



**MORENCI WASTEWATER TREATMENT PLANT**

**Aquifer Protection Permit #100193**

**Permit Amendment Application**

**August 2016**

Freeport-McMoRan Morenci Inc.

4521 U.S. Hwy 191

Morenci, AZ 85540

Aquifer Protection Permit Amendment Application  
Morenci Wastewater Treatment Plant and PMA Adjustment

**ATTACHMENT 1**

The following is an attachment to the ADEQ Aquifer Protection Permit (APP) Amendment Application that is an amendment for APP Permit #P-100193 to address:

- 1.1 Construction of new Morenci Wastewater Treatment Plant (WWTP) to replace the current Plantsite WWTP and Overflow Pond (Facility #99)
- 1.2 An adjustment of the current Pollutant Management Area (PMA) in Los Taos and American Mountain Areas
- 1.3 Minor Language to the Fact Sheet for accuracy

**1.1 Morenci Wastewater Treatment Plant**

**1.1.1 Introduction**

The operational mining plan for Freeport-McMoRan Morenci Inc. (FMMI) has determined that the current location of the Plantsite WWTP and Overflow Pond (Facility #99) needs to be decommissioned and replaced by the new Morenci WWTP. The new Morenci WWTP is designed to be non-discharging for APP purposes. As Morenci continues to expand tailings deposition “centerline tailing dam” as described in the Tailing Dam Reconstruction permit amendment dated June 30, 2015, the eastern section will overtake the existing Plantsite WWTP (Facility #99). The relocation will move the plant location approximately 2,900 feet to the southeast (see Figure 2).

Although the new Morenci WWTP is non-discharging, FMMI voluntarily proposes to include the facility in FMMI’s area-wide APP (P-100193) as Facility #99A (see below for more details).

Figure 3 contains the location of the new Morenci WWTP in relation to the entire FMMI site.

**1.1.2 Description**

The proposed Morenci WWTP receives gravity-flow sewage into a fine and grit screen before the wastewater (generated from the Morenci townsite and FMMI mine) enters an activated sludge tank. The liquid then moves to a clarifier where it will drop more solids. The sludge will be dried in concrete drying beds. Prior to sending the effluent to the reclaim water system and/or tailings (management of WWTP effluent at these locations already is authorized under the existing area-wide APP), the water is treated with chlorine tablets in a contact tank. Appendix B contains the Basis of Design Report for the proposed Morenci WWTP.

As noted above, the proposed WWTP has been designed to be a non-discharging facility. The facility is to be constructed out of impervious materials, e.g. concrete, or in above ground steel tanks (see Basis of Design for complete layout). All systems/areas will be inspected regularly. The original APP application dated March 28, 1996 Section 8.6.32 page 8-240 describes discharge from the Plantsite WWTP as 7,680 gpd (Appendix C). Completion of a number of upgrades under a compliance schedule reduced the volume of discharge as described in the original application. The new WWTP will not be a discharging facility so there will be a net reduction in discharge. Furthermore, commingling class B+ effluent with existing tailings or reclaim water will not cause an increase in pollutant discharge at these receiving facilities.

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A retention basin, located on the eastern side of the WWTP, will be used to collect stormwater and drop out sediment. See drawing 126-2-022 in the Basis of Design (Appendix B) for the location in relation to the WWTP.

Back-up power generation will allow the WWTP to pump all effluent in case of emergency loss of power. The generator is designed to operate for at least four hours. If any liquids are spilled from the wastewater treatment process, the liquids will be treated as a spill and clean-up immediately. The area around the WWTP will be bermed with an earthen berm to prevent spillage from leaving the site and to allow for easy clean-up.

**1.1.3 Technical Capability**

The Morenci WWTP was designed as a non-discharging facility by Arcadis under the direction of licensed Professional Engineers (PEs). Arcadis provides years of competent engineering services in wastewater treatment design.

