NEW MEXICO ENVIRONMENT DEPARTMENT

Surface Water Quality Bureau

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Governor

JOHN A. SANCHEZ
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DAVE MARTIN
Secretary

RAJ SOLOMON, P.E.
Deputy Secretary

June 8, 2011

Timothy Eastep, Manager
Environment, Land and Water
Chino Mines Company
Box 10
Bayard, NM 88023

Re: Application of the Hydrology Protocol to Smelter Tailing Soils Investigation Unit Drainages Work Plan

Dear Mr. Eastep:

Thank you for providing the New Mexico Environment Department (Department) a copy of the subject work plan for review. The Department's comments follow. EPA Region 6 has indicated its concurrence with these comments.

Section 1. Introduction and Background

The work plan cites the April 2011 revised draft Hydrology Protocol. It should instead cite the May 2011 version available at http://www.nmenv.state.nm.us/swqb/Hydrology/ as this is the document that has been approved by the Water Quality Control Commission.

The following statement is not complete per the water quality standards at 20.6.4.15.C NMAC:

> "If a use attainability analysis based on the department's *hydrology protocol* (latest edition), approved by the commission, demonstrates to the satisfaction of the department that Section 101(a)(2) uses are not feasible in an ephemeral water body, the water shall be subject to 20.6.4.97 NMAC."

Specifically, EPA must also grant technical approval of the use attainability analysis before the water shall be subject to 20.6.4.97 NMAC.

Section 2. Purpose and Objectives

> "The purpose of this current effort is to develop and implement an NMED and EPA-approved UAA work plan based on application of the HP to determine the proper classification for STSIU surface waters."

The purpose and objectives seem reasonable. However, 20.6.4.15.D NMAC states that "the proponent shall develop a work plan to conduct the use attainability analysis and shall submit the work plan to the department and region 6 EPA for review and comment (emphasis added)." Approval from NMED and EPA is not required; however, consideration of these comments is recommended.

Section 3. Proposed Survey and Analysis Plan

The plan should indicate how the repeatability of the data will be assured. The Department suggests that repeat or follow-up measurements at the same location could be used for this purpose. A question is: How much difference will be considered outside the limits of acceptable repeatability? A difference of a specific number of points would be useful, as indicated in Appendix C of the 2011 SWQB QAPP (found at ftp://ftp.nmenv.state.nm.us/www/swqb/QAPP/2011QAPP-Approved.pdf).

The location of pooled water may be useful in identifying locations of non-ephemeral streamflow. Regarding the choice of locations, local features should be considered, such as streambed elevation or slope changes, geologic features that control the depth of the alluvium or depth to groundwater, and the occurrence of bedrock. Any information about the depth to shallow groundwater should also be considered. For example, Figures 1 and 2 in the recently submitted "Use-Attainability Analysis for Stock Tanks Work Plan" indicate numerous spring seeps and windmills. The location of these features may provide information about the depth to shallow groundwater near the stream segments and the intermittency of water in the steam segments.

The Department recommends consideration of additional survey locations based on site knowledge of previously identified pools, the presence of aquatic life, and shallow groundwater:

- Add survey locations in Rustler Canyon. Pools and minnows have been identified during previous sampling events.
- Add survey locations to the unnamed drainage west of Rustler Canyon in the area near the 16,500 feet downstream marker. It is a significant tributary to Rustler.
- Figure 2, Subwatershed C. Add a fourth survey location to the northern part of this drainage, in the area near the 4,600 feet downstream marker.
- Figure 3, Martin Canyon. Similar to Rustler Canyon, pools with aquatic life were observed during the Remedial Investigation sampling. The 2,900 foot downstream marker is relatively close to the previous sampling location and is a recommended survey location.
- Add survey locations to the Remedial Investigation C Drainage. This area has very shallow ground water and possibly surface water pools.
- Add one or more survey locations in Lucky Bill Canyon because no survey locations are proposed in that subwatershed.

While it is not necessary to survey every known location with pools or shallow groundwater, the Hydrology Protocol does require sufficient documentation showing that the surveyed locations are representative of the stream segment (see pages 10-12 and the Expedited UAA Cover Sheet). If the Department does not find the documentation convincing, then approval of the expedited UAA will not be granted.

Section 3.5. Additional HP Scoring Conditions

The work plan discusses concerns about indicators 1.6, 1.7 and 1.8 in certain situations. Chino expressed these same concerns during the development of the Hydrology Protocol. The Hydrology Protocol relies on multiple indicators, and the final determination is based on the overall score. The score on one indicator, such as absence of rooted vegetation, will not dictate the overall score. Nevertheless, in response to Chino's comments, some flexibility was added to the Hydrology Protocol regarding indicators 1.6-1.8, with this caveat:

> "[the assessor]...should document on the *Field Sheet* and with photos those factors that explain any alternative scoring methodology."

The work plan should stress the importance of strong documentation when using an alternative scoring methodology. In the preliminary HP Evaluation presented in the work plan, the notes and photos do not adequately justify a score of 1 (instead of 2) based on the absence of rooted vegetation indicator.

If you have questions or would like to discuss any of these comments, please contact me at (505) 827-2822, or Tim Michael at (505) 476-3799.

Sincerely,

Pamela E. Homer

Pamela E. Homer
Water Quality Standards Coordinator

PH:tm

cc: *via e-mail*
Phil Harrigan, NMED
Jerry Schoeppner, NMED
Tim Michael, NMED
Dave Menzie, NMED
Russell Nelson, EPA
Mark Purcell, EPA
Ned Hall, Freeport-McMoran Copper & Gold Inc.
Pam Pinson, Chino

FREEPORT-MCMORAN COPPER & GOLD

Chino Mines Company
PO Box 10
Bayard, NM 88023

June 10, 2011

Certified Mail # 70090960000027604819
Return Receipt Requested

Ms. Pam Homer
New Mexico Environment Department
Surface Water Quality Bureau
P.O. Box 5469
Santa Fe, New Mexico 87502

Dear Ms. Homer:

Re: Response to NMED Comments on the Application of the Hydrology Protocol to Smelter Tailings Soils Investigation Unit Drainages Work Plan

This letter provides Freeport-McMoRan Chino Mines Company's (Chino) responses to New Mexico Environmental Department (NMED) comments contained in a letter dated June 8, 2011, on Chino's *Application of the Hydrology Protocol to the Smelter Tailings Soils Investigation Unit (STSIU) Drainages Work Plan* dated May 20, 2011. Comments from NMED's letter are reproduced below in italics, followed by Chino's response to each comment in non-italicized type.

Section 1 - Introduction and Background

NMED Comment: This work plan cites the April 2011 revised draft Hydrology Protocol. It should instead cite the May 2011 version because this is the document that has been approved by the Water Quality Control Commission.

Chino Response: The citation has been changed to the May 2011, version of the Hydrology Protocol.

NMED Comment: The following statement is not complete per the water quality standards at 20.6.4.15.C NMAC: "If a use attainability analysis based on the department's hydrology protocol (latest edition), approved by the commission, demonstrates to the satisfaction of the department that Section 101(a)(2) uses are not feasible in an ephemeral body of water, the water shall be subject to 20.6.4.97 NMAC."

Specifically, EPA must also grant technical approval of the use attainability analysis before the water shall be subject to 20.6.4.97 NMAC.

