EXPLANATION OF SIGNIFICANT DIFFERENCE # 4
to Record of Decision
Apache Powder Superfund Site
Cochise County, Arizona
July 2017

I. INTRODUCTION

The Apache Powder Superfund Site (Site) is located seven miles south of the City of Benson, in Cochise County, approximately 50 miles southeast of Tucson, Arizona (Figure 1). The purpose of this Explanation of Significant Differences (ESD) #4 is to modify the groundwater and soils remedies for the Site. The purpose for each change is described in detail in Section III of this document.

The previously selected Site remedies are identified in EPA's September 30, 1994, Record of Decision (ROD), subsequent ESDs signed in 1997, 2000, and 2008, and a ROD Amendment signed in 2005. The details of these remedies, including changes to the Conceptual Site Model (CSM) or scope of the work for these remedies, are summarized in the attached Table 1 (Groundwater) and Table 2 (Soils).

Under Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendment and Reauthorization Act of 1986, 42 U.S.C. § 9617(c), and Section 300.435(c)(2)(i) (55 Fed. Reg. 8666, 8852 (March 8, 1990)) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), EPA is required to publish an ESD when significant (but not fundamental) changes are made to a final remedial action as described in the ROD.

This document provides a brief background of the Site, the new modifications to the remedy, and the basis of the modifications to the remedy. EPA is issuing this ESD #4 to update both the groundwater and soils remedies based on new information provided by monitoring data and additional field studies conducted during the period of 2007 through 2016, changes to the CSM for the Southern Area Groundwater at the Site, and to address a new media component, Legacy Soils Area, an area of the Site not explicitly addressed in prior decision documents. The changes clarify the remaining cleanup work to be conducted, update the media components based on the current CSM, and promote more efficient Site cleanup.

This ESD #4 becomes part of the Administrative Record for the Site. The complete Administrative Record for the Site is available at the following locations:

Arizona Department of Environmental Quality
Phoenix Main Office
1110 W. Washington Street
Phoenix, Arizona 85007

U.S. EPA Records Center
75 Hawthorne Street, Suite 3110
San Francisco, California 94105

EPA, the lead agency, provided a fifteen (15) work-day comment period to the Arizona Department of Environmental Quality (ADEQ), the support agency. ADEQ comments on this

ESD #4 are summarized in Section IV of this document and included in the Site Administrative Record. Pursuant to 40 C.F.R. § 300.435(c)(2)(i), a formal public comment period is not required for this ESD #4. The ESD will be available to the public in the Site Administrative Record. EPA will publish a notice and a brief summary of the ESD in a local newspaper of general circulation.

II. BACKGROUND

A. Site Background and History

Apache Nitrogen Products, Inc. (ANPI) is the current owner and operator of the Site and manufactures nitric acid, solid and liquid ammonium nitrate, and nitrogenous fertilizer solutions. As of 2017, ANPI's property encompasses approximately 1,200 acres. The property is located south of Interstate 10 in southeastern Arizona, and is bounded on the east by the San Pedro River (Figure 2). The initial Site study area also included areas of nitrate-contaminated groundwater and surface water located outside of ANPI's property boundary.

ANPI (formerly known as the Apache Powder Company), began operations in 1922 as a manufacturer of explosives and industrial chemicals, including nitroglycerin, nitric acid, ammonium nitrate, dinitrotoluene, and blasting agents. These operations produced both solid and liquid wastes, which were historically disposed of on the property owned and operated by ANPI, contaminating both groundwater and soils at the Site.

Prior to 1971, ANPI allowed facility wastewater to flow into unlined ditches and washes, which lead to the San Pedro River, resulting in contamination of both the river and the shallow aquifer in the Northern Area of the Site. Later, from 1971 until 1995, ANPI discharged these wastewaters into six unlined evaporation ponds located in the Southern Area of the Site, which caused sediment contamination in the ponds and contamination of a perched groundwater zone both underneath and adjacent to the ponds. This contamination then migrated into a contiguous area to the east, which was later identified as the Molinos Creek Sub-Aquifer (MCA), a part of the shallow aquifer. The primary groundwater contaminant in the Southern Area was believed to be nitrate until perchlorate was discovered in the Southern Area perched system and the MCA in 1998.

In the 1980s and 1990s, soils contamination was also discovered on the Site. During the 2000s, until as recently as 2016, contaminants of concern (COCs) have been discovered in soils, drums, structures (e.g., buildings, sumps, tanks, pipelines), and other areas where contaminants had been buried or migrated in various operational and outlying areas of the Site. In the past, dinitrotoluene, trinitrotoluene, vanadium pentoxide, lead, and other COCs have been identified in the soils adjacent to or underneath structures at the Site. In 1998, perchlorate was detected in the perched zone in the Southern Area and in soils adjacent to the operations area.

To address these contamination problems, the Site was proposed for listing on the National Priorities List (NPL) in 1986, and placed on the NPL in 1990.

B. Selected Remedies in Prior Decision Documents

Since the 1990 NPL listing, EPA signed the following Site-related decision documents:

- 1994 Record of Decision (ROD)
- 1997 ESD #1
- 2000 ESD #2
- 2000 Time Critical Removal Action
- 2005 ROD Amendment
- 2008 ESD #3
- 2008 Preliminary Close-Out Report for remedy construction
- 2014 Time Critical Removal Action

Summaries of these documents are attached as Tables 1 and 2. The 1994 ROD did not identify Operable Units (OUs) for the Site. Instead, the ROD and ESD #3 identified the following media components, two for groundwater and four for soils:

- Media Component 1 - Perched Groundwater
- Media Component 2 - Shallow Aquifer
- Media Component 3 - Inactive Pond Soils and Sediments
- Media Component 4 - White Waste Materials and Drum Storage Area
- Media Component 5 - Wash 3 Area
- Media Component 7 – Other Drums

The groundwater-related Media Components (Perched Groundwater, and Shallow Aquifer) were identified in the 1994 ROD. The soils-related media components were identified in the 1994 ROD and the 2000 ESD #2. A summary of EPA's selected groundwater and soils remedies, which are now being modified by this ESD #4, are summarized in Table 1 (Groundwater Remedy Requirements and Modifications Since 1994 ROD) and Table 2 (Soils Remedy Requirements and Modifications Since 1994 ROD). These tables also summarize the changes to the CSM or the scope of work for both the groundwater and soils remedies at the Site.

In 2000 and 2014, ANPI conducted two separate Time-Critical Removal Actions consisting of controlled burns to treat explosives materials (trinitrotoluene, nitroglycerin, and detonation cord) after these contaminants were discovered in soils and in historic structures on the Site.

C. Investigation Results and Changes in the CSM Since the 2005 ROD Amendment Southern Area Groundwater

The CSM has changed considerably since the 1994 ROD and the 2005 ROD Amendment due to additional field studies conducted during the last decade. These changes relate to EPA's understanding of both the nature and extent of the perched zone (now known to be a perched system with two sub-components) and the proximity of the perched zone to the shallow aquifer.

At the time of the 1994 ROD, the Southern Area Groundwater was defined as two separate areas: (1) a single perched zone underneath unlined evaporation ponds; and (2) a shallow alluvial aquifer connected to the San Pedro River. The single perched zone was assumed to be hydraulically connected to the shallow aquifer and the San Pedro River (Figure 3, Conceptual

View in 1994). However, this concept is no longer supported by the current data. As the CSM evolved over time, based on a growing body of information, ANPI has completed three updated southern area characterization reports in 2003 (Hargis, 2003), 2007 (Hargis, 2007) and again in 2017 (Hargis, 2017). The 2003 report redefined the Southern Area Groundwater Area as four separate areas: (1) perched zone; (2) an area immediately east of the perched zone identified as the MCA; (3) a laterally confining unit with limited water; and (4) the shallow aquifer connected to the San Pedro River (Figures 4, Conceptual View in 2003). In 2003, these areas were still believed to be hydraulically connected (even if limited) to the shallow aquifer. The 2007 report further refined the CSM based on additional drilling conducted in the Southern Area. The investigative studies concluded that the MCA was not a continuous system, but instead greatly reduced in lateral extent. The MCA was determined to be separated into two lobes: one small uncontaminated area in the north near Monitor Well MW-24, and a larger contaminated area in the south still referred to as the MCA) (Figure 5, Conceptual View in 2007).

Most recently, field studies conducted from 2012-2016 further demonstrated that the MCA was an isolated unit (part of a separate "perched system") without hydraulic connection to the shallow aquifer along the San Pedro River, as shown in the attached cross-section (Figure 6, Conceptual Southern Area Cross-Section in 2017). As of 2017, the perched groundwater created by migration from the unlined evaporation ponds has reduced significantly in size from its original extent in 1995 to just minimal pockets of residual contaminated water (Figure 7, Areal Extent of Water in Perched Zone A). The contaminated Perched System is recognized as two sub-areas: Perched Zone A (PZ-A) and Perched Zone B (PZ-B) (Figure 8, Conceptual View in 2017), formerly known as the MCA (Figure 5, Conceptual View in 2005). The isolated and shrinking Perched Zone A to the west (which was created by the prior discharges of process waste waters into unlined evaporation ponds on the ANPI property) no longer has hydraulic connection to Perched Zone B, and the Perched Zone B has no hydraulic connection to the shallow aquifer along the San Pedro River. Although nitrate was detected in the shallow aquifer along the San Pedro River in the 1990s, nitrate has not been detected in the shallow aquifer or the river in the Southern Area since the mid-2000s. Perchlorate has never been detected in the shallow aquifer or the river. Therefore, the cleanup standards for the shallow aquifer in the Southern Area have been met.

