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November 1997

EPA Superfund
Explanation of Significant Difference for the Record of Decision:

Apache Powder Co., St. David, AZ 4/16/1997

SFUND RECORDS CTR
0048-01013

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

AR0993

MEMORANDUM

DATE: April 16, 1997

FROM: John Kemmerer, Acting Superfund Enforcement Branch Chief

TO: Keith Takata, Superfund Division Director

SUBJECT: Apache Powder Superfund Site - Explanation of Significant Differences

Attached for your signature is the Explanation of Significant Differences (ESD) for the Apache Powder Superfund site final Record (ROD). The purpose of the ESD is to enhance the selected groundwater remedy for the perched and shallow aquifer groundwater and to add additional flexibility in cleaning up contaminated soils.

The first component of this ESD allows for the perched groundwater to be extracted and treated by constructed wetlands (rather than by a brine concentrator) in conjunction with the extraction and treatment of the nitrate-contaminated shallow aquifer groundwater in the southeast portion of the site.

The second component of this ESD allows for two locations (a northern and southern location) for siting the constructed wetlands to treat the nitrate-contaminated shallow aquifer, including the use of a pipeline or several pipelines to carry the nitrate-contaminated groundwater from the extraction wells to the treatment areas.

The third component of this ESD allows for the recharge of the 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 fourth component of this ESD allows for additional shallow aquifer extraction wells to be located in areas of high concentrations of nitrate to expedite groundwater cleanup.

The fifth component of this ESD allows for the characterization, removal, treatment, and off-site disposal of any newly discovered contaminated soils materials not previously identified in the ROD pursuant to an EPA-approved Soils RD Workplan.

The need for these modifications became apparent during the remedial design activities at the site. We believe it is appropriate to address these modifications through an ESD at this time.

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EPA provided the State of Arizona with a fifteen day comment period on this ESD. Comments received from the Arizona Department of Environmental Quality and the Arizona Department of Water Resources are included in Section IV of this ESD. In addition, EPA will publish a notice in the San Pedro Valley News-Sun and the Arizona Daily Star newspapers which describes this ESD and its availability for review. This ESD and all documents that support the changes and clarifications herein will be contained in the Administrative Record for the Apache Powder Superfund site prior to the commencement of the remedial actions affected by this ESD.

Please contact Andria Benner at 744-2361 or David Rabbino at 744-1336, if you would like any additional information regarding this ESD.

0048-01013

APACHE POWDER SUPERFUND SITE

EXPLANATION OF SIGNIFICANT DIFFERENCES

for the FINAL REMEDY RECORD OF DECISION

April 1997

I. INTRODUCTION

On September 30, 1994, the United States Environmental Protection Agency (EPA) signed a Record of Decision (ROD) for the final remedy at the Apache Powder Superfund site in St. David, Arizona. The State of Arizona concurred with the remedy selected in the 1994 ROD. EPA now is modifying the ROD to explain differences between the remedy selected in September 1994 and the remedy currently under design and planned for implementation at the site. These changes are not fundamental alterations of the remedy described in the 1994 ROD.

Under Section 117 of the Comprehensive Environmental, Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendment and Reauthorization Act of 1986, and pursuant to 40 C.F.R Section 300.435(c)(2)(i)(55 Federal Register 8666, 8852 (March 8, 1990), EPA is required to publish an Explanation of Significant Differences (ESD) when significant (but not fundamental) changes are being considered to a final remedial action plan as described in a ROD. EPA has made a few important changes that modify the ROD requirements but did not alter the hazardous waste management approach that EPA selected in the ROD. The changes will enhance the effectiveness of the remedy and promote more effective cleanup of the site. The purpose for each of these changes is described in detail in Section III of this document.

This document provides a brief background of the site, a summary of the remedy selected in the 1994 ROD, a description of how this ESD affects the remedy originally selected by EPA in the 1994 ROD, and an explanation of why EPA is making these changes to the ROD. EPA is issuing this ESD #1 in order to take into account information received by EPA during the on-going groundwater monitoring and field investigative activities related to the final design for cleanup.

This ESD proposes to modify the previously selected remedy selected for the site as follows:

(1) allow for the perched groundwater to drain to the shallow aquifer to be extracted and treated by constructed wetlands (rather than by a brine concentrator) in conjunction with the extraction and treatment of the nitrate-contaminated shallow aquifer groundwater in the southeast portion of the site;

(2) allow for two locations, a northern and southern location, for siting the constructed wetlands to treat the nitrate-contaminated shallow aquifer, including the use of a pipeline or several pipelines to carry the nitrate-contaminated groundwater from the extraction wells to the treatment areas;

(3) allow for the recharge of the 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;

(4) allow for additional shallow aquifer extraction wells to be located in areas of high concentrations of nitrate to expedite groundwater cleanup; and

(5) allow for the characterization, removal, treatment, and disposal in a hazardous waste or solid waste disposal facility of any newly discovered contaminated soils materials not previously identified in the ROD.

