EPA

Apache Powder Superfund Site

U.S. Environmental Protection Agency, San Francisco, CA 94105

St. David, Arizona November 1996

# REMEDIAL DESIGN ACTIVITIES UPDATE AT APACHE POWDER SUPERFUND SITE

## INTRODUCTION

The U.S. Environmental Protection Agency (EPA) is sending this fact sheet to interested parties to update the community on activities at the Apache Powder Superfund site and to invite you to a community meeting on November 14 (see below). Recent activities which will be discussed at the meeting and which are outlined in this fact sheet include changes to the cleanup remedy selected for the site and various remedial design investigative activities.

## CHANGES TO THE RECORD OF DECISION

New data gathered during the remedial design investigation underway at the Apache Powder Superfund site indicate that the cleanup would be more effective and efficient if certain changes were made in the selected remedy. EPA signed the Record of Decision (ROD) for the site in September 1994. The changes being made to the ROD are not fundamental alterations to the original remedy. However, because the changes differ and further clarify or add additional requirements from the remedies originally selected in

*continued on page 2*

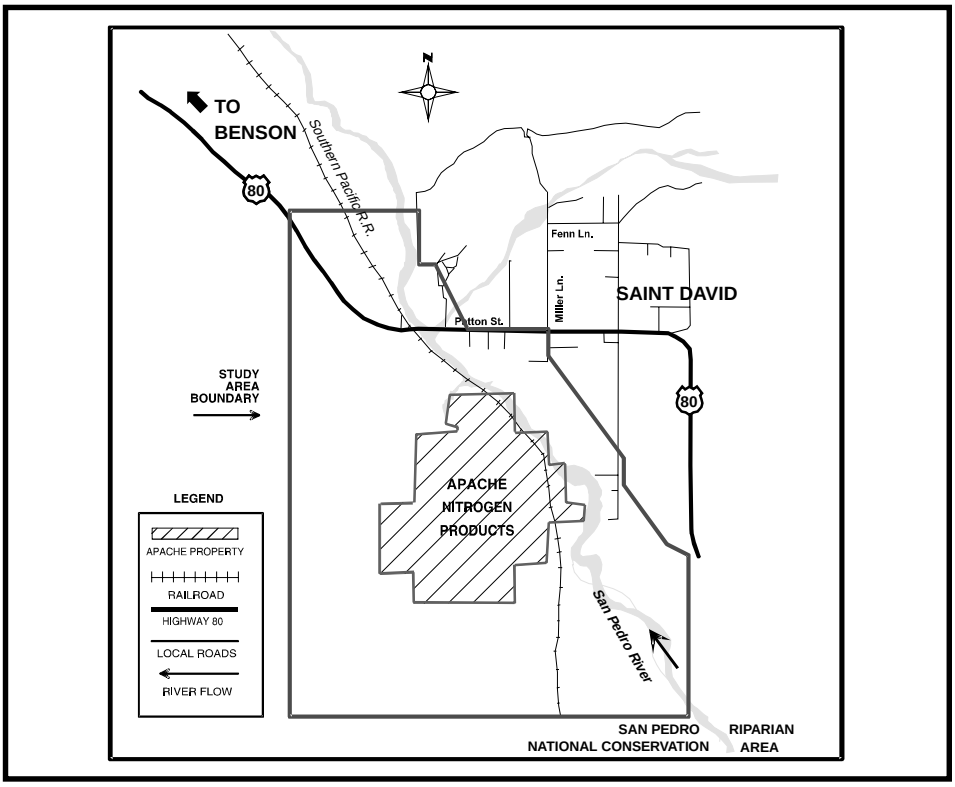


***Figure 1:*** *Map of Apache Powder Superfund site and surrounding area*

## *COMMUNITY MEETING*

You are invited to participate in a community meeting regarding the Explanation of Significant Differences (ESD) and other site activities related to the Apache Powder Superfund site.

**Thursday, November 14, 1996**
**7:00 PM**
**St. David School, K-Hall**
**70 Patton Street, St. David, Arizona**

Representatives from EPA, the State of Arizona and Apache Nitrogen Products, Inc. (ANP) will answer questions from the public regarding these changes, the remedial design activities underway and any other site-related questions.

the ROD, they are considered "significant" and require EPA to prepare and approve a document known as an Explanation of Significant Differences (ESD).