Because there is no connection to the shallow aquifer, Monitored Natural Attenuation (MNA) has been determined to be ineffective and inappropriate for the Southern Area Perched System (previously described as the perched zone, MCA and shallow aquifer). This determination is based on the lack of hydraulic continuity, limited hydraulic conductivity, insufficient yield and decreasing water levels in the perched system. There is insufficient yield (less than 150 gallons per day) for this water to be a viable potable water supply; therefore, there is no need to restore the contaminated perched system to drinking water standards. EPA, in consultation with ADEQ, has determined that the perched system is not suitable for future use as potable drinking water sources because of the decreasing and limited quantity of residual water present in this area.

D. Soils Activities Conducted in Recent Years and Future Soils Cleanup Activities

In 2012, ANPI informed EPA that it intended to begin a multi-year project to demolish legacy structures and buildings, which historically had been used for manufacturing or storage of

hazardous materials or explosives or for other purposes and are no longer in use. EPA concurred with ANPI's proposal with the understanding that if any contamination should be discovered as a result of these activities, ANPI would characterize, remove, treat and dispose off-Site any contaminated materials or soils as required in EPA's 1994 ROD and 2000 ESD #1. In 2013, to ensure confirmatory soils sampling work was properly conducted after the structures were demolished, at EPA's direction, ANPI prepared a Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) for conducting this work. In the intervening years, ANPI has identified over 200 structures for demolition within the operations area of the facility (Figure 9, Location of Legacy Soils Area). A portion of this work has been completed and additional work still needs to be completed in 2017-2018.

Prior to demolishing any of these structures, at EPA's direction, ANPI hired State-certified contractors in 2013 to survey and screen the structures for asbestos containing materials (ACM) or lead containing materials (LCM). All abatement and demolition work is performed by licensed contractors certified for the handling of hazardous materials, including LCM and ACM, and will be managed consistent with the respective regulatory guidance documents for their identification, handling and removal. Other chemicals and potentially hazardous materials are identified during each building demolition site survey performed in advance of the demolition activities. After the demolition is complete, EPA requires confirmatory soil sampling to confirm no soil contamination is left in place. As many of the structures were constructed more than 50 years ago, to comply with the National Historic Preservation Act (NHPA), EPA consulted with the State Historic Preservation Officer. In 2013, at EPA's direction, ANPI hired an NHPA expert to survey, photograph, and document the structures identified for demolition.

In 2014-2015, during survey activities and confirmatory soil sampling conducted after demolition of an estimated 160 of these structures, ANPI detected soils contaminated with previously unidentified contaminants of potential concern (COPCs), primarily explosives and hydrocarbon related compounds. Cleanup standards have not been selected in prior decision documents for these COPCs, which will need to be removed and disposed off-Site or treated on-Site. For work conducted previously, ANPI disposed of contaminated soils exceeding residential cleanup standards at a regulated disposal facility in accordance with the selected soils remedies in EPA's 1994 ROD and ESD #1. ANPI is aware it must request permission from EPA prior to disposal of any waste materials off-Site in accordance with the Superfund Off-Site Rule. All disposal facilities must be authorized specifically to receive CERCLA wastes pursuant to CERCLA Section 121(d)(3), 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440.

ANPI recently proposed using industrial soils cleanup standards to address any potential contamination discovered during future confirmatory soil sampling. Prior EPA decision documents selected Arizona Soil Remediation Levels (SRLs) at residential levels as the appropriate cleanup standards, except where background concentrations were greater than the residential SRLs, in which case the background concentrations would serve as the cleanup standards. Although in 2000, the current land use for the Apache Powder Superfund site was industrial and had been continuously since ANPI started operating in 1922, ANPI's owners at the time of previous decision documents requested that EPA select residential SRLs rather than non-residential or industrial cleanup standards in ESD #2.

ANPI's ownership changed in 2008, and the new owners have a different viewpoint. The current owners have reconfirmed that future use will never be residential and ANPI's intent is to upgrade its ammonium nitrate manufacturing facility for long-term future use to a state-of-the-art industrial facility. ANPI has agreed to additional Institutional Controls (ICs) to prevent recreational or residential use, as necessary, in the Legacy Soils Area (see Figure 9) if any contamination is left in place above residential levels. Accordingly, EPA determined that industrial cleanup standards with ICs are appropriate in areas where remaining contaminants exceed residential SRLs.

III. MODIFICATIONS TO THE REMEDY AND DESCRIPTION OF SIGNIFICANT DIFFERENCES

A. Modifications to the Remedy

This ESD #4 modifies the previously selected remedies for the groundwater and soils remedies as follows:

1. *Redefines Media Component 1 as the "Southern Area Perched System," not the "Perched Groundwater" as originally defined in the 1994 ROD.*

   This ESD revises the title of Media Component 1 – Perched Groundwater (which originally referred to the perched water underneath the unlined evaporation ponds) to "*Media Component 1 – Southern Area Perched System*" to clarify that the perched water (contaminated with nitrate and perchlorate) is only located in the Southern Area, is a perched system comprised of two perched areas (PZ-A and PZ-B), and is hydraulically isolated and not connected to the uncontaminated shallow aquifer in the Southern Area.

2. *Eliminates MNA as a remedy for the Southern Area Perched System, while retaining ICs and long-term groundwater monitoring.*

   MNA is eliminated as a remedy for the Southern Area Groundwater (previously described as the MCA and nearby shallow aquifer) because of changing Site conditions as described in the updated 2017 CSM. MNA has been determined to be ineffective and inappropriate in the MCA due to the lack of hydraulic continuity and due to the decreasing water levels in the perched system. Additionally, EPA now understands that there is no hydraulic connection to an aquifer (such as the nearby shallow aquifer) and insufficient yield (less than 150 gallons per day) for this water to be a viable potable water supply, and therefore restoration of the contaminated perched water system to drinking water standards is unnecessary. The ICs established in EPA's 2005 ROD Amendment will remain in place to prohibit the installation of wells in the contaminated shallow aquifer underlying the ANPI facility and to protect and caution the public about using the contaminated perched system in the Southern Area for drinking water purposes. Long-term monitoring will continue to confirm that water levels remain low or continue to decrease and to detect any unexpected changes in water chemistry in the perched system.

It should be noted that while EPA's prior decision documents required the shallow aquifer in the Southern Area be cleaned up to groundwater cleanup standards for nitrate and perchlorate, this requirement has been met since perchlorate has never been detected anywhere except in the perched system in the Southern Area, and nitrate has not been detected in the Southern Area shallow aquifer or adjacent San Pedro River since the mid-2000s.

3. *Establishes an eighth media component, Legacy Soils Area, to identify the areas of the ANPI facility where potential soils contamination has previously been discovered or may be discovered in the future when historical structures are removed from this area of the Site.*

   This ESD adds a new "*Media Component 8 - Legacy Soils Area*" to the remedy because the demolition activities in a large area of the Site have the potential to contaminate soils (Figure 9, Location of Media Component 8 - Legacy Soils Area). There is a threat of a release of hazardous substances or explosives wastes into soil from these activities, which could pose a risk to human health or the environment. Similar to the selected soil remedies in the 1994 ROD and subsequent ESDs, this soils modification expands and implements the same selected remedies, excavation and off-Site disposal, or on-Site treatment or encapsulation, for any potential discoveries of new contamination in the Legacy Soils Area.

4. *Establishes industrial (non-residential) soils cleanup standards for COPCs for future work conducted in the Legacy Soils Area*.

   Table 3 of this ESD modifies the soils remedy to provide an updated list of COPCs and their selected industrial (non-residential) cleanup standards for the remaining cleanup activities in the Legacy Soils Area and in any other areas of the Site. If confirmatory soil sampling detects contamination exceeding industrial cleanup standards in the underlying soils after removal of the demolition debris and the cement foundations, the contaminated soil must be removed and additional confirmatory soil sampling conducted to ensure the underlying soil does not contain COPCs that exceed cleanup standards.

5. *Modifies Soils ICs for contamination left in place in the Legacy Soils Area.*

   This ESD expands the ICs established in EPA's 2005 ROD Amendment for the capped inactive ponds where contaminated soils above residential cleanup levels remain on-Site. If soils below industrial (non-residential) cleanup standards and above residential cleanup standards are left on-Site, ICs restricting recreational and residential use will be put in place to prevent direct contact with contaminated soils and to protect and caution the public about the presence of contaminants on-Site. ANPI will file a Declaration of Environmental Use Restriction (DEUR) on areas of the Site where contaminated soils are left in place above Arizona residential SRLs. EPA will be notified if the property owner seeks a variance or termination of the DEUR. Access restriction, such as fencing and/or signage, will be implemented for areas with a DEUR prohibiting excavation or other disturbance of the soils.

