

# CLEANUP UNDERWAY AT APACHE POWDER SUPERFUND SITE

## Introduction

On September 30, 1994, the United States Environmental Protection Agency (EPA), with concurrence from the Arizona Department of Environmental Quality (ADEQ), signed a Record of Decision (ROD) selecting the cleanup plan for contaminated soils and groundwater at the Apache Powder Superfund site in St. David, Arizona. The Apache site is located on approximately 1,000 acres of land owned by Apache Nitrogen Products, Inc. (ANP) in Cochise County, approximately 50 miles southeast of Tucson.

After considering public comments, EPA selected the preferred alternatives identified in EPA's June 1994 Proposed Plan for the site cleanup. In short, the ROD calls for pumping and treating perched water by a brine concentrator; pumping and treatment of the nitrate-contaminated shallow aquifer groundwater through constructed wetlands; and a variety of on-site and off-site cleanup methods for the soils. Included as a component of the ROD is a Responsiveness Summary, which summarizes the significant comments received by EPA during the public comment period and EPA's responses to these comments.

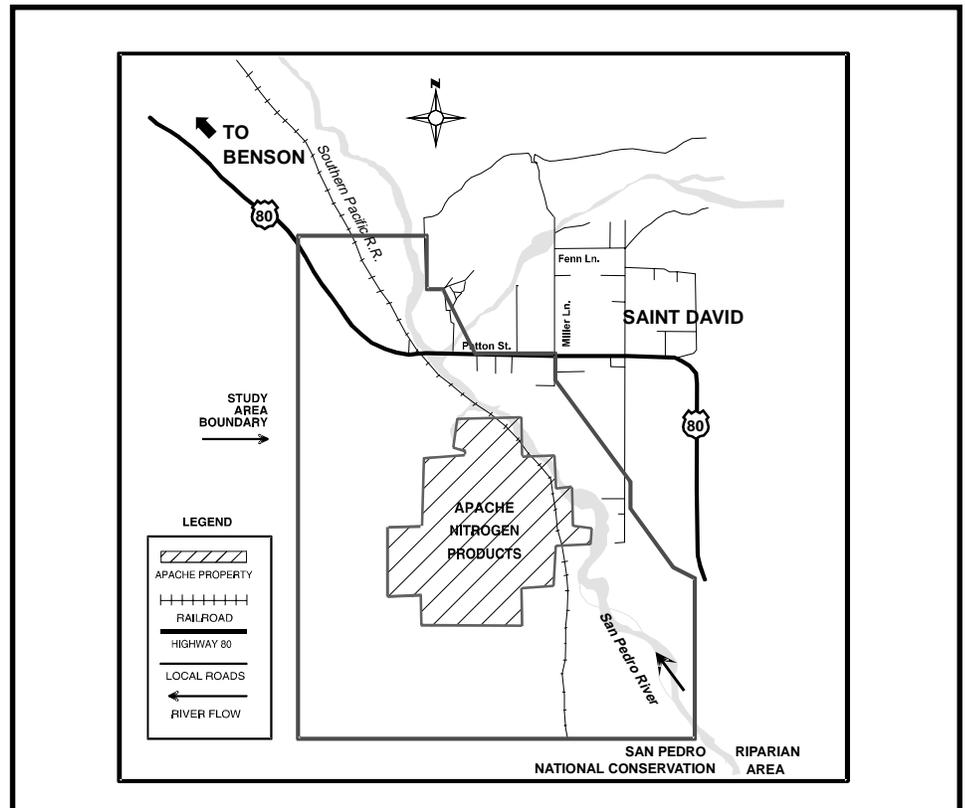


Figure 1: Map of Apache Powder Superfund site and surrounding area.

## Deep Aquifer Replacement Wells Hooked Up

As required by the ROD, eight households north of the Apache site that had been on bottled water since 1989 were hooked up to deep aquifer replacement wells by ANP in March 1995. In October 1994, the drilling was completed for the last of the eight deep aquifer replacement wells. Follow-up sampling to evaluate the water quality of these new wells was conducted from October 1994 through March 1995. Based on the test results, bottled water delivery was discontinued for the residences. However, because testing of one of the eight wells detected levels of naturally-occurring arsenic slightly above the State and federal drinking water standard, ANP installed an under-the-counter reverse osmosis treatment unit to remove the arsenic from this property owner's well. (See enclosed fact sheet on naturally-occurring elements, including arsenic.)