## MODIFICATIONS TO THE ROD

### #1 Treatment of the Perched Groundwater by Constructed Wetlands in Conjunction with Treatment of the Shallow Aquifer in the Southeast Portion of the Site (Rather Than by a Brine Concentrator)

The ROD identified two separate groundwater areas for treatment: the perched groundwater zone to be treated in a brine concentrator and the shallow aquifer to be treated by constructed wetlands. Because recent groundwater monitoring data indicate that the perched zone is dewatering very rapidly, and the nitrate concentrations have dropped to levels that could be effectively treated in a constructed wetlands, EPA now advocates treating both the perched zone and shallow aquifer together in constructed wetlands rather than by two separate treatment technologies. Additionally, recent investigations indicate that the remaining perched and shallow aquifer groundwater are very similar in water quality. Because these two areas are hydraulically connected, it now appears more technically and economically feasible to choose extraction locations that will provide for capture of perched groundwater after it has entered the shallow aquifer.

The ROD identified the use of a separate extraction system for pumping the perched groundwater into the brine concentrator. EPA now advocates extracting both the contaminated perched and shallow aquifer groundwater from one point in the southeast corner of the site. Due to Apache Nitrogen Product's (ANP) process wastewaters no longer being released to the evaporation ponds as of April 1995, individual wells are drying up in the perched zone without any additional action being taken. New extraction wells in the perched zone may go dry or only be an efficient pumping location for a limited period of time. The cost of moving these extraction wells or reconfiguring piping would be high. Rather than designing a perched zone extraction system which will need constant changes, it is more cost effective and sensible technically to extract the perched groundwater at the point it enters the shallow aquifer, an estimated 150 feet from the currently defined eastern boundary of the perched groundwater zone. Locating one extraction well and constructed wetlands treatment system in the southeast corner of the ANP facility will accomplish both source control of the perched groundwater zone and treatment of the geographic area of the plume with the second highest levels of nitrate contamination.

### #2 Two Locations (a Northern and Southern Location) for Siting the Constructed Wetlands to Treat the Shallow Aquifer, Including the Use of a Pipeline or Several Pipelines to Carry the Nitrate-Contaminated Groundwater from the Extraction Wells to the Treatment Area

ANP has presented several alternatives on proposed siting locations for the constructed wetlands to EPA and the Arizona Department of Environmental Quality (ADEQ). To support these alternatives, ANP has updated the groundwater model and completed the analysis of a set of low-level aerial photographs. ANP also conducted additional soil borings. (A detailed description of these activities is summarized in the draft Remedial Design Workplan for Shallow Aquifer Groundwater, Revision 4.0, dated September 30, 1996, which is available in the Benson Library site repository.) After discussing the feasibility of each of these alternatives in the context of this updated and new data, the agencies and ANP reached consensus on two areas as strong candidates for siting the wetlands.

#### ■ Northern Area Wetlands to be Located North of ANP Facility

EPA, ADEQ, and ANP agree that the first set of constructed wetlands for treating the shallow aquifer should be located in a relatively "stagnant" portion of the shallow aquifer north of the ANP facility. This is near the area where the concentration of nitrate in the shallow aquifer is the highest and where the groundwater circulation is low. It is in the vicinity of shallow aquifer monitor wells MW-17 and MW-18 and is referred to as the "northern area." Siting the first set of constructed wetlands in this area will capture the nitrate-contaminated shallow aquifer plume as it migrates north. It will maximize treatment in the area with the highest levels of nitrate where several residences are located and where there is the most potential for new residential develop-