FMMI prepared this application under the guidance of Jeffers Campbell, 28 years of experience in environmental permitting and compliance, with complementary group of capable engineers, scientists, and technicians. The Morenci WWTP will be run by properly licensed Operators as well as support staff and consultants with relevant experience and proper licensures.

**1.1.4 Effluent Characterization for Morenci WWTP/Demonstration of BADCT/Compliance with Aquifer Water Quality Standards**

Although effluent from the Morenci WWTP will be sent either to the tailings impoundments (already covered under the existing area-wide APP) or the reclaim water system for industrial re-use, FMMI voluntarily will manage the Morenci WWTP to meet the following performance goals and will therefore meet applicable BADCT performance criteria<sup>1</sup>

Parameter	Performance Goal
5-Day Biochemical Oxygen Demand (BOD <sub>5</sub> ), mg/L	<30 mg/L (30 day average) <45 mg/L (7 day average) >85% removal efficiency
Total Suspended Solids (TSS), mg/L	<30 mg/L (30 day average) <45 mg/L (7 day average) >85% removal efficiency
pH	6.0 to 9.0
Fecal Coliform, CFU	No fecal coliform or E. coli detected (4 of 7 weekly samples) <23 CFU/100mL (single sample, fecal coliform) <15 CFU/100mL (single sample, E. coli)
Total Nitrogen, mg/L	<10 mg/L (5 month rolling geometric mean)

<sup>1</sup>See Arizona Administrative Code (A.A.C.) R18-9-B204, ed. 9/30/2005.

Effluent sampling points will be taken at the effluent pump station on-site of the WWTP prior to the effluent being pumped to either tailings or the reclaim water system.

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In addition, because the new Morenci WWTP is non-discharging (i.e., there are no discharging facilities associated with the WWTP), compliance with aquifer water quality standards will be monitored at the conceptual POC well (see Figure 2 or 3 for location).

The Conceptual POC Well location is N 33°01'08", W 109°18'29"

The effluent will be discharged to either:

- Tailings, N 33°01'02", W 109°20'45"
- Reclaim Water System, N 33°02'07", W 109°21'20"

**1.1.5 Demolition of Existing Plantsite WWTP and Overflow Pond**

Once the Morenci WWTP is commissioned and fully-operational, the Plantsite WWTP and Overflow Pond will be cleaned to remove sludges from all tanks and drying bed and all removed sludges will be disposed of properly. All electrical and mechanical components will be removed as well as the trickle filter seals. The rest of the facility will then be abandoned in place and buried by tailings. ADEQ will be notified prior to demolition and subsequent APP amendment will submitted to remove the facility from Morenci's APP Permit.

**1.1.6 Changes to APP Permit—Addition of Facility #99A**

Below are the changes to the APP Permit with the proposed verbage.

**APP Permit Section 2.1 Facility/Site Description**

Proposed Permit Amendment:

Facility No.	Facility Name	Latitude	Longitude	Comments about Revision to Permit
99A	Morenci WWTP	33°05'15" N	109°22'00" W	Replaces Facility 99

**Table 2 Permitted Facilities and BADCT**

Proposed Permit Amendment:

Facility No.	FMMI No.	Facility Name	Latitude/ Longitude	Facility BADCT
99A		Morenci WWTP	33°05'15"N, 109°22'00"W	<b>Individual BADCT:</b> This facility is a non-discharging and consists of a municipal wastewater treatment plant and concrete sludge drying beds. The plant is designed to treat an inflow of 1.2 MGPD. The total effluent flow, including the flow from Clifton WWTP, is approximately 775,000 GPD. The effluent is pumped to either the reclaim water system (N 33°02'7", W 109°21'20") or tailings (N 33°01'02", W 109°20'45"). The entire WWTP will be bermed to collect spillage for effluent overflows, and a backup generator will be provided to contain the effluent volume for a 4-hour electrical downtime, if needed.

