APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): Oct 31, 2017

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: CESPA-RD-NM-LC; SPA-2017-00017-LCO; Approved Jurisdictional Determination - Little Rock Mine, Grant County, Freeport-McMoRan Tyrone Inc.

C. PROJECT LOCATION AND BACKGROUND INFORMATION: Freeport-McMoRan Tyrone Inc. (FMI) has requested an approved jurisdictional determination (AJD) for all of the land encompassed within the Little Rock Mine totaling approximately 682 acres located in Grant County New Mexico. Maps of the delineated area are provided as a reference. This JD request is not linked to a permit application.

State:New Mexico County/parish/borough: Grant City: Tyrone

Center coordinates of site (lat/long in degree decimal format): Lat. 32.65473° **N**, Long. -108.40218° **W**.

Universal Transverse Mercator:

Name of nearest waterbody: Deadman Canyon, California Gulch & unnamed tributary

Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Gila River

Name of watershed or Hydrologic Unit Code (HUC): Willow Creek-Mangus Creek Watershed within the Upper Gila-Mangas Subbasin, HUC12 150400020301

☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.

☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☒ Office (Desk) Determination. Date: October 04, 2017

☒ Field Determination. Date(s): March 22, 2017 and September 21, 2017

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

☐ Waters subject to the ebb and flow of the tide.

☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
      - ☐ TNWs, including territorial seas
      - ☐ Wetlands adjacent to TNWs
      - ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
      - ☒ Non-RPWs that flow directly or indirectly into TNWs
      - ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
      - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
      - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
      - ☒ Impoundments of jurisdictional waters
      - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
      Non-wetland waters: Deadman Canyon: 6635 linear feet: 15 width (ft) and/or 2.11 acres.
      Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Established by OHWM.**
      Elevation of established OHWM (if known):See HilgartWilson report for maps of the OHWM.

2. **Non-regulated waters/wetlands (check if applicable):**[3]

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW
Identify TNW: .

Summarize rationale supporting determination: .

2. Wetland adjacent to TNW
Summarize rationale supporting conclusion that wetland is "adjacent": .

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:
Watershed size: 2,048 **square miles**
Drainage area: 682 **acres**
Average annual rainfall: 18.53 inches
Average annual snowfall: inches

(ii) Physical Characteristics:
(a) Relationship with TNW:
☐ Tributary flows directly into TNW.
☒ Tributary flows through **2** tributaries before entering TNW.

Project waters are **15-20** river miles from TNW.
Project waters are **10-15** river miles from RPW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Project waters are **Pick List** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: .

Identify flow route to TNW[5]: Review area waters (including rerouted portions of those channels) to Mangas Creek (including the RPW segment of Mangas Creek from Mangas Springs to the Gila River) to the Gila River.

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

Tributary stream order, if known: Deadman Canyon is a 3rd order stream. California Gulch and the unnamed tributary are 1st order streams that are tributary to Deadman Canyon (including rerouted sections of Deadman Canyon).

(b) General Tributary Characteristics (check all that apply):

Tributary is:
☒ Natural
☐ Artificial (man-made). Explain: .
☒ Manipulated (man-altered). Explain: Deadman Diversion Channel and Cross-Cut channel are rerouted segments of Deadman Canyon. These segments were rerouted due to mining activity.

Tributary properties with respect to top of bank (estimate):
Average width: 20 feet
Average depth: 3 feet
Average side slopes: **3:1** .

Primary tributary substrate composition (check all that apply):

☒ Silts	☒ Sands	☐ Concrete
☒ Cobbles	☒ Gravel	☐ Muck
☒ Bedrock	☐ Vegetation. Type/% cover:	
☐ Other. Explain: .		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Relatively straight**
Tributary gradient (approximate average slope): 1% to 6 %

(c) Flow:
Tributary provides for: **Ephemeral flow**
Estimate average number of flow events in review area/year: **2-5**
Describe flow regime: Flows in response to precipitation.
Other information on duration and volume: .