## THE SELECTED REMEDY IN THE ROD

The major components of the selected remedy include:

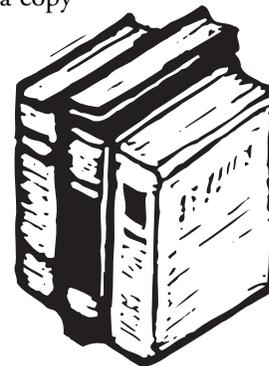
- Completing additional groundwater investigations to determine the extent of nitrate contamination and to determine the appropriate rates and locations for groundwater withdrawal and recharge;
- Pumping and treating the perched groundwater by forced evaporation (brine concentrator), in conjunction with treatment of the company's process wastewaters, to meet the federal and state drinking water standard of 10 parts per million (ppm) for nitrate; ANP completed construction of the brine concentrator in January 1995;
- Pumping and treating the shallow aquifer by use of constructed wetlands to meet the federal and state drinking water standard of 10 parts per million (ppm) for nitrate, and recharging the treated water to the shallow aquifer through wetlands, agricultural irrigation, discharge or some combination of these methods as determined during Remedial Design;
- Replacement of contaminated shallow aquifer domestic wells with deep aquifer wells;
- Groundwater monitoring;
- Clay capping of inactive ponds to prevent contact with contaminated soils;
- Implementing institutional controls so that future use of the site is compatible with the remedial goals and maintaining the protection provided by the clay caps;
- Excavating and removing nitrate-contaminated soils and drums of vanadium pentoxide from the White Waste Material and Drum Storage Area to an off-site facility for treatment and disposal; and
- Excavating and removing dinitrotoluene-contaminated soils, and any lead-contaminated soils which may be discovered, from the Wash 3 Area (excluding the Ash and Burn Area) to an off-site facility for treatment and disposal.

## INFORMATION REPOSITORY

The Administrative Record is a file which includes all documents upon which EPA based its cleanup decision. This includes the Remedial Investigation/Feasibility Study, the Proposed Plan, the Record of Decision and the Responsiveness Summary. Also available are copies of the transcript from the July 6, 1994 public meeting held to discuss the Proposed Plan and copies of all written comments received by EPA on the Plan. Additionally, a copy of EPA's Unilateral Order and ANP's response has been forwarded to the Benson Library for inclusion in the public repository. The Administrative Record is available for review at:

**Benson Library**  
302 South Huachuca  
Benson, Arizona 85602  
(602) 586-9535

**Hours:** Mon 9 am - 7 pm  
Tues & Wed 9 am - 5 pm  
Thurs 9 am - 7 pm  
Fri 9 am - 5 pm  
Sat 9 am - Noon



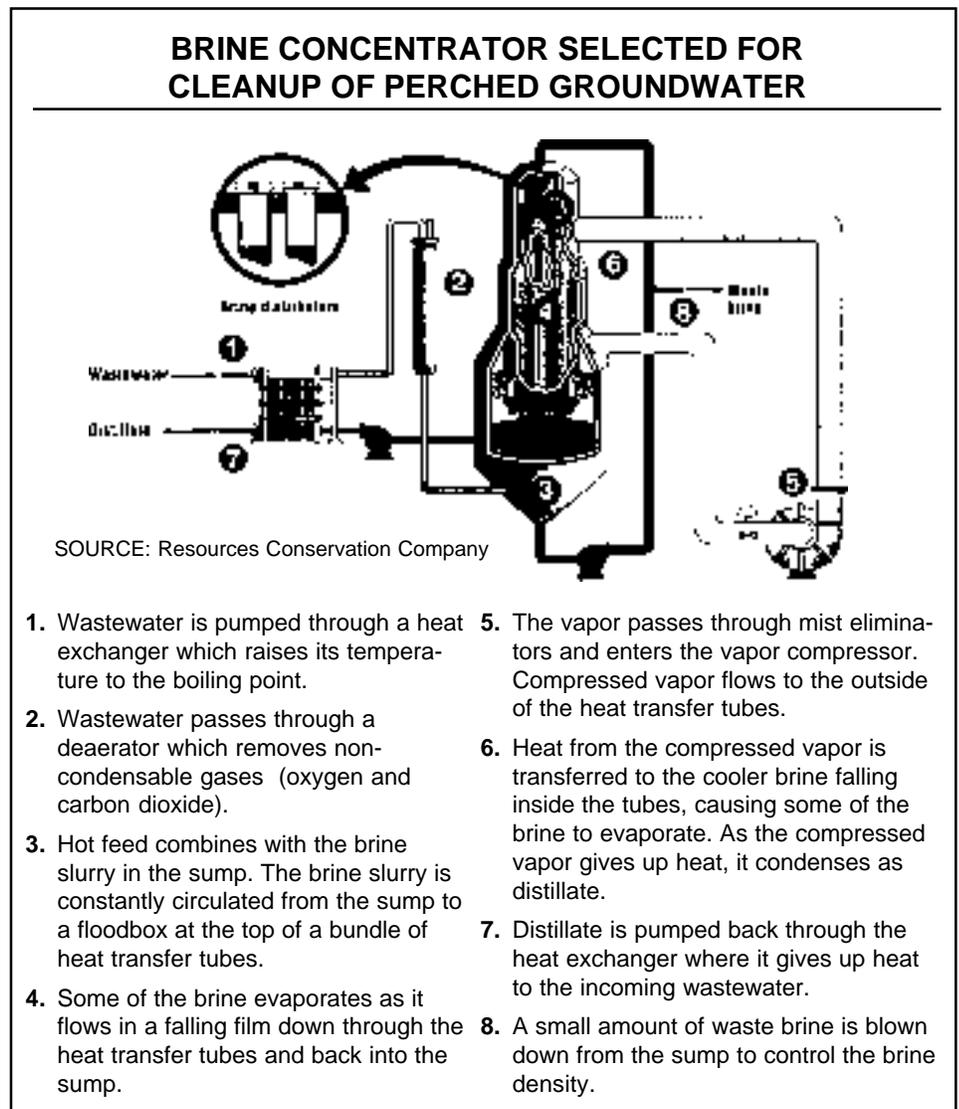
When Apache's design documents and sampling plans are approved by EPA, they, too, will be placed in the library.

## Apache Nitrogen Products, Inc. Accepts EPA's Groundwater and Soils Cleanup Order

On December 21, 1994, EPA issued a Unilateral Administrative Order (Order) to ANP for cleanup of the groundwater and soils contamination. The Order included deadlines for completion of conceptual design workplans for cleanup of the contaminated perched groundwater, shallow groundwater and soils. On January 6, 1995, ANP notified EPA that the company intended to comply with the Order and, on the same day, submitted a Comprehensive Groundwater Monitoring Plan. The draft soils design workplan, soils sample plan, and quality assurance plan for collection and analysis of field data were submitted to EPA by the deadline of February 17, 1995. On March 17, 1995, ANP met a second deadline to submit initial draft workplans for cleanup of the perched groundwater and the shallow aquifer, including consideration of an agricultural treatment end use component. Both the soils and groundwater draft workplans have been reviewed by EPA and the Arizona Department of Environmental Quality (ADEQ). ANP is currently incorporating the agencies' comments into revised design workplans.

## ANP Enters Into Consent Decree with ADEQ

On June 15, 1994, ANP and ADEQ entered into a Consent Decree (CD) to address environmental requirements under the State's aquifer protection and hazardous waste management programs. Similar to



**Figure 2: Brine concentrator process flow**

EPA's Order, the State's CD required the submittal of separate workplans by ANP to address various environmental problems ranging from final closure of the Open Burn / Open Detonation (OBOD) area to the start-up and operation of the brine concentrator to treat ANP's process wastewater.

ANP has submitted the required workplans on schedule, and specific field work is underway. In January 1995, ANP completed the construction of the brine concentrator. After completing the necessary start-up testing, ANP began full-scale opera-

tion of the brine concentrator by the CD's deadline of April 30, 1995. The company's wastewaters from its production processes are no longer being discharged to the on-site evaporation ponds. Instead, they are being treated by the brine concentrator and then recycled for reuse in the production process.