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**Table 3 Required Inspections and Operational Monitoring**

Proposed Permit Amendment:

Facility No.	FMMI No.	Facility Name	Operational Requirements
99A		Morenci WWTP	<p><b>Daily:</b></p> <ul style="list-style-type: none"> <li>• Clean filters and screens</li> <li>• Check moving equipment for integrity</li> </ul> <p><b>Quarterly:</b></p> <ul style="list-style-type: none"> <li>• Inspect pumps, structures, and tanks for integrity</li> </ul>

**1.1.7 Closure and Post-Closure Plans of Morenci WWTP**

The Morenci WWTP is expected to provide FMMI and the town of Morenci service for 50+ years depending mining activities and component longevity. Although the facility is non-discharging, when the time comes for closure of the Morenci WWTP, FMMI will notify the Arizona Department of Environmental Quality (ADEQ) that it intends to cease operations.

A detailed plan for closure and post-closure will be submitted to ADEQ ninety days prior to closure of the Morenci WWTP.

**1.2 Pollutant Management Area (PMA) Adjustments**

The current PMA as illustrated by the gold line in Figures 1 and 2 will be adjusted in the Los Taos and American Mountain areas and to encompass the new Morenci wastewater treatment plant. PMA adjustments in Los Taos and American Mountain areas are indicated by the green line in Figure 1. The purpose for adjusting the PMA is to accommodate the expansion of open pit mining. Approximately three million tons of earthen materials will be mined out from both areas and placed on APP permitted leach stockpiles (APP facility # 90 & #91) located within the Passive Containment Capture Zone (PCCZ). As described in APP permit Table 2, facility #90 and #91 authorized stockpile elevation is 7,000 famsl which meets the prescribed factor of safety as previously approved by ADEQ. All storm water run-off from mining activity will be directed, and contained within the mining operations as indicated by blue arrows (Figure 1). For language regarding the PCCZ, PMA adjustments, and mining activity, see Appendix A. PMA adjustment to encompass the new Morenci wastewater treatment plant (facility #99A) is indicated by the green line Figure 2.

There is roughly 56,400 tons of material to be mined from the Los Taos and American Mountain areas in the proposed PMA adjustments. The following are the destinations for the material:

- Silver Basin—74%
- Mine For Leach Stockpile—9%
- Placer Stockpile—9%
- Garfield Stockpile—3%
- Santa Rosa Stockpile—3%
- Lone Star Stockpile—1%
- Concentrator—1%

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### 1.3 Minor Language Changes to Fact Sheet

The following is a rewrite of the Fact Sheet and represents an accurate accounting of permitting activity for the life of APP P-100193 (not including this application) and should be utilized for this amendment.

Freeport-McMoRan Morenci, Inc.  
Arizona Aquifer Protection Program Permit P-100193  
Amended Permit Log (Fact Sheet)

In order to support and correct ADEQ Fact Sheet that accompany Aquifer Protection Permit issuance the following is provided.

The Freeport-McMoRan Morenci mine is operating pursuant to the conditions of APP P-100193. ADEQ issued this permit on October 26, 2000. Subsequent permitting actions include:

- (1) An "other" amendment, effective March 12, 2001, which modified tables to reserve Aquifer Quality Limits, corrected typographical errors, and corrected/inserted units of measurement.
- (2) A "minor" amendment, effective May 9, 2001, which modified tables to display alert levels for selected wells.
- (3) An "other" amendment, effective January 31, 2002, which modified the permit for changes in the design of the Horseshoe PLS Sump and Overflow Sump; replaced piezometer MP-2 with monitor well SW-104A, for purposes of measuring water levels in the vicinity of the open pit; and modified the units of measure for coliform reporting to "most probable number," with detection being considered 2 mpn/100.
- (4) An "other" amendment, effective August 1, 2002, which modified the destination of the wastewater treatment plant effluent to allow, rather than require, that it be pumped to the raffinate tank; added alert levels to monitoring tables for monitoring wells CC-44 and CC-46; modified the compliance schedule for facility No. 43 to change the pilot study, and modify test plan submittal and start- updates; and changed the destination of and description for Facility 69, Metcalf SX Plant Raffinate Pond, from that of a "single-lined impoundment" to an "unlined impoundment."
- (5) An "other" amendment, effective July 25, 2003, which added facility 120, Tailing Storm water Retention Dam 7C, to the list of permitted facilities (Table 1), along with operational requirements (Table 2); removed piezometer MP-5 from the list of groundwater monitoring points for hydrologic sink verification (Table 3); and added alert level and AQL entries for quarterly and biennial groundwater sampling for monitor well RG-7 (Table 5 and 6C).
- (6) An "other" amendment, effective September 26, 2003, which changed the due date for completion of the Horseshoe Sump and Overflow Pond upgrades, allowing a six-month extension to complete the revised construction design; revised the Pollutant Management Area; inserted alert level and aquifer quality limits for five POC wells (completion of ambient monitoring period); deferred the compliance schedule deadline for submission of closure plans for the Central SX/EW Plant Vehicle Wash and Vehicle Wash-SX Pipe yard to the final closure of the Area-

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Wide facility; added completion dates to the Compliance Schedule for 22 completed items; and inserted the aquifer quality limit for cyanide of 0.2 mg/L for POC Well SW-42.