Surface flow is: **Discrete.** Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☒ the presence of litter and debris
☐ changes in the character of soil	☐ destruction of terrestrial vegetation
☒ shelving	☒ the presence of wrack line
☐ vegetation matted down, bent, or absent	☒ sediment sorting
☒ leaf litter disturbed or washed away	☒ scour
☒ sediment deposition	☐ multiple observed or predicted flow events
☐ water staining	☐ abrupt change in plant community
☐ other (list):	

☒ Discontinuous OHWM.[7] Explain: OHWM is lost for short distances. Steeper gradient in some areas and zones of erosion/accumulation affect the presence of an OHWM.

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.). Explain: .
Identify specific pollutants, if known: See Section IV B.

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[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

☒ Riparian corridor. Characteristics (type, average width): In the vicinity of the first earthen dike in the ponding area there is riparian vegetation.

☐ Wetland fringe. Characteristics: .

☐ Habitat for:

- ☐ Federally Listed species. Explain findings: .
- ☐ Fish/spawn areas. Explain findings: .
- ☐ Other environmentally-sensitive species. Explain findings: .
- ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is**: Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

☐ Directly abutting

☐ Not directly abutting

- ☐ Discrete wetland hydrologic connection. Explain: .
- ☐ Ecological connection. Explain: .
- ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

☐ Riparian buffer. Characteristics (type, average width): .

☐ Vegetation type/percent cover. Explain: .

☐ Habitat for:

- ☐ Federally Listed species. Explain findings: .
- ☐ Fish/spawn areas. Explain findings: .
- ☐ Other environmentally-sensitive species. Explain findings: .
- ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: Deadman Canyon has more than an insubstantial or speculative effect on the chemical integrity of the downstream TNW, the Gila River at the confluence with Mangas Creek. A detailed analysis is provided in Section IV.B.

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☒ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☒ Tributary waters: **5360** linear feet**15**width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: **.**

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **.**

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: **2.11** acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☒ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

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[8]See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.*

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: **.**
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: **.**
☐ Other: (explain, if not covered above): **.**

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: 396.46 ephemeral/intermittent playas acres. List type of aquatic resource: upland sheet flow, ephemeral, intermittent, and perennial riverine and palustrine bottom.
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: u.
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: reports submitted by Higart Wilson as of August 29, 2017.
☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☒ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☐ U.S. Geological Survey map(s). Cite scale & quad name: .
☐ USDA Natural Resources Conservation Service Soil Survey. Citation: .
☐ National wetlands inventory map(s). Cite name: .
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is:Not a Floodplain (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☐ Aerial (Name & Date): .
or ☒ Other (Name & Date): Multiple photos of water resources in the review area and continuing down the tributaries to the TNW taken in March and September 2017 by USACE.
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☒ Other information (please specify): References listed below, ORM2, and land use data and internet searches.

B. ADDITIONAL COMMENTS TO SUPPORT JD:

The following discussion addresses the request for a stand-alone approved jurisdictional determination (AJD) for waters within the Little Rock Mine. The request for an AJD was made by Freeport McMoRan Tyrone Inc. (FMI) and the report "Little Rock Mine Approved Jurisdictional Determination Grant County, NM, August 2017 was prepared by HilgartWilson for FMI. This report will be referred to as the HilgartWilson report.

REVIEW AREA

The review area addressed in this AJD contains three aquatic resources: Deadman Canyon, California Gulch and an unnamed tributary that flows to Whitewater Creek. Figure 4 of the HilgartWilson report shows the three waters that comprise the review area for this AJD. These three waters will be referred to as "review area waters" for purposes of this significant nexus analysis. Photos from field site visits are provided in Appendix 1.