Although this ESD modifies the remedy for the perched groundwater in the southern portion of the site, the implementation of this portion of the remedy will be delayed at least two years while EPA evaluates the effectiveness of the constructed wetlands to treat the nitrate contamination in the northern portion of the site. Nitrate is a contaminant of concern both in the northern and southern portions of the site. The results of the first treatment system in the northern portion of the site will provide valuable data for the southern area. Operational and performance monitoring data from the northern area groundwater wetlands system may lead to adjustments in the extraction and treatment strategy for the southern area. After two years of study, EPA may recommend that rather than building a second wetlands, the nitrate contaminated groundwater from the shallow aquifer adjacent to the perched zone in the southern area be pumped to the already constructed wetlands in the northern area.

This ESD and supporting documentation will become part of the Apache Powder Administrative Record. Copies of the Administrative Record for the Apache Powder site (including this ESD) have been placed at the following locations:

Benson Library
302 South Huachuca
Benson, Arizona 95602
(602) 586-9535

EPA Region 9 Superfund Records Center
95 Hawthorne Street - 4th Floor
San Francisco, California 94105
(415) 536-2000

EPA provided a fifteen (15) working day comment period for the State of Arizona in accordance with 40 C.F.R. Section 300.515(h)(3). The State of Arizona's comments on this ESD are summarized in Section IV of this document and are also included in the Apache Powder Administrative Record file. Pursuant to 40 C.F.R. Section 300.435(c)(2)(i), EPA will publish a notice summarizing this ESD in a major newspaper of general circulation. A formal public comment period is not required for an ESD.

II. BACKGROUND

A. Site Background and Description

The Apache Powder Superfund site is located approximately 7 miles southeast of Benson and 2.5 miles southwest of St. David, in Cochise County, Arizona. The Apache Nitrogen Products, Inc. (ANP) property comprises 945 acres. The site study area (approximately 9 square miles) includes areas of nitrate-contaminated groundwater and surface water located outside ANP's boundary. The San Pedro River bounds the eastern side of the site running from the southeast corner of the property north towards the northwest. The predominant topography is "badlands", characterized by eroded ridges and hummocks dissected by northeast trending washes. Approximately eight residences are located immediately north of the facility, in the vicinity of monitoring wells 17 and 18. The San Pedro River National Conservation Area (SPRNCA), owned by the Bureau of Land Management, is located approximately two miles south of the site along the San Pedro River (Figure 1).

ANP began operation in 1922 as a manufacturer of industrial chemicals and explosives. Currently, ANP manufactures nitric acid, solid and liquid ammonium nitrate, and nitrogenous fertilizer solutions. ANP also distributes explosives materials to mining companies. ANP has an interim status permit under the Resource Conservation and Recovery Act (RCRA) for treatment of explosive wastes in its Ash and Burn Area. The Ash and Burn Area, also known as the Open Burn/Open Detonation (OB/OD) Area, is currently undergoing closure review by the Arizona Department of Environmental Quality (ADEQ) under its RCRA program authority.

Prior to 1971, facility wastewater composed of washdown and blowdown waters from its power house cooling tower and nitric acid plant, and from the loading, unloading, and storage of raw materials and products, was discharged on site into dry washes which flow to the San Pedro River. From 1971 until March 1995, wastewater was discharged into unlined evaporation ponds on site. The combination of these two activities resulted in nitrate-contamination of a perched groundwater zone, the shallow aquifer, and the surface water of the San Pedro River. The site was first identified as an environmental problem in the early 1980s, proposed by EPA for listing on the National Priorities List (NPL) in 1986, and placed on the list in 1990.

B. Remedies Selected in the 1994 ROD

The remedies selected in the ROD for the perched groundwater, the shallow aquifer groundwater and soils are shown in the second column of the attached tables 1, 2, 3, 4 and 5. The proposed changes to the ROD included in this ESD are shown in the fourth column.

III. MODIFICATIONS TO THE ROD REMEDY

A. 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 by a brine concentrator, and the shallow aquifer, to be treated by constructed wetlands. Because recent groundwater monitoring data indicate both that the perched zone is dewatering very rapidly and that the nitrate concentrations have dropped to levels that could be effectively treated in a constructed wetlands, EPA now proposes treating both the perched zone and shallow aquifer together in constructed wetlands rather than by two separate treatment technologies. Additionally, recent investigation activities indicate that the remaining perched and shallow aquifer groundwater are very similar in water quality. Because the physical distance between these two areas is only 150 feet and they 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 proposes to extract both the contaminated perched and shallow aquifer groundwater from one point in the southeast corner of the site. Due to ANP's 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 should be more cost effective and technically feasible 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 (Figure 2).

B. 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 ADEQ. To support these alternatives, ANP has updated the groundwater model and completed the analysis of a set of low-level aerial photographs, in addition to the soil borings described above. (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 near the area where the concentration of nitrate in the shallow aquifer is the highest and where the groundwater circulation is low. This area 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 also 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 development (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 the southeast corner of the ANP property 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". This area is where the perched and shallow aquifer converge, the concentrations of nitrate are very similar in both (unlike previously), and the perched zone was the original source for the contamination now found in the shallow aquifer in the southern area. Construction of the southern area treatment wetlands would begin approximately one year after the full-scale operation of the northern area treatment wetlands.