B. Description of Significant Differences

The remedy modifications described in Section III.A. above are significantly different (however, not fundamentally different) from the prior selected remedies. The remedy changes in this ESD #4 modify and further refine the 1994 ROD remedy and subsequent changes or modifications made in the 2005 ROD amendment and ESDs in the intervening years. This ESD #4 modifies Media Component 1 (Perched Groundwater) and adds a new Media Component 8 (Legacy Soils Area). No other media components are affected by this ESD. The reasons for the modifications are because in recent years new data have been collected, the groundwater conditions and EPA's understanding of those conditions have changed significantly in the Southern Area, and there have been new soils contamination discoveries as a result of the demolition of legacy structures on the Site. This has resulted in significant changes to the groundwater CSM in the intervening years. The primary purpose of these modifications is to clarify the administrative record regarding the remaining cleanup work to be conducted, update the media components based on the current CSM, and promote more efficient Site cleanup. None of the modifications will create significant new remedy costs. The modification for the Southern Groundwater perched system should reduce long-term monitoring costs as the perched system continues to dewater. Finally, the modifications proposed for these three media components in ESD #4 are consistent with prior remedy decisions and with the NCP for Superfund.

IV. SUPPORT AGENCY COMMENTS

EPA consulted with ADEQ in formulating these changes and in developing this ESD #4. EPA provided ADEQ with a fifteen (15) work-day comment period on this ESD #4. ADEQ supports the ESD's conclusions.

V. STATUTORY DETERMINATIONS

This ESD #4 modifies the selected remedy for both groundwater and soils, as described above. EPA believes it is appropriate to modify the selected remedy as set forth in this ESD. The selected remedy for the Site will remain protective of human health and the environment, continue to comply with the applicable or relevant and appropriate federal and state requirements for this remedial action, and continue to be cost-effective. While the changes and clarifications contained in this ESD #4 are significant, none of the proposed changes fundamentally change the remedy. EPA believes these remedy modifications will be cost-effective and clarify the cleanup goals for closing out the remaining work at the Site. The modified remedy satisfies CERCLA Section 121.

VII. PUBLIC PARTICIPATION ACTIVITIES

No public comment period is required for this ESD #4 because the changes are not fundamentally altering the selected remedy. In accordance with 40 C.F.R. § 300.435(c)(2)(ii), this final ESD #4 and all relevant, supporting documents will be contained in the Administrative Record for the Site. EPA will also publish a newspaper notification of this ESD #4.

Approved By:

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7/13/2017
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7/25/2017
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Table 1. Groundwater Remedy Requirements and Modifications Since 1994 ROD

Changes to Conceptual Site Model (CSM):
Between 2012 and 2016, additional investigations were conducted both in the Southern Groundwater Area and the Northern Groundwater Areas of the Site. Additional wells and borings were installed in both areas, and pump tests and other aquifer studies have been conducted.

Southern Area Groundwater: The CSM has changed considerably since the 1994 ROD. At the time, the perched zone was assumed to be hydraulically connected (even if limited) to the shallow aquifer along the San Pedro River. However, this concept is no longer supported by the current data. The CSM has evolved significantly over the last 20 or more years. An area east of the original perched zone, named the Molinos Creek Sub-Aquifer (MCA), was identified in a 2003 Southern Area Characterization Report. This second area was formed by contaminated water migrating from the original perched zone located to the west underneath the unlined evaporation ponds, which was sitting at a higher elevation on dense impermeable clay. The 2003 report concluded that both areas were separated from the shallow aquifer along the San Pedro River by a lateral confining unit of mixed clays and other soil types. After additional studies were completed, an updated 2007 Characterization Report and CSM indicated that monitored natural attenuation (MNA), rather than constructed wetlands, would be a more appropriate remedy for the MCA after the 1998 discovery of perchlorate in the Southern Area. By the time of the 2012 Five Year Review (FYR), the MNA remedy was determined to not be functioning due to increasing, not decreasing, concentrations of nitrate and perchlorate in the perched zone and the MCA. The 2012 FYR concluded that the MCA was hydraulically isolated and recommended consideration of in-situ treatment. Subsequent studies and characterization work determined that this option was infeasible due to the stagnant and confined nature of the MCA. Also, both the perched zone and MCA were showing continuing decreasing water levels. By 2013, the perched zone was almost dry (dewatered), partially due to an on-going extraction/evaporation system. The MCA also showed decreasing water levels and no water present in several areas where new wells or borings were installed. Pump tests in the MCA recovered very little water and indicated no hydraulic conductivity or flow-through to the nearby shallow aquifer. Therefore, the perched system has no connection to a potable water supply.

A 2017 Revised Southern Area Groundwater Characterization Report and an Updated CSM now define the Southern Area Groundwater as a fully isolated perched system, comprised of the original perched zone (PZ-A) and the MCA (PZ-B). It is an isolated body with insufficient yield to be a potential future drinking water source. In addition, while nitrate was detected in the nearby shallow aquifer along the San Pedro River in the 1990s, nitrate has not been detected in the shallow aquifer or the river in the Southern Area since the mid-2000s. Perchlorate has never been detected in the shallow aquifer or the river.

Table 1 (cont.)

1994 ROD	1997 ESD #1	2005 ROD Amendment	2007 ESD #3
ROD Remedy: • *Install additional groundwater monitor wells to determine the lateral extent of nitrate contamination in the shallow aquifer and the perched zone;* • *Conduct a groundwater monitoring program to collect chemical water quality data and water levels;* • *Extract and treat the perched groundwater by forced evaporation (brine concentrator), in conjunction with treatment of ANPI's process wastewaters, to meet the federal and state drinking water standards of 10 parts per million (ppm) for nitrate;* • *Extract and treat the shallow aquifer by use of constructed wetlands to meet the federal and state drinking water standard of 10 ppm for nitrate, and recharge the treated water through wetlands, agricultural irrigation, discharge or some combination of*	ESD Modifications: • *Allow perched groundwater to drain to the shallow aquifer to be extracted and treated by constructed wetlands (rather than the brine concentrator) in conjunction with the extraction and treatment of the nitrate-contaminated shallow aquifer groundwater in the southeast portion of the Site;* • *Allow for two locations, a northern and southern location, for siting the constructed wetlands to treat the nitrate-contaminated shallow aquifer groundwater, including the use of a pipeline or several pipelines to carry the nitrate-contaminated groundwater from the extraction wells to the treatment areas;* • *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;* • *Allow for additional shallow aquifer extraction wells to be*	ROD Changes: • *Change remedy for Southern Area Groundwater (contaminated with nitrate and perchlorate) to monitored natural attenuation (MNA) from constructed wetlands and continue to use ICs;* • *Add a cleanup standard for perchlorate.* Included the following ICs and control measures to avoid use of the contaminated shallow aquifer groundwater as drinking water until cleanup levels are reached: • *File a Declaration of Environmental Use Restriction (DEUR) in accordance with Arizona Revised Statutes, ARS Section 49.152.C, prohibiting residential use of the property and installation of wells in the contaminated shallow aquifer groundwater underlying the ANPI facility until groundwater cleanup standards are met, and requiring notification to EPA if the property owner seeks a variance or termination of the DEUR;* • *Restrict access, such as fencing and/or signage on ANPI's property, for areas with potential access to contaminated shallow aquifer groundwater or surface water;*	ESD Modifications: • Allow MNA for the leading edge of the Northern Area Groundwater nitrate plume, and all other contaminated portions beyond the extraction well's capture zone; • Continue on-going extraction and treatment with the existing extraction well (as described in the 1994 ROD). • Include ICs and physical measures for the entire plume (as described in the 2005 ROD Amendment).

these methods as determined during Remedial Design; • *Monitor long-term effectiveness and permanence;* • *Replace contaminated shallow aquifer domestic wells with deep aquifer wells;* • *Implement Institutional Controls (ICs) so that future use of the Site is compatible with the remedial goals and maintain the protection provided by the soil caps over inactive evaporation ponds.*	*located in areas of high concentrations of nitrate to expedite groundwater cleanup.*	• *Conduct education and out-reach practices, including but not limited to semi-annual reporting to all property owners and households within the known footprint of the contaminated groundwater both in the Southern and Northern Areas, to inform potentially affected community members about the extent of contamination and the risks of using the contaminated shallow aquifer for drinking water purposes;* • *Report to EPA on the status of all wells in both the shallow and deeper aquifer within and near the footprint of the contaminated groundwater both in the Southern and Northern Area, including detailed descriptions of the type of well, depth of well, use of well, construction details, and the ownership information (including property transfers and/or lot-splits), so that any potential exposure pathways can be identified in advance to notify and protect individuals living over the contaminated groundwater plume from inadvertently drinking contaminated water.*	

Table 2. Soils Remedy Requirements and Modifications Since 1994 ROD

Changes to Conceptual Site Model (CSM) or Scope of Cleanup Activities:
The most significant change to the scope of the soils cleanup activities since the 1994 ROD has been the decision by the current Site owners of the ANPI facility to demolish legacy structures and buildings which are no longer in use that historically had been used for manufacturing or storage of hazardous materials or explosives or for other purposes, and clean up any legacy soils contamination. The CSM has also changed, because the current owners want to clean up the residual contaminated soils to industrial (non-residential) cleanup standards, not residential cleanup standards, as the facility has been operating almost 100 years and the current owners see no future use for this Site for residential purposes. Therefore, the current owners are willing to place ICs, in the form of a Declaration of Environmental Use Restriction (DEUR) on specific portions of the facility, as needed.