EPA and ADEQ are coordinating the schedule for implementing all remaining environmental requirements, including those in the federal Order and the State's CD and other State requirements.

**TREATMENT WETLANDS**

**Natural Attenuation Process**

- 1- Sedimentation/Filtration
- 2- Biological Uptake/Oxidation/Reduction
- 3- Adsorption/Precipitation

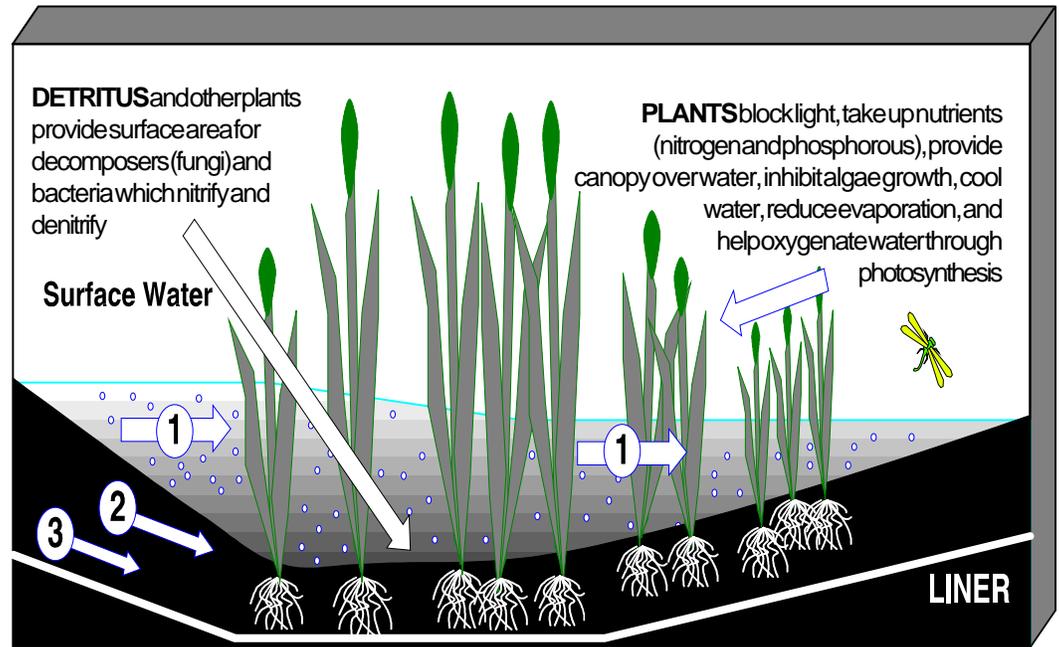


Figure 3a: Simplified illustration of a constructed wetlands used for initial treatment of contaminants

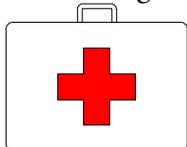
**EPA’s RESPONSE TO COMMENTS ON THE PROPOSED PLAN**

In addition to comments received on EPA’s proposed remedies for the areas of historical contamination at the ANP site, EPA received comments on air emissions and other State issues. Because of previous agreements between EPA and the State on the division of responsibilities for oversight and enforcement of cleanup activities at the site, EPA forwarded comments relating to State issues to ADEQ. EPA’s selection of the final remedy in the ROD reflects the input provided by the State of Arizona.

Several major issues were raised during the public comment period on the Proposed Plan. EPA grouped these concerns into the following six general categories and responded to these concerns in the Responsiveness Summary attached to the September 1994 ROD.

**(1) Health Concerns and Site Risks**

**Groundwater** - The potential health threat of nitrate in drinking water is one of the main concerns posed by the nitrate-contaminated shallow aquifer groundwater migrating from the Apache Powder site. The ongoing discharge of process wastewaters to the perched groundwater underneath the evaporation ponds



has resulted in continual contamination of the shallow aquifer. The installation of the brine concentrator (completed in January 1995) will halt this continuing discharge to the perched groundwater, since the wastewaters will be treated and recycled for reuse. Additionally, now that the brine concentrator has undergone start-up evaluation and is on-line, the design and construction of an extraction system to treat the perched groundwater along with the wastewaters is ready for implementation.