Chino Response: This statement has been revised (Section 1) to reflect the requirement of EPA's technical approval of the use attainability analysis before the water can be subject to 20.6.4.97 NMAC.

Section 2 - Purpose and Objectives

NMED Comment: "The purpose of this current effort is to develop and implement an NMED and EPA-approved UAA work plan based on application of the HP to determine the proper classification for STSIU surface waters."

The purpose and objectives seem reasonable. However, 20.6.4.15.D NMAC states that "the proponent shall develop a work plan to conduct the use attainability analysis and shall submit the work plan to the department and region 6 EPA for review and comment (emphasis added)." Approval from NMED and EPA is not required; however, consideration of these comments is recommended.

Chino Response: Chino appreciates EPA and NMED's review of the HP UAA work plan and the comments provided. Each comment is addressed herein and appropriate revisions to the work plan are included in the attached document to incorporate these considerations for the field sampling effort. Based on a phone call from Ms. Pam Homer to Mr. Ned Hall on June 10, 2011, Ms. Homer clarified that NMED approval of the work plan is required. Chino looks forward to providing NMED with a revised work plan for its review and approval.

Section 3 - Proposed Survey and Analysis Plan

NMED Comment: *The plan should indicate how the repeatability of the data will be assured. The Department suggests that repeat or follow-up measurements at the same location could be used for this purpose. A question is: How much difference will be considered outside the limits of acceptable repeatability. A difference of a specific number of points would be useful, as indicated in Appendix C of the 2011 SWQB QAPP.*

Chino Response: Chino supports characterizing the repeatability of the HP application. As described in the referenced SWQB QAPP, this can be accomplished by implementation of a field replicate where different field crew apply the HP to the same location and compare measured attributes and aggregate scores to the QC criteria specified in the QAPP. Consistent with recommendations in the SWCB QAPP, one field replicate will be included for each sampling season. This revision is included in Section 3.

NMED Comment: *NMED recommends the consideration of additional survey locations based on site knowledge of previously identified pools, the presence of aquatic life, and shallow groundwater:*

1. *Add survey locations in Rustler Canyon. Pools and minnows have been identified during previous sampling events.*
2. *Add survey locations to the unnamed drainage west of Rustler Canyon in the area near the 16,500 feet downstream marker.*
3. *Add a fourth location to the northern part of drainage C in the area near the 4,600 feet downstream marker.*
4. *Martin Canyon, similar to Rustler Canyon, pools with aquatic life were observed during the RI sampling. The 2,900 foot downstream maker is relatively close to the previous sampled location and is a recommended survey location.*
5. *Add survey locations to the Drainage C from the RI report.*
6. *Add one or more survey locations to Lucky Bill Canyon because no survey locations are proposed in that subwatershed.*

While it is not necessary to survey every known location with pools or shallow groundwater, the Hydrology Protocol does require sufficient documentation showing that the surveyed locations are representative of the stream segment (see pages 10-12 and the Expedited UAA Cover Sheet). If the Department does not find the documentation convincing, then approval of the expedited UAA will not be granted.

Chino Response*:* The proposed locations and associated stream segments for Hydrology Protocol application were selected to provide a representative characterization of each corresponding subwatershed. Some areas in the upper reaches of subwatersheds were not, however, included in the proposed study design due primarily to staff safety considerations and access challenges. Chino recognizes that the currently proposed locations may not address, and may therefore not support hydrologic-based use designation changes in some upper reaches of some subwatersheds. Where a use change cannot be supported with this round of data collection,

Chino recognizes that additional data may need to be collected, or default use designations may need to be adopted in some areas. With these issues and considerations in mind, Chino has reviewed NMED's proposal for inclusion of additional areas for Hydrology Protocol application, and is proposing to modify two of the originally proposed locations, and to add three new locations. Specific responses to each NMED proposed change are provided below.

1. The current proposed survey location in Rustler Canyon located at 16,000 feet downstream will be moved upstream to the 11,500 foot marker. This upstream placement will provide a more representative view of Rustler Canyon that encompasses headwater reaches to the confluence with Lampbright Draw.
2. As requested, Chino will add an additional survey location within the un-named tributary west of Rustler Canyon (Figure 1). This addition will result in the survey of a total of three survey locations within Rustler Canyon, which Chino believes is sufficient to characterize this small sub-watershed (Figure 1).
3. As requested, Chino will include an additional survey location near the 4,600 foot downstream marker within Drainage C at the request of NMED (Figure 1).
4. Chino had previously proposed a survey location in Martin Canyon near the 6,000 foot downstream marker. To address NMED's request for a survey location further upstream in the drainage, Chino proposes to move the previously proposed survey location upstream to the 2,900 foot downstream marker (Figure 1).
5. As requested, an additional survey location within Drainage C from the Remedial Investigation Report will be included. This location is contained in Subwatershed Drainage D3 (Figure 1).
6. NMED additionally requested the inclusion of one or more survey locations in Lucky Bill Canyon. Lucky Bill Canyon is a tributary to Bayard Canyon, which flows into Hanover-Whitewater Creek (HWC). The objectives of this work plan do not include hydrologic classification and/or use designation for Lucky Bill Canyon, as this drainage will be addressed in the future as part of the HWC Investigation Unit feasibility study (FS). Additional study design changes are therefore not proposed to address NMED's request regarding Lucky Bill Canyon.

Chino intends to implement all of the study design modification described above, with the understanding that some modifications to specific survey locations may need to be implemented in the field based on practicability (i.e., field staff safety and access considerations). A number of these locations are in remote areas that cannot be accessed by vehicles, and can only be reached by foot travel over rough and steep terrain. If field conditions dictate study design modifications, Chino will work with NMED staff in the field to modify locations in a mutually acceptable manner.

Section 3.5. - Additional HP Scoring Conditions

NMED Comment: Regarding additional HP scoring conditions and flexibility for HP indicators 1.6-1.8, "[the assessor]…should document on the Field Sheet and with photos those factors that explain any alternative scoring methodology." The work plan should stress the importance of strong documentation when using an alternative scoring methodology. In the preliminary HP Evaluation presented in the work plan, the notes and photos do not adequately justify a score of 1 (instead of 2) based on the absence of rooted vegetation indicator.

Chino Response: To the extent possible, strong documentation including photographs and field notes will be recorded to support HP scoring, particularly for any alternative scoring methodology. If the field crew determines alternative or additional scoring methodology may provide pertinent information supporting a hydrological designation, rationale and supporting documentation will be recorded in a field notebook that includes a written description, photo documentation and GPS coordinates. To emphasize the importance of strong documentation, text has been added to Section 3.5 of the HP work plan.

Proposed Approach for Issue Resolution & Work Plan Approval

Based on the study design modifications and additions documented in this letter, Chino is requesting provisional approval of the Hydrology Protocol Work Plan. Chino recognizes that this provisional approval would be contingent on the study design changes described herein being implemented in the field, and a modified work plan reflecting all changes described in this letter being submitted to NMED within 14 days of provisional approval. Chino is proposing this approach recognizing that field work is scheduled to begin on Sunday, June 12, and we believe that it is in the interest of all involved parties to have an agreed to study design when field work commences. Chino appreciates NMED's support of this process and the thoughtful comments provided. We look forward to working closely with you to successfully apply NMED's new HP in support of the FS for STSIU.