As described in the HilgartWilson report, the review area waters are located within the Willow Creek-Mangas Creek Watershed (HUC12 150400020301) within the Upper Gila-Mangas Subbasin. See Figure 8 of the HilgartWilson report for a map of the review area in the vicinity of the Little Rock and Tyrone mines. The following paragraphs describe the flow path between Deadman Canyon and the Gila River. Maps are provided in Appendix 2 and in the HilgartWilson report

Deadman Canyon flows from south to north through the Little Rock mine project area. At the north side of the mine area, flows from Deadman Canyon are joined by California Gulch. Flows continue north for a short distance to an earthen dike (earthen dike 1) where the dike blocks the natural flow path of Deadman Canyon. At Earthen dike 1 a delta-like ponded area has formed where water is slowed and sediment drops out. In a sufficiently sized storm event, flows from the ponded area are conveyed west and cross-gradient through the constructed Cross-Cut Channel. The Cross-Cut Channel was constructed in uplands to replace the natural flow path of the Deadman Canyon/California Gulch tributary system in order to convey flows around the Tyrone mine tailings facilities.

Further west, Whitewater Canyon, which is itself not part of the review area, also contributes flow to the Cross-Cut Channel including flow from the unnamed tributary. The combined flows of Deadman Canyon, California Gulch, White Water Canyon and the unnamed tributary continue west to a second earthen dike (earthen dike 2) which creates a second delta-like ponded area. In a sufficiently sized storm event, the combined flows are conveyed northward in a constructed channel, the Deadman Diversion Channel which parallels Ride Out Road. The Deadman Diversion Channel was also constructed in uplands to replace the natural flow path of the tributary system in order to convey flows around the Tyrone mine tailings facilities. The Deadman Diversion Channel flows northward until it crosses Ride Out Road and joins an unnamed tributary to Mangas Creek. At this point the channel steepens and flows through an incised reach to Mangas Creek. Mangas Creek flows northwest to the Gila River, a Traditionally Navigable Water (see TNW designation below).

Deadman Canyon, the Cross-Cut Channel, California Gulch, the unnamed tributary, and the Deadman Diversion Channel are ephemeral tributaries to Mangas Creek. California Gulch and Deadman Canyon bisect the earlier and ongoing mining activities at the Little Rock Mine. The natural pathway for both drainages has been altered by the Little Rock Mine and the adjacent Tyrone Mine. Mangas Creek is ephemeral until Mangas Springs, approximately 12 miles downgradient of the confluence with the Deadman Diversion Channel, and then perennial for an additional, approximately 8 miles to its confluence with the Gila River. (HilgartWilson Report)

The ordinary high water mark (OHWM) for review area waters was mapped by HilgartWilson and is described in more detail in the HilgartWilson report. Based on on-site observations the Corps is in agreement with the OHWM determinations provided by FMI for the channels is question.

SETTING

The review area is located within a hard-rock mining district that includes two primary mines, the FMI Tyrone copper mine and the adjacent Little Rock copper mine, also owned by FMI. Many reports describe the Little Rock mine as a unit of the larger Tyrone mine.

The Little Rock and Tyrone mines are located approximately 10 miles southwest of Silver City, New Mexico. The Tyrone mine straddles the Continental Divide and the Mimbres and Gila River basins. Turquoise, copper, and fluorspar were mined in the area from the late 1870s through the early 1900s. Open-pit copper mining began in 1967. Since 1992, the mine has been solely a copper leaching operation. In 2004 the open pit complex at Tyrone encompassed approximately 1,250 acres, including the Main, West Main, Valencia, Gettysburg, Copper Mountain, South Rim, Savanna, and San Salvador Hill pits. The Tyrone Mine contains a number of stockpiles located along the perimeter of the pit areas. The stockpiles generally fall into three types: 1) leach stockpiles, which are used to extract copper from low-grade ore, 2) waste rock stockpiles, which store excavated materials that have little or no recoverable copper; and 3) overburden stockpiles, which contain materials suitable for future reclamation purposes. Combined, the stockpiles encompass approximately 2,800 acres. The inactive tailing impoundments at the Tyrone Mine consist of the historic Burro Mountain Tailing Impoundment located in the East Mine Unit and six tailing impoundments in the Mangas Valley Tailing Unit. The Mangas Valley Tailings Area contains the currently inactive 1, 1A, 1X, 2, 3X, and 3 tailing impoundments. The tailing impoundments cover about 2,300 acres, and contain approximately 304 million tons of tailing. The tailing impoundments have been substantially reclaimed in the last 10 years. The mine also contains a mill and concentrator, a solution extraction-electrowinning plant (SX/EW), and other ancillary facilities.