C. Recharge 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. Various 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 and or the San Pedro River if the treated effluent were discharged into a wash adjacent to the wetlands 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 6 for the southern area wetlands and Wash 3 for the northern area wetlands (see Figure 2). 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, included constructing pipelines in Wash 3 and Wash 6 to transport treated effluent directly to the San Pedro River (SPR) or the SPR floodplain. This would have required permits from the Army Corps of Engineers if sited in a floodplain 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, Wash 6, and the San Pedro River in this area of discharge. The cost will be less than using reinjection wells.

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

None of the other recharge alternatives studied, including agricultural irrigation as a secondary use, are as cost-effective or efficient 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 in 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.

D. 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 will be installed.

Northern Area Wetlands

Remediation of this area involves treatment of the extracted groundwater 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 will be conducted to determine if an additional shallow aquifer extraction well and the corresponding pipeline would be required to completely capture the contamination in 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 obtained would be collected to determine if additional monitoring wells or other design modifications are needed for the southern area extraction and wetlands treatment systems.

E. Characterize, Remove, Treat, and Dispose Off-Site Any Newly Discovered Contaminated Soils Materials Not Previously Identified in ROD

Due to the recent discovery of several drums which may contain dinitrotoluene-contaminated soil 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. The

purpose of this proposed change is to incorporate other geographic areas of the site, not previously identified in the September 30, 1994 ROD, to be included in the soils cleanup remedies for the site. The cleanup of any other soils areas of the site will be identified in the Soils Remedial Design (RD) Workplan to be approved by EPA. The Soils RD Workplan will describe the additional areas to be characterized, the contaminants of concern, the soils materials proposed to remain on the site, the soils proposed for removal and, as appropriate, proposed treatment technologies, proposed treatment facilities, and proposed disposal facilities. Additionally, the Soils RD Workplan will identify any additional contaminants discovered during the RD investigative phase, which may require new cleanup standards to be added to an amended ROD.

IV. SUPPORT AGENCY COMMENTS

The Arizona Department of Environmental Quality (ADEQ) and the Arizona Department of Water Resources (ADWR) reviewed this ESD. Both ADEQ and ADWR support the proposed changes in this ESD. The ADEQ finds the ESD to be an adequate and accurate representation of the approved changes to the remedial design/remedial action. The ADWR additionally provided the following two comments:

1. The remedial action at the site, as modified by this ESD, is not anticipated to negatively impact the base flow in the nearby perennial reach of the San Pedro River, according to computer modeling.
2. The method of groundwater recharge included in this ESD was designed to avoid waste of groundwater in the area in order to preserve groundwater for future users. The method of recharge described in this ESD took into consideration the fact that groundwater conservation is an important concern for area residents, particularly those with domestic wells.

V. STATUTORY DETERMINATIONS

In light of the new information that has been developed, EPA believes it is appropriate to modify the selected remedy as set forth in this ESD. EPA believes that the remedy for the Apache Powder site will remain protective of human health and the environment, will continue to comply with federal and state requirements that are applicable and relevant and appropriate to this remedial action, and will continue to be cost-effective. In addition, the revised remedy uses permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. While the changes and clarifications contained in this ESD are significant, none of the proposed changes fundamentally change the remedy. EPA believes these modifications to the remedies will be cost effective, and accelerate the clean-up and restoration of the groundwater and the soils at the Apache Powder Superfund site.

VI. PUBLIC PARTICIPATION ACTIVITIES

EPA has presented these changes to the remedy in the form of an ESD because the changes are of a significant but not fundamental nature. EPA provided the State of Arizona with a fifteen (15) day comment period on this ESD. EPA also held a community meeting in St. David, Arizona on November 14, 1996 to discuss the recommended changes to the ROD contained in this ESD #1. In accordance with Section 117(c) of CERCLA, 42 U.S.C. Section 9617, EPA will publish a notice in the *San Pedro Valley News-Sun* and the *Arizona Daily Star* newspapers which describes this ESD and its availability for review. In accordance with 40 C.F.R. Section 300.435(c)(2)(ii), this ESD and all documents that support the changes and clarifications herein were contained in the Administrative Record for the Apache Powder Superfund site prior to the commencement of the remedial actions affected by this ESD.