None of the previous decision documents explicitly addressed soil contamination caused by the old buildings and other historic structures on the Site dating from the 1920s. Many of these structures posed a health and safety risk to on-site workers due to their degraded condition. Although ESD #1 included remedial requirements to characterize, remove, treat and dispose of any newly discovered unidentified waste materials (not previously identified in the ROD) discovered in soils, the scope of the Legacy Soils Area is considered more extensive than small-scale new discoveries. In 2012, ANPI notified EPA that it planned to demolish an estimated 160 legacy buildings and other structures in a series of seven phases as a multi-year project. As of 2017, the estimated number of structures has grown to over 200 structures. These demolition activities are located geographically throughout the ANPI facility. After demolishing of approximately 165 structures between 2012 and 2016, confirmatory soil sampling indicates that there is potential for impacts from a broad range of chemicals of Potential Concern (COPCs), primarily explosives, associated with these historical operations that may be detected during the confirmatory soil sampling process.

1994 ROD	1997 ESD #1	2000 ESD #2	2005 ROD Amendment
ROD Remedy: • *Excavate designated areas (identified in the ROD with soils contamination) to clean-up standards;* • *Consolidate and transport excavated materials to an off-site permitted facility for treatment and disposal;* • *Construct a low permeability clay cap over the contaminated soils in the inactive evaporation ponds;* • *Monitor the clay cap on an annual basis*	ESD Modifications: • *Allow for characterization, removal, treatment and off-site disposal of any previously unidentified waste materials not previously identified in the ROD discovered in any of the soils on-site.*	ESD Modifications: • *Establish cleanup standards for compounds or COCs (either recently detected or without ROD cleanup standards) in On-Site soils, sediments or drums;* • *Modify soils cleanup remedies to "no further action" for selected soils media components where hazardous substances were not detected or the levels of contamination do not*	ROD Changes: • *Change remedy for contaminated soils in the inactive ponds from containment with a clay cap to containment with a native soil cap and include use of ICs;* • *Modify remedy by adopting ADEQ's risk assessment procedures, in addition to previously adopted cleanup levels.* Include the following ICs and control measures to prevent direct contact with

to ensure integrity of cap is maintained and that the ponds do not act as a continuing source of groundwater contamination; • *Implement Institution Controls (ICs) so that the future use of the Site is compatible with the remedial goals and maintain the protection provided by the clay caps.*		*exceed EPA's soil cleanup standards;* • *Add an additional soils media component #7 (Other Drums) to incorporate additional drums discovered at the Site in Warehouse 244 and Wash 5.*	contaminated soils left in place on-Site until cleanup levels are reached: • *A Declaration of Environmental Use Restriction (DEUR), in accordance with Arizona Revised Statutes (ARS) Section 49.152.C, will need to be in place as long as waste remains at the Site, and EPA will need to be notified if the property owner seeks a variance or termination of the DEUR;* • *Access restriction, such as fencing and/or signage, for areas with a DEUR prohibiting excavation or other disturbance of the soil cap.* • *A Soils Operation and Maintenance (O&M) Workplan describing planned remediation and O&M activities, including any necessary engineering controls, for areas on the Site with residual soils contamination that may pose a risk to human health, including all areas where DEURs or other type of use restrictions (including Voluntary Environmental Management Use Restrictions or VEMURs) are required or have been established.*

TABLE 3. APACHE POWDER SUPERFUND SITE - SOIL CLEANUP STANDARDS

Chemical of Potential Concern (COPC)	. . . Milligrams per Kilogram . . .		
	Arizona SRL Residential[1]	Arizona SRL Non-Residential[2]	EPA Selected Cleanup Standard
INORGANICS			
ASBESTOS	NS	NS	Refer to Footnote [3]
NITRATE AS NITROGEN	NS	NS	100,000[4]
PERCHLORATE	55	720	720
EXPLOSIVES (NITROAROMATICS AND NITRAMINES)			
1,3-DINITROBENZENE	6.1	62	62
1,3,5-TRINITROBENZENE	1,800	18,000	18,000
2-NITROTOLUENE	0.93	22	22
2,4-DINITROTOLUENE	120	1,200	1,200
2,6-DINITROTOLUENE	61	620	620
2,4,6-TRINITROTOLUENE	18	310	310
3-NITROTOLUENE	730	1,000	1,000
4-NITROTOLUENE	13	300	300
HMX	3,100	31,000	31,000
NITROBENZENE	20	100	100
NITROGLYCERIN	39	1,200	1,200
PETN	NS	NS	570[5]
RDX	5.0	160	160
TETRYL	NS	NS	2,300[6]
SEMIVOLATILE ORGANIC COMPOUNDS (SVOCs)			
BENZO[A]ANTHRACENE	0.69	21	21
BENZO[A]PYRENE	0.069	2.1	2.1
BENZO[B]FLUORANTHENE	0.69	21	21
CARBAZOLE	27	860	860
CHRYSENE	68	2,000	2,000
DIBENZO(A,H)ANTHRACENE	0.69	2.1	2.1
DIBENZOFURAN	140	140	140
FLUORANTHENE	2,300	22,000	22,000
FLUORENE	2,700	26,000	26,000
INDENO(1,2,3-CD)PYRENE	1	21	21
NAPHTHALENE	56	190	190
PENTACHLOROPHENOL	3.2	90	90
PYRENE	2,300	29,000	29,000

TABLE 3. APACHE POWDER SUPERFUND SITE - SOIL CLEANUP STANDARDS

Chemical of Potential Concern (COPC)	. . . Milligrams per Kilogram . . .		
	Arizona SRL Residential[1]	Arizona SRL Non-Residential[2]	EPA Selected Cleanup Standard
TOTAL HYDROCARBONS (TPHs)			
TOTAL FUEL HYDROCARBONS (C10-C32)	4,100[7]	18,000[7]	18,000[7]
DIESEL RANGE ORGANICS (C10-C22)	4,100[7]	18,000[7]	18,000[7]
OIL RANGE ORGANICS (C22-C32)	4,100[7]	18,000[7]	18,000[7]
METALS			
ANTIMONY	31	410	410
ARSENIC	10	10	Refer to Footnote[8]
BARIUM	15,000	170,000	170,000
BERYLLIUM	150	1,900	1,900
CHROMIUM, TOTAL	NS	NS	4,500[9]
LEAD	400	800	800
MANGANESE	3,300	32,000	32,000
MISCELLANEOUS INORGANICS			
VANADIUM	78	1,000	1,000
VANADIUM PENTOXIDE	78	1,000	1,000

ABBREVIATIONS AND ACRONYMS:

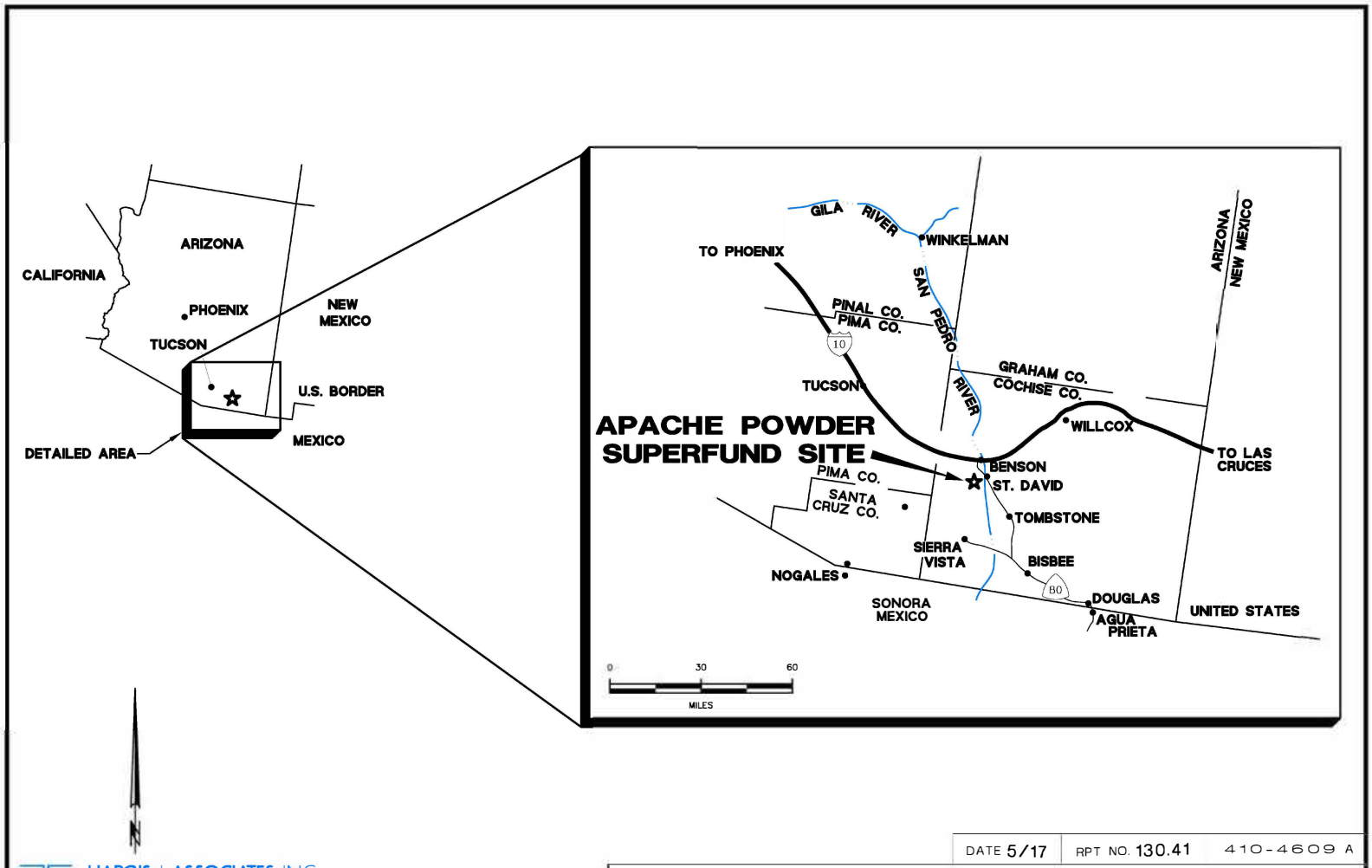
EPA = U.S. Environmental Protection Agency
NS = No specified Arizona SRL
SRL = Soil Remediation Level