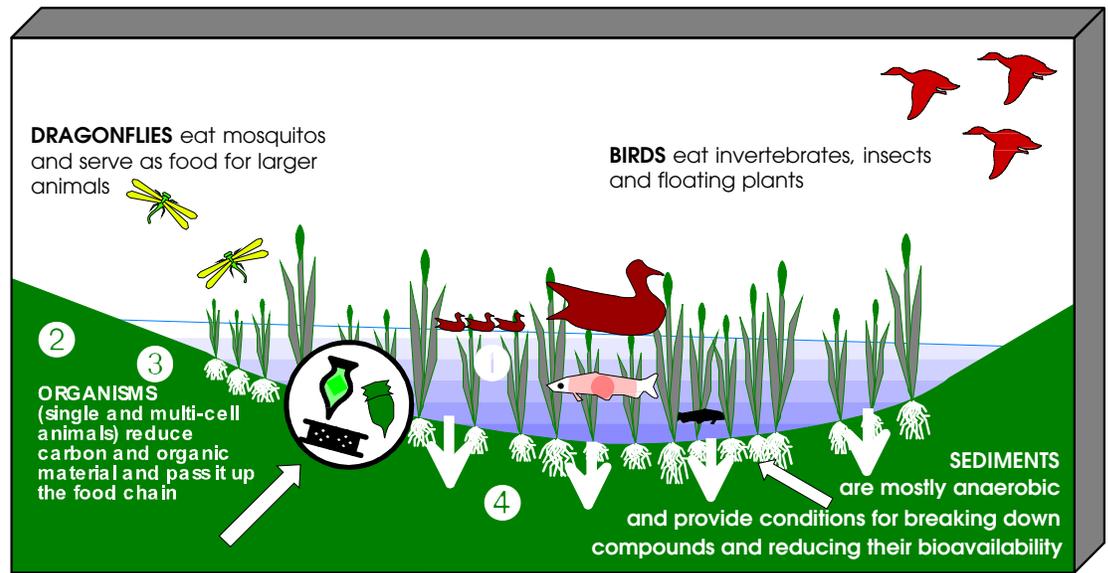
The extraction and treatment of the shallow aquifer will begin to clean up the nitrate contamination over a period of years. In the interim, as discussed earlier in this newsletter, ANP completed new deep aquifer replacement wells in late 1994 for the eight households previously being supplied bottled water under the Alternative Domestic Water Supply Plan (ADWSP). The full implementation of the ADWSP was incorporated as part of the ROD.

However, a potential risk continues to exist for new residents in the area who unknowingly may install drinking water wells into a contaminated portion in the shallow aquifer and potentially be exposed to nitrate. EPA considers the groundwater contamination at the site to be a potential health threat which must be cleaned up to protect human health. EPA is looking into ways to

**HABITATWETLANDS**

**Natural Attenuation Process**

- 1- Sedimentation/Filtration
- 2- Biological Uptake/Oxidation/Reduction
- 3- Adsorption/Precipitation
- 4- Infiltration/Recharge



**Figure 3b:** Simplified illustration of a constructed wetlands used for species habitat and recharge of treated water

insure that future residents are aware of the risks of using the shallow aquifer groundwater for drinking water.

**Soils** - Currently, the site is fenced. Contaminated soils do not pose an immediate risk, with the possible exception of risk to trespassers who are not knowledgeable of the on-site areas where hazardous substances are stored or contained. Trespassers could be exposed to some of the surface soil contamination that exists on the site. Another potential health risk via the soils pathway exists for on-site workers and nearby residents if the site were opened up for development. If contaminated soils were moved or disturbed in the future during the course of remedial activities, digging the foundations for buildings, or clearing site areas for construction, disturbed soil could be released to the atmosphere, greatly increasing the chances for human exposure. EPA considers the contaminated soil at the site a potential health threat requiring either removal or containment, based on assumptions made for future use of the site.