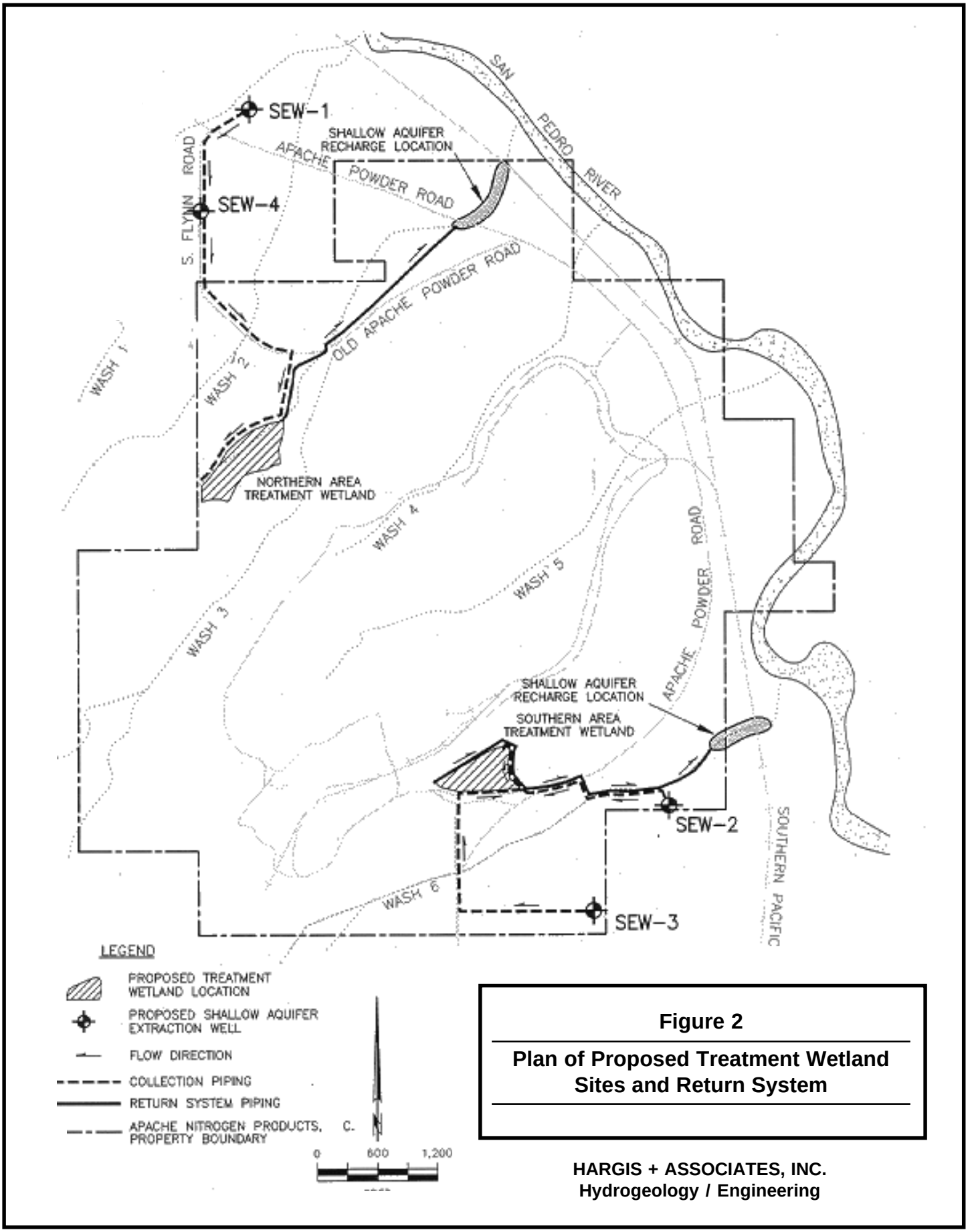


**Figure 2**

**Plan of Proposed Treatment Wetland Sites and Return System**

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**Hydrogeology / Engineering**

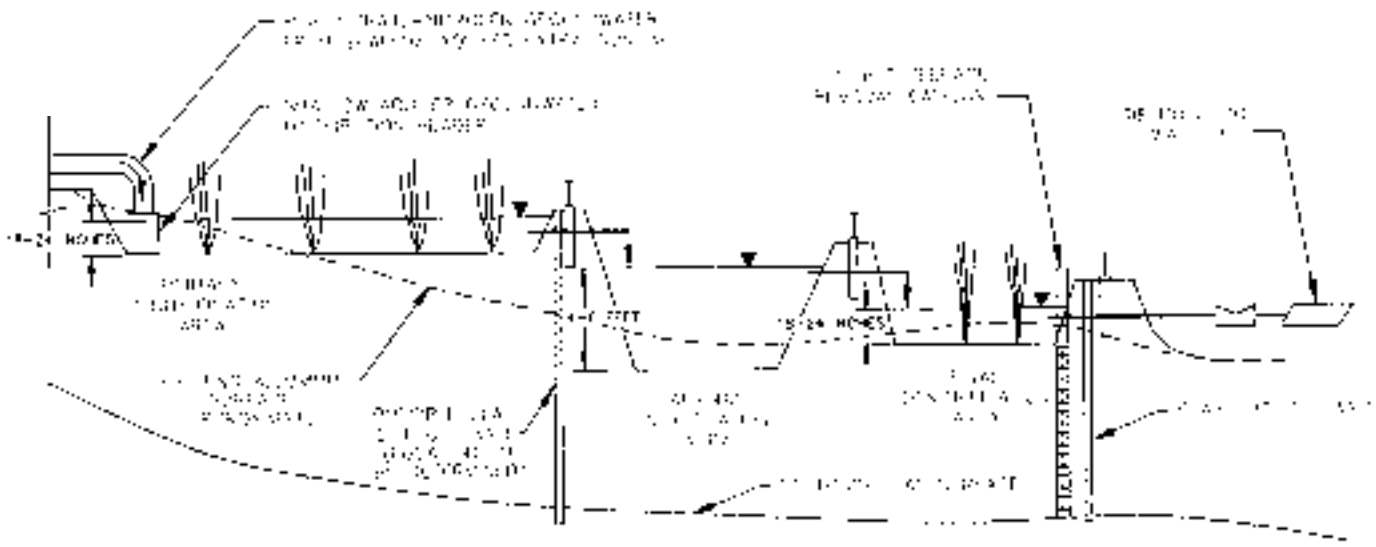
ment (Figure 2). This first set of wetlands would be constructed during the spring of 1997.

