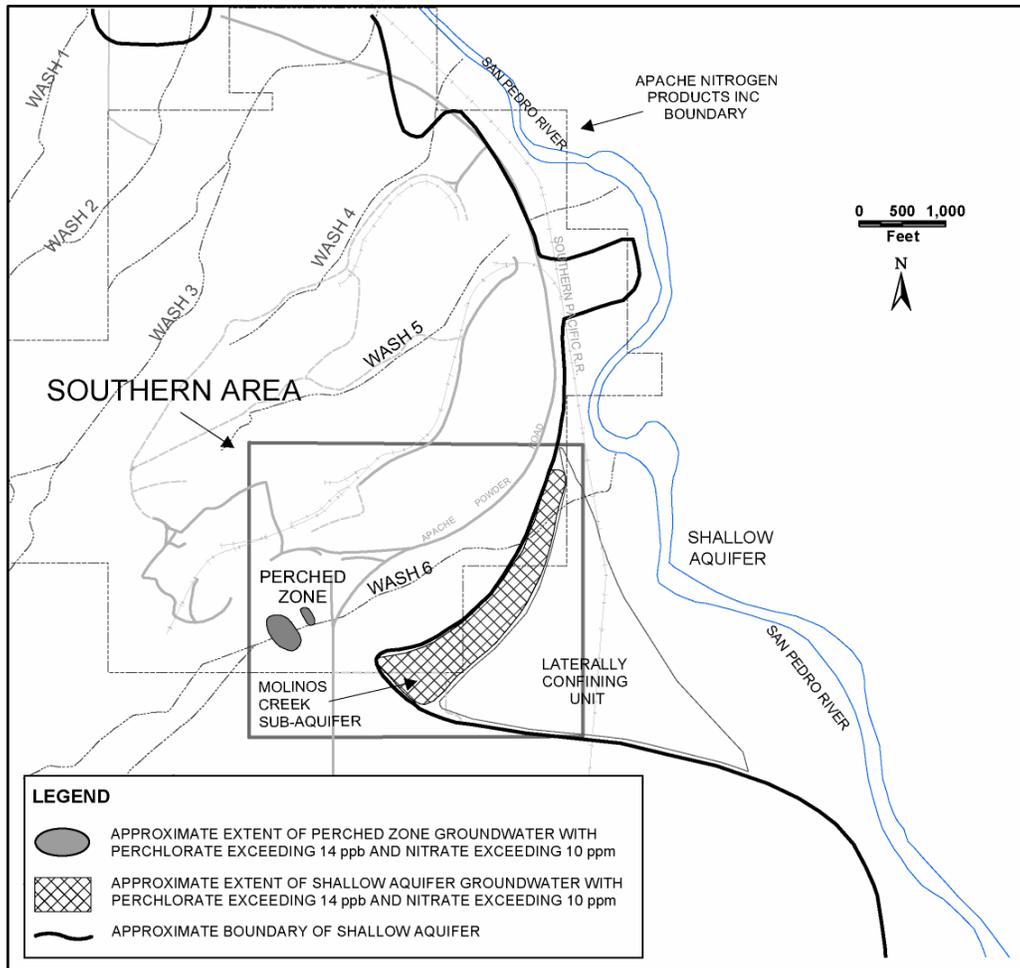


Figure 3. Groundwater Contamination in Southern Area

Northern Area Cleanup

In 2000, EPA directed ANP to reinvestigate the Northern Area to identify the extent of nitrate contamination in the shallow aquifer and surface water of the San Pedro River. ANP detected nitrate above the state and federal drinking water standard of 10 parts per million (ppm) in wells beyond the groundwater capture zone of the wetlands system (see Figure 4). EPA continues to evaluate new data to determine whether further refinements will be necessary to fully capture the nitrate contamination in the Northern Area.

Since the construction of the wetlands in the Northern Area, the effluent exiting the wetlands has not been sufficiently consistent for EPA to allow ANP to discharge it at the intended discharge location near the shallow aquifer. Because this system was not consistently meeting the cleanup standard of 10 ppm for nitrate, and because of unresolved regulatory

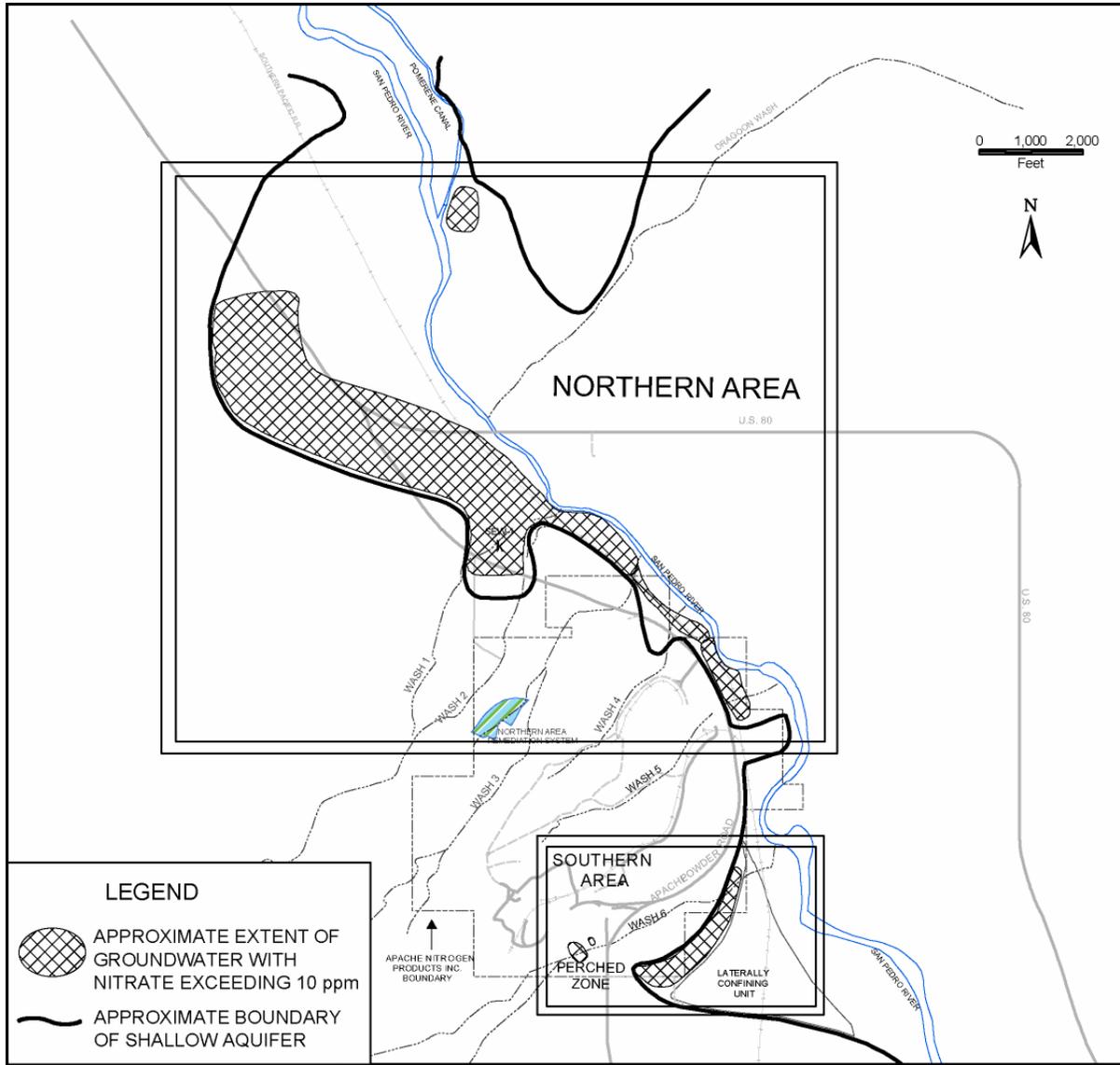


Figure 4. Location of Northern Area - Extent of Nitrate Contamination in Shallow Aquifer

concerns regarding coliform (e-coli) standards for the San Pedro River, EPA directed ANP to discharge to an alternate discharge point in Wash 3, located approximately one mile away from the San Pedro River. The e-coli issue has now been resolved and unlike prior years, the wetlands are now treating the nitrate consistently to below 10 ppm. As of May 2005, the NARS treated effluent was below 5 ppm nitrate. The NARS-treated effluent is now being discharged at the primary discharge location in Wash 3, in close proximity to the shallow aquifer and the San Pedro River (see Figure 5).

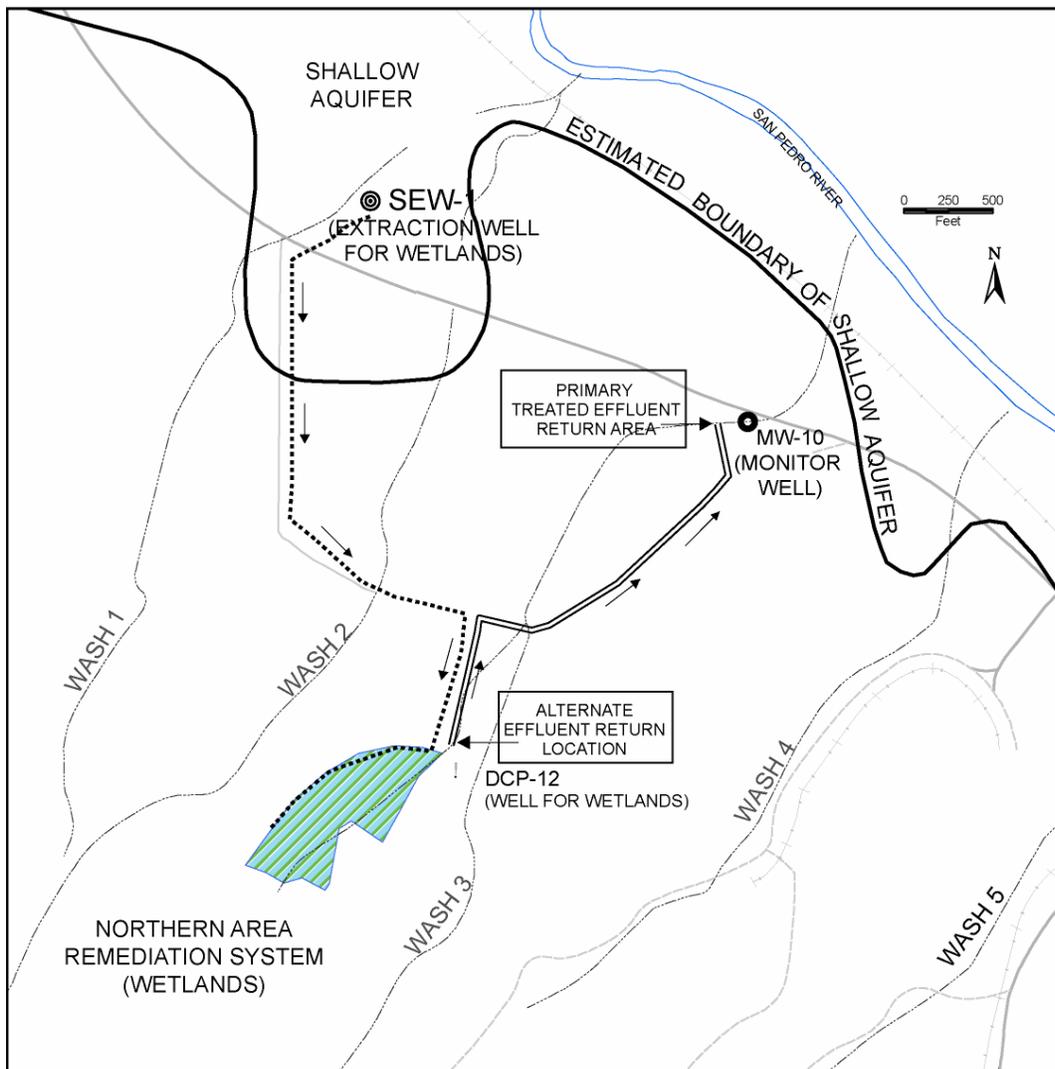


Figure 5. Northern Area Remediation System (NARS)

SOILS CONTAMINATION

The primary soil contaminants at the Site are trinitrotoluene (TNT), dinitrotoluene (DNT), lead and vanadium pentoxide. Other minor contaminants detected at low levels include arsenic, nitrate, perchlorate, beryllium and antimony. The following actions have been taken to address soil contamination:

- During the early 1990s, ANP conducted an investigation of the contaminated soils areas at the Site. EPA and ADEQ identified several areas of soil contamination to be addressed, including contaminated evaporation ponds (see Figure 6).