Please contact Mr. Ned Hall at (520) 229-6470 if you have any questions regarding this submittal.

Sincerely,

Ned Hall for

Timothy E. Eastep, Manager
Environment, Land and Water

TEE:pp
20110610-002
Attachment

c Messrs: Jerry Schoeppner, NMED
Phil Harrigan, NMED
Dave Menzie, NMED
Mark Purcell, EPA
Russell Nelson, EPA
Ned Hall, FCX (via email)

CITY: Lakewood DIV/GROUP: IM DB: MLM LD: PIC: PM: TM: TR:
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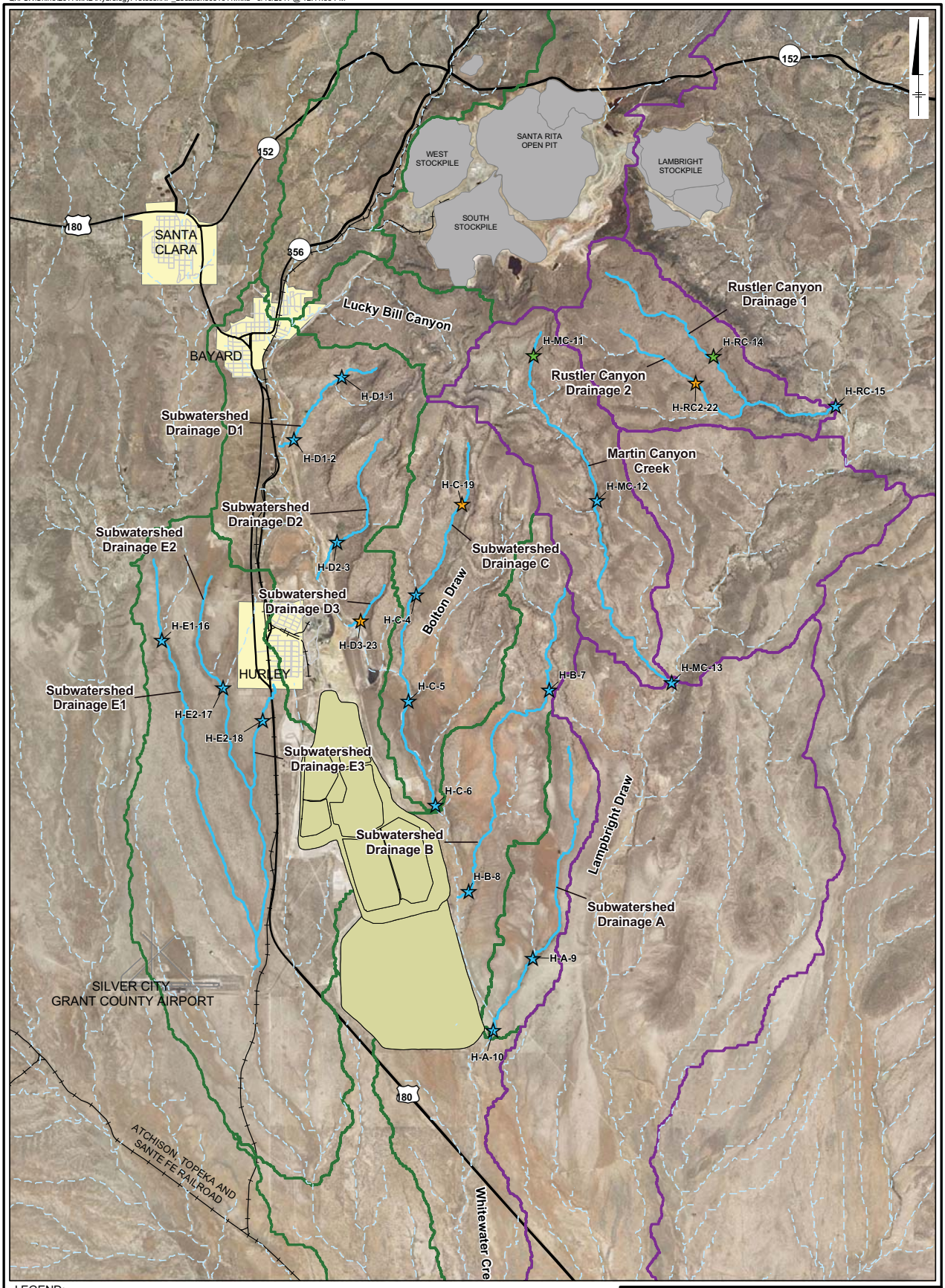

LEGEND:

- 2011 Hydrology Protocol Sample Location
- Moved 2011 Hydrology Protocol Sample Location
- New 2011 Hydrology Protocol Sample Location
- Profiled Drainages
- Other Drainages
- Lampbright Subwatershed Boundaries
- Hanover-Whitewater Subwatershed Boundaries
- Stockpiles
- Tailing Ponds
- Highway
- Railroad
- Town Roads
- City Limits

0 1 2 Miles
GRAPHIC SCALE

FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO

STSIU HYDROLOGY PROTOCOL WORK PLAN

EXTENTS OF DRAINAGE PROFILES

ARCADIS

FIGURE 1

SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lieutenant Governor

NEW MEXICO
ENVIRONMENT DEPARTMENT

Surface Water Quality Bureau

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DAVE MARTIN
Secretary

BUTCH TONGATE
Deputy Secretary

JAMES H. DAVIS, Ph.D.
Director
Resource Protection Division

April 30, 2012

Ned Hall
Manager - Water Quality Programs
Freeport-McMoRan Copper & Gold Inc.
6840 N. Oracle Road, Suite 140
Tucson, AZ 85704

Re: Application of the Hydrology Protocol to Smelter Tailings Soils Investigation Unit (STISIU) Drainages

Dear Mr. Hall:

The New Mexico Environment Department (Department) has reviewed the *Application of the Hydrology Protocol to Smelter Tailings Soils Investigation Unit (STSIU) Drainages* (Application) developed by ARCADIS for Freeport-McMoRan Copper & Gold Inc. (Freeport). In order to complete a Use Attainability Analysis (UAA) in accordance with 20.6.4.15.C NMAC, there must be sufficient evidence to conclude that the stream is ephemeral and that attainment of Clean Water Act §101(a)(2) aquatic life and recreational uses is not feasible due to "natural, ephemeral, intermittent, or low flow conditions or water levels [that] prevent the attainment of the use" (*see* 40 CFR §131.10(g)(2)). If the evidence is insufficient to conclude that the uses are not attainable due to 40 CFR §131.10(g)(2), or if Freeport chooses to proceed with a UAA based on another factor, the UAA must be conducted according to 20.6.5.15.D NMAC.

The Department provides the following input regarding the documentation necessary to proceed with an expedited Use Attainability Analysis (UAA) under NMAC 20.6.4.15.C. Freeport must satisfactorily address these issues before the Department can concur with the hydrology determinations in the Application.

1. According to a federal Final Rule effective April 19, 2012, Bolton Spring (Subwatershed C) and Ash Spring (Subwatershed B) and the associated migration pathway have been designated as critical habitat for the Chiricahua leopard frog. The springs and migration pathway be clearly delineated on maps and other documentation associated with a UAA

submission. Based on the designation of the springs and migration pathway as critical habitat, it may be appropriate to exclude the upper reaches of Subwatersheds B and C from the UAA; the exclusions should be explicit in the submission.

