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): Revised December 14, 2018

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. - Deadman Canyon

C. PROJECT LOCATION AND BACKGROUND INFORMATION: Freeport-McMoRan Tyrone Inc. (FMTI) requested an approved jurisdictional determination (AJD) for drainage features occurring within the Little Rock Mine located in Grant County, New Mexico. The Little Rock Mine includes a project area of approximately 682 acres and is bordered by the Tyrone Mine to the north and the Gila National Forest to the south and west. Maps of the delineated area are provided as a reference. This JD request is not linked to a permit application. An AJD was provided on 31 October 2017. Reconsideration requests dated 28 December 2017 and 23 April 2018, provided new information under 33 CFR Sec. 331.6(c). The USACE issued revised AJDs on 23 February 2018 and 7 July 2018 incorporating evaluations of the new information provided by FMTI. A third reconsideration request dated 7 September 2018, from FMTI was provided. The USACE has determined that the thrid reconsideration request did not provide new information for evaluation. This AJD is updated with information gathered internally.

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: 743653.136683 X Coordinate and 3615993.387009 Y Coordinate Zone 12
Name of nearest waterbody: Deadman Canyon is the subject of this AJD form; California Gulch & unnamed tributary are reviewed in a seprate form and are not the subject of the reconsideration request.

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, February 2018, July 2, 2018, and December 14, 2018
☒ 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.

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[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).

Wetlands: acres.

c. **Limits (boundaries) of jurisdiction** based on: **Established by OHWM.**
Elevation of established OHWM (if known):See HilgartWilson report dated August 2017 for maps of the OHWM.

2. **Non-regulated waters/wetlands (check if applicable):**[3]
☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: **NA**.

[3] Supporting documentation is presented in Section III.F.

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: **NA**.

Summarize rationale supporting determination: NA.

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

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: 0
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 **15-20** aerial (straight) miles from TNW.
Project waters are **10-15** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: The waters located within the site boundary do not cross or serve as state boundaries.

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

Identify flow route to TNW[5]: In order to identify the flow route to a TNW, the USACE must identify the subject tributary's "relevant reach". Relevant reach is a term used in the Approved Jurisdictional Determination (AJD) Form and Instructional Guidebook dated 30 May 2007. The instructions for determining the relevant reach are the same as the description for what a "tributary" is in footnote 21 in the 5 June 2007 Rapanos Guidance, which is the same as footnote 24 in the 2 December 2008 Rapanos Guidance: "tributary, for the purposes of this guidance, is the entire reach of the stream that is of the same order (i.e., from the point of confluence, where two lower order streams meet to form the tributary, downstream to the point such tributary enters a higher order stream)." The relevant reach, a third order stream named Deadman Canyon, is formed by the confluence of two second order streams near the Burro Mountain Road crossing. The relevant reach continues as a third order stream for approximately 12,755 feet until its confluence with another third order stream, Whitewater Canyon at the 90-degree corner where these streams have been re-routed around the southwest corner of No. 1 Series Tailings Facilities (Tyrone Mine). The flow path of Deadman Canyon joins Mangas Creek (including the RPW segment of Mangas Creek from Mangas Springs to the Gila River), which flows into the Gila River.

Tributary stream order, if known: Deadman Canyon is a third order stream. The USACE utilized field observations, most recent aerial photography, and USGS topo maps to make this determination. Stream order is based on Alan Needle Strahler's 1952 article "Dynamic Basis of Geomorphology" published in the Geological Society of America Bulletin. 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: 15 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: Unknown. The stability of Deadman Canyon has not been studied and the USACE is not aware of any existing data to conduct such an analysis.
Presence of run/riffle/pool complexes. Explain: NA.
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: **1**
Describe flow regime: Flows in response to precipitation.
Other information on duration and volume: The USGS StreamStats analysis (Waltemeyer 2008), which is based on stream gage data in adjacent areas, provides a discharge estimate for the 100 year, 24 hour event of approximately 3.2 cfs at the junction of Deadman Canyon and Mangas Creek.

Surface flow is: **Discrete and confined.** Characteristics: Surface flow is variable in the review area. In some relatively narrow reaches flow is confined, and in broader reaches flows are more braided.

Subsurface flow: **Unknown**. Explain findings: NA.
☐ Dye (or other) test performed: NA.

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

[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.
[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.