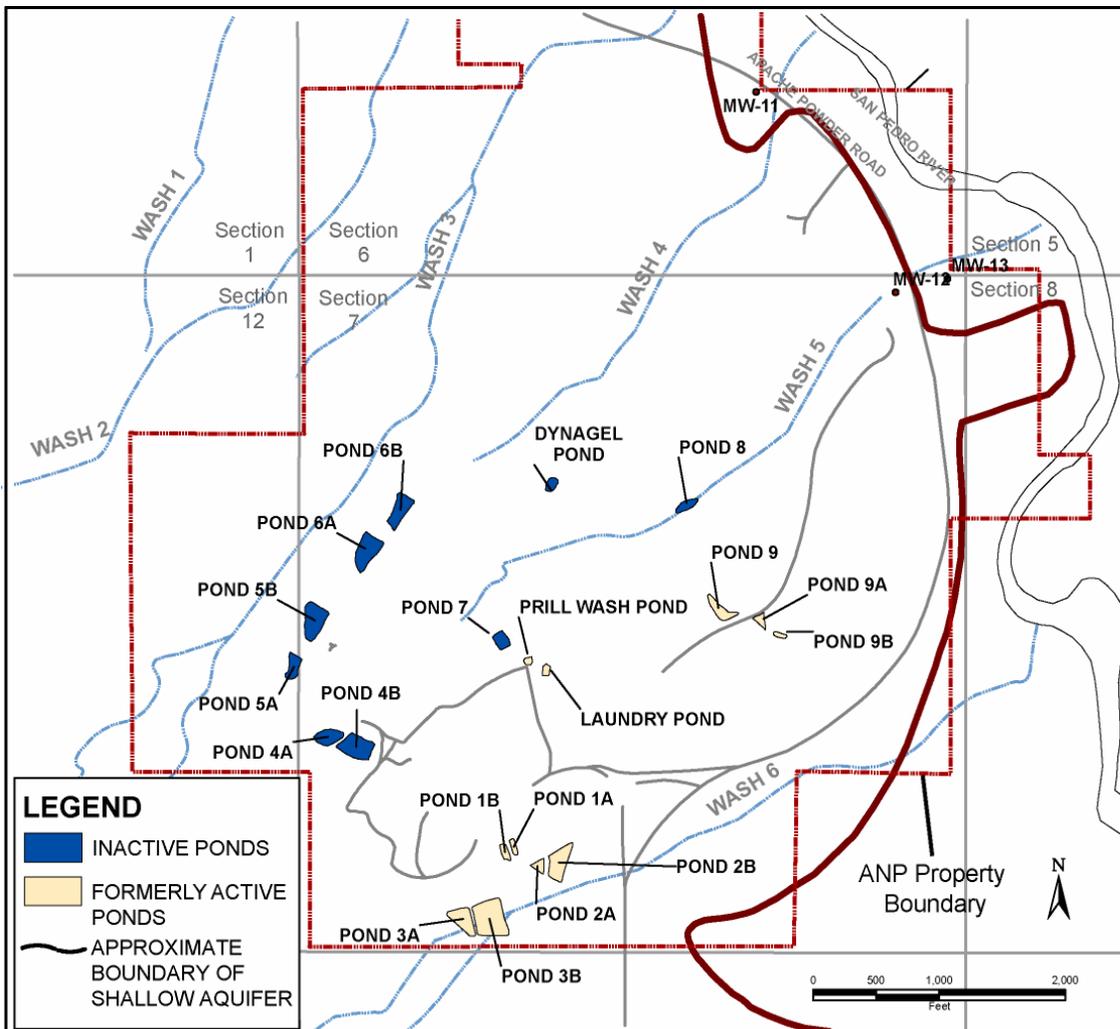


Figure 6. Location of *Inactive* and *Formerly Active* Ponds

- In the 1994 ROD, EPA selected remedial actions for all identified areas with soils contamination. For most areas, EPA required excavation to specified cleanup levels with off-site disposal. However for one area, the *inactive*¹ evaporation ponds, EPA required containment with a clay cap.
- Later in 1994, EPA issued an Order for cleanup of historic or inactive areas of the Site and ADEQ entered into a Consent Decree with ANP for cleanup of other areas of the Site where manufacturing operations were still ongoing. ADEQ and EPA divided regulatory

¹ The *inactive* ponds are nine unlined ponds that were not in use at the Site at the time of EPA's 1994 UAO and were included in EPA's 1994 ROD as Media Component 3. The *inactive* ponds are identified as Ponds 4A, 4B, 5A, 5B, 6A, 6B, 7, 8 and Dynagel Pond.

oversight for the contaminated evaporation ponds; EPA took responsibility for the *inactive* ponds and ADEQ took responsibility for the *formerly active*² ponds.

- In 1997, because new areas of soils contamination were identified, EPA modified the soils remedy to require ANP to investigate and clean up these new areas, including excavating, treating, containing, capping and/or disposing of these soils, as determined necessary by EPA.
- In 1999 and 2000, ANP excavated over 1,200 tons of contaminated soils which were transported off-site for treatment and/or disposal. ANP cleaned up all known areas of soils contamination, except for the contaminated soils in all the evaporation ponds.
- In 2000, EPA further modified the soils remedy to modify the soil cleanup standards.
- In 2001-2002, ADEQ decided that the remedy for the *formerly active ponds* should be consistent with the soil remedies selected under Superfund for the *inactive* ponds. Because of new soils data, EPA directed ANP in 2004 to complete an updated alternatives analysis for close out of all the evaporation ponds.

C. SCOPE OF THIS ACTION AND **REMEDIAL ACTION OBJECTIVES**

Based on new information, including the discovery of perchlorate in the Southern Area, EPA has decided that further changes and modifications are appropriate for the remedy for the Southern Area Groundwater and the residual soils contamination in ponds. These changes and modifications will meet the remedial action objectives (RAOs) originally established for the Site, which have been updated for this ROD Amendment, as follows:

- Restore the aquifer to drinking water standards for nitrate and EPA's site-specific cleanup level for perchlorate within a reasonable time frame;
- Minimize future migration of groundwater contamination;
- Restrict future use of the Site to non-residential uses;
- Reduce or eliminate further contamination of groundwater and surface water to allow the beneficial reuse of these resources; and
- Reduce or eliminate the direct contact threat associated with contaminated soil.

² The *formerly active* ponds are eleven evaporation ponds that were in active use in 1989 and closed in February 1995 and were included in the State of Arizona's 1994 Consent Decree. The *formerly active* ponds are identified as Ponds 1A, 1B, 2A, 2B, 3A, 3B, 9, 9A, 9B, Prill Wash Pond, and Laundry Pond.

D. SUMMARY OF SITE RISKS

GROUNDWATER CONTAMINANTS

Nitrate: Nitrate, detected in the Northern Area and Southern Area groundwater ranging from 390 to 3,100 parts per million (ppm), is a salt of nitric acid (a colorless, corrosive acid containing nitrogen). The primary health hazard associated with high nitrate levels in drinking water is *infantile methemoglobinemia*, a blood disorder that impedes the oxygen-carrying capacity of hemoglobin. Methemoglobinemia is generally limited to infants younger than three months. Older children and adults generally have sufficient acidity in their digestive tracks to offset bacterial conversion of nitrate into the toxin which causes the disorder. EPA has established a Maximum Contaminant Level (MCL) for nitrate in drinking water of 10 ppm.

Perchlorate: Perchlorate, detected in the Southern Area groundwater at concentrations ranging from 300 to 670 parts per billion (ppb), is a chemical that interferes with iodide uptake into the thyroid gland and, consequently, disrupts thyroid function resulting in reduced thyroid hormone production. Thyroid hormone deficiencies can affect normal metabolism, growth and development. Severe disruption of the thyroid can also result in the formation of thyroid tumors and other effects of impaired metabolism. Human and ecological studies on perchlorate are continuing. In the interim, EPA has selected a reference dose, based on a National Academy of Sciences study, of 0.007 mg/kg day for exposure to this compound. (A reference dose is the amount of chemical to which a person, including a member of a sensitive population, could be exposed over a lifetime without adverse health effects.) The State of Arizona has established a Health Based Guidance Level (HBGL) of 14 ppb. EPA has not established a National Primary Drinking Water Regulation for perchlorate.

HUMAN HEALTH RISK ASSESSMENT

As part of the Superfund process, EPA evaluates the potential risk a site may pose to the public and the environment. In September 1992 as part of the Site investigation, EPA conducted a baseline risk assessment to determine the current and future effects of contaminants on human health (IF Technology, Inc., Final Baseline Public Health Evaluation/Ecological Assessment, September 22, 1992). Later, in June 1994, additional risk information was incorporated into the Feasibility Study Report. The Site's current use is industrial, and this is the anticipated future land use for the main operational areas of the Site. The areas adjacent to the ANP facility boundary are used for residential and agricultural purposes. The potential future use of the groundwater will be as a drinking water source for the community once safe cleanup levels have been achieved. Therefore, the future potential human health risks are the same as those identified in the 1992 baseline risk assessment which focused on health effects for potential residents and trespassers (children and adults) as well as on-site workers (adults only) who could be exposed to Site contaminants due to direct contact with: (1) contaminated soil and sediment, and (2) contaminated surface water and groundwater. Therefore, when evaluating potential risk and future use of the Site, the remedy changes identified in this ROD Amendment are necessary

to protect public health, welfare or the environment.

In August 2004, ADEQ completed additional risk assessment evaluations for selected *inactive* and *formerly active* ponds on the Site that are no longer in use, but contained residual concentrations of certain metals (arsenic and beryllium) at levels exceeding the Arizona State residential Soil Remediation Levels (SRLs). The evaluation concluded that arsenic levels remaining in soils and sediments of Ponds 1A, 1B, 2B, 3A, 7 and Dynagel are likely to pose a potential human health risk; however, the potential risk to human health could be abated by conducting one of the following actions: (1) removal of selected contaminated “hot spots” to reduce the average concentration of arsenic in the soils; or (2) use a native soil cap cover or cap to eliminate direct contact and prevent migration of soils contamination. The ADEQ evaluation also stated that the human health risk posed by beryllium was less than originally established in EPA’s 1994 ROD. Updated, peer-reviewed scientific literature now indicates that the potential toxicity of beryllium is less than previously thought. EPA’s revised preliminary remediation goal (PRG) for residential use is 150 mg/kg, a level two orders of magnitude higher than the concentrations of beryllium detected in the pond soils and sediments. Therefore, the concentrations of beryllium detected in these ponds did not pose a human health risk.

ECOLOGICAL RISK ASSESSMENT

In November 2004, ANP completed a screening ecological risk assessment to determine if there were any potential significant ecological impacts from chemicals detected at the Site (Parsons, *Apache Powder Superfund Site, Screening-Level Ecological Risk Assessment and Preliminary Baseline Ecological Risk Assessment*, November 19, 2004). EPA reviewed and approved this Report. The Report concluded, after screening all areas of the Site with residual soil contamination, that these locations either did not contain contaminants of ecological concern or that these locations were not suitable as habitat. The Report further concluded that remedial measures to address contaminants may actually cause unnecessary disturbance to the ecological community. Therefore, the actions described in this ROD Amendment are necessary solely to address public health impacts.

E. SELECTED REMEDY CHANGES AND MODIFICATIONS

EPA is updating its cleanup plan for the Southern Area Groundwater and Soils, as follows:

- The remedy for the cleanup of the Southern Area Groundwater (contaminated with nitrate and perchlorate) is being changed from Constructed Wetlands to Monitored Natural Attenuation (MNA) and continue the use of Institutional Controls;
- The remedy for contaminated soils in the *inactive* ponds on the Site is being changed from Containment with a Clay Cap to Containment with a Native Soil Cap and include the use of Institutional Controls;

- The remedy for Groundwater is being modified by adding a cleanup standard for perchlorate;
- The remedy for Soils is being modified by adopting ADEQ's risk assessment procedures, in addition to previously adopted cleanup levels; and
- The remedy for the Northern Area wetlands is being modified to provide for a secondary discharge location for contingency use.