Keith Takata — 4-16-97

Keith Takata
Director, Superfund Division

Date

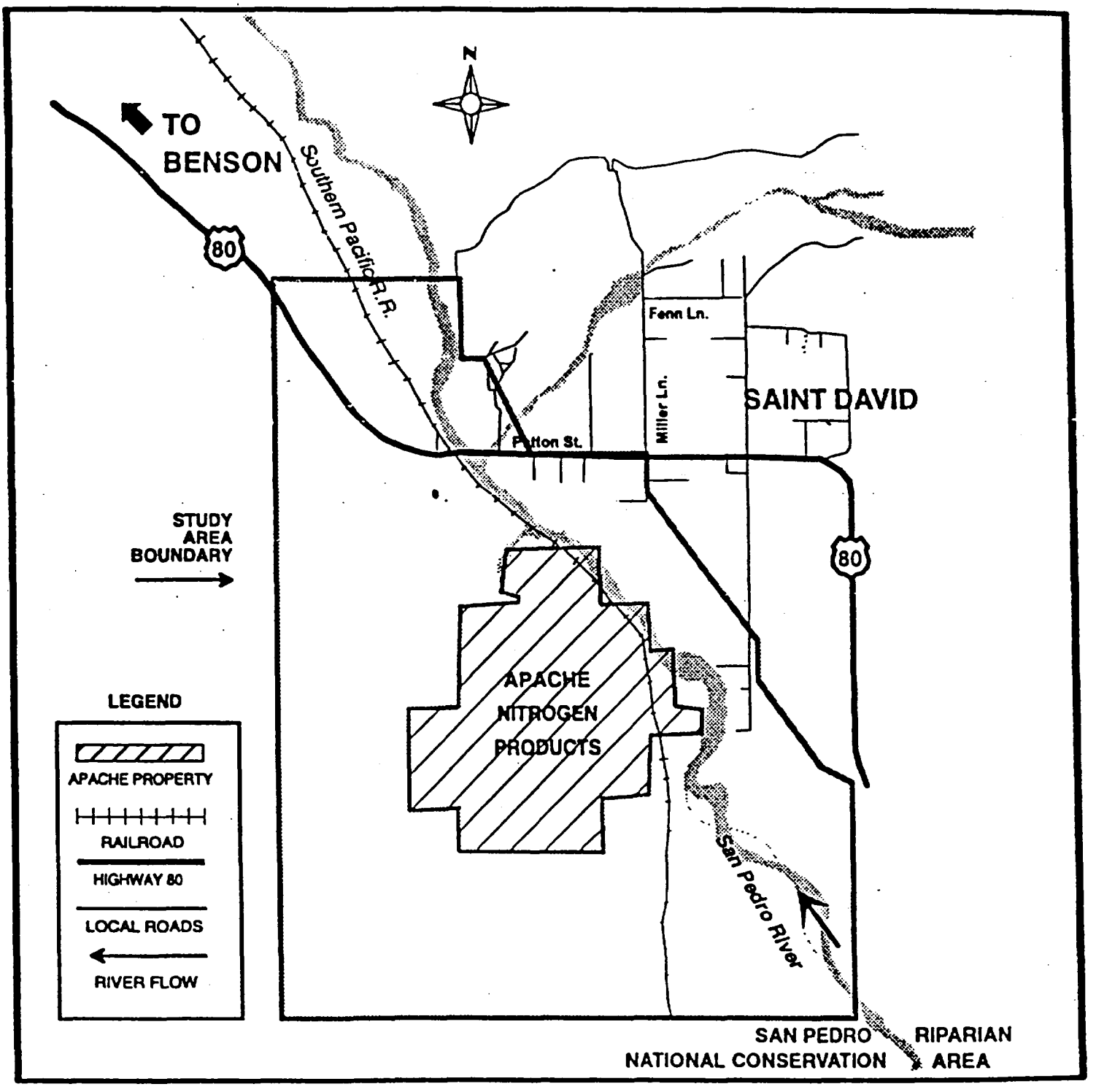