In order to protect the health of the community, the pathway through which the population can be exposed must be eliminated. EPA selected in the ROD a combination of methods to protect people from the contaminated soils: on-site containment and off-site treatment and disposal. The metal-contaminated soils and sediments in the inactive ponds will remain in place and will

be covered with a low-permeability clay cap. The clay cap will be a physical barrier between people and the contaminated soils. Institutional controls (e.g., deed restrictions) may be put in place to ensure that future use of the inactive ponds area is compatible with the remedial goals and to maintain the integrity of the clay caps. The remaining contaminated soils, currently located in the White Waste Material and Drum Storage Area and in the Wash 3 Area, will be excavated and removed to an off-site, permitted hazardous waste facility for treatment and disposal.

**2. Water Resources - Agricultural Irrigation**

A major concern raised by the community on the Proposed Plan was whether the use of constructed wetlands to treat the shallow aquifer adequately considers the unique water resource constraints on this arid part of southeastern Arizona. Several comments, including comments from ADEQ and ANP, recommended that consideration be given to agricultural irrigation as either a secondary treatment alternative or for end use.

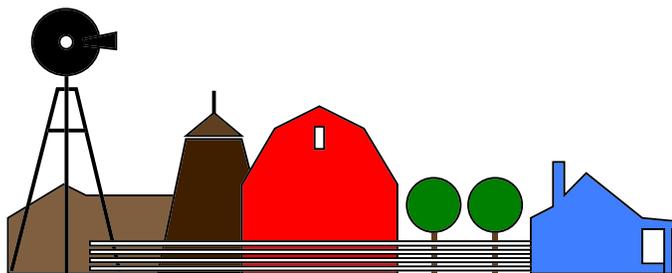
An irrigation proposal was presented by a member of the agricultural community, identifying owners of approximately 1,000 acres of privately-owned land adjacent to the ANP site who would be interested in taking the nitrate-contaminated water for



crop irrigation. These 1,000 acres were on both the east and the west side of the San Pedro River. To date, the contaminated nitrate plume has only been detected on the west side of the river, with the exception of a small area near the Pomerene Canal, north of the site. Only low levels of nitrate contamination (3-5 ppm) in the range normally expected in an agricultural area have been detected on the east side of the river. For this reason, EPA believes consideration of agricultural irrigation should be limited to the west side of the river to minimize the risk of additional drinking water wells becoming contaminated.

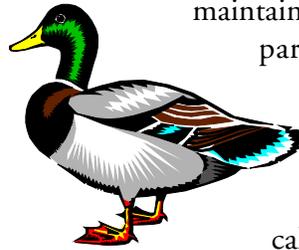
EPA agreed in the Responsiveness Summary that the agricultural irrigation concept should be evaluated during the first phase of remedial design (RD). EPA has directed ANP to complete an analysis of the agricultural alternative. This analysis includes gathering data on the concentrations of nitrate in various portions of the plume, water balance, the potential land acreage both on and off the ANP site, access to off-site acreage, and the cost and feasibility of the distribution system. Based on the findings of these studies, it may be feasible to incorporate the use of agricultural irrigation either as secondary treatment following primary treatment in a constructed wetlands or as an end use if the influent levels of nitrate can be reduced to levels that can be treated efficiently by the crops. However, until these studies are completed, EPA believes it is premature to alter the selection of constructed wetlands for treatment of the nitrate in the shallow aquifer.

Some members of the agricultural community expressed an interest in developing educational programs in the use of constructed wetlands and/or crop irrigation to inform the community on environmental protection and enhancement and good farming/ranching practices. EPA is pursuing possible sources of funding for this type of outreach effort.



### 3. Water Resources - Riparian Protection

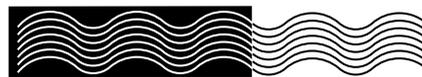
Many members of the community and various state agencies commented on the importance of protecting the water resources of the San Pedro River Basin and to maintain or, if possible, enhance the riparian resources. Concerns were raised that pumping the shallow aquifer groundwater to treat and remove the nitrate may potentially damage these ecological resources.



EPA concurs with this concern and determined in the ROD that various types of hydrogeological studies should be conducted during remedial design to evaluate the hydraulic connection between the shallow aquifer and the San Pedro River. These studies include aquifer testing, updated water quality testing and groundwater modeling. In addition, refinement of the assumptions on pumping rates and the location of extraction wells will be developed during RD to minimize any impact on the flow of the San Pedro River. Water levels also will be monitored during operations so that adjustments to the pumping rates can be made as necessary. EPA also will consider measures during RD for enhancing existing riparian resources by careful consideration of the siting and construction design (including choice of vegetation) for the constructed wetlands.