■ **Southern Area Wetlands to be Located Near Southeast Boundary of ANP Property**

A second set of constructed wetlands will, if needed, be sited in the southeast corner of the ANP property to treat both the shallow aquifer in this area and water from the adjacent perched groundwater zone together (Figure 2). This area is another "stagnant" portion of the shallow aquifer in the vicinity of monitor wells MW-14 and MW-15 and is referred to as the "southern area." The reasons this area was chosen is because this is where the perched and shallow aquifer converge, the concentrations of nitrate are now very similar in both, and the perched zone was the original source point for the contamination now found in the shallow aquifer. Construction of the southern area treatment wetlands would begin approximately one year after the full-scale operation of the northern area treatment wetlands.

## #3 Recharge of Treated Perched and Shallow Aquifer Groundwater by Gravity-Flow Pipeline Discharge to a Shallow Aquifer Recharge Location in Wash 3 for the Northern Area Wetlands and to a Shallow Aquifer Recharge Location in Wash 6 for the Southern Area Wetlands

The method of recharge of treated perched and shallow aquifer groundwater was not specified in the ROD because additional groundwater modeling, investigation, and monitoring needed to be completed during remedial design. During 1995 and 1996, ANP completed several field studies and investigations. Based on the results of this data, ANP completed an evaluation of various recharge alternatives. Concerns were raised by the State agencies, ADEQ and the Arizona Department of Water Resources (ADWR), regarding the beneficial use of the treated effluent. Because ANP could not quantify the amount (if any) of treated effluent that would reach the shallow aquifer (or the San Pedro River



NOT TO SCALE

**Figure 3**

**Conceptual Treatment Wetland Design**

NOTE:
Treatment wetlands will be graded to provide a constant depth of water

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**Hydrogeology / Engineering**

if the treated effluent were discharged into a wash adjacent to the wetland treatment areas), EPA and the State agencies concurred that ANP should recharge the treated groundwater via gravity-flow pipeline discharge to shallow aquifer recharge locations along Wash 3 for the southern area wetlands and Wash 6 for the northern area wetlands. The recharge would occur once the groundwater is treated to the federal and state drinking water standard of 10 parts per million (ppm) for nitrate.

Other recharge options which were considered, including constructing pipelines in Wash 3 and Wash 6 to transport treated effluent directly to the San Pedro River or its floodplain, would have required permits from the Army Corps of Engineers, and may have impacted the habitats of endangered species, and could have resulted in the disturbance of archeological sites in the area.

The use of a pipeline routed outside of a wash until it reaches a recharge location along the wash will be an efficient and effective method of recharge. The treated groundwater will return quickly to the shallow aquifer system and will reduce the level of nitrate in the underlying shallow aquifer groundwater in the vicinity of the San Pedro River. Additionally, the selected point of discharge should provide the ancillary benefit of enhancing the riparian and ecological quality of Wash 3 and Wash 6 and the San Pedro River in this area. The cost will be less than using reinjection wells.

The treated groundwater will meet federal National Pollution Discharge Elimination Standards (NPDES) permit requirements.

None of the other recharge alternatives studied, including agricultural irrigation as a secondary use, are as cost-effective for recharging the treated groundwater to the shallow aquifer. However, untreated shallow aquifer groundwater or treated effluent may be provided for agricultural use under certain conditions. This could occur in areas where there is a high concentration of nitrate contaminated shallow aquifer groundwater or where the shallow aquifer is not present. An adequate monitoring well network and proximity to the extraction or recharge pipelines would be necessary.

## #4 Locate Additional Shallow Aquifer Extraction Wells in Area of High Concentrations of Nitrate to Expedite Groundwater Cleanup

After the extraction and treatment systems have been operational for several years, groundwater monitoring data may indicate that the initial extraction wells are not sufficient to capture the nitrate-contaminated groundwater plume. If necessary, additional extraction wells may be needed.

### ■ Northern Area Wetlands

Remediation of this area involves treatment of the groundwater through its extraction from the shallow aquifer in two phases. Contaminated shallow aquifer groundwater would be extracted initially from one extraction well located in the vicinity of monitoring wells MW-17 and MW-18 and transported via a pipeline routed along private and county property until it crosses onto ANP property to the northern area wetlands treatment area. After the northern area wetlands have been operating an estimated four years, a review would be conducted to determine if an additional shallow aquifer extraction well and the corresponding pipeline would be required to expedite cleanup of this area.