The basis for these selected changes or modifications to the remedy are described below in Part III and the alternatives evaluated are described in Part IV. A comparison of these new changes or modifications to the remedies selected in EPA's 1994 ROD and 1997 and 2000 ESDs is shown on Table 1.

PART III BASIS FOR THE REMEDY CHANGES AND MODIFICATIONS

The basis for the remedy changes and modification identified in this ROD Amendment is a combination of new and historical field studies, monitoring data, and technical evaluations conducted by ANP with EPA and ADEQ oversight. The reports related to this work are included in the July 2005 Supplement 7 to the Apache Powder Administrative Record.

The primary documents relied upon for evaluating the feasibility of various alternatives for updating the cleanup remedies for the Southern Area Groundwater and Soils areas are the *Supplemental Feasibility Study Report for the Southern Area Groundwater* and the *Supplemental Feasibility Study Report for Pond Soils and Sediments*, prepared by Hargis + Associates. There are numerous technical reports that support the development and findings in these two feasibility studies, including: EPA's *Five-Year Review Report* (September 2002); *San Pedro River Summary of Investigations* (July 2003); *Annual Summary of Quarterly and Surface Water Monitoring Program* (2000 through 2004); *Characterization of Groundwater Systems in Southern Area* (June 2003); *Applicability of Monitored Natural Attenuation* (July 2003); *Summary of Soil Analytical Data* (February 2004); *Screening Level Ecological Risk Assessment and Preliminary Baseline Ecological Risk Assessment* (November 2004); *Remedial Action Implementation Report for Media Component 3 (Inactive Ponds)* (March 2001); *Remedial Action Implementation Report for Media Components 4, 5 and 7* (July 2002); and numerous communications. The basis for the modifications to the remedy included in this ROD Amendment are also found in Supplement 7 of the Administrative Record. Part IV describes the new alternatives evaluated.

Some of the specific reasons that EPA is selecting MNA as the revised groundwater remedy for the Southern Area are:

- ***Natural Conditions Contain Contamination in Southern Area.*** The groundwater

contamination in the Southern Area lies within the buried St. David clay³ in an ancient channel informally named Molinos Creek Sub-Aquifer. The Molinos Creek Sub-Aquifer remains separated from the San Pedro River by fine-grained sediments called the laterally confining unit (see Figure 3). The Sub-Aquifer roughly trends north-south along the ANP south-eastern boundary and acts as an hydraulic “sink” that contains the perchlorate and nitrate contamination in the Southern Area.

- ***MNA is Effective for Both Nitrate and Perchlorate.*** MNA is an effective remedy for reducing the mass and concentration of dissolved nitrate and perchlorate. Nitrate and perchlorate-reducing bacteria are present in the Southern Area.
- ***Natural Processes Are Expected to Achieve Remedial Objectives in a Reasonable Time Frame Compared to Other Objectives.*** Groundwater model projections indicate that MNA can attain groundwater cleanup goals for both perchlorate and nitrate within a time frame comparable to that selected for the Northern Area of the Site (within 30 years). Modeling simulations for the use of MNA in the Southern Area indicate that it will take 29 years or less for contaminant concentrations to reach EPA’s cleanup standards.

Some of the specific reasons that EPA is selecting a Native Soil Cap as the revised soils remedy are:

New Sampling Data Indicate Limited Residual Contamination. Since the 1994 ROD, extensive soil sampling, including the collection of samples within the first few feet of soil and from deeper soil borings, was conducted in most of the ponds. The results of this sampling indicate that the residual soils contamination in most ponds is limited in areal extent and often only found at depth.

Contaminated Ponds Underlain with Deep Layer of Clay not Shallow Groundwater. The presence of several hundred feet of dense clay underneath both the *active* and *formerly inactive* ponds acts as hydraulic barrier between surface contamination and the underlying deep aquifer. Additionally, the dewatering of the perched system over the last decade removed the contaminant pathway between the *formerly active* ponds and the shallow aquifer.

Risk Evaluation Concluded that a Native Soil Cap Would be Protective. In 2004, ADEQ conducted a site-specific statistical risk evaluation of residual contaminants (beryllium, arsenic and antimony) in the following *active* and *formerly active* ponds: 1A, 1B, 2A, 2B, 3A, 3B, 7 and Dynagel. The evaluation concluded that the risk could be abated if direct contact were eliminated by use of a native soil cap or cover, with specific institutional and engineering

³ The St. David clay is an underlying clay layer several hundred feet deep found below the ANP facility and in the general vicinity of the Site. This thick clay layer prevents groundwater and soils contaminants from migrating into the deeper groundwater below this clay layer.

controls including implementation of a Declaration of Environmental Use Restriction (DEUR) to ensure that the cap is maintained and future use is non-residential.

More Cost-Effective to Construct and Monitor a Native Soil Cap. A native soil cap will be as effective in containing the residual soil contaminants and preventing direct contact as a clay cap at a significantly lower construction cost. Additionally, the long term operations and maintenance costs of a native soil cap are lower than those for an impermeable clay cap.

The basis for the other three changes or modifications to the remedy is discussed in Part V (Other Changes or Modifications to the Remedy) of this ROD Amendment.

PART IV DESCRIPTION AND EVALUATION OF NEW ALTERNATIVES FOR REMEDY CHANGES

The NCP establishes nine criteria, which EPA uses to evaluate and compare different alternatives considered when selecting an updated remedy (see Figure 2). The text below summarizes the performance of each alternative against the nine criteria, noting how each alternative compares to the other options under consideration for changes to both the Southern Area Groundwater and Soils remedies. The estimated costs are total costs, including capital costs and long-term operations and maintenance (O&M). The “Detailed Analysis of Alternatives” can be found in the respective Supplemental Feasibility Study (SFS) Reports for each media component.

A. ALTERNATIVES FOR SOUTHERN AREA GROUNDWATER

EPA’s selected revised remedy for cleanup of the Southern Area Shallow Aquifer Groundwater is Alternative 3 (Monitored Natural Attenuation or MNA) (see Figure 7) with continued use of Institutional Controls and informational outreach to caution the public to avoid using the shallow aquifer groundwater for drinking water until contaminants reach safe levels. The remedy also includes continued source control (continued de-watering of the perched zone). Figure 3 shows the location of the contaminated Southern Area Shallow Aquifer and the perched zone. Alternatives 2 (Reverse Osmosis) and 4 (Ion Exchange) are both effective and implementable technologies for treating nitrate and perchlorate, but they also generate process waste streams which would need to be managed and disposed of off-site with much higher costs. EPA does not consider the No Action Alternative 1 effective or protective for the Southern Area Shallow Aquifer Groundwater.

The alternatives evaluated were:

- **Alternative 1 - No Action** EPA’s guidance requires this alternative to be evaluated to establish a baseline for comparison. (Estimated Total Cost \$0)

SOUTHERN AREA SHALLOW AQUIFER GROUNDWATER				
ALTERNATIVE EVALUATION TABLE				
Evaluation Criteria	Alternative 1 No Action	Alternative 2 Reverse Osmosis (RO)	Alternative 3 Monitored Natural Attenuation (MNA) <i>EPA's Preferred Alternative</i>	Alternative 4 Ion Exchange
Overall Protectiveness	○	●	●	●
Compliance with State and Federal Requirements	○	●	●	●
Long-term Effectiveness	○	●	●	●
Implementability	not applicable	◐	●	◐
Short-term Effectiveness	not applicable	◐	●	◐
Reduction of Toxicity, Mobility or Volume by Treatment	○	●	●	●
Estimated Project Costs	\$0	\$5.1 million	\$768,000	\$4.1 million
State Agency Acceptance	ADEQ has verbally concurred with EPA's preferred alternative.			
Community Acceptance	Community acceptance of the preferred alternative will be evaluated after the public comment period.			
<p>● = Fully meets criterion ◐ = Partially meets criterion ○ = Does not meet criterion</p> <p>Note: EPA's prefers Alternative 3 (MNA) because natural geologic and hydrogeologic conditions contain the nitrate and perchlorate contamination in the Southern Area and MNA is most cost-effective. MNA is effective in reducing the mass and concentrations of both contaminants naturally without the need to engineer and manage an energy-demanding physical treatment plant.</p>				

Figure 7. Alternative Evaluation Table for Southern Area Shallow Aquifer

- **Alternative 2 - Reverse Osmosis (RO)** Contaminated groundwater is extracted, treated by passing the water through a membrane separation process under high pressure and recharged into the shallow aquifer. RO is a proven, engineered technology for removal of nitrate and perchlorate, but it generates a solid sludge that must be disposed. (Estimated Total Cost including O&M \$5.1 million)
- **Alternative 3 - Monitored Natural Attenuation (MNA) - EPA's Selected Remedy** Contaminated groundwater is allowed to degrade naturally through biological processes without implementing extraction or treatment technologies. MNA allows the use of *natural attenuation processes* within the context of a carefully controlled and monitored site cleanup approach that will reduce contaminant concentrations to levels that are protective of human health and the environment within a *reasonable time frame*. (Estimated Total Cost including O&M \$768,000)
- **Alternative 4 - Ion Exchange** Contaminated groundwater is extracted, treated by passing the water through an ion exchange resin and recharged into the shallow aquifer. Ion exchange is a proven, engineered technology for removal of nitrate and perchlorate, but it generates used resin that must be disposed of or recycled. (Estimated Total Cost including O&M \$4.1 million)

Selected Remedy for Southern Area Groundwater

EPA is selecting MNA, with Institutional Controls, for the Southern Area Groundwater because MNA is expected to achieve substantial and long-term risk reduction in a reasonable time frame. Changing the primary treatment method from Constructed Wetlands to MNA is a fundamental change to the remedy and results in a cost decrease. EPA is selecting this revised remedy because under existing favorable conditions, natural processes are able to act in this area of the Site without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants (both nitrate and perchlorate) in the groundwater. When evaluating the feasibility of MNA, ANP completed a comprehensive site characterization and also implemented measures to control the source (the perched zone) of the groundwater contamination in the Southern Area. The progress of natural attenuation toward the Site's remediation objectives will be carefully monitored to ensure that it will meet Site cleanup objectives within a time frame that is reasonable compared to those of other methods. Some of the contaminated groundwater in the Southern Area has migrated beyond ANP's boundary underneath nearby private property. However, long-term impacts on existing water supplies or resources are not anticipated as a result of implementing the MNA remedy because of the hydraulic isolation of the Molinos Creek Sub-Aquifer.

In addition to the institutional controls described below, this ROD Amendment requires performance monitoring and contingency measures if MNA is unable to achieve cleanup goals, as follows:

- ***Performance Monitoring Required for Site.*** A comprehensive well monitoring network will be established or expanded as necessary, and monitoring will be conducted to ensure that the concentrations of COCs in monitoring wells continue to decline and that contamination does not migrate beyond the boundaries of the monitoring network.
- ***Contingency Measures will be Implemented if Natural Attenuation is Unable to Achieve Cleanup Goals.*** If concentrations of COCs should begin to increase in the designated monitoring wells or not decline as predicted or if contamination should be detected beyond the boundary of the monitoring network, EPA will re-evaluate the MNA remedy and will take action to ensure the effective remediation of groundwater in the Southern Area.

Institutional Controls for Groundwater

Institutional controls will continue to be used to caution the public about using contaminated shallow aquifer groundwater as drinking water until cleanup levels are reached, as follows:

- A DEUR in accordance with Arizona Revised Statutes, ARS Section 49.152.C, will need to be in place until groundwater cleanup standards are met prohibiting installation of wells in the contaminated shallow aquifer groundwater underlying the ANP facility, and EPA will need to be notified if the property owner seeks a variance or termination of the DEUR;
- Access restriction, such as fencing and/or signage on ANP's property, for areas with potential access to contaminated shallow aquifer groundwater or surface water;
- Education and out-reach practices, including but not limited to semi-annual reporting to all property owners and households within the known footprint of the contaminated groundwater both in the Southern and Northern Areas, to inform potential effected community members about the extent of contamination and the risks of using the contaminated shallow aquifer for drinking water purposes; and
- Reporting to EPA on the status of all wells in both the shallow and deeper aquifer within and near the footprint of the contaminated groundwater both in the Southern and Northern Area, including detailed descriptions of the type of well, depth of well, use of well, construction details, and the ownership information (including property transfers and/or lot-splits), so that any potential exposure pathways can be identified in advance to notify and protect individuals living over the contaminated groundwater plume from unknowingly drinking contaminated water.