Figure 1. Map of Apache Powder Superfund Site and Surrounding Area

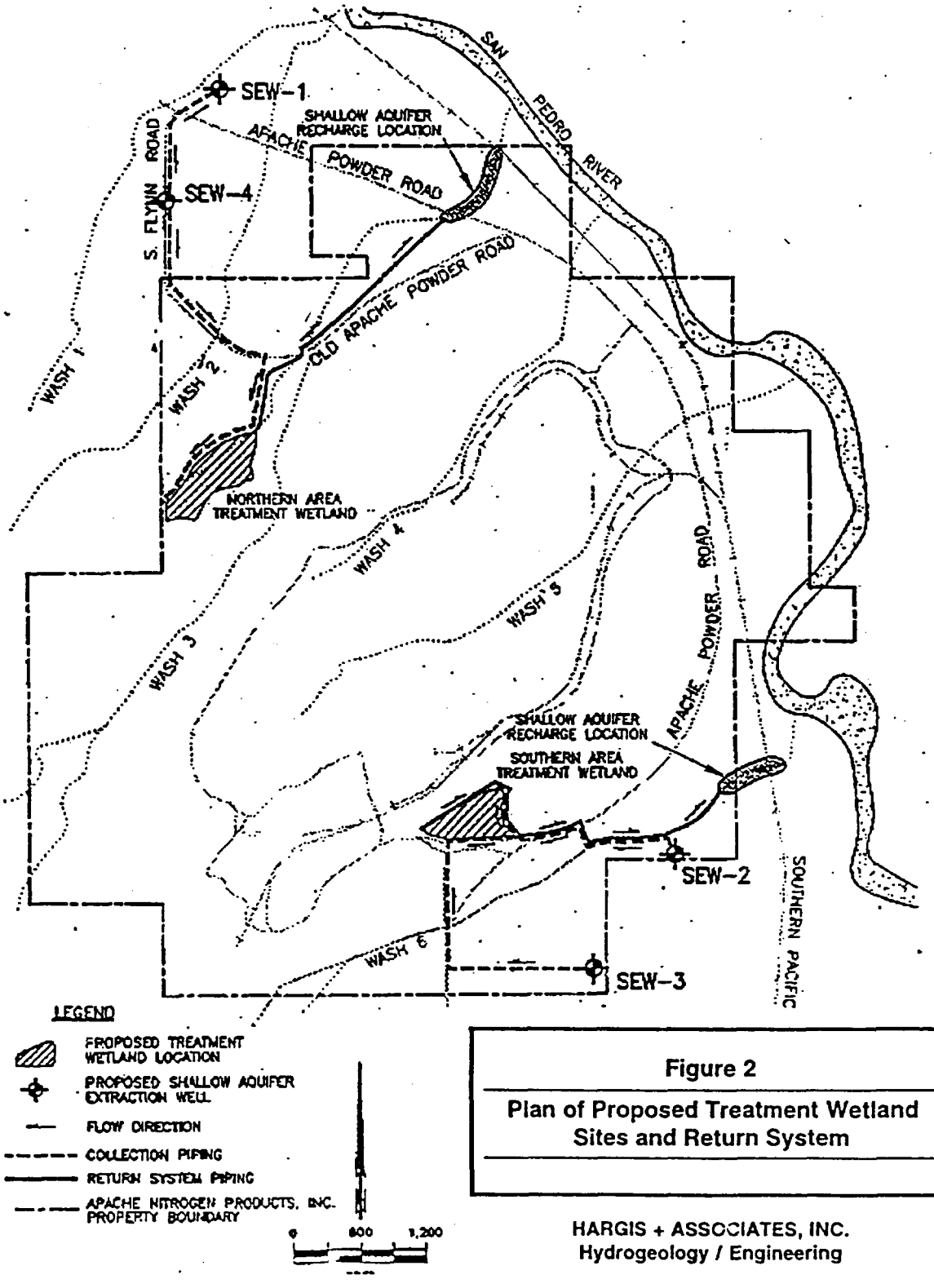
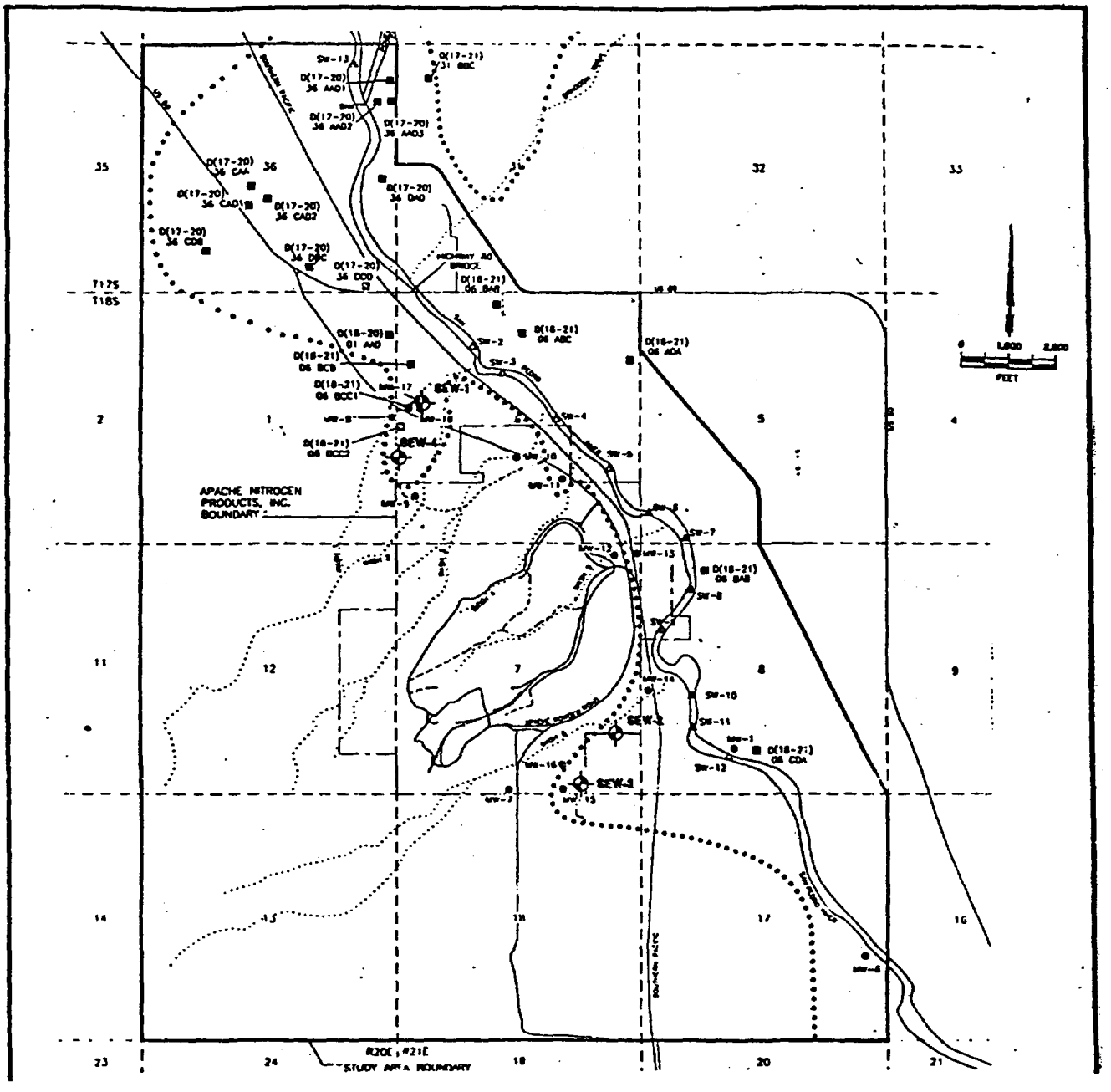