### ■ Southern Area Wetlands

Remediation of the southern area also involves extraction of groundwater from the shallow aquifer in two phases. The first phase would extract groundwater in the vicinity of monitoring well MW-14. The second phase would extract groundwater in the vicinity of monitoring well MW-15. This would facilitate the overall cleanup of the shallow aquifer while cleaning up any contaminated perched groundwater draining into the shallow aquifer. During the first year or two of operation of the northern area extraction and wetlands treatment systems, monitoring data would be collected to determine if additional monitoring wells or other design modifications are needed for the southern area extraction and wetlands treatment systems.

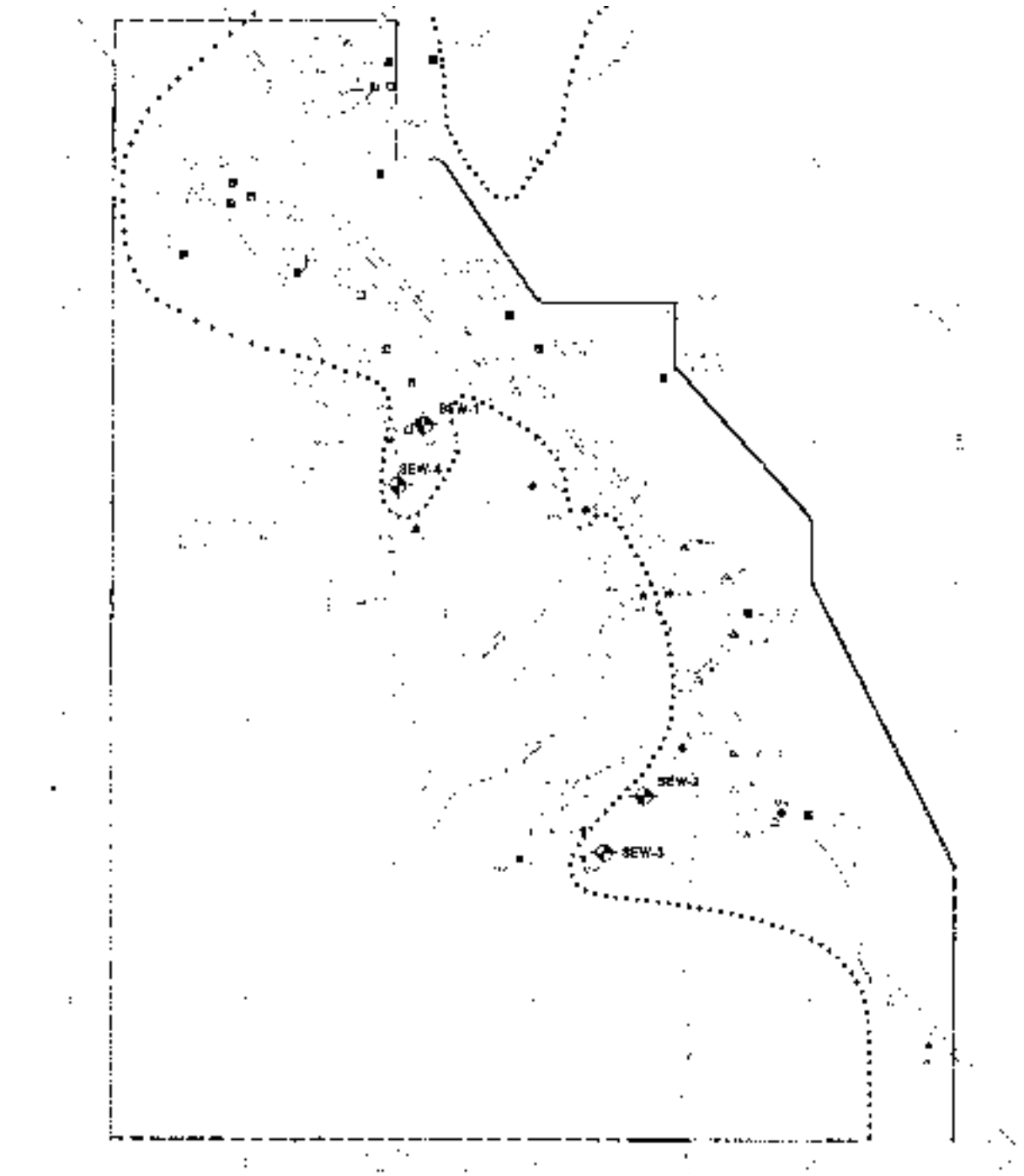


**Figure 4**

**Proposed Shallow Aquifer Extraction Well Locations**

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### #5 Characterize, Remove, Treat, and Dispose Off Site Any Newly Discovered Contaminated Soils Materials Not Previously Identified in ROD

Due to the recent discovery of two dinitrotoluene-type drums in the vicinity of one of the inactive ponds, EPA proposes expanding the soils remedy to include characterization, removal, treatment and off-site disposal of any previously unidentified waste materials discovered in any of the soils on site.