EPA will require an updated Well Inventory, a Performance Monitoring Plan, and a Community Outreach Plan for the Site, to include provisions as described above. Following

EPA's approval of the inventory and outreach plan, the plan will be updated at least annually, or as directed by EPA.

B. ALTERNATIVES FOR CONTAMINATED SOILS IN PONDS

EPA's selected revised remedy for cleanup of the Contaminated Soils and Sediments in Ponds (see Figure 8) at the Apache Powder Superfund Site is a combination of Alternative 4 (Containment with a Native Soil Cap) and Alternative 2 (Institutional Controls). This is a change from the 1994 ROD which selected use of containment with a clay cap for the residual soil contamination to be left on the ANP facility. These alternatives were compared against EPA's nine criteria in Figure 2. Alternatives 3 (Containment with a Clay Cap) and 4 (Containment with a Native Soil Cap) are both effective and implementable. However, because the primary exposure pathway is inhalation or ingestion, both types of caps are equally protective and a native soil cap is significantly lower in cost. EPA does not consider the No Action Alternative 1 effective or protective for the contaminated soils in ponds.

The alternatives evaluated were:

- **Alternative 1 - No Action** EPA's guidance requires this alternative to be evaluated to establish a baseline for comparison. (Estimated Total Cost \$0)
- **Alternative 2 - Institutional Controls - EPA's Preferred Alternative, along with Alternative 4** Administrative actions designed to reduce or eliminate exposure to contaminated soils, such as fencing and/or deed restrictions that would be used to prevent exposure to contaminated soils remaining at the Site. (Estimated Total Cost including O&M \$85,000)
- **Alternative 3 - Containment with Clay Cap** Ponds with residual soil contamination that exceeds EPA's cleanup standards would be regraded and covered with an engineered clay cap. A deed restriction would also be necessary because residual contamination would remain on-Site. (Estimated Total Cost including O&M \$2.04 million)
- **Alternative 4 - Containment with Native Soil Cap - EPA's Preferred Alternative, along with Alternative 2** Ponds with residual soil contamination that exceeds EPA's cleanup standards would be regraded and covered with a native soil cap. A deed restriction would also be necessary because residual contamination would remain on-Site. (Estimated Total Cost including O&M \$430,000)

Selected Remedy for Contaminated Soils in Ponds

In this ROD amendment, EPA is changing the remedy for the *inactive* ponds from the previous remedy of Containment with a Clay Cap to a new remedy, Containment with a Native Soil Cap combined with Institutional Controls. This new remedy will also apply to the *formerly active* ponds remaining to be closed out under ADEQ's Consent Decree. EPA is selecting a

CONTAMINATED SOILS IN PONDS				
ALTERNATIVE EVALUATION TABLE				
Evaluation Criteria	Alternative 1 No Action	Alternative 2 Institutional Controls <i>EPA's Preferred Alternative in combination with Alternative 4</i>	Alternative 3 Containment with Clay Cap	Alternative 4 Containment with Native Soil Cap <i>EPA's Preferred Alternative in combination with Alternative 2</i>
Overall Protectiveness	○	●	●	●
Compliance with State and Federal Requirements	○	○	●	●
Long-term Effectiveness	○	●	●	●
Implementability	not applicable	●	●	●
Short-term Effectiveness	not applicable	●	●	●
Reduction of Toxicity, Mobility or Volume by Treatment	○	○	●	●
Estimated Project Costs	\$0	\$85,000	\$2.04 million	\$430,000
State Agency Acceptance	ADEQ has verbally concurred with EPA's preferred alternative.			
Community Acceptance	Community acceptance of the preferred alternative will be evaluated after the public comment period.			
<p>● = Fully meets criterion ◐ = Partially meets criterion ○ = Does not meet criterion</p> <p>Note: Alternatives 3 and 4 both meet most of EPA's evaluation criteria, but the estimated total project costs for Alternative 4 are significantly lower than for Alternative 3. While Alternative 2 (Institutional Controls) independently would not be effective, the use of deed restrictions in combination with Alternative 4 creates a more effective remedy than Alternative 4 by itself.</p>				

Figure 8. Alternative Evaluation Table for Contaminated Soils in Ponds

native soil cap because a native soil cap will prevent exposure (inhalation and ingestion) to contaminated soils and sediments and reduce potential water infiltration as effectively as a clay cap, but with lower costs. The primary reason a native soil cap is just as effective as a clay cap is because these ponds are protected from contact with groundwater because of an underlying clay layer several hundred feet deep (known as the St. David clay) which prevents any pond contaminants from migrating into the deeper groundwater below this clay layer.

Institutional Controls for Soils

EPA's revised remedy combines Containment with a Native Soil Cap with use of the following Institutional Controls:

- A DEUR (in accordance with ARS Section 49.152.C) will need to be in place as long as waste remains at the Site, and EPA will need to be notified if the property owner seeks a variance or termination of the DEUR; and
- Access restriction, such as fencing and/or signage, for areas with a DEUR prohibiting excavation or other disturbance of the soil cap.

EPA will require a Soils Operation and Maintenance (O&M) Workplan describing planned remediation and O&M activities, including any necessary engineering controls, for areas on the Site with residual soils contamination that may pose a risk to human health, including all areas where DEURs or other type of use restrictions (including Voluntary Environmental Management Use Restrictions or VEMURs) are required or have been established.

PART V OTHER CHANGES OR MODIFICATIONS TO THE REMEDY

Cleanup Standard for Perchlorate in Groundwater

Neither EPA nor the State of Arizona has established a drinking water standard for perchlorate. In this ROD amendment, EPA is selecting a Site-specific cleanup standard for perchlorate of 14 ppb, which is the Arizona Department of Health Services' Health Based Guidance Level (HBGL). An HBGL is similar to an EPA Preliminary Remediation Goal (PRG), which is an initial cleanup goal developed on readily available information. An HBGL is meant to set a level that will be protective of human exposure, including exposure by sensitive populations. The Arizona HBGL is not inconsistent with EPA's Integrated Risk Information System (IRIS) reference dose.

Adoption of State Soils Remediation Levels Process for Risk Assessment

Minor modifications to the remedy are needed for the areas in which residual soils contamination remains at the Site. Because the residual soils contamination in most ponds was limited in areal extent and often only found at depth, the potential health risk posed by residual

contamination needed to be reevaluated. To address this, EPA is further modifying the soils cleanup standards selected in EPA's 2000 ESD (which adopted the State's Soil Remediation Levels (SRLs) as EPA's soils cleanup standards) by also now adopting ADEQ's risk assessment procedures for determining when remedial actions need to be taken for contaminated soils. These procedures allow ADEQ to either apply SRLs or conduct a site-specific risk evaluation to determine if soils contamination in a specific location poses a potential risk to human health.

Discharge Standards for Treated Effluent From Wetlands

The 1994 ROD required the treated effluent from the wetlands to meet a nitrate cleanup standard of 10 ppm when it was discharged into the shallow aquifer. However, the ROD and the 1997 ESD modifications to the wetlands remedy did not include any provisions if the effluent did not meet the 10 ppm standard nor allow for operational flexibility. In this action, EPA is amending the remedy to allow some operation flexibility to the NARS, including provisions for an alternate discharge point as follows:

- Discharges of treated effluent at the primary discharge location must be at or below 10 ppm nitrate at all times.
- To allow for operational flexibility and interruptions to treatment due to unforeseen causes, effluent may be discharged at the secondary discharge location up to 20 percent of the time (see Figure 5). Discharges at the secondary discharge location may exceed 10 ppm nitrate in accordance with the State's tributary rule (Arizona Administrative Code (AAC) R18-11-105(1))
- Discharges of e-coli from the NARS are exempt from meeting total counts of coliform because the e-coli is not a result of humans but from the use and visitation of wildlife to the wetlands.

PART VI SUPPORT AGENCY COMMENTS

The Arizona Department of Environmental Quality (ADEQ) has reviewed this ROD amendment and supports its conclusions.

PART VII STATUTORY DETERMINATIONS

Because of new information that has been developed, EPA believes it is appropriate to change or modify the selected remedy for cleanup as set forth in this ROD amendment. As required by Section 121(d) of CERCLA, the remedy for the Apache Powder Superfund Site as amended herein is protective of human health and the environment, and complies with federal and state requirements that are applicable and relevant and appropriate to this remedial action. An updated ARARs table summarizing all relevant ARARs for the Site is attached as Appendix

A. Table 1, Selected Changes to the ROD, sets forth the substantive modifications to the ARARs table. In addition, the revised remedy uses permanent solutions and alternative treatment technologies to the maximum extent practicable for this Site. This ROD amendment includes both fundamental changes to the remedies for the Southern Area Groundwater and Soils media component, as well as other modifications which are significant. These changes and modifications to the remedy will continue to be cost-effective, and will facilitate the cleanup and restoration of the groundwater and the soils at the Apache Powder Superfund Site.

PART VIII PUBLIC PARTICIPATION COMPLIANCE

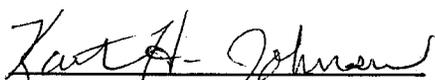
EPA has informed the community surrounding the Site of developments and has solicited the community's input on Site activities. Beginning in 1990, EPA's outreach has included public meetings and informal communications with community members, fact sheets (most recently in March 2004), the Proposed Plan for this ROD Amendment in July 2005, a July 2005 Proposed Plan public meeting, and a September 2005 follow-up community meeting to further answer groundwater questions raised at the public meeting. Additionally, ANP, the potentially responsible party, has also conducted an independent outreach program to inform the nearby community of on-going plant upgrades and other facility activities.

In July 2005, EPA released the Proposed Plan describing the alternatives and EPA's preference for updating the Site cleanup plan. At the same time, EPA gave notice that a 30-day public comment period would be open from July 6 to August 4, 2005 and that the Administrative Record was available for review at the Benson Library in Benson, Arizona and EPA's Records Center in San Francisco. As required by Section 300.435(c)(2)(i)(B) of the NCP, on July 6, EPA also published a notice in local newspapers (the *San Pedro Valley News* and the *Tucson Citizen*) about the proposed remedy changes, including notice about the availability of investigation reports, supplemental feasibility studies, the Proposed Plan, and the rest of the administrative record, the start of the comment period, and the Public Meeting planned for July 19 in St. David, Arizona.

EPA received several comments on the proposed remedy changes for the Southern Area Groundwater and Soils at the July 19 Public Meeting and during the 30-day Public Comment Period. Of the comments submitted, other than questions, no substantive technical reasons were provided by the public as to why EPA should not proceed to update the remedies for these two areas. However, certain community members raised issues about EPA's previously selected wetlands remedy for the Northern Area, in particular the potential impact on water supply by the extraction well used for the wetlands. Other comments indicated a concern that the Northern Area could be hydraulically connected to the Southern Area contamination. EPA continues to evaluate this issue; however, to date, EPA has found no substantial evidence to support the existence of such hydraulic connection. Because the Northern Area remedy is currently being investigated and reevaluated, this ROD amendment proposes no specific remedy changes for this area with the exception of use of an alternate discharge point for the treated effluent. The attached response summary responds to the comments provided during the public comment

period based on available data; however, if any changes to the Northern Area Groundwater extraction system are necessary, they will be proposed separately in the future once additional studies are completed.

For all activities at the Site, EPA will continue to meet the public participation requirements established in Sections 300.435(c)(2)(i) and 300.825(a)(2).



Kathleen Johnson
Chief, Federal Facilities and Site Cleanup Branch

9/30/05
Date

PART IX RESPONSIVENESS SUMMARY TO PUBLIC COMMENTS

A. Overview

On July 6, 2005, the U.S. Environmental Protection Agency (EPA) issued a Proposed Plan stating EPA's preference for the cleanup alternatives for the Apache Powder Superfund Site (Site) in St. David, Arizona. A thirty-day public comment period, following the issuance of the Proposed Plan, ended on August 4, 2005. At a public meeting held on July 19, 2005, EPA presented the alternatives for amending the Record of Decision (ROD) to update the cleanup decisions by making fundamental changes for the Southern Area Shallow Aquifer and the Soils areas at the Site, and other modifications and changes to cleanup standards, cleanup risk assessment procedures, and standards for an alternate discharge point at the Northern Area wetlands. At the meeting, EPA described its preferred alternative for each of these changes and responded verbally to community comments during a question and answer session. This Responsiveness Summary is a written summary of the significant comments received by EPA during the public comment period and EPA's responses to these comments.