2. According to Sivinski and Tonne (2011), "Another loss of New Mexico desert springs and ciénegas occurred at a cluster of large springs near the dry mouth of the Rio Mimbres in Grant County. The fates of Apache Tejo Spring, Cold Spring, Kennecott Warm Spring, and Kennecott Cold Spring were to be completely captured by wells to supply water to the copper mill at Hurley in the early twentieth century." Because of the possibility that mining activities have influenced the hydrology of the drainages, additional information demonstrating that the existing uses are the same as the attainable uses is necessary to strengthen the UAA. Specifically, the UAA must include evidence that the ephemeral characteristics of the drainages are not the result of mining activities. Such documentation could include the groundwater model that documents the mine capture area, but it need not be specific to each watershed proposed (i.e., it could be provided in a single memo covering the STSIU area in general).

3. Historical information may indicate that Martin Canyon has not always been ephemeral. Paige (1916) identified both Martin Canyon and Rustler Canyon by name, in recognition of the difference between these watercourses and the ephemerals further out in the Mimbres Basin. "All southerly drainage flows toward the Rio Grande but, encountering the sands of a desert region, sinks beneath the surface and is lost. Mangas River and Bear Creek, with their tributaries, are the channels for the northern flow. Mimbres River and its tributaries, Rustler Canyon, Martin Canyon, Whitewater Creek and its tributaries, San Vicente Arroyo and its tributaries, and other small streams carry the southward-flowing water to the desert." Besides including Martin Canyon in the quadrangle description, Paige also indicates Martin Canyon as an unbroken blue line (a perennial stream) on the Silver City Quadrangle topography map. Relevant historical documentation should be discussed and addressed, particularly in relation to the current drought condition.

4. Paige indicates an unnamed spring (approximately 32.7095, -108.0967) about one-third mile southeast of Bolton Spring. Both this unnamed spring and Bolton Spring (approximately 32.7134, -108.0997) are in Subwatershed Drainage C. Ash Spring (approximately 32.7156, -108.0720) is in the upper portion of Subwatershed Drainage B. Because of the historical occurrence of water at these locations and the historical record of Martin Canyon, the exclusion of all of Martin Canyon and those locations in Subwatershed B and Subwatershed C that are north of the MC-13, which is the southernmost Martin Canyon location (approximately 39.6927, -108.0426), should be considered.

If these issues are addressed there may be sufficient evidence to support an expedited UAA for many of the watersheds, particularly Subwatersheds A, D, and E. If Freeport wishes to pursue this process, the next steps, as described in 20.6.4.15(C) NMAC are as follows:

1. Freeport submits an expedited UAA to the Department. This submittal should include necessary data, findings, and conclusions, including the Hydrology Protocol documentation for the proposed watercourses. The submittal must address the comments above.

2. The Department reviews the submittal to determine if there is sufficient demonstration that Section 101(a)(2) uses are not feasible.

3. If the submittal demonstrates to the satisfaction of the Department that Section 101(a)(2) uses are not feasible, the Department posts the documents on its website for a 30-day public comment period.

4. Upon review of comments received, the Department may proceed to submit the UAA to EPA for technical approval.

5. Upon EPA approval the waters become subject to ephemeral (20.6.4.97 NMAC) water quality standards.

If you have questions, please contact me at (505) 476-3671, or Tim Michael at (505) 476-3799.

Sincerely,

James Hogan
Program Manager, Monitoring and Assessment Section/
Acting Water Quality Standards Coordinator

cc: *via e-mail*
Phil Harrigan, NMED
Jerry Schoeppner, NMED
Joseph Fox, NMED
Tim Michael, NMED
James Bearzi, NMED
Dave Menzie, NMED
Russell Nelson, EPA
Petra Sanchez, EPA
Pam Pinson, Chino

References

Paige, S. 1916. Geologic Atlas of the United States, Silver City Folio, New Mexico. Department of the Interior, United States Geologic Survey. Washington D.C.

Sivinski, R. and Tonne, P. 2011. Survey and Assessment of Aridland Spring Ciénegas in the Southwest Region. ESA Section 6 Report Submitted to: New Mexico Energy, Minerals and Natural Resources Department, Santa Fe and USDI-Fish & Wildlife Service, Region 2, Albuquerque, New Mexico. October 2011.

FREEPORT-MCMORAN COPPER & GOLD

Chino Mines Company
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Bayard, NM 88023

August 17, 2012

Certified Mail #70121010000143556912
Return Receipt Requested

James Hogan
Acting Bureau Chief
New Mexico Environment Department
Surface Water Quality Bureau
P.O. Box 5469
Santa Fe, New Mexico 87502

Dear Mr. Hogan:

Re: Response to NMED Comments on the Application of the Hydrology Protocol to Smelter Tailings Soils Investigation Unit Drainages

In July 2011, Freeport-McMoRan Chino Mines Company (Chino) submitted a workplan for the *Application of the Hydrology Protocol to Smelter Tailings Soils Investigation Unit (STSIU) Drainages* under the Administrative Order on Consent with the New Mexico Environment Department (NMED). In February 2012, Chino submitted the hydrology protocol study results report to NMED that supports determinations regarding the appropriate hydrologic classification of surface waters through an expedited Use Attainability Analysis process, as described in Section 20.6.4.15 (2) NMAC. The attached document provides Chino's responses to NMED comments on Chino's results report contained in a letter dated April 30, 2012.

Please contact Mr. Ned Hall at (520) 393-2292 if you have any questions regarding the referenced report and attached responses.

Sincerely,

for
Timothy E. Eastep, Manager
Environment, Land & Water

TEE:pp
20120801-001
Attachments

c: Tim Michael, NMED
Shelly Lemon, NMED
Phil Harrigan, NMED
Joe Fox, NMED
Jerry Schoeppner, NMED

c: Russell Nelson, EPA
Petra Sanchez, EPA
Ned Hall, Copper & Gold Inc. (via email)
Pam Pinson, Chino (via email)

Freeport-McMoRan Chino Mines Company – Administrative Order on Consent
Response to New Mexico Environment Department Comments dated April 30, 2012
Application of the Hydrology Protocol to Smelter Tailings Soils Investigation Unit Drainages

August 17, 2012

This document presents Freeport-McMoRan Chino Mines Company's (Chino) response to comments from the New Mexico Environment Department (NMED) on the Application of the Hydrology Protocol (HP) to Smelter/Tailing Soils Investigation Unit (STSIU) Drainages, dated February 2012. The comments were received from NMED in a letter dated April 30, 2012. The HP report was prepared to support determinations regarding the appropriate hydrologic classification of STSIU surface waters through an expedited Use-Attainability Analysis (UAA) process, as described in section 20.6.4.15 (2) of New Mexico's Administrative Code (NMAC). This letter is organized to present a response to each comment received from NMED (reproduced below in **bold text**).

1. According to a federal Final Rule effective April 19, 2012, Bolton Spring (Subwatershed C) and Ash Spring (Subwatershed B) and the associated migration pathway have been designated as critical habitat for the Chiricahua leopard frog. The springs and migration pathway [should] be clearly delineated on maps and other documentation associated with a UAA submission. Based on the designation of the springs and migration pathway as critical habitat, it may be appropriate to exclude the upper reaches of Subwatersheds B and C from the UAA; the exclusions should be explicit in the submission.