## RESULTS OF REMEDIAL DESIGN INVESTIGATIVE ACTIVITIES

## Perched Groundwater Zone

### ■ Water Levels Declining

From the second quarter of 1995 to the second quarter of 1996, the water levels in the perched zone monitoring wells and piezometers have dropped on an average seven feet. Prior to ANP ceasing discharge of its process wastewaters to the unlined evaporation ponds in April 1995, the discharge of ANP's wastewaters to the ponds was a constant source of contaminated recharge to the perched zone.

### ■ Nitrate Concentrations Dropping

The current nitrate concentrations in perched zone monitoring wells and piezometers range from 50-500 ppm (approximate average 180 ppm) also have dropped considerably from the 1980s and the early 1990s when the concentrations of nitrate ranged from 500-1,000 ppm. The earlier, higher concentrations were used as a basis for the EPA Record of Decision (ROD) selecting the brine concentrator to treat the perched groundwater. Other factors that led to the selection of the brine concentrator included the economic feasibility of using the same treatment system that would be treating the production wastewaters, the presence of larger volumes of perched groundwater than currently exist, and the presence of other pollutants (arsenic and fluoride) detected in the perched groundwater.

## Shallow Aquifer Groundwater

### ■ Shallow Aquifer Monitoring

Beginning with baseline monitoring of the perched groundwater zone and the adjacent shallow aquifer groundwater in December 1994 prior to the start-up testing for the brine concentrator, ANP continues to conduct quarterly shallow aquifer groundwater monitoring. This monitoring includes collection of groundwater quality samples and water level measurements from both private wells and ANP monitoring wells installed throughout the shallow aquifer in the areas of known or suspected nitrate contamination. During the period of July 1990 through February 1995, results of this monitoring indicate that the concentrations of nitrate have declined in monitoring well MW-15 located adjacent to the perched groundwater zone in the southern area and also in some of the monitoring wells near the northernmost extent of the plume.

### ■ Groundwater Modeling

During 1995 and 1996, ANP updated a previously developed groundwater model for several purposes: (1) to determine the optimal configuration of groundwater extraction wells; (2) to determine the optimal locations and flow rates for groundwater extraction wells; (3) to aid in the design and sizing of the treatment wetlands; (4) to evaluate options for return of treated effluent to the shallow aquifer and the San Pedro River; and (5) to evaluate the impacts of the preferred northern area extraction and treatment wetlands system on the flow of the San Pedro River and the water levels in the shallow aquifer.

## Other Remedial Investigative Activities

### ■ Geotechnical Investigation

In October 1995, ANP completed 16 soil borings along the eastern boundary of the ANP facility to determine soil permeability characteristics and appropriate locations for the treatment and recharge wetlands. Supplemental borings were conducted during August 1996 and September 1996 in the vicinity of the proposed northern area treatment wetlands site to provide additional subsurface lithologic data.

The 1995 borings identified some unexpected hydrogeologic conditions. The distribution and type of alluvial deposits present in the potential areas for siting the treatment and recharge wetlands was the opposite of what was anticipated. Instead of highly permeable, alluvial material along the San Pedro River, the subsurface was underlain with impermeable clay in many locations. However, the results of the August 1996 geotechnical investigations, including the excavation of 13 test pits, verified that the clay layer underlying the proposed northern area treatment wetland is continuous and a good location for siting the wetlands.

### ■ Aerial Photography

In November 1995, aerial photography was conducted by ANP to assist in determining potential locations for the treatment wetlands and potential routing for the pipelines needed to route the nitrate contaminated shallow aquifer groundwater from the extraction well to the treatment location.

### ■ Topographical Survey

In April and May 1996, a ground survey was performed by ANP to generate topographic maps of the proposed locations of the northern area treatment wetlands and the pipeline for transporting the extracted contaminated groundwater to the wetlands.

### ■ Biological Assessment

In July 1996, a biological assessment was completed for ANP in the vicinity of the proposed northern area treatment wetlands to comply with the requirements of the federal Endangered Species Act. The biological assessment involved obtaining updated lists of endangered, threatened, proposed, and candidate species for the vicinity of the proposed northern area treatment wetlands, conducting a site visit to search for the species, and completing a written report. The report concluded that the proposed northern area treatment wetlands will not adversely impact endangered species in the area.