After consideration of the public comments and review of the administrative record, EPA is amending the prior cleanup remedies to select the new remedies for the Southern Area Shallow Aquifer and Soils identified in the Proposed Plan. These new remedies are described fully in earlier sections of this ROD Amendment. In short, the remedy calls for monitored natural attenuation of the nitrate and perchlorate contaminated groundwater in the Southern Area and containment with a native soil cap of the contaminated soils in on-site ponds.

The community response to the Proposed Plan, described more fully in Section E below, raised no specific objections to EPA's proposed remedy changes for the Southern Area Groundwater and the Soils areas. EPA received only one written comment requesting clarification about the proposed remedy change for the Southern Area Groundwater and no written comments were submitted about the proposed changes to the Soils remedy.

However, a number of written comments and concerns were submitted about EPA's previously selected groundwater remedy for the Northern Area. Community comments and questions posed verbally about the Northern Area remedy also consumed most of the public meeting's question and answer period. These comments are summarized and discussed in Section E (Summary of Response to Major Issues and Concerns) below. However, this ROD Amendment does not address any fundamental changes to the Northern Area groundwater remedy. As discussed below, EPA is conducting further studies and investigations in the Northern Area in order to determine whether further response actions are needed in that area.

No comments on EPA's proposed remedy changes and modifications to the Southern Area Groundwater or Soils were submitted by state and federal agencies or by Apache Nitrogen Products, Inc. (ANP), the owner and operator of the Apache site. However, the Arizona

Department of Environmental Quality (ADEQ) has verbally provided general support and concurrence with the proposed remedy changes, as has ANP.

B. History of Community Involvement

EPA has conducted a community outreach program to involve the community in activities at the site. For a detailed description of these activities, refer to Part VIII of this ROD Amendment.

C. Community Concerns on Major Issues

The community expressed its concerns about the cleanup of the Apache Powder Superfund Site in two principal ways: (1) verbal comments and questions were presented at the July 19 Public Meeting in St. David, Arizona attended by many community members and immediate neighbors of the ANP facility, and (2) written comments were submitted by mail to EPA, Region 9. EPA acknowledges and appreciates the input of the local community.

Several concerns or issues about the Northern Area groundwater remedy, not the proposed changes and modifications to the Southern Area Groundwater remedy and the Soils remedy, were raised by certain community members during the public comment period. A summary of those issues and EPA's responses are presented in Section E.

EPA is not repeating in this Responsiveness Summary all questions and answers from the public meeting. A copy of the meeting transcript is included in the Administrative Record and is available at the public repository in the Benson Library.

D. Comment Letters Received

In addition to the comments received during the public meeting, EPA received and considered a comment form, a letter and a petition (submitted by two parties with multiple signatures), as listed below. These comments were all post-marked on or prior to August 4, 2005, the close of the comment period.

- Lawrence Saunders, St. David, Arizona, July 25, 2005 (public comment form)
- Lorin McCrae, St. David, Arizona, July 27, 2005 (letter and petition)
- Bert A. Goodman, St. David, Arizona, August 4, 2005 (petition)

The petition (submitted in duplicate by both Lorin McCrae and Bert Goodman) was signed by the following 35 individuals:

Lorin McCrae, Oracle, Arizona
Joyce McCrae, Oracle, Arizona

Max Kartchner, Benson, Arizona
Done Kartchner, Benson, Arizona
Fred Kartchner, St. David, Arizona
Kent McRae, Tucson, Arizona
John H. Escapule, St. David, Arizona
Margaret Escapule, St. David, Arizona
Richard LaCasse, St. David, Arizona
Laura C. Levy, St. David, Arizona
Richard Drow, St. David, Arizona
Gary Woolever, St. David, Arizona
David Goodman, St. David, Arizona
Ronald B. Higgingbotham, St. David, Arizona
Venice J. Higgingbotham, St. David, Arizona
Galyon Williams, St. David, Arizona
Berta Williams, St. David, Arizona
George B. Murray, St. David, Arizona
Heather Murray, St. David, Arizona
Susan M. LeSueur, St. David, Arizona
Michael I. LeSueur, St. David, Arizona
Susan Moran, St. David, Arizona
Peter C. Moran, St. David, Arizona
Annette Johansen, St. David, Arizona
Mary Jones, St. David, Arizona
Roy Jones, St. David, Arizona
Randy Wooten, St. David, Arizona
Janice Wooten, St. David, Arizona
Thomas M. Goodman, St. David, Arizona
Bert Goodman, St. David, Arizona
Hollie Goodman, St. David, Arizona
Mike Goodman, St. David, Arizona
Annie M. Dever, St. David, Arizona
Kline P. Dever, St. David, Arizona
Dorothy J. Clemmer, St. David, Arizona

Copies of all written comments and the petitions are in the Administrative Record and will be available at the public repository in the Benson Library.

E. Summary of Response to Major Issues and Concerns

The primary comments received on the proposed changes and modifications to the cleanup remedy for the Apache Site focused on concerns related to the Northern Area remedy. These concerns were summarized in three major points in the petition submitted by two stakeholders and signed by a total of 35 community members (including the two stakeholders)

from St. David, Arizona and other nearby communities. The petition stated that the undersigned voted “No Confidence” on EPA’s proposed remedy changes and instead requested EPA select the most expensive remedies for the Southern Area Groundwater (Reverse Osmosis at a cost of \$5.1 million) and for the Soils (Containment with a Clay Cap at a cost of \$2,040,000) unless the following three actions are taken or directed by EPA: (1) Stop pumping of SEW-1 (the extraction well for the Northern Area) until monitored field tests (dye tracking, temperature analysis, chemical analysis, pressure and water level elevations, etc.) confirm the presence or absence of deep artesian water in the shallow aquifer extraction system; (2) Conduct third party monitoring to determine whether any of the 8 deep aquifer replacement wells (installed by ANP as part of an Alternate Water Supply Program in 1994) are leaking into the shallow aquifer and provide a remedy where applicable; and (3) Drill at least two test boreholes to a depth of up to 250 feet in locations identified by the concerned stakeholder to determine if there is hydraulic communication between the Northern and Southern Groundwater systems.

In this responsiveness summary, EPA is responding to all written comments submitted during the public comment period, including the comments or concerns identified in the above-described petition. This responsiveness summary does not include responses to comments or questions raised at the July 19 public meeting, if the comments were addressed at that time. EPA takes these issues raised by the community seriously and is investigating them. At EPA’s direction, ANP is continuing to conduct field work and other studies in the Northern Area, including installing additional monitoring wells, conducting additional groundwater sampling, and updating a groundwater model for the Northern Area. Once the on-going data collection efforts are completed, EPA may then propose changes or modifications to the Northern Area remedy if determined necessary.

E.1. Water Resources - Deep Aquifer Artesian Water Supply

The community’s major concern about the Northern Area remedy, as expressed during the public comment period, is that water supply in the deep artesian aquifer may be adversely impacted by the Superfund extraction well that removes contaminated groundwater from the shallow aquifer for treatment in the wetlands treatment system. One nearby property owner believes that the use of this extraction well (SEW-1) is causing loss of artesian pressure and lowering the water table in his deeper aquifer wells. This property owner is the originator of the petition signed by himself and 35 of his neighbors.

The area in and around St. David, Arizona is hydraulically unique in that there is a 300-400 foot layer of dense clay, known as the St. David clay, which operates as a confining layer that keeps water in the deep aquifer groundwater under artesian pressure. Since groundwater was first developed (pre-1900) in the St. David area, many wells have been under sufficient artesian pressure to flow freely to the surface without lifting by pumps. More recently, artesian wells belonging to this stakeholder have stopped flowing to the surface.

The stakeholder believes that ANP’s extraction well SEW-1 is causing this problem by

pulling water upward from the deeper aquifer through an unconfirmed, improperly sealed deep aquifer well or wells, thus reducing the pressure. The stakeholder believes that this theory of potential hydraulic connection between the shallow and deeper aquifer can be proven by additional field testing (i.e., dye tracing, temperature analysis, chemical analysis, pressure and water level elevation monitoring, etc.). He has further suggested a need to test the integrity of the 8 deep aquifer replacement wells that ANP installed in 1994 (as part of EPA's directed Alternate Domestic Water Supply Plan) to determine if they are acting as conduit wells. (These two actions items are listed as items #1 and #2 in the petition that was submitted during the public comment period.) If this theory of hydraulic connection between the two aquifers is proven to be correct, the stakeholder asserts that EPA should discontinue pumping the shallow aquifer at SEW-1 in order to mitigate or protect the stakeholder's deep aquifer artesian water supply and potentially the deep aquifer water supply of other nearby neighbors.

Response: EPA, ANP and ADEQ have been in on-going discussions for more than a year with this stakeholder who is concerned about potential adverse impacts on his water supply. There has been a continuing, unresolved difference of technical opinion between the stakeholder and hydrogeologists working on the Site regarding various assertions made by this stakeholder. EPA, in the interest of soliciting community input and ensuring that valuable information not be lost when ideas are presented that may differ from prevailing theories, directed ANP and its contractors to technically respond to the assertions by this stakeholder about potential impact of the wetlands extraction system on his deeper aquifer wells. ANP's contractors have conducted research on well drilling trends both in the greater Benson area and in the immediate vicinity of the ANP facility and St. David, evaluated data provided by this stakeholder, and collected additional water quality data, water level measurements, and other data to evaluate the assertions made by this stakeholder. Some of the results of ANP's research were presented at the planned September 1 meeting on the Northern Area. Additionally, because of the assertion made in the recently submitted petition that questions the structural integrity of the 8 deep aquifer replacement wells installed in 1994, EPA has directed its own contractor, CH2M Hill, to re-evaluate the construction details, as-built drawings, and historical water quality data on these 8 wells, and to resample each of these wells to confirm their hydraulic integrity.

While this additional data collection effort is still on-going, EPA has not received to date any technical data or evidence that supports the assertions in the petition. On the contrary, EPA has seen data that indicate that declines in the deep aquifer are widespread and have been on-going even prior to the commencement of ANP's remedial action. EPA believes that the adverse impacts to the stakeholder's deep aquifer wells, including a decrease

in static water levels, have indeed occurred, but EPA has no substantial evidence that this impact is a result of ANP's pumping contaminated groundwater from the shallow aquifer. Additionally, there is no evidence that deep aquifer wells in the immediate vicinity of ANP's extraction well, SEW-1, could cause or are causing the impacts that this stakeholder is asserting. The Northern Area is still being studied by ANP. EPA will continue to evaluate new data as they are generated and may propose changes in the Northern Area in the future. At this time, however, EPA does not have sufficient evidence to recommend a change in the on-going pumping strategy for the Northern Area.

E.2 Hydraulic Connection Between Northern and Southern Area Groundwater Systems

The other major concern expressed by this same stakeholder and also included in the petition is that there may be additional unidentified lateral pathways (paleochannels) between the Northern and Southern Areas of the Site. The stakeholder has asserted that although perchlorate has only been identified in the Southern Area, it is only a matter of time before it will migrate to the Northern Area and potentially contaminate his shallow well and those of his neighbors. The stakeholder states that insufficient investigation and characterization has been conducted of potential preferential pathways to the west of the San Pedro River and to the west of the area previously investigated by ANP, at EPA's direction.

Response: As stated above, the same stakeholder who is concerned about loss of water supply in his deeper aquifer wells, also has asserted that there could be an unidentified lateral connection (via underground paleochannels) between the Northern Area and Southern Area shallow aquifer groundwater. Contrary to this theory of potential connection, ANP's investigative efforts (which EPA and ADEQ have overseen over the last decade) indicate that there were two separate "source areas" from which groundwater contaminants originated. One source is associated with the Northern Area of the Site and another with the Southern Area. Existing data indicate that the source of Southern Area groundwater contamination was wastewater discharges (containing nitrate and/or perchlorate) from plant operations. These wastewaters were discharged into Wash 6 prior to 1973 and subsequently until 1995 to unlined evaporation ponds creating an underlying perched groundwater system. In turn, the perched groundwater system grew in size sufficiently to cause migration of contaminated groundwater to flow into a portion of the shallow aquifer known as the Molinos Creek Sub-Aquifer in the Southern Area.