The principal features at the Little Rock mine include the open pit, the North and West Canyon overburden stockpiles, historic Ohio Mine and dam, the reclaimed Copper Leach Stockpile and Precipitation Plant. The closed and reclaimed leach stockpile contains about 1.7 million tons of primarily copper oxide ore that was leached with sulfuric acid solutions during the early 1970's (Discharge Permit Renewal and Modification – DP-1236, New Mexico Environment Department, March 8, 2016).
The existing open pit and overburden stockpiles occupy approximately 205 acres, while approximately 32 acres are associated with the reclaimed P-Plant and Copper Leach Stockpile (Tyrone Mine Closure/Closeout Plan Update, Phelps Dodge Tyrone, Inc., Prepared by Golder and Associates and Submitted by Freeport McMoRan Tyrone, Inc, October 2007 and Updated Closure/Closeout Plan for the Little Rock Mine, Prepared by Golder and Associates and Submitted by Freeport McMoRan Tyrone, Inc, June 19, 2014). The leach ore stockpiles, waste rock piles, open pits, and tailing impoundments at the mines contain mineral sulfides which, when oxidized, generate acidic solutions. These acidic solutions react with in situ minerals, which produces acid rock drainage and associated metals and sulfate contamination. (New Mexico Environment Department Ground Water Quality Bureau, In the Matter of the Application of Phelps Dodge Tyrone Inc. for a Supplemental Discharge Permit for Closure (DP-1341), Proposed Findings of Fact and Conclusions of Law, October 2002)

Also located within the Tyrone mine in Deadman Canyon are historic mining operations such as the United States Natural Resources (USNR) copper leach dumps which operated in the early 1970's. Contaminated surface water from USNR mining operations is reported to have left residual staining of copper minerals on sediments in the Deadman Canyon creek bed. A surface impoundment located below the USNR Leach Ore Stockpile in the Deadman Canyon area contained water with a typical pH ranging from 4.0 to 4.5 standard units. Also, a former leach ore stockpile leached by a previous operator, the Copper Mountain Stockpile, was removed from the Deadman Canyon area and placed on the Tyrone No. 2A Leach Ore Stockpile in 2000. (New Mexico Environment Department Ground Water Quality Bureau, In the Matter of the Application of Phelps Dodge Tyrone Inc. for a Supplemental Discharge Permit for Closure (DP-1341), Proposed Findings of Fact and Conclusions of Law, October 2002)

At the Tyrone mine waste stockpiles, the presence of sulfide-bearing mineral assemblages results in significant acid-generating potential. Eighty percent of the stockpiles at Tyrone had negative acid-base accounting. As a result, stockpiles have the capacity to produce acidic seeps at the toes of stockpiles, which serve as sources of hazardous substances to ground water, especially because the stockpiles are not lined.