### ■ Archeological Survey

In August 1996, an archeological survey was completed to comply with the requirements of the National Historic Preservation Act. One archeological site was found and was given an Arizona State Museum (ASM) number. However, this ASM site was discovered in an area that will not be disturbed by the construction and remediation activities. No other archeological sites were discovered. Therefore, the report concluded that the implementation of a treatment wetlands in the northern area will not impact archeological or historical resources in the area.

## EPA AND ADEQ COORDINATE CLEANUP ACTIVITIES

During the period of March-September 1995, extensive effort was expended by EPA and ADEQ to coordinate on the priorities for implementing activities under the State's Consent Decree (CD) and EPA's Unilateral Administrative Order (Order). This coordination was instigated by ANP notifying both EPA and ADEQ in April 1995 that the company only had sufficient resources to expend one million dollars per year to conduct environmental investigation and cleanup activities. After lengthy discussions with ANP, and after taking into consideration all environmental cleanup requirements, a phased three-year cleanup schedule was developed by ANP and agreed to by EPA and ADEQ. The agencies continue to coordinate environmental cleanup activities and conduct technical meetings on a regular basis.

## PROJECTED COSTS REDUCED

Due to several factors, including new technical data, more detailed analysis of design alternatives and suggested revised approaches, the projected costs of cleanup have been reduced considerably from the estimated $21 million dollars presented in EPA's July 1994 Proposed Plan. The current cost estimate is in the range of $10 million. This change is a result of greater than anticipated physical changes in the perched zone, development of a design alternative to combine treatment of the perched and shallow aquifer groundwater in the southeast corner of the facility and the development of a phased implementation schedule which spreads EPA and ADEQ's cleanup requirements over several years.