Figure 2

Plan of Proposed Treatment Wetland Sites and Return System

HARGIS + ASSOCIATES, INC.
Hydrogeology / Engineering



EXPLANATION

MONITOR WELL

PRIVATE WELL

SAN PEDRO RIVER SURFACE WATER MONITORING LOCATION

APPROXIMATE BOUNDARY OF SHALLOW AQUIFER

PROPOSED SHALLOW AQUIFER EXTRACTION WELL LOCATION

HARGIS + ASSOCIATES, INC.
Hydrogeology / Engineering

Figure 3. Map Showing Location of Shallow Aquifer Monitoring Wells and Proposed Shallow Aquifer Extraction Well Locations

TABLE 1

PROPOSED CHANGES TO RECORD OF DECISION (ROD)			
PROPOSED PLAN - JUNE 1994	**ROD DECISION - SEPTEMBER 1994**	**NEW DATA COLLECTED DURING RD / EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD)**	**PROPOSED CHANGES TO ROD ESD CHANGE #1 APRIL 1997**
#1. TREATMENT OF PERCHED GROUNDWATER BY CONSTRUCTED WETLANDS IN CONJUNCTION WITH TREATMENT OF THE SHALLOW AQUIFER IN THE SOUTHEAST PORTION OF THE SITE (RATHER THAN BY BRINE CONCENTRATOR)			
EPA's preferred alternative in the Proposed Plan was to use forced evaporation (a brine concentrator) to clean up the perched groundwater to meet federal and state drinking water standard of 10 parts per million (ppm) for nitrate and the maximum contaminant levels (MCLs) for metals. Extraction was to be done by 7 wells, with evaporation of the contaminated groundwater in a brine concentrator, condensation of distilled water, and reuse of the treated water in the ANP plant processes. If the treated water were not recycled, it would be recharged or reinjected to the shallow aquifer after meeting state aquifer and surface water quality standards.	The selected remedy in the ROD for the perched groundwater (GW) is the same as the preferred alternative in the Proposed Plan, as described in the first column of this Table #1. (See ROD, Table 1 (page 2-13) and page 2-27.)	During the period of 1995 to 1996, the water levels in the perched GW monitoring wells (MWs) & piezometers dropped on an average of 7 feet. Prior to ANP ceasing discharge of process wastewaters to the unlined evaporation ponds in April 1995, the discharge was a constant source of recharge to the perched zone. Several perched zone MWs are now dry. The nitrate concentrations in the perched zone MWs and piezometers currently range from 50-500 ppm (approx. average 180 ppm), as compared to the 1980s and the early 1990s when the nitrate concentrations ranged from 100-1,000 ppm. The earlier, higher concentrations were used as a basis for the ROD selecting the brine concentrator to treat the perched GW. Recent investigations indicate that the remaining perched and shallow aquifer GW are very similar in water quality. Because these two areas are hydraulically connected, it now appears more technical and economically feasible to treat these two areas together.	This ESD Change #1 was proposed in a Nov 1996 Fact Sheet to document EPA's decision to treat both the perched GW zone and the shallow aquifer together in constructed wetlands rather than by two separate treatment technologies (e.g., forced evaporation in a brine concentrator and constructed wetlands). It is more sensible technically to extract the perched GW at the point it enters the shallow aquifer (an estim. 150 feet from the eastern boundary of the perched GW zone) than to install new extraction wells in the perched zone which may go dry or may only be an efficient pumping location for a limited period of time. Also, the cost of moving these extraction wells or reconfiguring piping would be high. Locating one extraction well and a constructed wetlands treatment system in the southeast corner of the ANP facility will accomplish both source control of the perched GW zone and treatment of the geographic area of the plume with the second highest level of nitrate contamination.