- ☒ leaf litter disturbed or washed away
- ☒ sediment deposition
- ☐ water staining
- ☐ other (list):
- ☒ scour
- ☐ multiple observed or predicted flow events
- ☐ abrupt change in plant community

☒ Discontinuous OHWM.[7] Explain: OHWM is lost for short distances. Flatter gradient in channelized reaches 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:
- ☐ oil or scum line along shore objects
- ☐ fine shell or debris deposits (foreshore)
- ☐ physical markings/characteristics
- ☐ tidal gauges
- ☐ other (list):

☐ Mean High Water Mark indicated by:
- ☐ survey to available datum;
- ☐ physical markings;
- ☐ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: See Section IV B.

Identify specific pollutants, if known: See Section IV B.

[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: NA.

☐ Habitat for:

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

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: NA acres

Wetland type. Explain: NA.

Wetland quality. Explain: NA.

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

(b) General Flow Relationship with Non-TNW:

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

Surface flow is**: Pick List**

Characteristics: NA.

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

☐ Dye (or other) test performed: NA.

(c) Wetland Adjacency Determination with Non-TNW:

☐ Directly abutting

☐ Not directly abutting

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

(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: NA.

Identify specific pollutants, if known: NA.

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

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

☐ Vegetation type/percent cover. Explain: NA.

☐ Habitat for:

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

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

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

Approximately (0) 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)
NA	NA	NA	NA

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

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 Canyonis a tributary to the Gila River. 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, 0 acres.
   - ☐ Wetlands adjacent to TNWs: 0 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: NA.
   - ☐ 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: NA.

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: **0** linear feet **0** width (ft).
☐ Other non-wetland waters: **0** acres.
Identify type(s) of waters: **NA**.

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: **0** acres.
Identify type(s) of waters: **NA.**

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: **NA.**

☐ 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: NA.

Provide acreage estimates for jurisdictional wetlands in the review area: **0** 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: **0** 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: **0** 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: NA.

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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.*

☐ Other factors. Explain: NA.

Identify water body and summarize rationale supporting determination: NA.

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: 0 linear feet 0 width (ft).
☐ Other non-wetland waters: 0 acres.
  Identify type(s) of waters:NA**.**
☐ Wetlands: 0 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): **NA.**

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): **0** linear feet width (ft).
☐ Lakes/ponds: 0 acres.
☐ Other non-wetland waters: 0 acres. List type of aquatic resource: NA.
☐ Wetlands: 0 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): **0** linear feet, **0** width (ft).
☐ Lakes/ponds: 0 acres.
☐ Other non-wetland waters: 0 acres. List type of aquatic resource: NA.
☐ Wetlands: 0 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 Freeport McMoRan, Inc. as of September 7, 2018.
☒ 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: NA.
☐ Corps navigable waters' study: NA.
☐ U.S. Geological Survey Hydrologic Atlas: NA.
  ☐ USGS NHD data.
  ☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name: 1:24K Wind Mountain.
☐ USDA Natural Resources Conservation Service Soil Survey. Citation: .
☒ National wetlands inventory map(s). Cite name: Wind Mountain.
☐ State/Local wetland inventory map(s): NA.
☐ FEMA/FIRM maps: NA.
☐ 100-year Floodplain Elevation is: Not a Floodplain (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☒ Aerial (Name & Date): Google Earth Pro imagery from 1996 thru 2014.
  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: NA.
☐ Applicable/supporting case law: NA.
☐ Applicable/supporting scientific literature: NA.
☒ Other information (please specify): References listed below, ORM2, land use data.

B. ADDITIONAL COMMENTS TO SUPPORT JD:

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. This AJD form addresses Deadman Canyon. California Gulch and the unnamed tributary are addressed in a separate AJD form. Figure 4 of the HilgartWilson report shows the locations of the three waters. Photos from field site visits are provided in Appendix 1.

As described in the HilgartWilson report, Deadman Canyon is 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 and routed into a different sub-watershed 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 the portion of Deadman Canyon within the Little Rock Mine boundary was mapped by HilgartWilson and is described in more detail in the HilgartWilson report. Specifically, HilgartWilson delineated the OHWM utilizing the Corps Arid West OWHM Delineation Manual and mapped the OHWM within the area identified as the “project area” in Figure 8, and Figures 9-A through 9-K of their report. Based on on-site observations the Corps is in agreement with the OHWM delineation provided by HilgartWilson for the channels they mapped. Additionally the Corps and EPA participated in field investigations on March 23, 2017 and September 9, 2017 which provided a broader overview of Deadman Canyon, Mangas Creek and the Mangas Creek/Gila River confluence. Generally, the Corps observed that wherever the channels follow a natural valley slope there is an OHWM. In rerouted portions of the tributary system there is an anthropogenic discontinuity in the OHWM for a portion of the flow path where the slope is flattened. Connectivity is not severed by these rerouted portions of the stream that display a discontinuous OHWM. There is a clear OHWM upgradient of the rerouted channel segments and downgradient of those segments, as well as in some places within the rerouted sections. Based on on-site observations, the HilgartWilson report and a review of aerial photography, Deadman Canyon is a tributary to Mangas Creek and then the Gila River, and not an erosional feature.