In contrast, the nitrate contamination in the Northern Area resulted from wastewater discharges and contaminated runoff containing only nitrate. This contamination entered into the shallow aquifer in the Northern Area via Washes 3, 4, and 5. In EPA's 1997 Explanation of Significant Difference

(ESD), EPA determined that the Northern Area and the Southern Area Groundwater systems were to be treated separately based on the data available at the time. Since the 1997 ESD, at EPA's direction, ANP continued to conduct in-depth investigations and hydrogeological studies to further characterize the Molinos Creek Sub-Aquifer in the Southern Groundwater Area and the San Pedro River, as well as the Northern Area near an identified nitrate hot-spot between Washes 4 and 5. These investigations included rigorous assessment of the hydrogeology including: groundwater quality monitoring, water level monitoring, geophysical surveys, and exploratory borings to determine the thickness and depth of the shallow aquifer and the characteristics of perched zone groundwater drainage into the shallow aquifer; geochemical characterization of groundwater samples; and numerical groundwater flow and transport modeling. Additionally, ANP has conducted extensive sampling for perchlorate (a chemical that originated solely from within the Southern Area source area) to investigate any potential hydraulic interrelationship between these three water bodies or aquifer systems. This has involved not only extensive sampling and analysis in groundwater, but also a thorough survey of San Pedro surface water and subflow. EPA is continually reviewing groundwater data to determine whether our past conclusions are accurate and verifiable. We understand that some members of the community may have a different position and EPA takes the community's comments very seriously, however to date, EPA has not been presented with any factual evidence to support the assertion that these aquifer systems are connected.

E.3 Ineffectiveness of Northern Area Capture System to Prevent Contamination of Previously Uncontaminated Wells

Another stakeholder is a nearby resident who expressed concern that the extraction system used to capture and contain the nitrate-contaminated groundwater in the Northern Area (i.e., the use of one extraction well, SEW-1) does not appear to be effectively controlling plume migration. This stakeholder's opinion is based on monitoring results for his shallow aquifer well, which was tested as non-detect for nitrate 3 years ago and now exceeds 30 ppm nitrate. The stakeholder has been advised not to use this well for drinking water for his livestock. The stakeholder is concerned that the contaminated plume is not being controlled and that it is adversely impacting his well and potentially the shallow aquifer wells of other nearby neighbors.

Response: EPA is concerned about the lack of adequate capture in the Northern Area to prevent contamination reaching previously uncontaminated agricultural wells. As a result of this concern, EPA has directed ANP to install additional monitor wells in the Northern Area to better define the extent of nitrate contamination and to develop a revised groundwater model to better predict contaminant movement and cleanup time frames for the Northern Area.

ANP's initial analysis of this problem indicates that contamination by-passed the extraction well (SEW-1) when the well was not being pumped as a result of delays in the full-scale start-up of the wetlands treatment system. However, these studies are still on-going and will not be completed for another 6-12 months. At the conclusion of this work, EPA may direct ANP to modify the existing extraction system, if determined appropriate.

E.4 Outdated Plume Maps Identifying the Extent of Nitrate Contamination in the Northern Area

Another stakeholder expressed concern that the maps showing the extent of nitrate contamination in the Northern Area indicated that the stakeholder's property was located within the boundaries of the contaminated groundwater (and thus within the boundaries of the Apache Superfund Site) when in fact his property did not overlie any portion of the contaminated shallow aquifer. The stakeholder requested that updated maps be provided and his property "be removed from the Superfund boundary."

Response: As a result of this comment, EPA has directed ANP to update its plume maps and ensure that current maps are distributed to affected and interested parties so that the contaminated shallow aquifer is not unknowingly used for drinking water and to notify future property owners that deep aquifer wells are necessary for a potable water supply because of the contamination in the shallow aquifer. EPA and ANP will also conduct more outreach to community members so that they understand the extent of the contaminated shallow aquifer and the availability of EPA guidance discussing the impact of the presence or absence of contaminated groundwater under their property.

F. Detailed Response to Comments

This portion of the Responsiveness Summary responds to more specific or technical comments made or submitted during the public comment period by community members. This section also includes responses to specific questions raised during the public meeting that were not answered at the public meeting or in the previous section E.

F.1 Lack of Discussion About Northern Area at Public Meeting: The comment indicated disappointment that EPA did not want to talk about the Northern Area Remedy at the public meeting and requested that another meeting be held about the Northern Area.

Response: EPA, in conjunction with the Community Watershed Alliance, ANP and ADEQ, set up a follow-up meeting on the Northern Area on September 1, 2005 in St. David, Arizona to further respond to the issues and questions related to the Northern Area Groundwater remedy. Because the purpose of the Proposed Plan and the July 19, 2005 public meeting was to solicit

comments on the proposed remedy changes for the Southern Area Groundwater and the contaminated Pond Soils only, EPA's presentation material was focused on these two topics. In reflection, because of the wider-audience interest, EPA recognizes that perhaps the public meeting should have covered the Northern Area also, even if not part of EPA's current decision-making process. However, a follow-up meeting held on September 1 provided a better forum for discussing the details of the Northern Area remedy.

F.2 Removal of Private Property from Superfund "Boundary": A comment was submitted requesting that this stakeholder's property be removed from the Superfund "boundary" because EPA stated that there was no contamination under the stakeholder's property.

Response: Geologic data indicates that the contaminated shallow aquifer is not present beneath this particular property. However, on certain maps it appears that the contaminated plume underlies this property because the maps used to indicate the extent of contamination are not precisely drawn. As a result of this written comment, as well as verbal comments at the public meeting, EPA has directed ANP and ADEQ to redraw more precisely the plume maps showing the known extent of contamination.

F.3 EPA and ANP's Position on the Southern Area Proposed Remedy Change: A comment indicated that the audience member did not understand, based on the remarks at the public meeting, what EPA and ANP really wanted to do with the Southern Area.

Response: EPA's Proposed Plan recommended, and this ROD Amendment selects, monitored natural attenuation (MNA) for cleanup of the nitrate and perchlorate in the Southern Area. The selection of MNA by EPA will require source control measures and monitoring to determine whether contaminant concentrations reflect a similar downward trend as has been observed for the last few years indicating that natural processes are continuing to reduce contamination as projected.

F.4 Control of Question and Answer Period by One Stakeholder: One audience member asked why EPA and ANP allowed one stakeholder (who was upset about water supply and the previously selected Northern Area remedy) "to take over the meeting." In other words, the audience member asked, did EPA and ANP agree with the stakeholder's assertions that the deep aquifer wells were drying up, there were increased nitrate concentrations in the Northern Area, that property owners were not allowed to pump their irrigation wells, etc.

Response: EPA asked attendees at the public meeting if there were any more comments

or questions about the Proposed Plan for the Southern Area Groundwater and Soils remedies before allowing discussion of other topics to move forward. Because there was no indication that any audience members had other questions, EPA turned the floor over to this particular stakeholder who requested permission to speak. To address these Northern Area concerns a separate follow-up community meeting, facilitated by the Community Watershed Alliance, was held on September 1, 2005.

F.5 Authority of EPA to Ensure that the Water Supply is Not Adversely Affected: A comment was made that it appears EPA has “no authority to enforce the ROD restriction against adversely affecting existing wells” and “ANP claims they cannot change the (pumping) program because is it controlled by EPA.” The comment also indicated that “there are several witnesses to the (EPA) promises that the deep water would not be pumped as part of the clean up process.”

Response: EPA’s 1994 Record of Decision and Responsiveness Summary to public comments at the time identified similar community concerns as those submitted again in 2005 about potential adverse impact on water supply, including loss of artesian pressure due to Superfund cleanup actions. In 1994, similar issues were raised about the installation of 8 deep aquifer replacement wells impacting artesian pressure and water supply for nearby owners of deep aquifer wells. At the time, EPA’s 1994 ROD stated that “to resolve these issues, discussions should be held among landowners, ANP, and local officials, including the St. David water supply system officials. EPA will, to the extent practicable, facilitate such discussions and perform other actions as necessary to protect public health.” The Responsiveness Summary to EPA’s 1994 ROD further states that “EPA concurs that additional studies need to be conducted during the first phase of RD (Remedial Design) to minimize any impact on the San Pedro River and downstream users. EPA will ensure that the RD will effectively address recharge to the shallow aquifer groundwater.”

However, regarding potential impacts to the deeper aquifer, EPA’s 1994 Responsiveness Summary did not make the specific promises asserted in this 2005 comment. EPA’s response at the time was that “EPA is aware that the installation of new deep wells may impact the availability of water for other nearby wells. EPA also recognizes that some landowners have incurred or may incur expenses due to the lowering of deep aquifer water levels (irrespective of whether the lowering of the deep aquifer levels was due to new deep well installation or other possible causes). Because the Apache Powder Superfund Site is not located in an area designated by the Arizona Department of Water Resources as an Active Management Area (AMA), there are no legal restrictions that would prohibit parties from drilling wells

on their property to withdraw water from either the shallow or deep aquifer. EPA believes requiring cleanup of the shallow aquifer and ensuring safe water for those who have relied on the shallow aquifer for domestic use are appropriate measures to protect human health and the environment, and EPA will seek to avoid possible inadvertent negative impacts of the selected remedy.” EPA continues to evaluate these issues, as discussed above (see Paragraph E.4, Response).

Table 1

SELECTED CHANGES TO RECORD OF DECISION (ROD)			
#1 CHANGE TREATMENT METHOD FOR SOUTHERN AREA SHALLOW AQUIFER GROUNDWATER TO MONITORED NATURAL ATTENUATION (RATHER THAN BY CONSTRUCTED WETLANDS)			
September 1994 Record of Decision (ROD)	April 1997 ESD & Sept 2000 ESD Changes to ROD	New Data Collected After ROD & ESDs	September 2005 ROD Amendment Changes
<p>The selected remedy in the ROD for the shallow aquifer groundwater (in 1994 the Southern Area was not yet defined as distinct from the Northern Area) was constructed wetlands. Other alternatives considered were reverse osmosis, ion exchange and no action.</p>	<p>EPA 1997 ESD combined the Southern Area Shallow Aquifer and the Perched System for collective treatment by a wetlands system rather than by two systems (e.g., forced evaporation for the perched and wetlands for the Southern Area Shallow Aquifer). New data collected during 1995-1996 showed water levels in the perched system dropping an average of 7 feet and nitrate concentrations dropping an average of 180 ppm when compared to data from the 1980s and 1990s. Therefore continuing to dewater the perched system seemed most efficient. These two areas were also determined to be hydraulically connected. Thus, EPA determined that it would be more technically effective and economically feasible to treat the two areas with the same technology.</p> <p>EPA's 2000 ESD did not address changes to the groundwater remedy, only soils modifications.</p>	<p>In 1998, perchlorate was detected in the Southern Area Shallow Aquifer and the Perched System. Because of the uncertainty of whether perchlorate could pose an ecological risk, it no longer seemed prudent to proceed with a wetlands remedy until more studies were completed. During 1999-2004 extensive investigation and sampling was conducted to characterize the extent of perchlorate and already known nitrate contamination in these two areas, as well as the San Pedro River and the Northern Area. After installation of new monitor wells and sampling of these and existing wells, as well as an extensive network of well points in the San Pedro River, EPA determined that the extent of perchlorate contamination is confined to the Perched System (which is now almost dry) and the Southern Area Shallow Aquifer. No perchlorate was detected in either the Northern Area or the San Pedro River.</p>	<p>This ROD Amendment, which was proposed in EPA's July 2005 Fact Sheet, makes a fundamental change to the treatment technology for the Southern Area Groundwater from constructed wetlands to Monitored Natural Attenuation (MNA). The dewatering of the Perched System will continue as a form of Source Control. EPA has decided that MNA is an effective remedy after evaluating a series of studies conducted by ANP in the Southern Area, including a focused Southern Area Characterization Report, a MNA Evaluation Report, and field studies to identify and isolate microorganisms in the Southern Area soils that degrade both nitrate and perchlorate. There is sufficient evidence that the contaminants are naturally biodegrading to the extent that continued monitoring of this MNA activity will be as effective as any other technology. However, if future data indicate otherwise, EPA will then consider other remedies.</p>