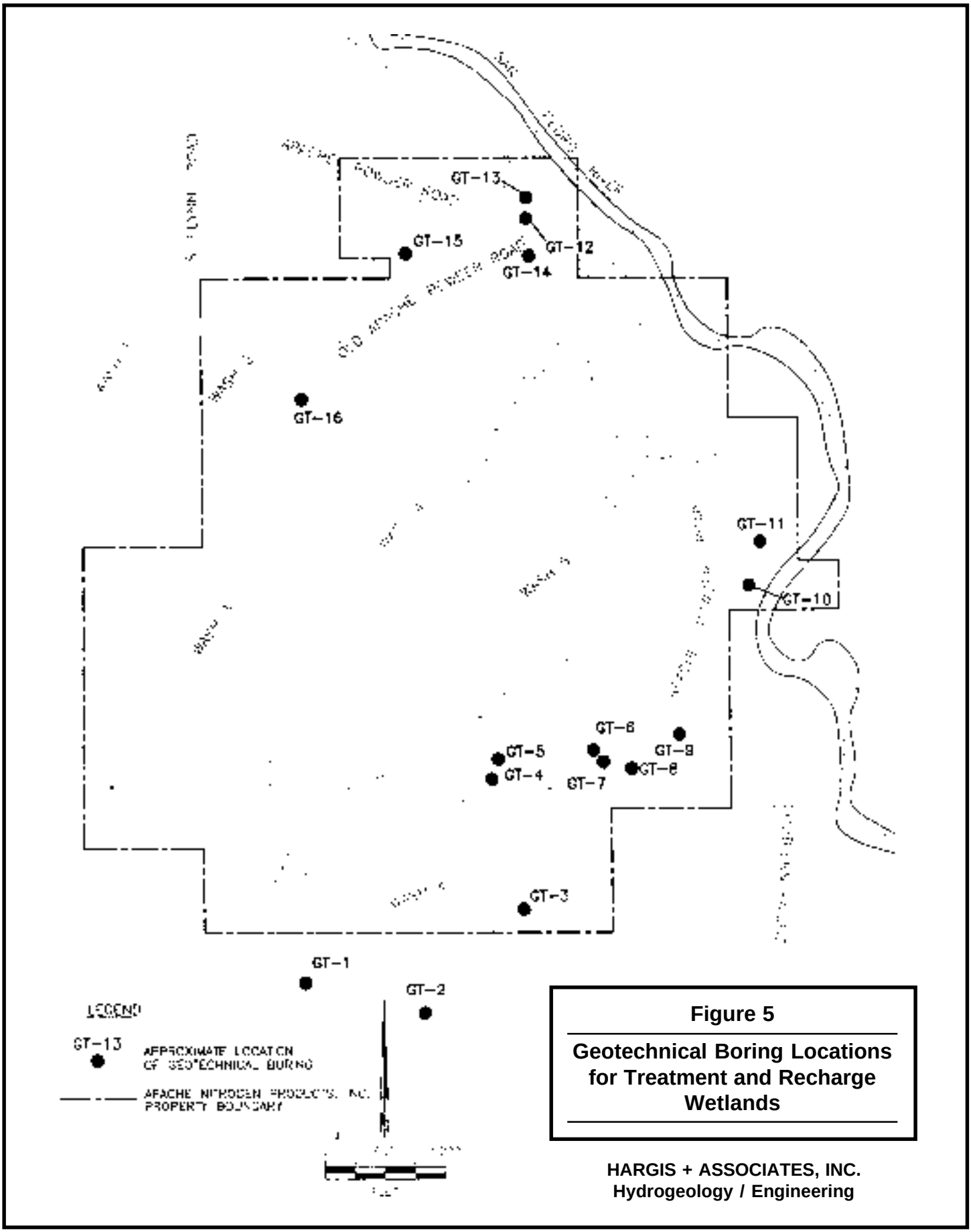


**Figure 5**

**Geotechnical Boring Locations for Treatment and Recharge Wetlands**

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**Hydrogeology / Engineering**

## PROGRESS OF CLEANUP ACTIVITIES REQUIRED BY ADEQ CONSENT DECREE

### ■ Brine Concentrator Treating ANP's Production Wastewater

The brine concentrator has been up and running since April 1995. No production process wastewater has been discharged to the unlined evaporation ponds since this date. As discussed above, the benefits to the perched groundwater system have been immediate. Both the concentrations of nitrate and groundwater levels have been steadily dropping in the perched zone since this operational change was implemented. ANP paid $5.5 million dollars to Resource Conservation, Inc. for the construction and installation of the brine concentrator.

### ■ New Containment Pad for Liquid Ammonium Nitrate Plant

In late February and early March 1996, ANP installed a new containment pad for the Liquid Ammonium Nitrate (LAN) plant located in the southeast corner of the facility. The asphalt pad previously in place only provided limited containment for waste process fluids at the ANP's LAN plant. The new containment pad is designed to be a reinforced concrete slab surrounded by a wide curb. The pad lining is stainless steel, which is more resistant to nitric acid and ammonium nitrate spills than concrete. The stainless steel lining was installed to cover the entire internal surface of the concrete containment dike. The cost to ANP to replace the containment pad was approximately $550,000.

### ■ Open Burn/Open Detonation Area Cleanup

On December 8, 1995, ANP prepared a response and submitted a revised final Closure Plan for the Open Burn/Open Detonation (OBOD) Area. In late December 1995, ADEQ approved ANP's request to begin closure of the OBOD area after completing the upgrade of the LAN containment pad. Closure of the OBOD area currently is scheduled to begin in November 1996 and to be completed in March 1997.

### ■ Air Monitoring Requirements

During 1995, ANP expended an estimated $50,000 conducting air monitoring of its new nitric acid plant and other existing emission points (e.g., air stacks), as required by ADEQ. ANP has set aside funding during 1997-1998 to comply with EPA's Title V air permitting requirements.

### ■ Aquifer Protection Permit Program

In November 1995, ANP completed soil boring and soil sampling in the production areas of the ANP facility to determine if the operational facilities could be contributing to any additional potential contamination to the underlying aquifers. No leaks were detected around the existing operating structures, with the exception of potential releases in the LAN area, which has been addressed, as discussed above. There was no evidence of subsurface seepage or saturated soils in the operations area, except for the existing perched groundwater system that is drying up now that the release of production wastewaters to the unlined evaporation ponds has ceased.

## *OPPORTUNITY FOR PUBLIC INVOLVEMENT*

The Superfund program places a high value on community interests and concerns and we are interested in receiving community input during this remedial design phase. You will have an opportunity to ask questions and provide comments on the cleanup underway at the Apache Powder Superfund site at the community meeting.

**Thursday, November 14, 1996**

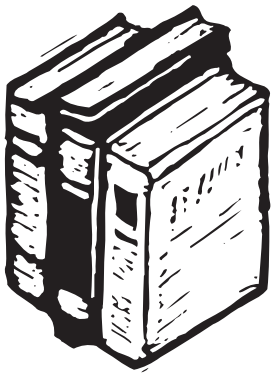
**7:00 PM**

**St. David School, K-Hall**

**70 Patton Street, St. David, Arizona**

## *INFORMATION REPOSITORY*

The Administrative Record is a file which includes all documents upon which EPA bases these proposed changes to the remedy. This includes the Remedial Investigation/Feasibility Study, the Proposed Plan, the Record of Decision and its Responsiveness Summary, Quarterly Groundwater Monitoring Reports, and draft Remedial Design Reports. A copy of the Administrative Record is available for review at:



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| | 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.

## 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.

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

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ACTIVITIES UPDATE AT
APACHE POWDER SUPERFUND SITE

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