SETTING
The review area is located within a hard-rock mining district that includes two primary mines, the FMTI Tyrone copper mine and the adjacent Little Rock copper mine, also owned by FMTI. 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 (NM). 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 water quality contamination including impacted storm water runoff, impacted ground water, and meteoric water that infiltrates through and is collected as seepage from the base of stockpiles. Surface water (runoff and seepage flows) and ground water is expected to require management and treatment for a duration of 100 years following cessation of mining operations. (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 Deadman Canyon 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 - FOR PURPOSES OF THIS APPROVED JURISDICTIONAL DETERMINATION
The Gila River is an (a)(1) water at the confluence with Mangas Creek, which is the point where the flow from the relevant reach, Deadman Canyon, enters the Gila River. We base this assessment on the fact that the Gila River at this location is susceptible to use in interstate commerce as demonstrated by reaches upstream and downstream of this location are used for commercial recreatioal rafting, evidence that interstate travelers use these commercial rafting services, and the fact that the physical characteristics of the Gila River at the confluence with Mangas Creek are substantially similar to those of the reaches currently used for commercial recreational rafting.

The information presented in the following paragraphs provides documentation regarding the status of navigability of the Gila River in NM in accordance with the "Rapanos Guidance" for determining jurisdiction for purposes of Section 404 of the Clean Water Act. This designation is made for the purposes of this AJD. Because of the dispersed nature of the activities supporting TNW designation, specific reaches of the Gila River are not designated as a TNW. In addition the Gila River maintains the same stream order from upstream of the confluence with Mangas Creek to downstream of the NM and Arizona (AZ) state line. The portion of the Gila River that is in the vicinity of the confluence with Mangas Creek is part of the TNW. See Appendix 2 for a map of the locations discussed in this section.

The Gila River drainage basin includes 56,570-square miles in NM and AZ. The Upper Gila River watershed (USGS sub region 1504) comprises about 12,850-square miles in southwestern NM and southeastern AZ. 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 is well documented on the Gila River in NM. 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 (BLM). 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 NM. 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. Additionally a company formally doing business as Known World Guides operated commercial rafting on the Gila River from 1996 till 2002. Appendix 4 provides supporting documentation regarding commercial rafting on the Gila River in NM.

According to direct correspondence and internet sources the Gila River in NM is also frequently rafted by people from within and outside of NM who do not use a commercial rafting company. There are many internet sources available that document rafting of the Gila River, 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. Proximity to the Gila National Forest makes the Gila River in NM a draw for tourism-based recreation. The “New Mexico True” tourism campaign promotes boating on the Gila River. The BLM website also advertises seasonal whitewater boating opportunities on several rivers in NM including the Gila River Lower Box Canyon in southern NM. The website states “These whitewater rivers attract a high number of both private and commercial rafters and boaters from all over the country”. 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.

For the purposes of this AJD, based on the information above, the Corps has determined the Gila River in NM has been and is currently used for interstate commercial water borne recreation and is susceptible to such use throughout its course and is therefore a traditional navigable water.

SIGNIFICANT NEXUS ANALYSIS

The relevant reach that is the subject of this analysis is Deadman Canyon, a third order stream as depicted on Figure 4 of the HilgartWilson Report. Two other streams were evaluated and found to have no significant nexus to the Gila River. These are the relevant reach of California Gulch and the unnamed tributary to Whitewater Creek. A separate analysis is provided for California Gulch and the unnamed tributary.

This significant nexus analysis evaluates the third order reach of Deadman Canyon which extends from the upstream confluence with an unnamed tributary near Burro Mountain Road, downstream to the confluence with Whitewater Canyon. The relevant reach of Deadman Canyon includes the cut-off wall seepage interception system described in more detail below. The cut-off wall was built near the locations of two mine-contaminated seeps in Deadman Canyon, 5 and 5E which are also described below. Deadman Canyon flows through a significantly disturbed mining district that has undergone decades of water contaminant control intervention. Segments of Deadman Canyon flow in the 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 Deadman Canyon and the Gila River.