FOOTNOTES:

EPA selected cleanup standards are based on the 2009 Arizona Administrative Code (AAC) Title 18; Ch. 7 Appendix A non-residential Arizona Soil Remediation Levels (SRL), except where noted in the footnotes below:

[1] = Residential - 2009 Arizona Administrative Code (AAC) Title 18; Ch. 7, Appendix A Residential SRLs, March 31, 2009.
[2] = Non-Residential - 2009 Arizona Administrative Code (AAC) Title 18; Ch. 7, Appendix A Non-Residential SRLs, March 31, 2009.
[3] = Asbestos - Cleanup Standard: (1) Step 1-Look for visual evidence; (2) Step 2-Clean up to non-visual to a minimum depth of 1 foot below ground surface (bgs).
[4] = Nitrate as Nitrogen - 2000 EPA Superfund Explanation of Significant Differences: Apache Powder Co. EPA ID: AZD008399263 OU 01 St. David, AZ Table 2 - Comparison of Potential Cleanup Levels and EPA Selected Cleanup Standards for Contaminated Soils and Waste Materials, EPA Selected Cleanup Standard ESD #2 09/29/2000.
[5] = PETN - 2017 EPA Region IX Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1) Industrial Soil, June 2017.
[6] = Tetryl - 2017 EPA Region IX Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1) Industrial Soil, June 2017.
[7] = Total Fuel Hydrocarbons - 2009 Arizona Administrative Code (AAC) Title 18; Ch. 7, Appendix B 1997 Soil Remediation Levels (SRLs), March 31, 2009.
[8] = Arsenic - Site-specific soil background concentrations were calculated according to the methodology specified in AAC R18-7-204, using concentrations of all background soil samples collected during the remedial investigation (i.e., SS-01 through -04, S-1, and S-2). Applying the rule, the 95% upper confidence level of the mean concentrations yielded concentrations of 24.58 mg/kg for surficial soils; 17.00 mg/kg for granite wash sediments; and 36.29 mg/kg for St. David clay. This methodology is consistent with EPA Guidance 9285.708I.
[9] = Total Chromium - 2009 Arizona Administrative Code (AAC) Title 18; Ch. 7, Appendix B 1997 Soil Remediation Levels (SRLs), March 31, 2009.

Figure 1



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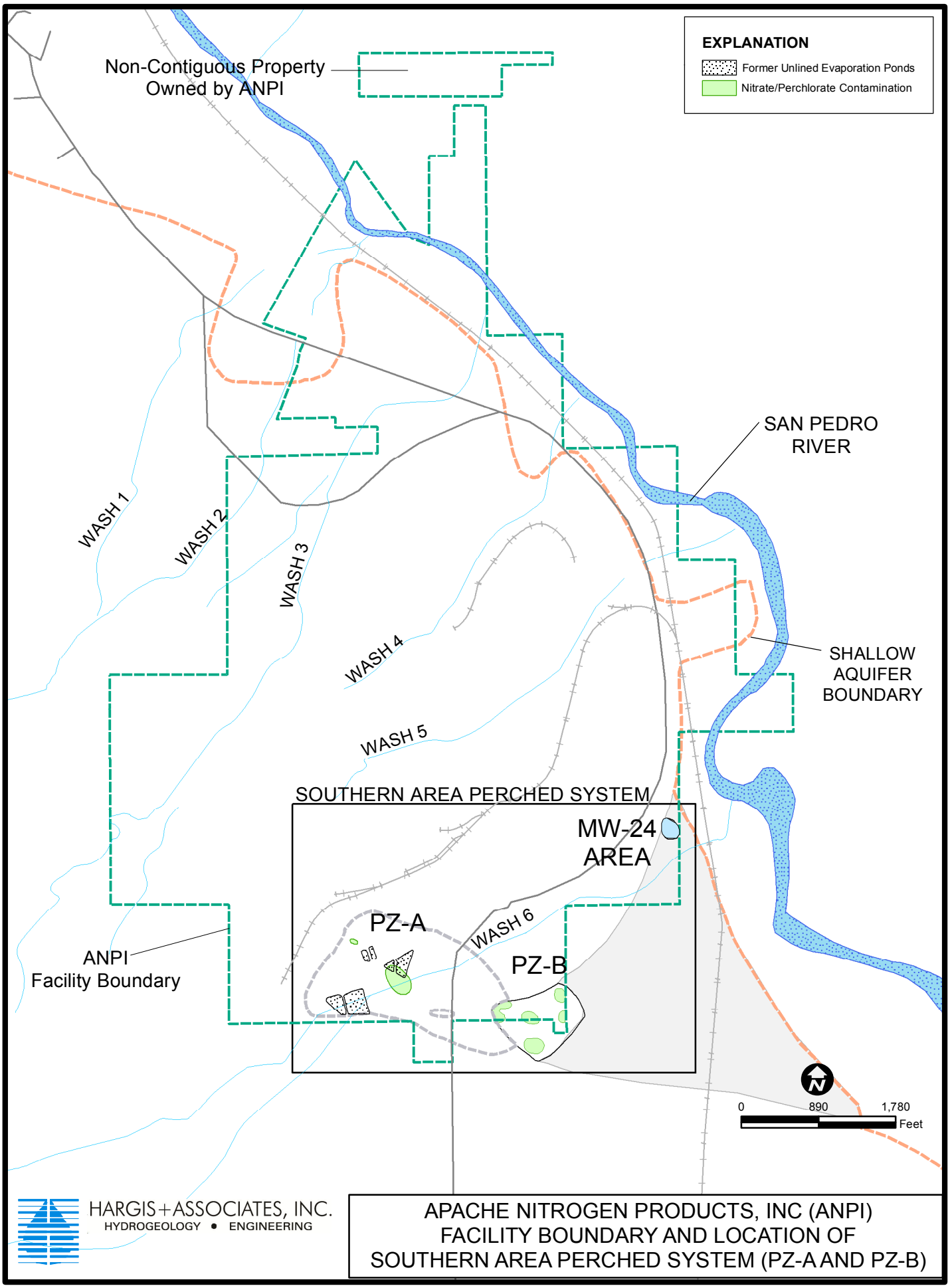
DATE 5/17 | RPT NO. 130.41 | 410-4609 A