SELECTED CHANGES TO RECORD OF DECISION (ROD)			
#2 CHANGE CONTAINMENT METHOD FOR CONTAMINATED SOILS IN PONDS FROM A CLAY CAP TO A NATIVE SOIL CAP			
September 1994 Record of Decision (ROD)	April 1997 ESD & Sept 2000 ESD Changes to ROD	New Data Collected After ROD & ESDs	September 2005 ROD Amendment Changes
<p>The selected remedy in the ROD for the contaminated soils in the <i>inactive</i> ponds was to contain on-site (by use of backfill and a clay cap) all soils in the 10 inactive ponds (with no excavation or disturbance to contaminated soils). At the time of EPA's 1994 ROD, other on-site ponds that were still in use, known as the <i>formerly active</i> ponds were to be addressed under the Arizona Department of Environmental Quality (ADEQ) Consent Decree (CD). The <i>formerly active</i> ponds overlie the contaminated Perched System because these unlined evaporation ponds were used to accept washdown waters from ANP's plant operations. These ponds ceased being used in 1995 when ANP installed the brine concentrator to treat the washdown waters.</p>	<p>EPA's 1997 ESD did not address the remedy for contaminated soils in the <i>inactive</i> ponds, only groundwater remedy modifications.</p> <p>However, EPA's Sept 2000 ESD did modify the soils remedy by providing new criteria for evaluating contaminated soils, as follows: (1) established cleanup standards for compounds or Chemicals of Concern (COCs) either recently detected or without ROD cleanup standards identified in on-site soils, sediments or drums; and (2) modify soils cleanup remedies to "no further action" for selected soils media components where hazardous substances were not detected or the levels of contamination do not exceed EPA's soils and waste cleanup standards. EPA's new soils cleanup standards were established to be equivalent to the Arizona newly adopted 1997 Soil Remediation Levels (SRLs).</p>	<p>During the 1990s, subsequent sampling and analysis of pond sediments and soils identified in the 1994 ROD for on-site capping with clay indicated that the concentrations of metals in the sediments of certain ponds did not appear to exceed soils cleanup standards. Also, sampling of selected ponds indicated the presence of specific COCs above EPA's cleanup standards, but at great depth (greater than 10-15 feet below ground surface) that may not pose a risk to public health if properly contained. ANP resampled both the <i>inactive</i> ponds and the <i>formerly active</i> ponds at EPA and ADEQ's direction. Also borings were installed in the <i>formerly active</i> ponds to determine whether soils contaminants were bound up in the underlying soils or had leached/migrated into the underlying Perched System. This extensive sampling indicated that a native soil cap would be as effective as a clay cap for containing the limited amount of identified residual soils contamination.</p>	<p>This ROD Amendment, which was proposed in EPA's July 2005 Fact Sheet, makes a fundamental change to the containment method for contaminated pond soils from a clay cap to a native soil cap. After coordination between EPA and ADEQ in 2003-2004, it was agreed that the CERCLA remedy for the contaminated soils in the <i>inactive</i> ponds should be the same as ADEQ's remedy for the <i>formerly active</i> ponds covered under the State's CD.</p>

SELECTED CHANGES TO RECORD OF DECISION (ROD)			
#3 SELECTION OF A CLEANUP STANDARD FOR PERCHLORATE			
September 1994 Record of Decision (ROD)	April 1997 ESD & Sept 2000 ESD Changes to ROD	New Data Collected After ROD & ESDs	September 2005 ROD Amendment Changes
No discussion of perchlorate in 1994 ROD because perchlorate was not discovered until four years later in 1998.	<p>No discussion of perchlorate in 1997 ESD because perchlorate not yet discovered.</p> <p>No discussion of perchlorate in 2000 ESD because extent of perchlorate contamination at Site not yet defined.</p>	After discovery of perchlorate in 1998, extensive sampling was conducted of the shallow aquifer groundwater and surface water of the San Pedro River to define the extent of perchlorate contamination at the Site. After extensive water sampling, EPA concluded in 2004 that the extent of perchlorate contamination was confined to the Southern Area Shallow Aquifer and the Perched System due to discharge of washdown waters to Wash 6 and also to the <i>formerly active</i> ponds overlying the Perched System which is hydraulically connected to the shallow aquifer.	This ROD Amendment, which was proposed in EPA's July 2005 Fact Sheet, modifies the groundwater cleanup standards for the Site by establishing a cleanup standard of 14 parts per billion (ppb), which is the Arizona Department of Health Services' Health Based Guidance Level (HBGL). An HBGL is similar to an EPA Preliminary Remediation Goal (PRG), which is an initial cleanup goal developed on readily available information. An HBGL is meant to set a level that will be protective of human exposure, including exposure to sensitive populations.

SELECTED CHANGES TO RECORD OF DECISION (ROD)			
#4 ADOPTION OF AN ALTERNATE DISCHARGE POINT FOR TREATED EFFLUENT FROM NORTHERN AREA WETLANDS			
September 1994 Record of Decision (ROD)	April 1997 ESD & Sept 2000 ESD Changes to ROD	New Data Collected After ROD & ESDs	September 2005 ROD Amendment Changes
<p>At the time of the 1994 ROD, EPA selected constructed wetlands as the remedy for the shallow aquifer groundwater contamination and required the treated effluent to meet a nitrate cleanup standard of 10 parts per million (ppm), the state and federal drinking water standard, when the effluent was discharged into the shallow aquifer. However, the details on how the treated effluent was to be returned or recharged to the shallow aquifer were left to be decided during the Remedial Design (RD) phase to be completed in the future. EPA deferred making a decision on the method of recharge at the time because of community comments regarding maintaining water balance for downstream users and consideration of agricultural irrigation. Also, no provisions were included in the 1994 ROD if the treated effluent did not meet the cleanup standard of 10 ppm.</p>	<p>After ANP completed several field studies in 1995 and 1996, including installation of 16 boreholes along the San Pedro River where recharge "leaky" wetlands were proposed, data findings indicated that "leaky" wetlands could not effectively recharge the treated effluent because of an impermeable 6-10 foot clay layer below the surface along the river. None of the other recharge alternatives, including agricultural irrigation as a secondary use, were as cost-effective as recharging the treated groundwater directly to the shallow aquifer. Therefore, EPA's 1997 ESD decided that the effluent should be recharged via gravity-flow pipeline to a recharge location along Wash 3 where the water would readily recharge the shallow aquifer. No provisions were included in the 1997 ESD if the treated effluent did not meet the cleanup standard of 10 ppm.</p> <p>EPA's 2000 ESD did not address changes to the groundwater remedy, only soils modifications.</p>	<p>After the wetlands were constructed in 1997, ANP struggled during the period of 1998 to 2003 to establish the wetlands vegetation and the microorganisms needed to denitrify the nitrate in the wetlands ponds. Challenges included caterpillar infestations, difficulty establishing certain types of vegetation and certain failed experiments on adding additional carbon supplements (sucrose, molasses, etc.) to provide nutrients for the microbial populations. While contaminated water was pumped to the wetlands during this period, the effluent at the final treatment pond often did not meet EPA's cleanup standard. Therefore, on an interim basis, EPA allowed ANP to discharge at an alternate discharge point adjacent to the final treatment pond approximately one mile upslope from the San Pedro River where there was no risk of effluent above the cleanup standard reaching the shallow aquifer or the San Pedro River.</p>	<p>This ROD Amendment, which was proposed in EPA's July 2005 Fact Sheet, modifies the remedy to allow some operational flexibility to the wetlands treatment system or Northern Area Remediation System (NARS), by clarifying EPA's standards for discharge as follows: (1) discharges of treated effluent at the primary discharge location near the San Pedro River and shallow aquifer must be at or below 10 ppm nitrate at all times; (2) to allow for operational flexibility and interruptions to treatment due to unforeseen causes, effluent may be discharged at the secondary discharge location up to 20 percent of the time and these discharges may exceed 10 ppm nitrate in accordance with the State's tributary rule; (3) discharges of e-coli from the NARS are exempt from meeting total counts of coliform because the e-coli s not a result of humans but from the use and visitation of wildlife to the wetlands.</p>

Table 1 – Page 4

SELECTED CHANGES TO RECORD OF DECISION (ROD)

#5 ADOPTION OF ARIZONA RISK ASSESSMENT PROCEDURES FOR DETERMINING POTENTIAL HUMAN HEALTH RISK OF RESIDUAL SOILS CONTAMINATION

September 1994 Record of Decision (ROD)	April 1997 ESD & Sept 2000 ESD Changes to ROD	New Data Collected After ROD & ESDs	September 2005 ROD Amendment Changes
<p>No discussion of Arizona risk assessment procedures in 1994 ROD because these procedures were not yet established and insufficient data had been collected to fully characterize extent of soils contamination to complete RD.</p>	<p>No discussion of Arizona risk assessment procedures in 1997 ESD because this ESD focused on modifications to EPA's groundwater remedy and did not address soils issues.</p> <p>No discussion of Arizona risk assessment procedures in 2000 ESD because insufficient data had been collected to fully characterize extent of soils contamination to complete RD.</p>	<p>See discussion above under item #2 (Change Containment Method for Contaminated Pond Soils) describing investigation and sampling activities conducted during the 1990s to further characterize the extent of soils contamination in several ponds. Based on new data collected during these studies, EPA determined that previously selected remedies should be reevaluated and updated in order to close out remaining areas with residual soils contamination.</p>	<p>This ROD Amendment, which was proposed in EPA's July 2005 Fact Sheet, modifies the remedy to allow minor modifications to the soils remedy where residual soils contamination remains at the Site. This residual soils contamination may not pose a public health risk and, therefore, may not need further cleanup. To address this, EPA is further modifying the soils cleanup standards selected in EPA's 2000 ESD (which adopted the State's residential SRLs as EPA's soils cleanup standards for specific compounds) by also now adopting ADEQ's risk assessment procedures. Thus, allowing EPA to use either the SLR or a site-specific risk-assessment for selecting a specific remedial action for areas with contaminated soils.</p>

SELECTED CHANGES TO RECORD OF DECISION (ROD)

#6 CHANGES TO ARARs/TBC TABLES

September 1994 Record of Decision (ROD)	April 1997 ESD & Sept 2000 ESD Changes to ROD	New Data Collected After ROD & ESDs	September 2005 ROD Amendment Changes
The 1994 ROD cited surface water quality standards for discharge of treated groundwater but did not reference Aquifer Protection Permit (APP) substantive requirements.	The 1997 ESD did not make any changes to the ARARs selected in the 1994 ROD. The 2000 ESD did not make any changes to the relevant ARARs selected in the 1994 ROD.	The basis for including the APP substantive requirements is not a result of new data collected, but a result of an updated analysis of ARARs and TBCs for the Site.	Added reference to APP substantive requirements (ARS Article 3, Section 49-241).
1994 ROD referenced AAC 18-11-104 relating to discharges into the San Pedro River.	The 1997 ESD did not make any changes to the ARARs selected in the 1994 ROD. The 2000 ESD did not make any changes to the relevant ARARs selected in the 1994 ROD.	E. coli exceedances found to be caused by wildlife use of the wetlands.	Added reference to AAC R18-11-119 providing that E. coli exceedances do not violate discharge standards if not caused by human activity.
No discussion of perchlorate in 1994 ROD because perchlorate was not discovered until four years later in 1998.	No discussion of perchlorate in 1997 ESD because perchlorate not yet discovered. No discussion of perchlorate in 2000 ESD because extent of perchlorate contamination at Site not yet defined.	See, change # 3 above, regarding "Selection of a Cleanup Standard for Perchlorate."	The ARARs/TBC table set forth in Appendix A was updated to add Arizona's 14 ppb HBGL for perchlorate as the cleanup level for the MNA remedy.
The 1994 ROD required compliance with Federal and State regulations governing the treatment, storage, and disposal of solid waste, including financial assurance requirements.	The 1997 ESD did not make any changes to the ARARs selected in the 1994 ROD. The 2000 ESD did not make any changes to the solid waste ARARs selected in the 1994 ROD.	Financial assurance requirements will be met through federal CERCLA requirements, making the solid waste regulations unnecessary.	Financial assurance requirements were deleted from the ARARs table.