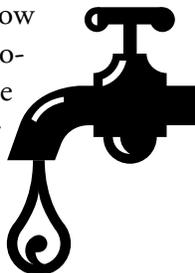
### 4. Water Resources - Downstream Users

Other members of the community commented that pumping and extracting the groundwater from the shallow aquifer for treatment by constructed wetlands may continue to exacerbate an already lowered water table. As stated above, EPA concurs that additional studies need to be conducted during the first phase of RD to minimize any impact on the San Pedro River Basin and the availability of water for downstream users. EPA will ensure that the RD will effectively address recharge to the shallow aquifer groundwater.



## 5. Water Resources - Deep Aquifer Replacement Wells

Some members of the community commented that it was inequitable to install deep replacement wells for households that had been on bottled water due to the nitrate contamination of their shallow aquifer drinking water wells, while not providing monetary compensation for those land owners who installed a deep aquifer well (because of prior knowledge of the shallow aquifer nitrate contamination) or who have delayed installing either a shallow or deep aquifer well. Some of the comments requested that EPA do something about this matter.



The purpose of the replacement well installation project is to protect the health of those people whose drinking water contained unsafe nitrate levels. Those who have drilled their own deep aquifer wells, fortunately, have eliminated their own risk of exposure to the nitrate-contaminated shallow aquifer groundwater. EPA generally does not have the authority to intercede in private party disputes regarding alleged property damage or losses.

A few comments stated that because of additional water demands on the deep aquifer, certain wells that previously had been artesian (naturally flowing) would require the installation of pumps, resulting in increased costs. 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 (whether the lowering of deep aquifer levels is due to new deep well installation or other possible causes). Because the Apache Powder site is not located in an area designated by the Arizona Department of Water Resources as an Active Management Area, 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.

Other comments recommended that the St. David water supply system be extended to accommodate new residents in areas of nitrate-contaminated groundwater who otherwise will be forced to drill deep aquifer wells. EPA also recognizes that future population growth and the need to supply potable water will continue to be a concern in the Benson/St. David area. To resolve these issues, discussions should be held among landowners, ANP, and local representatives, including the St. David water supply system officials. EPA will, to the extent practicable, facilitate such discussions and will perform other actions as necessary to protect public health.

## 6. Effectiveness of Remedy

Four of the five selected remedial actions in the ROD received general concurrence by the community, with the exception that ANP did not concur with EPA's recommendations for additional soil sampling. At a follow-up meeting with EPA, ADEQ and ANP in November 1994, agreement was reached on the type and amount of additional soil sampling required.



The proposed selection of constructed wetlands to treat the nitrate-contaminated shallow aquifer received numerous comments, as discussed above. EPA believes many of these concerns will be resolved during the first phase of remedial design after the various studies previously discussed have been completed. EPA agrees that the shallow aquifer extraction system, including the siting of the extraction wells, the recharge locations and the pumping rates, need to be carefully reviewed and considered once updated data are gathered. Additionally, if new information becomes available supporting the inclusion of an agricultural irrigation component, EPA will modify the remedy, if appropriate. Currently, no changes are planned to EPA's selection in the ROD of constructed wetlands for treatment of the shallow aquifer.

## FOR MORE INFORMATION

The Superfund program places a high value on community input in addressing hazardous waste cleanups. Your comments are invited and encouraged. If you have any questions or concerns about cleanup activities at the Apache Powder site, please contact:

Vicki Rosen  
Community Relations Coordinator  
U.S. EPA  
75 Hawthorne St. (H-1-1)  
San Francisco, CA 94105  
(415) 744-2187

Andria Benner  
Remedial Project Manager  
U.S. EPA  
75 Hawthorne St. (H-7-2)  
San Francisco, CA 94105  
(415) 744-2361

or leave a message on EPA's TOLL-FREE line: (800) 231-3075 and we will return the call.

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U.S. Environmental Protection Agency, Region IX  
75 Hawthorne Street (H-1-1)  
San Francisco, CA 94105  
Attn: Vicki Rosen

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**Inside: Cleanup Plan  
Selected for  
Apache Powder  
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