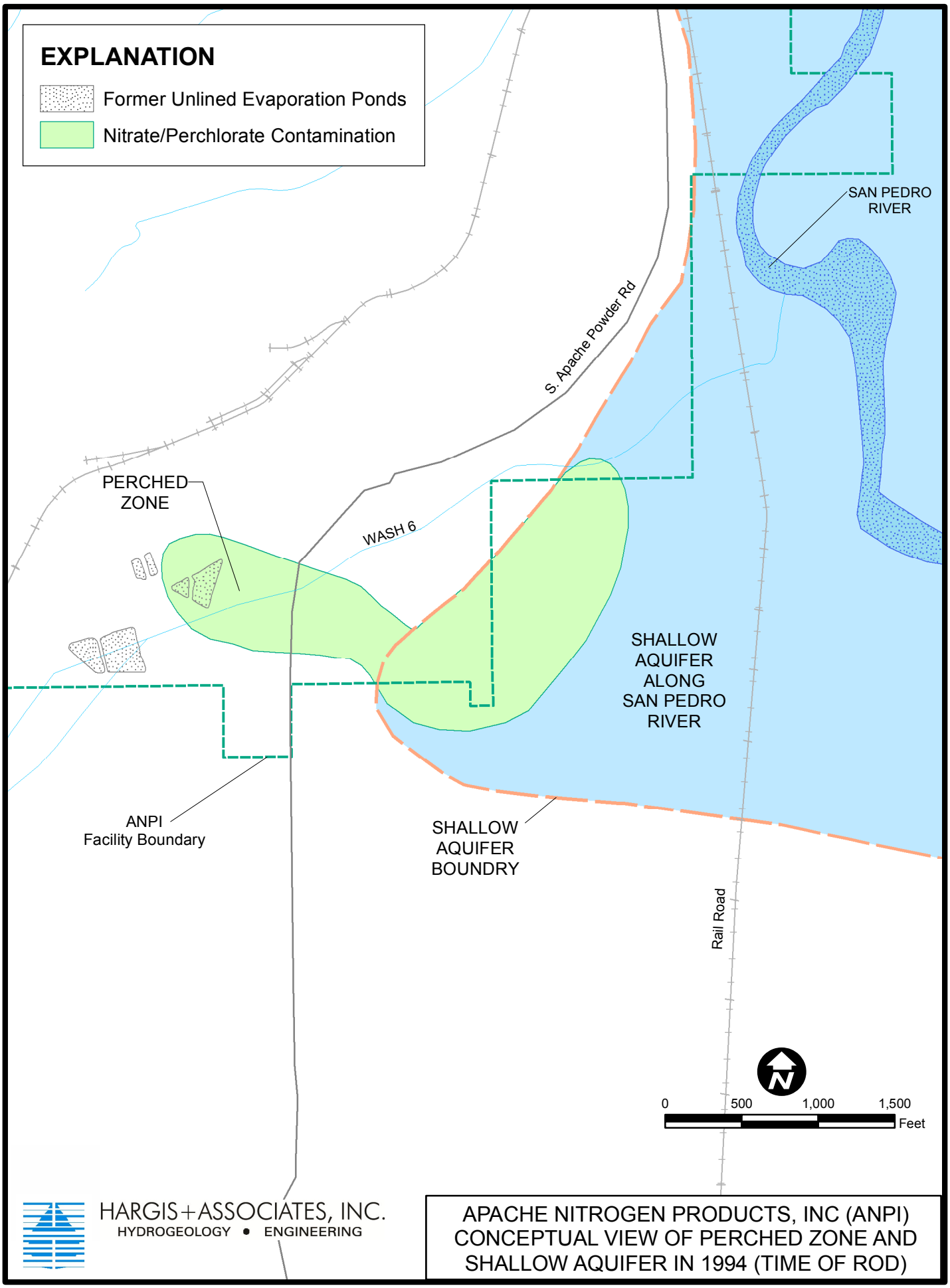
FIGURE 1. LOCATION OF APACHE POWDER SUPERFUND SITE COCHISE COUNTY, ARIZONA

Figure 2



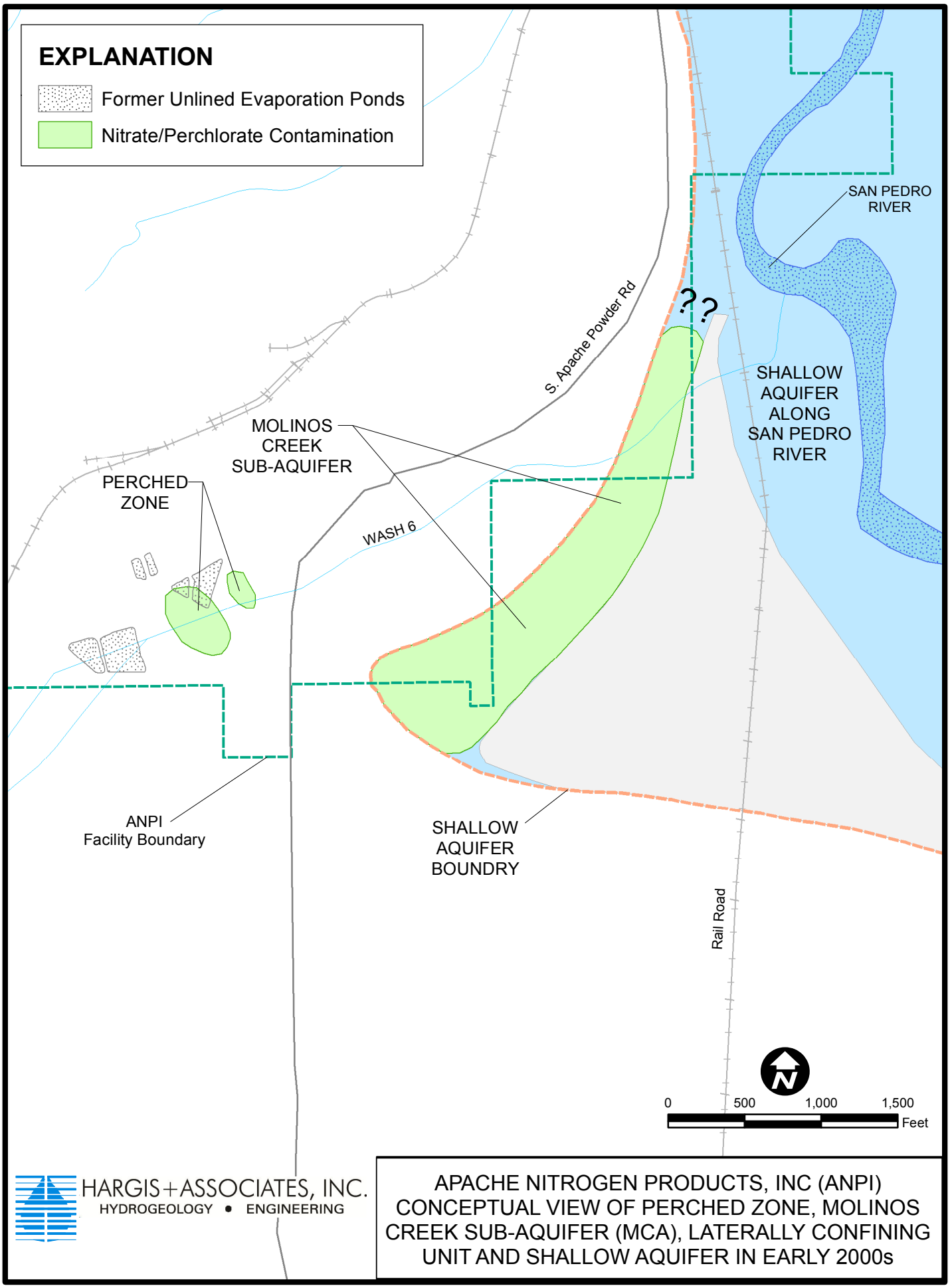
APACHE NITROGEN PRODUCTS, INC (ANPI)
FACILITY BOUNDARY AND LOCATION OF
SOUTHERN AREA PERCHED SYSTEM (PZ-A AND PZ-B)

Figure 3



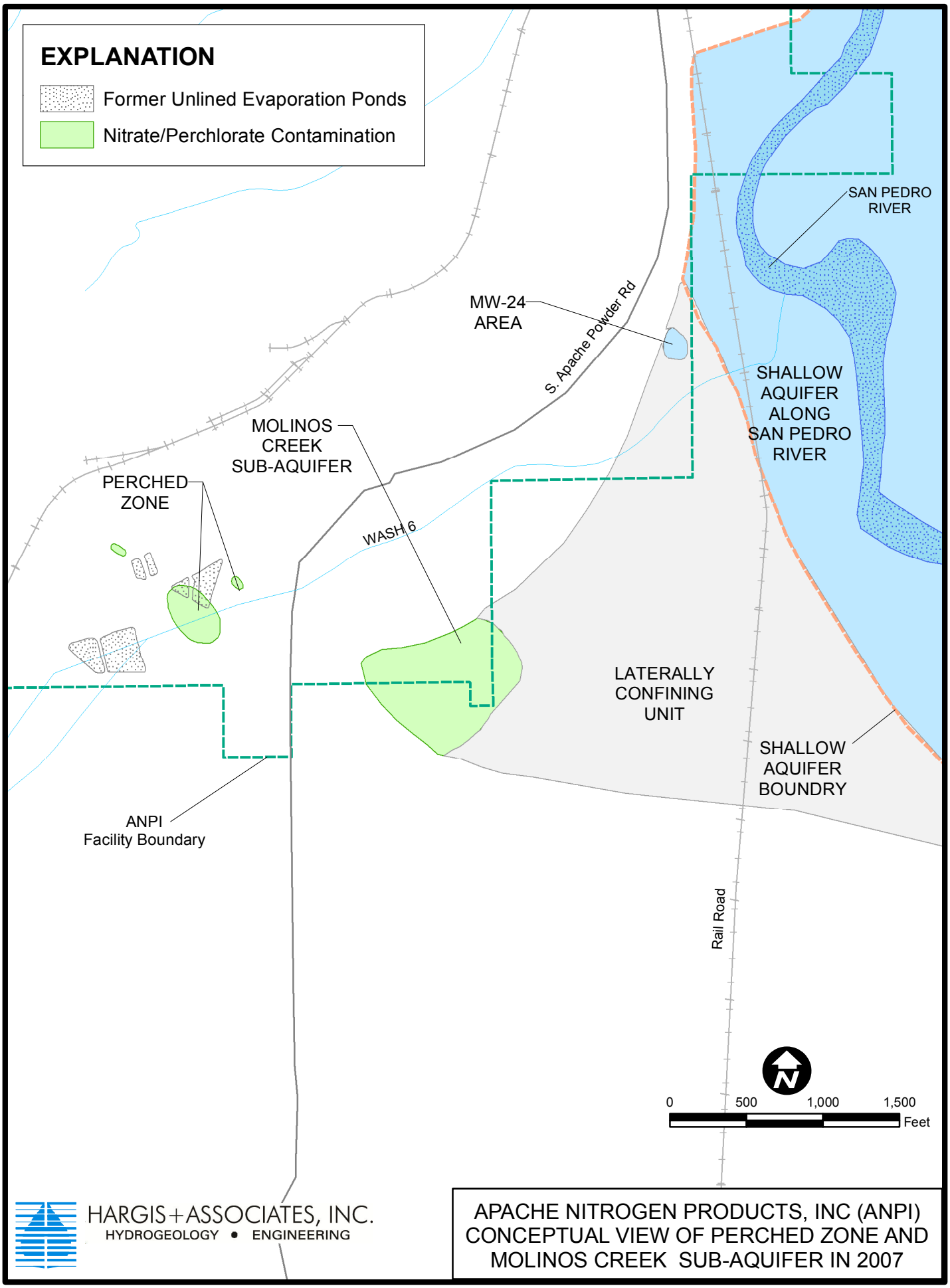
APACHE NITROGEN PRODUCTS, INC (ANPI)
CONCEPTUAL VIEW OF PERCHED ZONE AND
SHALLOW AQUIFER IN 1994 (TIME OF ROD)