The hard rock mining district described in this document is a source of regional, not only localized, water quality contamination and other impacts. Contaminated water is expected to require management and treatment for at least 100 years following cessation of mining operations, including impacted storm water runoff, impacted ground water, and meteoric water that infiltrates through and is collected as seepage from the base of stockpiles. (Tyrone Mine Closure/Closeout Plan Update, Phelps Dodge Tyrone, Inc., Prepared by Golder and Associates and Submitted by Freeport McMoRan Tyrone, Inc, October 2007). Additionally, Open pit mining has altered surface water and ground water hydrology, and some surface water that would have flowed to the Gila River basin now flows into the open pit (Preassessment Screen for the Tyrone Mine Site, Silver City, New Mexico, Prepared for U.S. Fish and Wildlife Service, Stratus Consulting, Inc. June 2003). Though this significant nexus analysis focuses on the nexus between local review area waters and the Gila River, it is important to note this is only one piece of a more complex situation involving numerous sources of hazardous substance releases, complex pathways of contaminant transport, and various affected and potentially affected resources.

TNW DESIGNATION

The information presented in the following paragraphs provides documentation regarding the status of navigability of the Gila River in New Mexico from near its headwaters in the Gila Wilderness Area, located in the Gila National Forest, to the New Mexico and Arizona State Line, in accordance with the "Rapanos Guidance" for determining jurisdiction for purposes of Section 404 of the Clean Water Act. See Appendix 2 for a map of the proposed determination area.

The Gila River drainage basin includes 56,570-square miles in New Mexico (NM) and Arizona (AZ). The Upper Gila River watershed (USGS sub region 1504) comprises about 12,850-square miles in southwestern New Mexico and southeastern Arizona. The Gila River headwaters originate in NM on the Gila National Forest near the Gila Cliff Dwellings and are joined downstream by several major tributaries; Carlyle Canyon, Blue Creek, Mangas Creek, Duck Creek, Bear Creek Mogollon Creek, Sapillo Creek, Beaver Creek, and the West and Middle Fork of the Gila River. The Gila River joins the Colorado River at the confluence near Yuma, AZ. The Colorado River continues into the Gulf of California.

The Gila River is perennial from its headwaters on the Gila National Forest, to the NM/AZ state line. There are three USGS stream gages on the Gila River in NM. USGS stream gage no. 09430500 is located near the community of Gila NM. USGS stream gage no. 09431500 is located near the community of Redrock NM. USGS stream gage no. 09432000 is located near the community of Virden, NM. The Gila NM gage has recorded flows for 89 years with the maximum daily mean flow in March during spring runoff of 347-cfs and the minimum daily mean flow in July during the dry season of 45-cfs. The Redrock gage has recorded flows for 53 years with the maximum daily mean flow in March during spring runoff of 656-cfs and the minimum daily mean flow in July during the dry season of 37-cfs. The Virden gage has recorded flows for 82 years with the maximum daily mean flow in March during spring runoff of 460-cfs and the minimum daily mean flow in July during the dry season of 34-cfs (Appendix 3).

Commercial river rafting has been well documented on the Gila River in New Mexico. One commercial rafting company reported obtaining federal permits as early as 1996 for river rafting on the Gila through the Gila Lower Box Wilderness Study Area, managed by the Bureau of Land Management. In present day, commercial guide services for river rafting on the Gila River can be obtained directly from a rafting company or organized sponsors such as the Gila Conservation Coalition (GCC). The GCC has organized kayak trips as part of the annual Gila River Festival since 2008. The commercial rafting company GCC uses is Far Flung Adventures. According to Steve Harris, the

Executive Director of Far Flung Adventures, his company has led at least 15 commercial rafting trips on various sections of the Gila River in New Mexico. In particular, trips associated with the Gila River Festival have included a section of the Gila River above Mangas Creek from the Mogollon campground to the Nature Conservancy property. Another commercial trip he has led is below Mangas Creek from Red Rocks to Nichols Canyon. Participants in the GCC-organized commercial rafting trips have been both local and out-of-state customers. According to representatives from a company called Known World Guides, they operated commercial rafting on the Gila from 1996 till 2002. Appendix 4 provides supporting documentation regarding commercial rafting on the Gila River in New Mexico.