The relevant reach traps pollutants preventing them from reaching 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 including Deadman Canyon. 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 (FMTI 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 relevant reach of Deadman Canyon include a cut-off wall that was completed in 2017 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 water quality 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 serves 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 FMTI, 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 (FMTI field trip communication). Water quality controls installed in Deadman Canyon as mandated by New Mexico Environment Department (NMED) indicate concern about a nexus with downstream waters. 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 NMED 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. Additionally, FMTI has obtained coverage under EPA's Multi-Sector General Permit under Section 402 of the Clean Water Act, which includes implementation of stormwater controls and monitoring.

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 1, 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)

In 2003 Stratus Consulting prepared a Preassessment Screen and Determination for a natural resource damage assessment (NRDA) for three large copper mines in southwestern NM and southeastern AZ, including the Tyrone Mine. The Preassessment Screen was prepared under contract to the U.S. Fish and Wildlife Service, one of the trustee agencies in accordance with NRDA regulations. This report concludes that 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 Deadman Canyon 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 NMED'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 NM 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 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 Deadman Canyon and therefore has no bearing on the evaluation of a significant nexus between Deadman Canyon 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 relevant reach transports pollutants to the Gila River. Daniel B. Stephens and Associates prepared a report on behalf of FMTI entitled "Review of Jurisdictional Determination for Little Rock Mine" (referred to here as the 2017 DBS Report) which was submitted to the Corps as new information on December 28, 2017. The report provides additional water quality data for the review area and downstream waters. Time series plots and other figures included in the report show spikes in concentrations of mine-related contaminants in waters along the Deadman Canyon to Mangas Creek to Gila River flow path including arsenic (Figure A-1 Mangas Spring), cadmium (Figure A-2 Mangas Spring; Figure 6 Mangas Spring), chromium (Figure A-3 Mangas Creek, Mangas Spring and Gila River), copper (Figure A-4 Mangas Spring and Gila River; Figure 3 Mangas Spring; Figure 8 Mangas Spring), lead (Figure A-5 Mangas Spring; Figure 9 Mangas Spring), and zinc (Figure A-7 Mangas Spring, Gila River). These spikes exceed the background concentrations indicated in the same figures.

Additionally, as shown in the 2017 DBS Report figures, detection limits for the sampling events vary greatly, and in some cases are higher than the peak contaminant concentrations detected during the period of record. For example, detection limits for cadmium and chromium in the Gila River vary by more than an order of magnitude (Figure A-2, A-3) and detection limits for lead vary by two orders of magnitude (Figure A-5). In the 1998/1999 timeframe the detection limits for chromium and lead for Gila River samples are nearly as high as the peak concentrations over the period of record for all samples (Figure A-3 and A-5). Furthermore, there are periods of time where samples were not collected for particular mine related contaminants. For example there are gaps in Figures 5, 7 and 11 for contaminants of concern at Mangas Spring and in Figures A-1 through A-7 after 2010 for the Gila River.

The 2017 DBS Report uses time series plots to support an assertion that a lack of time-correlated water quality concentration increases at the Tyrone Mine and downstream at Mangas Spring demonstrates a lack of chemical nexus between the mine and downstream waters. Stated simply, the report indicates that a nexus finding is not supported if peak concentrations do not occur at the same time at the mine and downstream. However, unlike perennial streams that continuously move sediment and contaminants through the watershed, contaminant movement in non-perennial stream channels generally occurs in pulses in response to short duration, high intensity precipitation events that are typical of arid and semi¬arid regions. This precipitation pattern promotes the stepwise movement, deposition and storage of sediment and contaminants. Therefore, contaminants are not expected to travel from upstream reaches to receiving waters in a single event, but are instead deposited, remobilized during the next flow, and so on throughout the system. (The Ecological and Hydrological Significance of Ephemeral and Intermittent Streams in the Arid and Semi-arid American Southwest, EPA, November 2008) From Deadman Canyon in the mine area to downstream receiving waters, latent contamination can settle in ponding areas and in stream bed sediments until they are re-mobilized some distance downstream based on local storm conditions.

As discussed in the previous paragraphs, the data provided in the 2017 DBS Report do not support the report's assertion that Deadman Canyon water quality has not affected and will not affect Mangas Spring or the Gila River. The Tyrone and Little Rock mines are substantial sources of heavy metals and other contaminants that have impacted alluvial groundwater, seeps that discharge to surface water, and surface water quality. These contaminants are found in Mangas Creek and in the Gila River at concentrations above background.