Chino Response

Figure A presents Bolton Spring and Ash Spring and the associated migration pathway that has been designated as critical habitat for the Chiricahua leopard frog (CLF). As described by the United States Fish and Wildlife Service (USFWS), the primary constituent elements of CLF critical habitat consist of breeding habitats and dispersal habitats (USFWS 2012). Hydrologic characteristics of each habitat type, as presented by USFWS, are summarized below.

Breeding habitat: Standing bodies of fresh water, including natural and manmade (e.g., stock) ponds, slow-moving streams or pools within streams, off-channel pools, and other ephemeral or permanent water bodies that typically hold water or that are rarely dry for more than a month. "To be considered essential breeding habitat, water must be persistent enough to support breeding, tadpole development to metamorphosis (change into a frog), and survival of frogs…. Given these requirements, sites that dry out for 1 month or more will not provide essential breeding or overwintering habitat." FR Vol. 77, No. 54, March 20, 2012, 16341.

Dispersal and non-breeding habitat: Consisting of areas with ephemeral (present for only a short time), intermittent, or perennial water that are generally not suitable for breeding, and associated upland or riparian habitat that provides corridors (overland movement or along wetted drainages) for frogs among breeding sites in a metapopulation with the following characteristics:

(a) Are not more than 1.0 mile (1.6 kilometer) overland, 3.0 miles (4.8 kilometers) along ephemeral or intermittent drainages, 5.0 miles (8.0 kilometers) along perennial drainages, or some combination thereof not to exceed 5.0 miles.

Based on the USFWS description of CLF critical habitat, it is appropriate to exclude Bolton and Ash Springs from an ephemeral designation because these areas are designated as breeding habitat that typically hold

areas of isolated surface water and thus function as potential breeding habitat. For other alluvium-dominated drainages for which ephemeral designation is requested, however, sensor data indicates that these drainages often are not wet for more than a few minutes during a storm event and, in any event, are dry for greater than 1 month. As a result, these drainages do not hold water long enough to complete the metamorphosis process and cannot serve as breeding habitats. In addition, other ephemeral pools in bedrock-controlled drainage segments that contain water briefly in response to rainfall are not considered appropriate breeding habitat because they do not contain a sustained source of water. Therefore, an ephemeral designation for drainage areas that are not hydrologically connected to Bolton or Ash Springs is appropriate based on the USFWS description. USFWS also states the dispersal and non-breeding habitat can consist of upland or ephemeral areas that can provide a corridor for movement of frogs between breeding sites (i.e., the two springs). Accordingly, designation of a section of drainage as critical habitat does not preclude an ephemeral designation because the critical habitat can, by definition, consist of ephemeral drainage channels.

Figure A presents drainage areas that are proposed to be excluded from an ephemeral designation based on the above interpretation of the CLF critical habitat (i.e., exclusion areas). To provide additional buffer and a point of geographic reference, each exclusion area is proposed to extend from the point of each spring downstream to the nearest confluence. A specific summary of each exclusion area is provided below.

Bolton Spring: The point of Bolton Spring (approximately 32.713419 N, -108.071980 W) downstream in Bolton Canyon to the confluence with subwatershed drainage C (a distance of approximately 0.42 miles [0.68 kilometers]). The confluence with subwatershed drainage C provides an appropriate geographic reference, and this exclusion area is consistent with the USFWS critical habitat (Figure A). In addition, limiting the exclusion area to the confluence of subwatershed drainage C is consistent with the ephemeral designation determined at HP sample reach C-4, which is located in subwatershed drainage C at the confluence point with Bolton Canyon.

Ash Spring: The point of Ash Spring (approximately 32.715625 N, -108.071980 W) downstream to the confluence with subwatershed B drainage (a distance of approximately 1.13 miles [1.82 kilometers]). This exclusion area extends beyond the entire segment of USFWS critical habitat in the Ash Spring drainage and extends further downstream to the nearest confluence to provide a point of geographic reference (Figure A).

2. According to Sivinski and Tonne (2011), "Another loss of New Mexico desert springs and ciénegas occurred at a cluster of large springs near the dry mouth of the Rio Mimbres in Grant County. The fates of Apache Tejo Spring, Cold Spring, Kennecott Warm Spring, and Kennecott Cold Spring were to be completely captured by wells to supply water to the copper mill at Hurley in the early twentieth century." Because of the possibility that mining activities have influenced the hydrology of the drainages, additional information demonstrating that the existing uses are the same as the attainable uses is necessary to strengthen the UAA. Specifically, the UAA must include evidence that the ephemeral characteristics of the drainages are not the result of mining activities. Such documentation could include the groundwater model that documents the mine capture areas, but it need not be specific to each watershed proposed (i.e., it could be provided in a single memo covering the STSIU area in general).

<u>Chino Response</u>

An "existing use" is defined as, "a use actually attained in a surface water of the state on or after November 28, 1975, whether or not it is a designated use." (20.6.4.7 NMAC; *see also* 20.6.4.6.Q NMAC and 40 CFR 131.3(e)). Chino finds no legal authority to support any requirement by NMED to include evidence that the ephemeral characteristics of the drainages are not the result of historic mining activities conducted prior to

November 28, 1975. Without waiving legal defenses to the contrary, however, the UAA will be revised to provide additional technical information to show that the ephemeral characteristics of the drainages are not the result of current or historic mining activities, as discussed in more detail below. Such documentation will not, however, include the groundwater model that documents the mine capture area but may reference the model. The Santa Rita open pit groundwater capture zone was clearly delineated as part of Discharge Permit 1340, which was approved by NMED Ground Water Quality Bureau on February 28, 2003. The open pit capture zone delineation is the result of an extensive hydrogeologic investigation and has been previously accepted by NMED. Figure A presents a map that depicts this open pit capture zone and the delineated subwatershed drainages that were assessed as part of the Chino STSIU HP study. As indicated in Figure A, Rustler Canyon is the only STSIU subwatershed that could be influenced by the pit groundwater capture. The current Chino STSIU HP study, however, characterized Rustler Canyon as intermittent and thus did not recommend a formal classification or re-classification for Rustler Canyon drainages. The delineated pit capture zone provides evidence that the hydrology of the drainages outside of Rustler Canyon are not impacted by mining activities because the Santa Rita pit represents the primary source of potential historical mining impact that could have affected the natural STSIU hydrology.

The springs referenced by Sivinski and Tonne (2011) in the NMED comment are not located within STSIU drainages that were assessed in this HP study. Cold Spring is a well, locally referred to as Cold Spring 2 well, and is located within the 2C Cattle Ranch near Faywood Hot Springs, approximately 6 miles south of the STSIU area. Kennecott Warm Spring is located approximately 5 miles south of the STSIU area (Figure A). Apache Tejo Warm Spring is located within the STSIU area but is outside of any STSIU drainages assessed during the HP study (Figure A). All hydrologic designations proposed based on the results of this HP study apply to drainages that are at a significantly higher elevation and that are not hydrologically connected to these springs. Springs are, by definition, isolated areas of groundwater emergence and are not characteristic of regional groundwater conditions, especially the groundwater conditions at distances of miles away from the springs themselves.