According to direct correspondence and internet sources the Gila River in NM is also frequently rafted by people who do not use a commercial rafting company. There are many internet sources available that document rafting of the Gila River in New Mexico, covering topics such as recommended reach runs, put-in and take-out sites, rapids classification, and private individual accounts and photographs of rafting experiences on the Gila River. Additionally, Steve Harris from far Flung Adventures and others have reported that rafting takes place along the stretch of river below the Freeport McMoRan mining company diversion at Bill Evans Lake to the Middle Gila Box. Documentation of non-commercial rafting is available in Appendix 5.

Based on this information the Corps has determined the Gila River in New Mexico has been and is currently used for interstate commerce and is susceptible to such use throughout its course and is therefore a traditional navigable water.

SIGNIFICANT NEXUS ANALYSIS

Review area waters are located within a significantly disturbed mining district that has undergone decades of water contaminant control intervention. Segments of review area waters flow in their natural channel, however, large stretches have been rerouted into man made diversion channels as the footprint of mine areas increased. Despite these disturbances, a hydrologic connection remains intact between review area waters, Mangas Creek and the Gila River.

In particular, the earthen dike 1 and earthen dike 2 areas along with the Tyrone mine tailing facilities, have altered the flow pattern, direction, and functions of local drainages. The earthen dikes are described in the HilgartWilson report as obstructions to flow, creating “delta” areas that pond water which can flow into constructed diversion channels (Cross-Cut Channel and Deadman Diversion Channel) during sufficiently sized storm events. These “delta” areas have been artificially created and effectively perform as settling basins, particularly in the case of the Deadman Canyon delta. The earthen berms (1 and 2) were originally constructed to keep surface water in Deadman Canyon from flowing into the Tyrone mine tailing impoundments that are adjacent to the stream. However, the berms provide additional functionality by slowing water which causes sediment to drop out (FMI field trip communication, September 2017).

According to the HilgartWilson report, site observations and anecdotal evidence from long term Tyrone personnel indicate that surface flows in the constructed Deadman Diversion Channel downgradient of the Whitewater Canyon delta area occur roughly every three to five years. The report also indicates that both of the earthen dikes are expected to convey flow in a 10 year 24-hour storm event (i.e. surface water is expected to flow past the earthen berms, on average, once every 10 years). According to the USACE arid west field guide for identification of the Ordinary High Water Mark, the dominant precipitation event in the Arid West is the low to moderate (5–10 year) discharge event. “Low to moderate events are capable of carrying the largest proportion of sediment over time in arid channels, making them the dominant or effective discharges in the region (Wolman and Miller 1960).” “These low to moderate events, which are responsible for the majority of the impact, are similar in concept to the every-other-year frequency of the bankfull discharge (Dunne and Leopold 1978, Rosgen 1996) in more humid regions.” (USACE OHWM Arid West Manual 2008) Despite the extensive manipulation of the tributary system and landscape within the mining district (including dikes, delta areas, and associated shallow groundwater storage) anecdotal reports and projected flow recurrence intervals are within the normal ranges that one would expect to see in this type of an arid environment.

Other water quality control features constructed within the review area include a cut-off wall that was completed in 2017 within Deadman Canyon to help control contaminated seepage that emanates from the adjacent Tyrone mine. The purpose of the cut-off wall is to capture impacted perched water that reaches the northern extent of the alluvium. Perched water in this portion of the canyon is of poor quality and exceeds New Mexico Section 3103 standards for multiple constituents. For example, perched water samples collected from well 166-2006-03 generally exceed Section 3103 standards for aluminum, cadmium, cobalt, copper, fluoride, manganese, pH, TDS, and sulfate. Collection of perched groundwater at this location would serve to contain impacted water at a natural collection point, where the alluvium is constricted both vertically and laterally and the water is forced to the surface. (Stage 2 Abatement Plan for the Tyrone Mine, Daniel B. Stephens and Associates, 2015). The cut-off wall augments an older seepage collection system (the Seep 5E pond) which overflowed into Deadman canyon in 2001 during a period when the stream was flowing. The spill had a pH of 4. (Preassessment Screen for the Tyrone Mine Site, Silver City, New Mexico, Prepared for U.S. Fish and Wildlife Service, Stratus Consulting, Inc. June 2003) Water collected at the cut-off wall has a low pH and is pumped into the Tyrone mine process water system. According to FMI, the newly installed cut-off wall captures surface flow and is intended to prevent surface water from becoming contaminated and moving downstream. In the event of large storm events, surface water can flow over the cut-off wall (FMI field trip communication). The cut-off wall and other water quality control systems would not be needed if there was no chance of contaminants moving offsite into downstream waters.