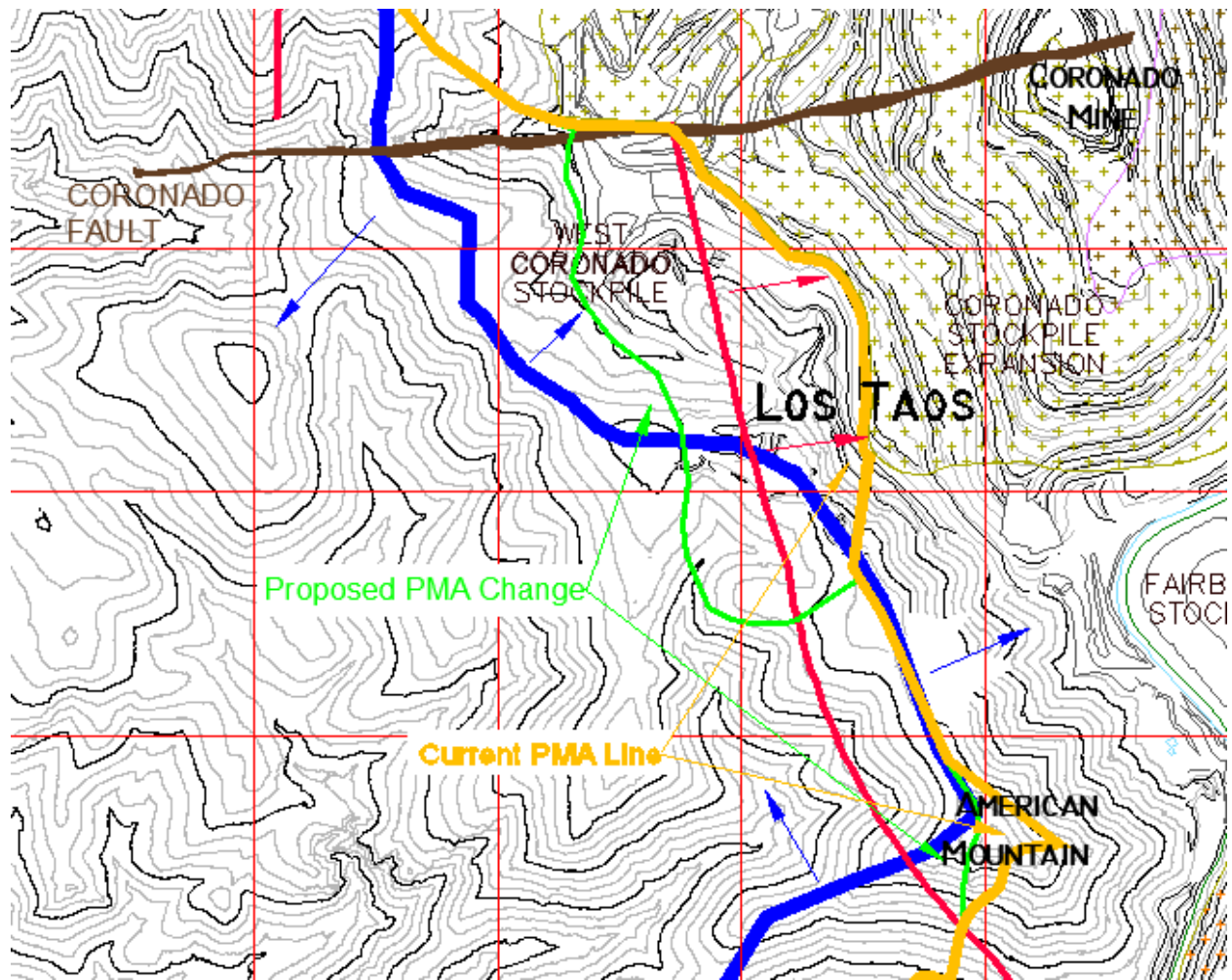
- (7) A combined "significant/other" amendment, effective June 28, 2004, (LTF: 30686 & 31405) which removed nickel and chromium from the list of required analytes for POC Well CC-46; revised the completion dates for the Mine for Leach Crushed Ore Stockpile Relocation Project (Facilities 59-67).
- (8) Two Combined "other" amendments, effective January 23, 2007, (LTF: 33359 & 37849) that modified the footprint of the King Stockpile (Facility 88), to incorporate an area (Garfield Test Leach Area) to be used as a temporary location for leach testing of selected ores (Shannon Stockpile run-of-mine ore); modified Section 2.6.2 to no longer require the submission of sampling logs and records, lab analytical reports, field notes, and QA/QC procedures with the SMRF forms; clarified Section 2.6.1(5), which requires graphs of groundwater monitoring data to be submitted in biennial reports; changed the Compliance Schedule submission date and completion date of a closure plan for the Former Metcalf Concentrate Overflow Ponds; replaced Sections 1, 4, 5, 6, and 7 to conform to the current APP framework; revised the Groundwater Section and subordinate Unit names throughout the permit to conform to the current organizational structure; corrected rules citations to conform to the current APP Rules in Section 2.6.5 and Section 2.9.
- (9) An "other" amendment, effective October 8, 2009, (LTF: 47345) that added to the permit a revised footprint and pollutant management area (PMA) for the Southwest (Leach) Stockpile, and modified the configuration of eight leach collection facilities in the Southwest Stockpile Collection System.
- (10) A "significant" amendment, dated April 8, 2010, (LTF: 48483) for which a demonstration that the Hydrologic sink created by the open-pit and other controls has created a passive containment capture zone (PCCZ) within the mine site.
- (11) An "other" amendment, effective April 4, 2011, (LTF: 51854) which satisfied the compliance schedule requirement to submit an updated financial assurance mechanism for APP P-100193.
- (12) An "other" amendment, effective February 27, 2012 (LTF: 54659), which included expansion of the Pollutant Management Area (PMA) to include newly acquired property to the west of the Garfield Pit, and replacement of groundwater level monitor well DW-17 with DW-16, due to expansion of the Garfield Pit.
- (13) An "other" amendment, effective July 5, 2012 (LTF: 55643), included expansion of the Pollutant Management Area (PMA) to include newly acquired property to the west of the Garfield Pit, and replacement of groundwater level monitor well DW-40 with DW-38, due to expansion of the Garfield Pit.
- (14) A "significant" amendment effective December 2012 (LTF: 56418), to permit an approximately 22-acre reconstruction of the Southwest Tailing Impoundment and expansion to its footprint using the centerline construction method instead of the previously used downstream method.