Figure 4

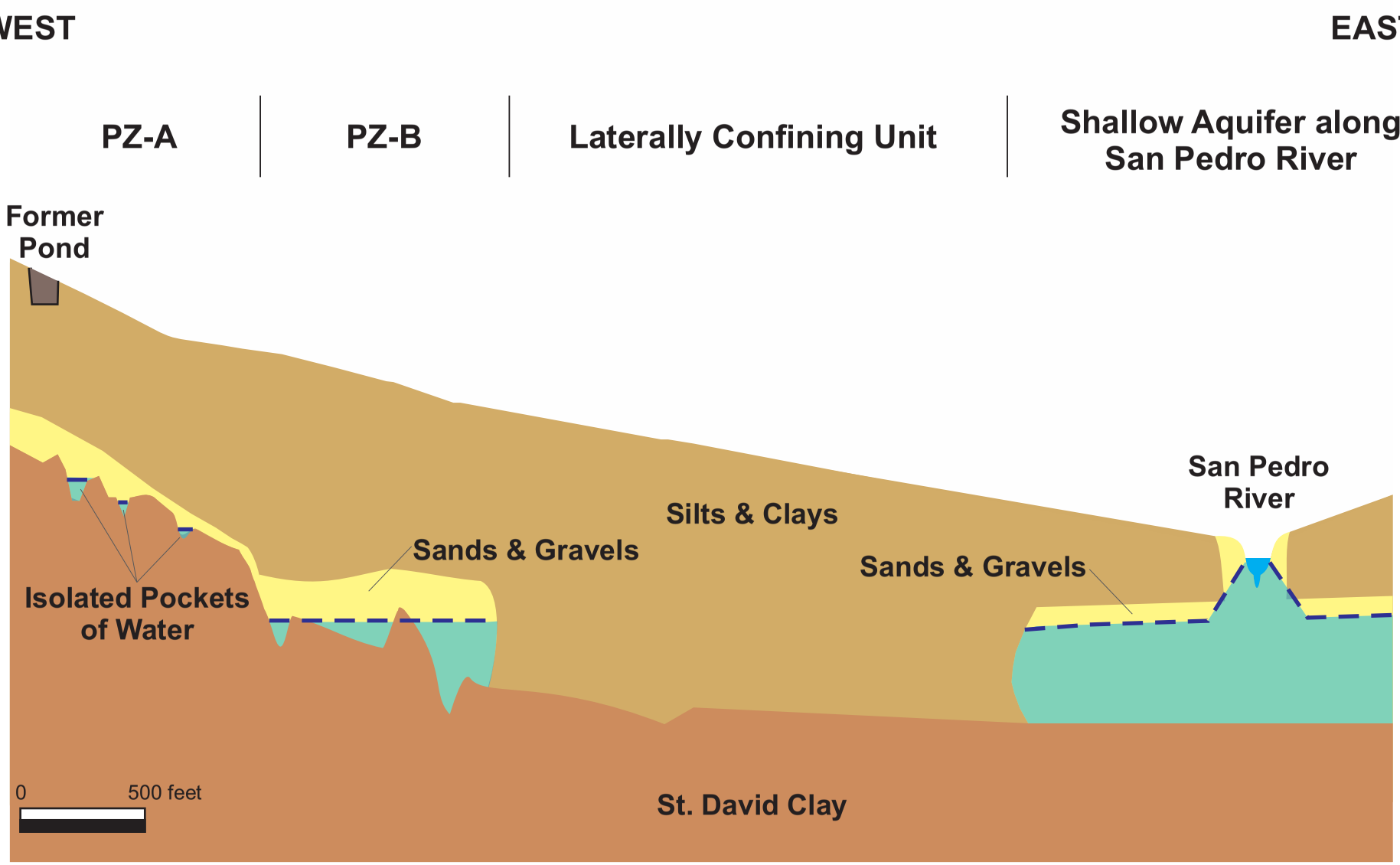


APACHE NITROGEN PRODUCTS, INC (ANPI)
CONCEPTUAL VIEW OF PERCHED ZONE, MOLINOS CREEK SUB-AQUIFER (MCA), LATERALLY CONFINING UNIT AND SHALLOW AQUIFER IN EARLY 2000s

Figure 5



APACHE NITROGEN PRODUCTS, INC (ANPI)
CONCEPTUAL VIEW OF PERCHED ZONE AND
MOLINOS CREEK SUB-AQUIFER IN 2007



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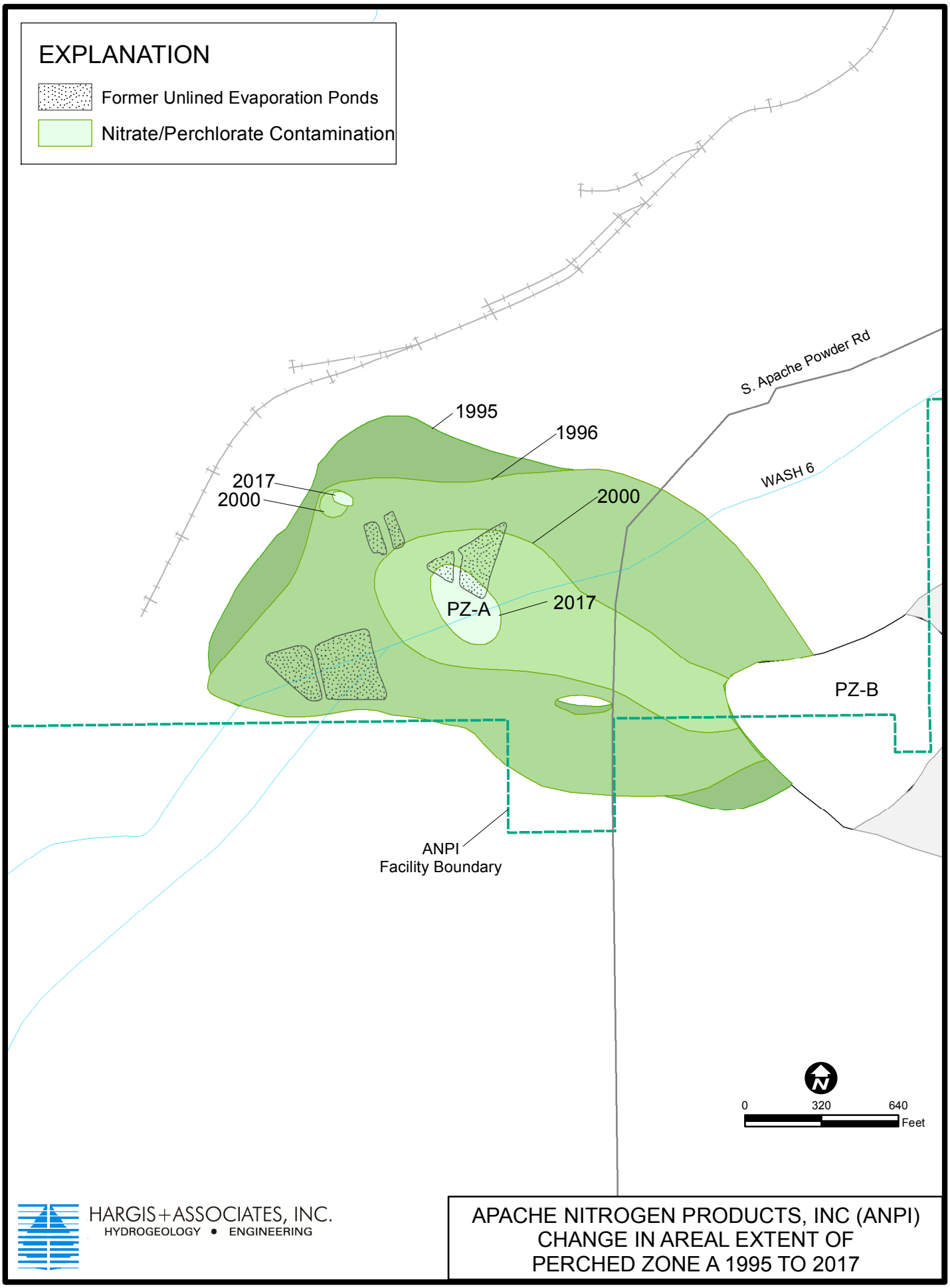
CONCEPTUAL CROSS-SECTION (WEST-EAST) SHOWING PERCHED WATER IN ISOLATED DEPRESSIONS OR POCKETS IN PZ-A AND PZ-B