TABLE 2

PROPOSED CHANGES TO RECORD OF DECISION (ROD)			
PROPOSED PLAN - JUNE 1994	**ROD DECISION - SEPTEMBER 1994**	**NEW DATA COLLECTED DURING DESIGN/ EXPLANATION OF SIGNIFICANT DIFFERENCES**	**PROPOSED CHANGES TO ROD ESD CHANGE #2 APRIL 1997**
#2. TWO LOCATIONS (NORTHERN AND SOUTHERN) FOR SITING THE CONSTRUCTED WETLANDS TO TREAT THE SHALLOW AQUIFER			
EPA's preferred alternative in the Proposed Plan was to extract and clean up the nitrate-contaminated shallow aquifer groundwater (GW) to meet federal and state drinking water standards for nitrate by using a constructed "treatment" wetlands. Treated water would be recharged to the shallow aquifer by "leaky habitat" wetlands, unless water balance studies during the RD investigative phase recommended reinjection into the shallow aquifer or discharge to the San Pedro River to maintain water balance for downstream users. (The Proposed Plan did not indicate the size, number or location of either the proposed "treatment" wetlands or the "leaky habitat" wetlands to be used for recharging the GW. These determinations were to be made based on studies completed during the RD investigative phase.)	The selected remedy in the ROD for the shallow aquifer GW is the same as the preferred alternative in the Proposed Plan, as described in the first column of this Table #2, with one exception. Based on community comments on the Proposed Plan, the ROD expanded the alternatives to be considered during the RD investigative studies for GW recharge to also include agricultural irrigation. (See Table #3 of this ESD for additional details.) (See ROD, Table 2 (page 2-13) and page 2-27.)	During the RD investigative phase in 1995 and 1996, Apache Nitrogen Products, Inc. (ANP) proposed several alternatives for constructed wetlands siting locations to EPA and the Arizona Department of Environmental Quality (ADEQ). To support these alternatives, ANP updated the GW model and completed the analysis of a set of low-level aerial photographs. ANP also conducted additional soil borings. Based on the results of these studies, EPA, ADEQ, and ANP agreed that the most efficient method of treating the shallow aquifer is through siting treatment wetlands in two locations (a northern and southern location). The northern location would capture the plume to prevent it from migrating further northwest. A second set of wetlands in the southern area of the site would provide source control of the remaining perched GW and will capture the remainder of the plume. By siting two separate wetlands, the number of years required to reduce the nitrate concentrations to below 10 ppm (the MCL and treatment standard in the ROD) should be reduced.	This ESD Change #2 was proposed in a Nov 1996 Fact Sheet to document EPA's decision to treat the contaminated shallow aquifer GW in two locations (a northern location and a southern location). The first set of wetlands should be located in a relatively "stagnant" portion of the shallow aquifer north of the ANP facility, near the area where the concentration of nitrate in the shallow aquifer is the highest and where the groundwater circulation is low, in the vicinity of monitoring wells (MW)-17 and MW-18. The northern location also will maximize treatment in an area where several residences are located and where there is the most potential for residential development. A second set of constructed wetlands will be constructed, if needed, in the southeast corner of the ANP property to treat both the shallow aquifer in this area and water from the adjacent perched GW zone. This area is another "stagnant" portion of the shallow aquifer in the vicinity of MW-14 and MW-15. (See Table 1 of this ESD for additional details on the southern area constructed wetlands.)

TABLE 3

PROPOSED CHANGES TO RECORD OF DECISION (ROD)			
PROPOSED PLAN - JUNE 1994	**ROD DECISION - SEPTEMBER 1994**	**NEW DATA COLLECTED DURING RD / EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD)**	**PROPOSED CHANGES TO ROD ESD CHANGE #3 APRIL 1997**
#3. RECHARGE OF TREATED PERCHED AND SHALLOW AQUIFER GROUNDWATER BY GRAVITY-FLOW PIPELINE DISCHARGE TO A SHALLOW AQUIFER RECHARGE LOCATIONS IN WASH 3 (NORTHERN WETLANDS) AND WASH 6 (SOUTHERN WETLANDS)			
EPA's preferred alternative in the Proposed Plan was to recharge treated shallow aquifer groundwater (GW) by "leaky habitat" wetlands, unless water balance studies during the RD investigative phase recommended reinjection into the shallow aquifer or discharge to the San Pedro River to maintain water balance for downstream users. (See Table #2 of this ESD for additional details.)	The selected remedy for recharge of the treated perched and shallow aquifer GW was not specified in the ROD because additional GW modeling, investigation, and monitoring needed to be completed during the RD. The ROD acknowledged the comments received from the community regarding the need for additional studies, including consideration of agricultural irrigation, before making a final determination. (See ROD, Table 2 (page 2-13); page 2-27; and pages 2-32 and 2-33.)	During 1995 and 1996, ANP completed several field studies and investigations. 16 borings were completed in the Fall 1995 along the San Pedro River, where the recharge "leaky habitat" wetlands were proposed to be sited. Data indicated that these areas were underlain by an impermeable layer of clay 6-10 feet below the surface, which would prevent treated GW from effectively recharging into the shallow aquifer. Concerns were raised by the Arizona Department of Water Quality and the Arizona Department of Water Resources regarding the beneficial use of the treated effluent. ANP could not quantify the amount (if any) of treated effluent that would reach the shallow aquifer (or the San Pedro River if the treated effluent were discharged into a wash adjacent to the wetland treatment areas). None of the other recharge alternatives studied, including agricultural irrigation as a secondary use, were as cost-effective for recharging the treated GW to the shallow aquifer.	This ESD Change #3 was proposed in a Nov 1996 Fact Sheet to document EPA's decision, in coordination with the State agencies, that ANP should recharge the treated GW via gravity-flow pipeline discharge to shallow aquifer recharge locations along Wash 3 for the northern area wetlands and Wash 6 for the southern area wetlands. 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 would have required permits and could impact 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.