HilgartWilson recently prepared an additional report on behalf of FMTI entitled "Little Rock Mine- Hydrology & Infiltration Analysis", dated April 23, 2018 (referred to here as the HilgartWilson April 2018 report), which was submitted to the Corps as new information on April 23, 2018. The HilgartWilson April 2018 report described their use and results of the Corps developed Hydrologic Engineering Center - Hydrologic Modeling System (HEC-HMS) in an attempt to define what they meant by "sufficiently large events" in the HilgartWilson report discussed above. HEC-HMS, like any model, requires collecting and inputing precise data, and making appropriate assumptions in order to generate valid and scientifically repeatable results. The HilgartWilson April 2018 report claims that HEC-HMS modeling concludes that flows would never make it to the Gila River. The Corps conducted an assessment of the HilgartWilson April 2018 report and found that the use of diversions in the HEC-HMS modeling likely underestimates the volume of water that is transmitted downstream; the infiltration rates assumed for the Mangas Creek channel bed are for saturated conditions, which represents a maximum infiltration rate; and that the modeling did not consider review area watershed contributions to the Gila River. Therefore, the Corps has determined that this additional information is insufficient and that surface flows occur with enough frequency to result in a hydrologic connection between Deadman Canyon and the Gila River.

The watersheds surrounding the review area contribute coincident flow to Deadman Canyon discharges. It is likely that Mangas Creek is not dry when Deadman and Whitewater Canyons contributions reach the confluence. More water in Mangas Creek results in greater opportunity for discharging flows to reach the Gila River. The USGS StreamStats analysis of Mangas Creek at Whitewater Canyon results in a 12,600 cfs peak flow for the 100-year storm (Waltermeyer 2008). On September 15, 2013, a rainfall-runoff event occured within the Gila River watershed that resulted in flooding with over 8 inches of precipitation for a 24-hour storm. There is the possibility of a similar storm impacting the entire project area, especially since this rainstorm event had a primary preciptation cell size of approximately 10 miles by 24 miles in the same geographic region as Deadman Canyon.

DBS recently prepared an additional report on behalf of FMTI entitled "Technical Memorandum Updated Mixing Calculation and Reivew of Revised Approved Jurisdictional Determination Little Rock Mine", dated April 23, 2018 (referred to here as the DBS April 2018 report), which was submitted to the Corps as new information on April 23, 2018. The DBS April 2018 report utilized outputs from the HilgartWilson April 2018 report to redo their mixing zone calculations. The DBS April 2018 report proposes that there is no chemical contribution from Deadman Canyon to the Gila River due to their claim of absence of surface flows necessary to transport contaminates from Deadman Canyon to the Gila River, and that any metals from Deadman Canyon would be present at concentrations below regional background levels. As stated above, the Corps has determined that the HilgartWilson April 2018 is insufficient and therefore, use of the output from this report results in imprecise conclusions in the DBS April 2018 report. In addition the DBS April 2018 report sampling methodology does not adequately capture the water quality conditions during episodic stormwater events occurring in Deadman Canyon, Mangas Creek, and the Gila River; and the mixing model does not incorporate the contribution of dissolved metals from all hydrologic flowpaths, underestimating the load of dissolved metals entering Mangas Creek and the Gila River. Therfore, the Corps has determined that the DBS April 2018 report does not support changing our conclusion that there is a chemical nexus between Deadman Canyon and the Gila River as described above.

SUMMARY AND FINDINGS

A hydrologic connection remains intact between Deadman Canyon and the Gila River.

As part of this AJD, the Gila River has been determined to be a TNW because it is navigable-in-fact.

Water quality controls have been intentionally and unintentionally created in Deadman Canyon which confine/remove metal pollutants from the leach pile seepage that discharges into Deadman Canyon. The "delta" formations created along the rerouted Deadman Canyon flowpath remove sediment, metal pollutants and water from surface flow, which decreases the contribution to the Gila River and improves water quality. Engineered water quality controls installed in Deadman Canyon are capturing and removing pollutants from surface flow. If not for the controls, pollutants will move unchecked downstream to Mangas Creek and ultimately the Gila River. The relevant reach traps pollutants preventing them from reaching the Gila River, which establishes a chemical nexus.

Absent the controls in Deadman Canyon, more pollutants will be found in the Gila River. Episodic transport of pollutants from surrounding mining operations in Deadman Canyon have occured. Water quality data shows that the same contaminants present in Deadman Canyon have been found in downstream waters. Water quality data shows periodic spiked contaminant concentrations above background in Mangas Creek and the Gila River for contaminants that are present in high concentrations in the relevant reach of Deadman Canyon. The relevant reach transports pollutants to the Gila River. Pollutant transport in Deadman Canyon to the Gila River is also a chemical nexus.

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. Deadman Canyon has a significant chemical nexus to the Gila River; therefore, Deadman Canyon is a waters of the U.S.

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