Furthermore, there are no historic references that mine operations have impacted the hydrologic conditions within the drainage basins assessed during the application of the HP. The Silver City Quadrangle referenced by Paige (1916) shows that the current hydrologic conditions of the HP study area and the designations made through the application of the HP are consistent with the conditions over 100 years ago. Refer to the comment # 3 response for further information regarding the Paige (1916) study and the Rustler Canyon designation. Multiple historical records pertaining to the springs referenced by Sivinski and Tonne (2011) indicate these springs have historically been described as being located within ephemeral watersheds:

> Paige (1916), who recorded Apache Tejo spring, noted that “the fall of rain is insufficient anywhere in the region to produce perennial streams.” Paige (1916) also reported that streams in this area flow only in direct response to precipitation (as explained below in response to comment #3).
>
> In addition, Summers (1976) surveyed Apache Tejo Warm Spring, Faywood Hot Spring, and Kennecott Warm Springs and described that “these springs are in south-central Grant County near the City of Rocks State Park, 4 to 15 miles from the Mimbres River in a region where streams flow only during and immediately after rainstorms.” These historical observations are consistent with NMED’s definition of an ephemeral water of the state provided in 20.6.4.7 NMAC (i.e., that the water body contains water briefly only in direct response to precipitation) and therefore support the results from the current HP report.

In New Mexico, warm and hot springs are typically in areas of volcanism (Ortiz and Fedor 1979; Summers 1976), which is a major geologic feature of the Chino Mine area, as described by Audétat and Pettke (2006). Historic records indicate both Apache Tejo and Kennecott Warm Springs are thermal waters. Records from 1879 indicate the temperature of Apache Tejo Spring was 97 °F (Birnie 1879 as cited in Summers 1976).

Records from 1899 indicate the temperature of Kennecott Warm Spring was 120 °F (Wheeler 1899 as cited in Summers 1976). As described by Summers (1976), thermal waters in New Mexico are derived from deeply circulating flow systems and have temperatures higher than the annual air temperatures with little seasonal variations. In contrast, springs that derive from shallow-flow systems are expected to have temperatures reflective of climatic conditions (Summers 1976). Based on a frequency analysis of springs in New Mexico, Summers (1965 as cited in Summers 1976) recommended 90 °F as a dividing point between the more abundant cooler spring temperatures and the less frequent warmer springs. This information suggests that Apache Tejo and Kennecott Warm Springs derived flow from deeper groundwater sources, likely associated with volcanic structures such as fissures or faults. Geologic observations made by Paige (1916) are also consistent with this assumption:

> "The warm springs that occur at intervals from Apache Tejo to Faywood Springs produce a large volume of water of underground origin. These springs lie along a northwestward trending fault plain and the high temperature of their water indicates they rise from a considerable depth, presumably along a fault."

Based on the above information, the existing ephemeral characteristics of the assessed STSIU drainages are considered representative of historic conditions, not the result of mining activities. Conclusively, it follows that

- The pit groundwater capture zone does not impact any of the drainages of interest;
- The springs referenced in Sivinski and Tonne (2011) are not located in the drainages assessed during the HP study;
- Flow in these springs was likely derived from a deeper, thermal groundwater source which is separate from a shallow groundwater table that can sustain stream flow; and
- Historic documentation also indicates these drainages have been ephemeral for more than 100 years.

3. Historical information may indicate that Martin Canyon has not always been ephemeral. Paige (1916) identified both Martin and Rustler Canyon by name, in recognition of the difference between these watercourses and the ephemerals further out in the Mimbres Basin. "All southerly drainage flows toward the Rio Grande but, encountering the sands of a desert region, sinks beneath the surface and is lost. Mangas River and Bear Creek, with their tributaries, are the channels for the northern flow. Mimbres River and its tributaries, Rustler Canyon, Martin Canyon, Whitewater Creek and its tributaries, San Vicente Arroyo and its tributaries, and other small streams carry the southward-flowing water to the desert." Besides including Martin Canyon in the quadrangle description, Paige also indicates Martin Canyon as an unbroken blue line (a perennial stream) on the Silver City Quadrangle topography map. Relevant historical documentation should be discussed and addressed, particularly in relation to the current drought condition.

<u>Chino Response</u>

An "existing use" is defined as, "a use actually attained in a surface water of the state on or after November 28, 1975, whether or not it is a designated use." (20.6.4.7 NMAC; *see also* 20.6.4.6.Q NMAC and 40 CFR 131.3(e)). Chino finds no legal authority to support any requirement by NMED to include evidence that the ephemeral characteristics of the drainages are not the result of historic

mining activities conducted prior to November 28, 1975. Without waiving legal defenses to the contrary, however, Chino provides the following:

There is no indication that human influences have had an impact on the flow regime of Martin Canyon. Further, flow designations made in the Silver City quadrangle of 1907 may be flawed, the date of 1975 is a more appropriate baseline from which to establish a flow regime and appropriate designated uses. Regardless, from a technical perspective, the available information supports a weight of evidence that Martin Canyon has not been influenced by mining or mining-related operations. Technical information to support this perspective is provided in detail below.

(a) Surface water flow in STSIU drainages is controlled by precipitation and potential inputs of groundwater. Historic and current information indicates that groundwater or precipitation is not sufficient to sustain flow in Martin Canyon. For example, it has been demonstrated that the groundwater conditions in the Martin Canyon drainage basin are representative of the natural and sustained condition, and groundwater does not connect to the drainage channel to sustain a non-storm influenced flow. The Santa Rita pit groundwater capture zone has been clearly delineated and does not extend into the Martin Canyon drainage basin (Figure A), thus groundwater that is associated with Martin Canyon is not affected by the presence of the mine pit. Groundwater elevation in the upper Martin Canyon basin and outside the influence of pit capture confirms that groundwater is at a depth of greater than 400 feet below ground surface (Golder 2008). Additionally no portion of the Martin Canyon has been developed or modified from its natural condition. The Martin Canyon drainage basin and current flow regime, therefore, should be considered unaffected by historic mining operations and thus representative of historic conditions.

(b) Regarding the unbroken blue stream line on the 1916 Silver City topography map, it is generally accepted that use of USGS topographic maps for the determination of hydrologic and stream flow conditions for regulatory purposes goes beyond the intent of the USGS, and the determinations made are not always reliable or accurate and should generally be ground-truthed, especially in headwater streams with less consistent or predictable flow characteristics.

"U.S. Geologic Survey (USGS) topographic maps commonly are used to determine the perennial or intermittent status of stream. However, there is a general recognition that the cartographic representations of perennial and intermittent streams in USGS topographic maps are not as accurate or consistent as desirable from one map sheet to another." (USGS Scientific Investigations Report 2009-5015).

Hydrologic designations presented in topographic maps from 100 years ago are likely even more uncertain because of the potential error inherent in human observation, which older topographic maps were exclusively based (i.e., other pertinent types of data were likely not considered, particularly to the extent such data are considered and used in the HP for hydrologic classifications). Additionally, potential regulatory implications of hydrologic designations made at that time would not have been known.