The New Mexico Environment Department has required permits under authority of the New Mexico Water Quality Act to control the discharge of pollutants into surface and ground water from the mines. (Discharge Permit Renewal and Modification – DP-1236, New Mexico Environment Department, March 8, 2016) These permits require ongoing monitoring and corrective action when spills occur. For example, in 1997 under Discharge Permit (DP) 166, the assessment of potential seepage from the No. 2 stockpile to Deadman Canyon resulted in corrective actions, including installation of interception and barrier systems; installation of a secondary collection trench downgradient of the Seep 5E pond in 2000; and installation of seepage collection systems in 1998. (Preassessment Screen for the Tyrone Mine Site, Silver City, New Mexico, Prepared for U.S. Fish and Wildlife Service, Stratus Consulting, Inc. June 2003). Additionally, seepage interception systems include the No. 3A Stockpile Ground Water Interception System, and the seepage interceptor systems located along Deadman Canyon, in and along Oak Grove Draw, and in Brick Kiln Gulch. The function of these systems is to intercept, collect and pump acid mine seepage and contaminated ground water that would otherwise migrate further from the stockpiles and the mining area. (New Mexico Environment Department Ground Water Quality Bureau, In the Matter of the Application of Phelps Dodge Tyrone Inc. for a Supplemental Discharge Permit for Closure (DP-1341), Proposed Findings of Fact and Conclusions of Law, October 2002). Discharge permits also address closure of mine facilities. For example, tailing impoundments have been reclaimed, and storm water has been redirected to drainage areas that flow into Deadman Canyon.

Despite containment efforts, surface water within the review area has been contaminated from mining operations (Affected Areas Study Work Plan, Tyrone Mine Facility, Prepared for Phelps Dodge Tyrone, Inc. by Daniel B. Stephens and Associates, April 2005). Raffinate, the leaching solution for the mine stockpiles, contains sulfuric acid and ferrous and ferric sulfate. After the raffinate has percolated through the piles, it contains sulfuric acid, ferrous and ferric sulfate, and copper, and is known as Pregnant Leach Solution or PLS. Sulfuric acid, ferrous sulfate, and ferric sulfate are listed hazardous substances and all contain sulfate. Leakage of PLS has contaminated groundwater in Deadman Canyon at the Tyrone Mine. (Final Groundwater Restoration Plan for the Chino, Cobre, and Tyrone Mine Facilities, New Mexico Office of Natural Resources Trustee, January 4, 2012) Ground and surface water in the vicinity of the mines is interconnected. Discharge of ground water to seeps and springs is documented. (Affected Areas Study Work Plan, Tyrone Mine Facility, Prepared for Phelps Dodge Tyrone, Inc. by Daniel B. Stephens and Associates, April 2005) (See Appendix **, Sig Nexus Figure 3 -Deadman Canyon Location of Seeps – from Tyrone Affected Areas Study Work Plan, Daniel B. Stephens, 2005)