TABLE 4

PROPOSED CHANGES TO RECORD OF DECISION (ROD)			
PROPOSED PLAN - JUNE 1994	**ROD DECISION - SEPTEMBER 1994**	**NEW DATA COLLECTED DURING RD EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD)**	**PROPOSED CHANGES TO ROD ESD CHANGE #4 APRIL 1997**
#4. LOCATE ADDITIONAL SHALLOW AQUIFER EXTRACTION WELLS IN AREA OF HIGH CONCENTRATIONS OF NITRATE TO EXPEDITE GROUNDWATER CLEANUP			
EPA's preferred alternative in the Proposed Plan was to use four wells to extract the shallow aquifer groundwater (GW) for treatment in the constructed wetlands. The number of extraction wells was based on an earlier GW model developed by Apache Nitrogen Products, Inc. (ANP) for the Feasibility Study (FS).	The selected remedy in the ROD for the extraction and treatment of shallow aquifer GW is the same as the preferred alternative in the Proposed Plan, as described in the first column of this Table #4. However, based on community and agency comments regarding the potential impact of pumping on existing water resources, the ROD states that during the design process GW analyses will be performed to ensure that the extraction and treatment of the contaminated shallow aquifer does not unduly interfere or diminish the existing water resources. The ROD also provides that the community will have an opportunity to participate during the selection of the type and final siting of the constructed wetlands and the method of recharge for the treated GW. (See Rod, Table 2 (page 2-13, page 2-26, and page 2-27.)	During 1996 and 1996, ANP updated a previously developed GW model for several purposes, including: (1) to determine the optimal configuration and number of GW extraction wells; (2) to determine the optimal locations and flow rates for GW extraction wells; and (3)0 to evaluate the impacts of the northern area extraction and treatment wetlands system on the flow of the San Pedro River and the water levels in the shallow aquifer. The initial conclusions of this analysis were that only one extraction well would be needed for the northern area wetlands in the vicinity of monitoring wells (MW)-17 and MW-18 and only one extraction wells would be needed in the southern area. (See Figure 2 of this ESD for a map showing location of extraction wells.)	This ESD Change #4 was proposed in a Nov 1996 Fact Sheet to document the record that after the extraction and treatment systems have been operational for several years, GW monitoring data may indicate hat the initial extraction wells are not sufficient to capture the nitrate-contaminated GW plume, If necessary, additional extraction wells may be needed. After the northern area wetlands have been operating an estimated 4 years, a review would be conducted to determine if an additional shallow aquifer extraction well and the corresponding pipeline would be required to expedite the cleanup of this area. Also, 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 MWs or other design modifications are needed for the souther area extraction and wetlands treatment systems.

TABLE 5

PROPOSED CHANGES TO RECORD OF DECISION (ROD)			
PROPOSED PLAN - JUNE 1994	**ROD DECISION - SEPTEMBER 1994**	**NEW DATA COLLECTED DURING RD / EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD)**	**PROPOSED CHANGES TO ROD - ESD CHANGE #5 APRIL 1997**
#5. CHARACTERIZE, REMOVE, TREAT, AND DISPOSE OFF SITE ANY NEWLY DISCOVERED CONTAMINATED SOILS MATERIALS NOT PREVIOUSLY IDENTIFIED IN RECORD OF DECISION (ROD)			
The Proposed Plan identified three media areas were identified for soils cleanup: (1) Inactive Pond Soils and Sediments; (2) White Waste Materials & Drum Storage Area; and (3) Wash 3 Area (Excluding the Ash and Burn Area). EPA's preferred alternatives for these media areas were: (1) On-site containment (backfill and clay cap) all soils in the 10 inactive ponds (no excavation or disturbance to contaminated soils); (2) Remove drums, excavate & backfill of all drummed wastes and contaminated soils from the white waste materials & drum storage area, including transport, treatment (fixation), and disposal at a RCRA permitted treatment, storage & disposal (TSD) facility; and (3) Excavate & backfill contaminated soils, including transport, treatment (fixation of lead-contaminated soils; incineration of DNT-contaminated soils), and disposal at a RCRA permitted TSD facility.	The ROD identified the same three media areas for soils cleanup as the Proposed Plan and selected EPA's preferred alternatives, as described in the first column of this Table #5. [Neither the Proposed Plan nor the ROD included language regarding how to respond, if other areas of soils contamination were discovered on the site post the ROD (e.g., during the remedial design (RD) investigative phase or during the course of other future field activities).] (See ROD, Table 3 (page 2-16), Table 4 (page 2-17), Table 5 (page 2-17), Table 12 (page 2-31); and page 2-29.)	Several drums (possibly containing dinitrotoluene-contaminated soil) were discovered in inactive pond 8 during the RD investigative phase in the Fall of 1995. Apache Nitrogen Products (ANP), the PRPs, notified EPA of the finding and requested permission to sample the waste materials. ANP also stated that there was a potential for other unidentified contaminated soils materials to be discovered given the size and history of the approximately 1,000 acre explosives manufacturing facility. In December 1995, EPA instructed ANP to include a proposal for cleanup of these drums, and any other newly discovered areas of potential soil contamination, in the Soils RD Workplan for the site.	This ESD Change #5 was proposed in a Nov 1996 Fact Sheet to document the record that additional areas of soils contamination not previously identified in the ROD may be identified on the site and may require response actions, including characterization, removal, treatment, and disposal. If such areas of contaminated soils are discovered, the language in this ESD #5 allows any newly discovered areas to be incorporated into the Soils RD Workplan and the remedial action (RA), as necessary. This ESD also clarifies that any such actions are subject to the approval of EPA and may require new cleanup standards to be added to an amended ROD.