Figure 6

Figure 7



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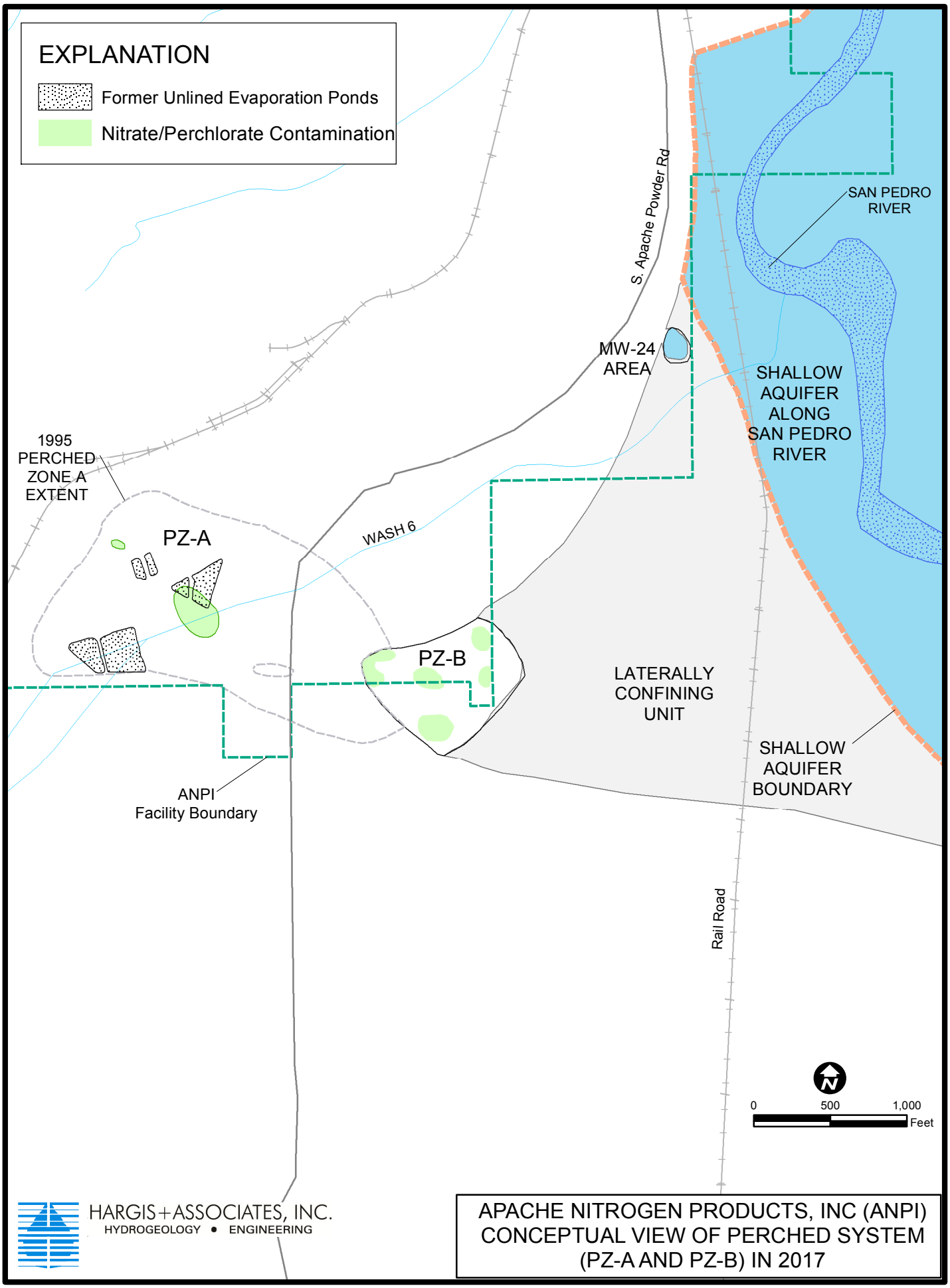
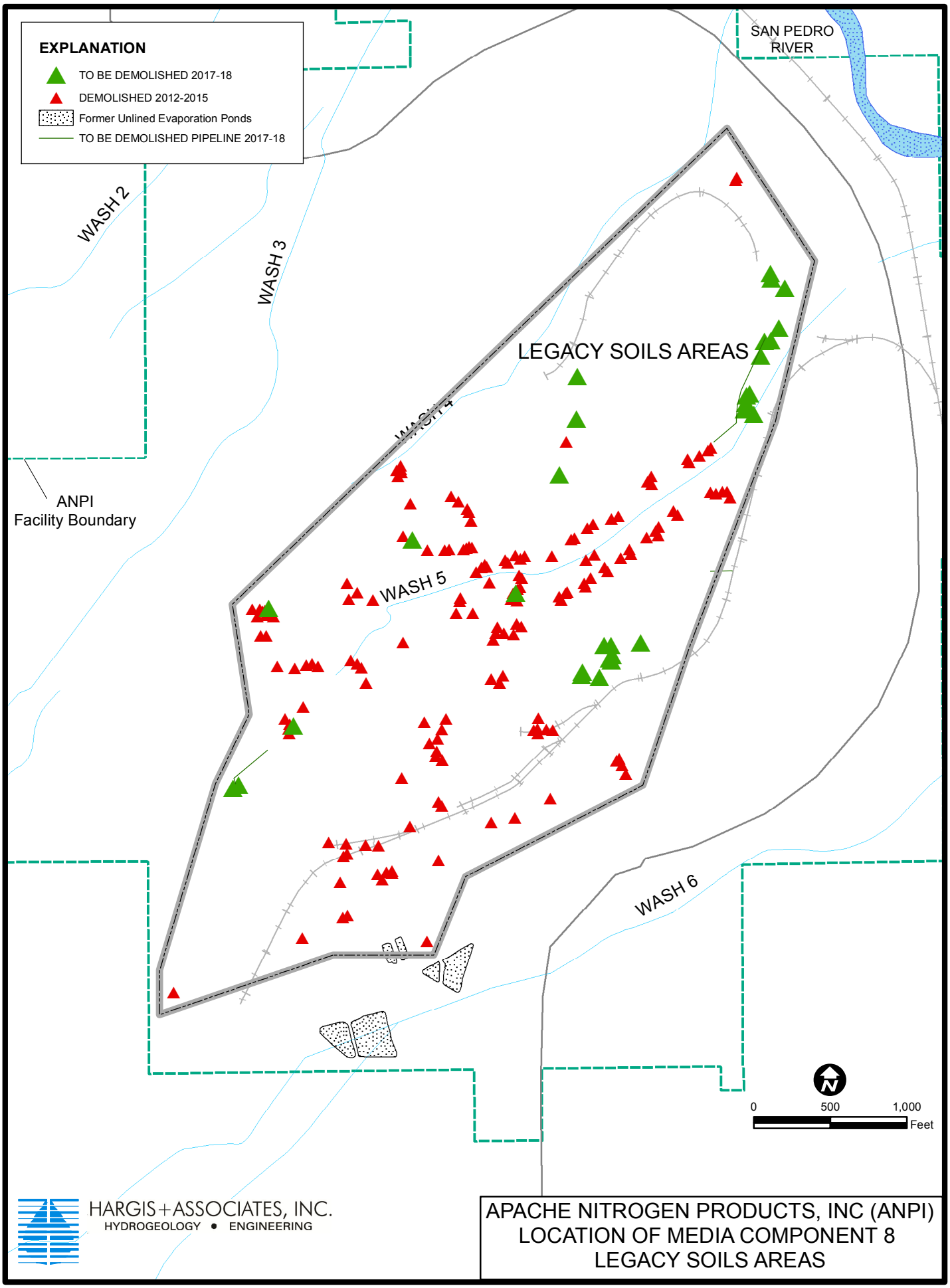
APACHE NITROGEN PRODUCTS, INC (ANPI)
CHANGE IN AREAL EXTENT OF
PERCHED ZONE A 1995 TO 2017

Figure 8



APACHE NITROGEN PRODUCTS, INC (ANPI)
CONCEPTUAL VIEW OF PERCHED SYSTEM
(PZ-A AND PZ-B) IN 2017

Figure 9


EXPLANATION
TO BE DEMOLISHED 2017-18
DEMOLISHED 2012-2015
Former Unlined Evaporation Ponds
TO BE DEMOLISHED PIPELINE 2017-18
SAN PEDRO RIVER
WASH 2
WASH 3
WASH 4
WASH 5
WASH 6
LEGACY SOILS AREAS
ANPI Facility Boundary
0
500
1,000
Feet
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APACHE NITROGEN PRODUCTS, INC (ANPI)
LOCATION OF MEDIA COMPONENT 8
LEGACY SOILS AREAS