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- (15) A “significant” amendment effective April 29, 2013 (LTF: 47231) On April 2, 2008, the permittee submitted an amendment application to permit a new copper leaching facility called the Silver Basin Leach Stockpile. This new dump leach facility includes the use of liners at lower elevations of the dump, and site specific hydrologic and geologic factors, such as depth to groundwater (1000-feet at upper elevations of basin) and hydraulic conductivity to provide additional discharge reduction. The facility is to be constructed in three phases, with ultimate dump crest elevations for each phase being approximately 1300-feet (Phase 1), 1750-feet (Phase 2), and 2000-feet (Phase 3), over a total area of approximately 800 acres.
- (16) An “other” Amendment effective February 5, 2014 (LTF: 58648) this other amendment application was submitted to make the following changes to the permit:
- (1) The substitution of replacement water level well DW-43 for the inaccessible water level well DW-42 for purposes of water level monitoring under the APP.
  - (2) The extension to the east of the pollutant management area (PMA) at the Lower Chase Creek Complex stockpile boundary. This complex is comprised of the Rock House Canyon Stockpile (Facility 77), Rock House Canyon Expansion Stockpile (Facility 78), and Lower Chase Creek Stockpile (Facility 79).
  - (3) A change in the northwest PMA boundary for the pending expansion of mining operations into that area.
  - (4) An update to the corporate guarantee, which is used as the financial assurance mechanism for APP P- 100193.
- (17) An “Minor” Amendment effective June 30, 2015 (LTF 62449)  
This minor amendment application was initiated to include the Silver Basin Leach Stockpile and Silver Basin PLS Pond 1/2 into the permit. These facilities were previously permitted under significant amendment to the Morenci APP, LTF 47231, but were inadvertently left out of the previous revision.

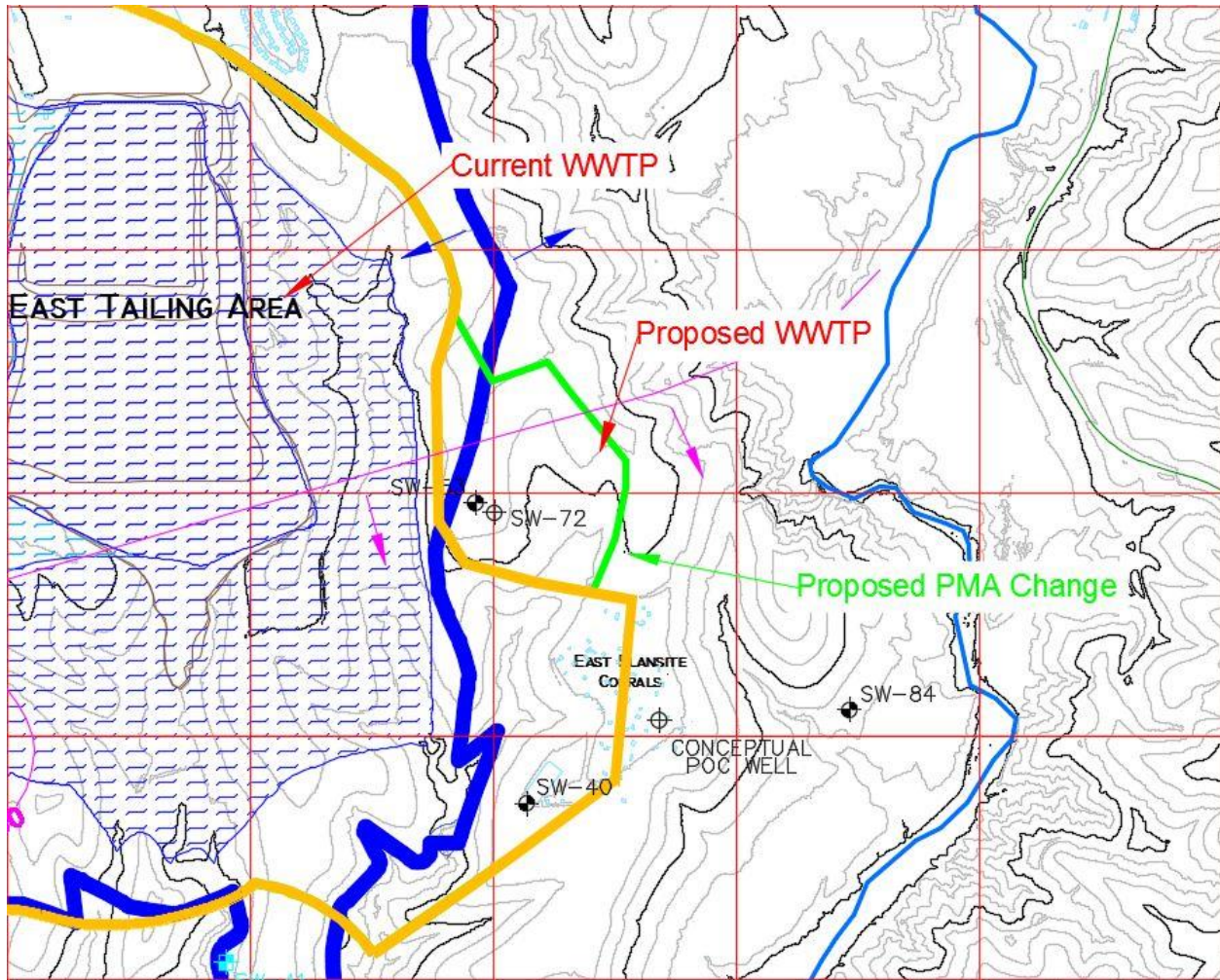
FIGURE 1—PMA Adjustment for Los Taos and American Mountain