SELECTED CHANGES TO RECORD OF DECISION (ROD)

#6 CHANGES TO ARARs/TBC TABLES (Continued)

<p>The 1994 ROD required compliance with Federal and State regulations governing the treatment, storage, and disposal of solid waste, including reference to clay-lined disposal units.</p>	<p>The 1997 ESD did not make any changes to the ARARs selected in the 1994 ROD.</p> <p>The 2000 ESD did not make any changes to the solid waste ARARs selected in the 1994 ROD.</p>	<p>Clay cap will be replaced with soil cap.</p>	<p>Reference to clay-lined disposal units deleted from ARARs table. Solid waste disposal area requirements may still be relevant and appropriate for soil-capped areas.</p>
<p>The 1994 ROD required compliance with Federal and State regulations governing the treatment, storage, and disposal of hazardous waste.</p>	<p>The 1997 ESD did not make any changes to the ARARs selected in the 1994 ROD.</p> <p>The 2000 ESD did not make any changes to the hazardous waste ARARs selected in the 1994 ROD.</p>	<p>Because the new groundwater remedy for the Southern Area is MNA, EPA does not anticipate the need to treat, store or dispose of hazardous waste.</p>	<p>Since the MNA remedy does not require the storage of hazardous waste on-site, the ARARs table was modified to make clear that the RCRA tank and container regulations will only apply if RCRA hazardous waste is held on site prior to treatment or disposal.</p>
<p>1994 ROD referenced AAC 18-11-104 relating to discharges into the San Pedro River.</p>	<p>The 1997 ESD did not make any changes to the ARARs selected in the 1994 ROD.</p> <p>The 2000 ESD did not make any changes to the relevant ARARs selected in the 1994 ROD.</p>	<p>R18-11-105 adopted effective April 24, 1996 and amended March 8, 2002.</p>	<p>Added reference to AAC R18-11-105, setting water quality standards for tributaries to listed surface waters.</p>

APPENDIX A

<p align="center">Action-Specific Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered (TBC) Requirements Selected for the Apache Powder Superfund Site</p>		
Action	Citation	Requirement Description
Groundwater pumping	ARS § 49-224 AAC R18-11-407	Classifies the shallow aquifer as a drinking water aquifer, requiring that remedial actions attain Arizona Water Quality Standards.
	ARS § 45-454.01	Exempts remedial actions from requirements of ARS 45-401 <u>et seq.</u> if water is withdrawn, treated, and re injected on-site. Must comply with certain well-drilling and construction standards.
	ARS § 45-401 <u>et seq.</u>	Substantive portions of this chapter could apply if the remedial action does not qualify for the exemption of ARS 45-454.01
Discharge of treated groundwater	33 USC Section 1342 (Section 402 of CWA)	Must comply with substantive National Pollutant Discharge Elimination System requirements for discharge of treated groundwater to navigable waters of the United States. This requirement could also apply to the recharge of treated groundwater if there is a hydrologic connection between the aquifer and the navigable waters.
	33 USC Section 1344 (Section 404 of CWA)	Standards for the management and protection of wetlands. These standards would not apply to the constructed wetlands as long as the wetlands are used as treatment units. The substantive provisions could become applicable if the constructed wetlands remain after treatment is completed. All provisions including permitting could apply to habitat wetlands created off-site.
	ARS Article 3, Section 49-241 (AAC R18-9-101 through R18-9-110)	Discharges of treated water must meet Aquifer Protection Permit substantive requirements.
	ARS Section 49-222 (AAC R18-11-405.B; AAC R18-11-109 (Note: R18-9-111 through 130 have been repealed.)	Treated groundwater must meet Arizona surface water quality standards if discharged to surface waters of the state. This requirement could also apply to the recharge of treated groundwater if there is a hydrologic connection between the aquifer and the surface water.
	AAC R18-11-107	The level of water quality necessary to protect existing uses on navigable waters shall be maintained and protected.
AAC R18-11-119	Discharge to surface water with excess concentration of E. coli not a violation if not caused by human activity.	

APPENDIX A (Con't.)

Action-Specific ARARs and TBCs (Cont'd.)		
Action	Citation	Requirement Description
Recharge/injection treated groundwater	ARS Section 49-223 (AAC R18-11-405.A AAC R18-11-405.C AAC R18-9-101 through R18-9-203)	Recharged or reinjected ground-water must meet Arizona aquifer water quality standards. A discharge shall not cause a pollutant to be present in an aquifer classified as protected for drinking water in a concentration which endangers human health, or if it could impair existing or reasonably foreseeable uses of water in an aquifer. Discharges of treated water must meet Aquifer Protection Permit substantive requirements.
Agricultural reuse of treated groundwater	AAC R18-9-702 through R18-9-705	Treated wastewater used for agricultural purposes must meet surface water AWQS.
Groundwater cleanup level	Health-Based Guidance Level for Perchlorate, Arizona Department of Health Services – May, 2000	MNA remedy will be implemented until health-based guidance level of 14 ppb for perchlorate is achieved (TBC).
Soil excavation	AAC R18-2-801 <u>et seq</u>	The excavation of contaminated soils and pond sediments at ANP must comply with mobile and nonpoint source emissions standards, including combustion engines, machines, and equipment that is capable of being operated in more than one county. The regulations prohibit emissions of smoke or dust that exceed 40% opacity.
	AAC R18-2-606	Prohibits handling of materials likely to result in significant amounts of airborne dust without taking reasonable precautions to prevent particulate matter from becoming airborne.
	AAC R18-2-607	No person shall permit organic or inorganic dust-producing material to be stacked, piled, or stored without preventing particulate matter from becoming airborne.
	AAC R18-2-612	Opacity of an emission from any non-point source shall not exceed 40% opacity.
Treatment, storage, and disposal of solid waste	40 CFR 257-3	Prohibits open dumping of solid wastes. Placement of solid waste or any constituent thereof into or on any land or water (for example, if any treatment of the contaminated soils sediments, groundwater, or wastewater at ANP involved placement of the contaminated materials) in a manner that violates the criteria set out in this regulation (floodplain, endangered species, surface water, groundwater, land application, disease, air, and safety) could constitute open dumping.
	ARS Section 49-762	If existing on January 1, 1994, submit a solid waste facility plan to ADEQ. Provide evidence of financial assurance. Comply with siting and restrictive covenant requirements for solid waste landfills.

APPENDIX A (Cont'd.)

Action-Specific ARARs and TBCs (Cont'd.)		
Action	Citation	Requirement Description
Treatment, storage and disposal of solid waste (contd.)	ARS Section 49-771	As of October 9, 1993, a restrictive covenant must be recorded on the solid waste disposal area of the facility.
	AAC R18-13-301 <u>et seq.</u>	Establishes criteria for the storage, treatment and disposal of refuse, rubbish, garbage, and objectionable wastes, including specific requirements for landfill construction.
Storage of hazardous waste	40 CFR Part 265 Subparts I and J; AAC R18-8-265.	If RCRA hazardous waste is held on site prior to treatment or disposal it will be managed in accordance with the requirements of 40 CFR Section 265 Subpart I (containers) or Subpart J (tanks) and AAC R18-8-265.
Capping of hazardous waste	AAC R18-8-264 (40 CFR 264-228(a)) (40 CFR 264.228(b))	RCRA capping requirements may apply or be relevant and appropriate to the closure of the ponds. Placement of a cap over waste requires a cover designed and constructed to minimum standards.
	(40 CFR 264.117(c))	Restrict postclosure use of property as necessary to prevent damage to the cover.
	(40 CFR 264.310(b))	Prevent run-on and run-off from damaging the cover, protect and maintain benchmarks used to locate waste cells.
Off-site treatment/ off- site disposal of hazardous waste	AAC R18-8-268 (40 CFR 268)	Treatment of waste subject to ban on land disposal must obtain levels achievable by best demonstrated available treatment technologies for each hazardous constituent in each listed waste. These requirements are applicable to the disposal of any RCRA hazardous wastes for which treatment standards have been set. All requirements must be met for off-site treatment/disposal.
Off-site treatment/off site disposal of hazardous waste	AAC R18-8-268 (40 CFR 268 Subpart D and E and waste analysis requirements of Subpart A)	See above; only the substantive portions of the regulations apply to on-site treatment and disposal.
Revised from Hargis +Associates, 1992c		

APPENDIX A (Con't.)

Location-Specific Applicable or Relevant and Appropriate Requirements for the Apache Powder Superfund Site		
Location	Citation	Requirement Description
Floodplain areas	EO 11986 Protection of Floodplains (40 CFR 6, Appendix A)	Remedial actions occurring in a floodplain should avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values. Federal agencies are directed to ensure that planning programs and budget requests reflect consideration of floodplain management, including the restoration and preservation of such land as natural undeveloped floodplain. Accepted floodproofing and other flood control measures shall be undertaken to achieve flood protection. Whenever practical, structures shall be elevated above the base flood level rather than filling land. As part of any federal plan or action, the potential for restoring and preserving floodplains so their natural beneficial values can be realized must be considered. Crossing of the ANP with piping or location of wells in the 100-year floodplain will be designed to avoid impact to flood surface profiles. Any potential pipe or well breakage due to flooding will likely not introduce new contamination because of the nature of the contamination in the groundwater and surface water in and around the ANP site.
	40 CFR Section 257.3 ARS 49-772	The eastern portion of the Apache Powder site is within the San Pedro River Basin and, therefore, is within the 100-year floodplain. Remedial actions should reflect consideration for flood hazards and floodplain management.
Areas where actions may cause irreparable harm, loss, or destruction of significant artifacts	National Archaeological and Historical Preservation Act (16 USC Section 469; 36 CFR Part 65)	Requirements to take action to recover and preserve artifacts if remedial action threatens significant scientific, prehistoric, historic, or archeological data. No known scientific, prehistoric, or historic artifacts are present at the ANP site.
	National Historic Preservation Act, Section 106 (16 USC Section 470 <u>et.seq.</u>); 36 CFR Part 800	See above.
Critical habitat upon which endangered or threatened species depends	Endangered Species Act of 1973, Section 7 (16 USC Section 1536); 50 CFR Part 402	Must make a determination of endangered or threatened species and take appropriate action to conserve these species, including consultation with the U.S. Fish and Wildlife Service as required.

APPENDIX A (Cont'd.)

Location-Specific ARARs (Cont'd.)		
Location	Citation	Requirement Description
Wetland	EO 11990, Protection of Wetlands (40 CFR 6, Appendix A); Clean Water Act Section 404; 40 CFR Parts 230, 231	If wetlands are located within the area of proposed federal activities, the agency must conduct a Wetlands Assessment. If there is no practical alternative to locating in or affecting the wetland, the Agency shall act to minimize potential harm to the wetland.
Areas with streams or rivers	Fish and Wildlife Coordination Act (16 USC Section 661 et.seq.); 40 CFR 6.302	Required consultation with Department of Fish and Wildlife prior to any action that would alter a body of water in the United States. This requirement could be applicable to any action that would result in modification of the San Pedro River.
San Pedro River and tributaries	AAC R18-11-104 and Appendix B	The San Pedro River (from the Mexican border to Redington) has the following designated uses: aquatic and wildlife, full body contact, fish consumption, and agricultural livestock watering. Discharges into the San Pedro River must be protective of all designated uses.
	AAC R18-11-105	Water quality standards for surface waters that are not listed in Appendix B, but are tributary to a listed surface water.
	ARS Section 17-237	Unlawful to discharge in a stream or body of water any deleterious substance which is injurious to wildlife. Applies to point source discharges from Wash 3 Area (excluding Ash and Burn Area) or treated groundwater into San Pedro River.
<p>Revised from Hargis + Associates, 1993a</p> <p>Action-Specific ARARs and TBCs (Cont'd.)</p> <p>ACRONYMS:</p> <p>AAC = Arizona Administrative Code ADEQ = Arizona Department of Environmental Quality ANP = Apache Nitrogen Products, Inc. ARAR = Applicable or relevant and appropriate requirements ARS = Arizona Revised Statutes AWQS = Arizona Water Quality Standards CFR = Code of Federal Regulations CWA = Clean Water Act EO = Executive Order RCRA = Resource Conservation and Recovery Act TBC = To-be considered USC = United States Code</p>		