At Seep 5 in Deadman Canyon, which is located across the channel from Seep 5E, water samples taken from 1996 to 2001 showed elevated concentrations of cobalt, copper, nickel, zinc, and manganese. Measured Seep 5E concentrations were as high as 1,020 mg/l of copper, 70.3 mg/l of manganese, and 62 mg/l of zinc. (Preassessment Screen for the Tyrone Mine Site, Silver City, New Mexico, Prepared for U.S. Fish and Wildlife Service, Stratus Consulting, Inc. June 2003) On the west side of the Tyrone mine, seepage of acid rock drainage from the Nos. 2 and 2A Leach Stockpiles, as well as from historic operations, has caused contamination of surface water and ground water within Deadman Canyon. (New Mexico Water Quality Control Commission. In the Matter of the Appeal of Supplemental Discharge Permit for Closure (DP-1341) For Phelps Dodge Tyrone, Decision and Order on Remand, February 4, 2009)

Further downstream, water quality samples from Mangas Creek show that surface water has been exposed to hazardous substances. Samples of surface water in Mangas Creek have exceeded water quality criteria established under Section 304(a)(1) of the Clean Water Act for the protection of aquatic life. Arsenic, cadmium, chromium, copper, and lead have been detected in Mangas Creek below Mangas Springs, while manganese has been detected in Mangas Creek at the confluence with the Gila River. Also, sampling points in the Gila River, downstream of the confluence with Mangas Creek, suggest that hazardous substances may have been transported from the mine to the Gila River. In the Gila River downstream from Mangas Creek, concentrations of dissolved copper have exceeded 30 micrograms per liter (ug/L), while concentrations of total copper have exceeded 150 ug/l. Dissolved zinc concentrations have exceeded 50 ug/L, while concentrations of total zinc have exceeded 900 ug/L (Figures 3.4 and 3.5). (Preassessment Screen for the Tyrone Mine Site, Silver City, New Mexico, Prepared for U.S. Fish and Wildlife Service, Stratus Consulting, Inc. June 2003) (See Appendix 1, Sig Nexus Figure 4-6)

The HilgartWilson report does not address past contamination in review area waters and downstream waters, and relies on the water quality data available in the most recent Section 303(d)/ Section 305(b) Integrated Report (IR) which documents the results of a 2011 survey conducted by the New Mexico Environment Department's Surface Water Quality Bureau (SWQB). Interventions over the last two decades such as tailings reclamation and the cut-off wall have reduced contaminant loads when those systems are fully functioning. Additionally, most watersheds in New Mexico are sampled by SWQB on an eight year rotation, so these surveys are not intended to document releases such as spills and other short term events (Final 2016 – 2018 State of New Mexico Clean Water Act Section 303(d)/Section 305(b) Integrated Report Prepared by New Mexico Environment Department Surface Water Quality Bureau, September 2016). Additionally, the SWQB sampling effort does not specifically target mining impacts (personal communication with NMED staff).

The HilgartWilson report notes that in a 2015 Environmental Assessment (EA), the Bureau of Land Management (BLM) assessed water quality impacts associated with a proposal to expand the Little Rock open pit and determined that there would be no substantial effect on surface water quality. The 2015 EA does not address water quality impacts associated with existing and past conditions in review area waters and therefore has no bearing on the evaluation of a significant nexus between review area waters and the Gila River. In fact, the EA states: Given the existing, disturbed nature of the canyon walls and channel bottom and the application of BMPs and design features to control erosion and sedimentation, a substantial change would not be expected to downgradient water quality. The EA also references the monitoring requirements of existing water quality permits in its determination that there will be no impacts from an open pit expansion.

The Tyrone and Little Rock mines are substantial sources of contaminants that have impacted alluvial and regional water tables and surface water quality. Though engineered systems are in place to reduce water contamination, mining operations of the type and magnitude as the Little Rock and Tyrone mines have a high rate of failure (U.S. Copper Porphyry Mines Report, The Track Record of Water Quality Impacts Resulting From Pipeline Spills, Tailings Failures And Water Collection And Treatment Failures, July 2012, Prepared by Earthworks).

Based on available information, we have concluded that Deadman Canyon has more than an insubstantial or speculative effect on the chemical integrity of the downstream TNW, the Gila River at the confluence with Mangas Creek.

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