Current PMA (gold line) and proposed PMA lines at American Mountain and Los Taos (green line). The blue line/arrows represent the surface water boundary and direction of flow. The PCCZ, the magenta line/arrow, is the ground water divide and direction of flow.

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FIGURE 2—Location for New Morenci WWTP



Current PMA Line (gold line), the proposed PMA change (green line), surface watershed boundary (blue line), and the groundwater flow (magenta line) near the proposed Morenci WWTP. The figure shows the location of the proposed WWTP as well as the Conceptual POC Well. Figure 3 shows proposed WWTP compared to entire FMMI site.

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**Figure 4—Original APP Application March 28, 1996 Section 8.2.32 page 8-240**

**Discharge From Facility**

Discharge from the facility is considered to be the infiltration of water from the sludge drying ponds and stormwater impacted by effluent overflow in the Overflow Pond. The estimated discharge from the drying ponds is estimated to be approximately 5 percent of the sludge volume. The estimated discharge from the sludge drying ponds, based on average evaporation rates and final sludge water content, is approximately 280 gpd.

An infiltration analysis was performed to calculate the vertical discharge rate from the Overflow Pond. Calculations of discharge for this facility are based on formulas and general assumptions presented in Section 8.3.3.4—Analytical Solutions - Ponds. Tables 8.3.3-4 and 8.3.3-7 present the variables used in the calculations, such as fluid depth, drainage dimensions, and underlying hydraulic conductivity.

A discharge rate of 7,680 gpd was estimated for the sludge drying ponds and the Plantsite WWTP Overflow Pond.

DAMES & MOORE

March 28, 1996  
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**Figure 5—FEMA Map for WWTP Location (FEMA Panel 04011C0620D eff. 9/28/2007)**

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**Figure 6—FEMA Map for American Mountain and Los Taos Areas (FEMA Panel 04009C1100D  
eff. 9/28/2007)**



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**Appendix A—Language Regarding PCCZ, PMA Adjustment, and Mining Activity**

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**APPENDIX B—Basis of Design Report: Morenci Wastewater Treatment Plant Project**