(c) While Paige (1916) identified Martin and Rustler Canyon by name, as noted in the Paige (1916) quotation provided in NMED comment #3 above, that particular description is not indicative of the actual hydrologic regime for either drainage, except for the direction of flow relative to the Rio Grande. Additionally, within the text there is no indication that Martin Canyon has a maintained source of flow. As Paige (1916) describes directly after the quotation provided in comment #3:

"The fall of rain is insufficient anywhere in the region to produce perennial streams. A number, however, such as Bear Creek and its tributaries, Allie, Bear and Shingle canyons, and Santa Rita Creek, are fed by springs sufficiently strong to afford a meager supply for man or beast at isolated localities. As a whole, nevertheless, flow in streams is regulated by torrential downpours, rising to floods as the storms break and sinking to trickling rivulets as the clouds disperse."

The hydrologic description in the text cited above, however, is more indicative of the historical hydrology of the region because it provides information that streams flow only in direct response to precipitation. This description is consistent with the definition of an ephemeral water of the state provided in 20.6.4.7 NMAC (i.e., that the water body contains water briefly only in direct response to precipitation), which is also the basis for classifying an ephemeral water through the NMED HP. Further, when describing the select regional springs that are capable of providing a notable amount of water, Paige (1916) does not identify any springs or drainages located within the STSIU area (although STSIU drainages [e.g., Martin and Rustler] are identified elsewhere by Paige). Lastly, the description from Paige (1916) provided in comment # 3 that states flow sinks beneath the surface and is lost when encountering the sands of the desert region, is also consistent with observations made throughout the STSIU area. In particular, many of the STSIU drainages transition from headwater streams with primarily bedrock substrate capable of sustaining ephemeral pools to lower gradient sections of drainages that are composed primarily of deep alluvium unsuitable for the creation of pool habitat for aquatic life uses.

(d) Precipitation data at the Fort Bayard climatic station (USC00293265) were reviewed for assessment of the hydrology possibly observed at the time when the Silver City Quadrangle was being completed. The station is located approximately 8 miles from Martin Canyon and monthly precipitation data are available on a near continuous basis from the late 1800s through early 2011 (Figure B). It should first be noted that the recent period has had generally greater than average precipitation. Therefore, the precipitation and flow regime observations made at the time of the HP assessment in 2011 are at least representative of the general precipitation conditions observed over the last century, and possibly reflective of wetter conditions.

It can be observed from the Fort Bayard precipitation data that when the topographic survey for the Silver City Quadrangle was conducted (identified as completed in 1907 on the quadrangle itself) the precipitation at the time was not characteristic of the general condition over the last century. This significantly increased precipitation may have influenced hydrologic observations made at that time for the topographic map. The actual span of time that was needed to complete the topographic survey is unknown, but given the area of the quadrangle (approximately 900 square miles) and its topographic complexity, it likely would have taken multiple years to complete. Precipitation data observed at the Fort Bayard climatic station indicate that 1905 was by far the wettest year on record with total precipitation of 31.1 inches, which nearly doubles the annual average of 15.9 inches for the station. Years 1904 and 1906 were also unusually wet with precipitation averages in the upper 25 percent of observed data. Had field work associated with the 1907 topographic survey been conducted during this time period, a reasonable assumption given the date of the survey completion, flow observations made in Martin Canyon could have been influenced by the exceedingly uncharacteristic precipitation during those years.

Although the Silver City quadrangle is appropriate to consider as a potential line of historic evidence in establishing a flow regime, the flow assignment made for Martin Canyon in that map is questionable. It is a reasonable conclusion based on the review of available historic precipitation data that the flow observations made for that map may have been influenced by extreme precipitation events that were likely coincident with the survey completed. Such observations, or possibly field error, may have resulted in an inaccurate

representation of the flow regime of Martin Canyon used in the map. Use of such flow designations for regulatory purposes goes beyond the intent of the USGS because of the recognized technical inconsistencies and the potential for error (USGS Scientific Investigations Report 2009-5015).

Given the potential for error in the historic flow determination that was made, and because there has not been human influence (from the mine or otherwise) on the hydrology of Martin Canyon, or other STSIU drainages that were characterized as ephemeral, the historic flow regime assigned in the Silver City quadrangle should not be considered applicable. The ephemeral flow regime observed and supported by the HP process should be accepted as reflective of the current and historic characteristic flow condition of the STSIU drainages.

4. Paige indicates an unnamed spring (approximately 32.7095, -108.0967) about one-third mile southeast of Bolton Spring. Both this unnamed spring and Bolton Spring (approximately 32.7134, -108.0997) are in Subwatershed Drainage C. Ash Spring (approximately 32.7156, -108.0720) is in the upper portion of Subwatershed Drainage B. Because of the historical occurrence of water at these locations and the historical record of Martin Canyon, the exclusion of all of Martin Canyon and those locations in Subwatershed B and Subwatershed C that are north of the MC-13, which is the southernmost Martin Canyon location (approximately 39.6927, -108.0426), should be considered.

Chino Response

As described in the response to comment # 3, the historic representation of Martin Canyon (i.e., an unbroken blue stream line from the 1916 topographic map) is likely inaccurate and should not be considered as a basis to establish the historic hydrologic regime of Martin Canyon. The lack of influence of the Santa Rita Pit on the hydrology of Martin Canyon, and other STSIU drainages, provides a strong indication that mining operations have not influenced the hydrology of the STSIU drainages. As a result, the hydrologic classifications determined in the current HP process are considered representative of the current and historic flow regime.

The exclusion areas associated with Bolton Spring and Ash Spring, described in the response to comment # 1, provide a sufficient coverage of drainage areas to account for the potential of localized surface water associated with spring seepage and provides a logical geographic extent. Excluding the upper portions of Subwatersheds B and C from this expedited UAA is inconsistent with the results of the current HP study and the determination that historical mining operations have not influenced the STSIU hydrology.

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CITY: Lakewood DIV/GROUP: IM DB: MLM LD: PIC: PM: TM: TR:
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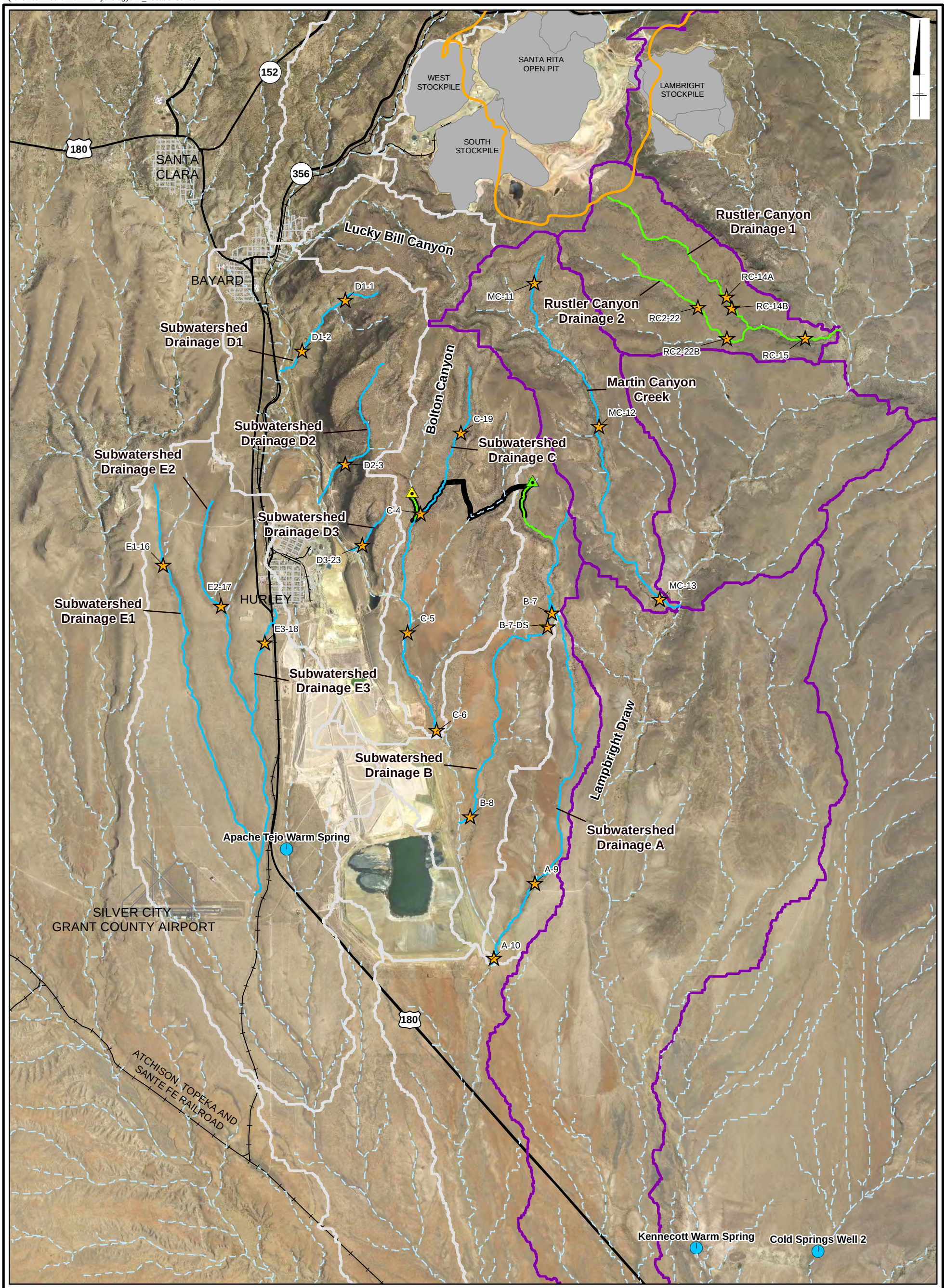

LEGEND:

- 2011 Hydrology Protocol Sample Location
- Pit Capture Zone from Golder (2008)
- Ephemeral Drainages
- Non-Ephemeral Drainages
- Other Drainages
- USFWS Proposed Critical Habitat Transect
- Lampbright Subwatershed Boundaries
- Hanover-Whitewater Subwatershed Boundaries
- Stockpiles
- Highway
- Railroad
- Town Roads
- Ash Spring
- Bolton Springs

0 1 2 Miles
GRAPHIC SCALE

FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO

APPLICATIONS OF HYDROLOGY PROTOCOL TO STSIU DRAINAGES

HYDROLOGY PROTOCOL SAMPLE LOCATIONS

ARCADIS

FIGURE
A

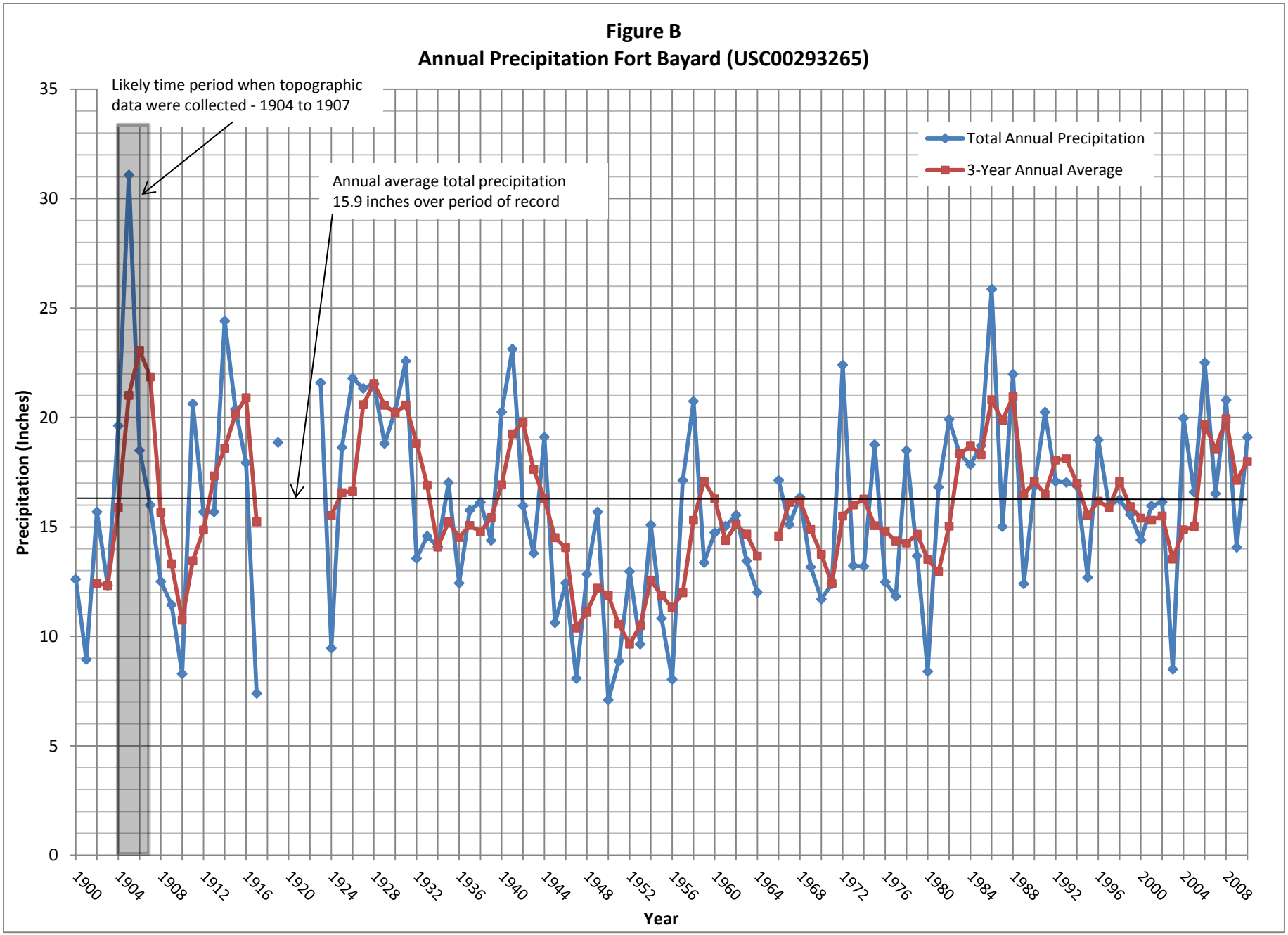
Figure B
Annual Precipitation Fort Bayard (USC00293265)
Likely time period when topographic data were collected - 1904 to 1907
Annual average total precipitation 15.9 inches over period of record
Total Annual Precipitation
3-Year Annual Average
Precipitation (Inches)
Year
0
5
10
15
20
25
30
35
1900
1904
1908
1912
1916
1920
1924
1928
1932
1936
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1944
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