Freeport-McMoRan Chino Mines Company
P.O.Box10
Bayard, NM 88023

October 31, 2014

Certified Mail #70132250000167308599
Return Receipt Requested

Mr. Jerry Schoeppner, Chief
New Mexico Environment Department
Ground Water Quality Bureau
P. O. Box 5624
Santa Fe, New Mexico 87502

Dear Mr. Schoeppner:

Re: Chino AOC, Annual Monitoring Report, Groundhog Mine Site
Interim Remedial Action, Hanover-Whitewater Creeks Investigation Unit

Freeport-McMoRan Chino Mines Company (Chino) submits the Annual Monitoring Report for the completed Groundhog Mine Site Interim Remedial Action (IRA) for the monitoring period ending September 30, 2014. The Groundhog Mine Site IRA was performed by Chino pursuant to requirements of the Administrative Order on Consent between the New Mexico Environment Department (NMED) and Chino. Additional acreage was added to the IRA with the old pipeline corridor stockpile removal and remediation within the mine site in 2011.

As per Section 6.0 of the IRA Completion Report dated June 10, 2009, this annual monitoring report includes the following information:

- Data tabulation sheet of analytical results screened against New Mexico Ground Water Standards (Section 20.6.2.3103 NMAC) for monitoring well and surface water samples collected at the Groundhog Mine site;
- Copies of the original laboratory data sheets;
- The quarterly erosion surveys; and
- The annual vegetation monitoring survey.

Additionally, this report includes information described in Section 6.0 of the Completion Report for the Osceolla, CG Bell, and Tenderfoot B Stockpiles IRA. These three historical mine sites are proximal and have similar requirements as the Groundhog IRA. The following information is also attached for these stockpiles:

- The annual vegetation survey; and
- Quarterly erosion reports for the three historical small stockpiles are included with the Groundhog Mine Site quarterly monitoring survey.

The attached ground water quality data are for monitor wells GH-2004-2S and GH-2004-2D. Noted in the shallow ground water quality is a trend beginning in 2009 which shows an increase in concentrations for cadmium, manganese, sulfate, TDS, and zinc. Chino currently attributes this to oxidation in underground workings, and this will be addressed as part of the Discharge Permit (DP) 1340 Site Wide Abatement (SWA) process. In a letter dated March 13, 2014 which approved the annual 2013 report, NMED requested additional information concerning this statement. Chino responded in a letter dated May 5, 2014 that this statement is only conceptual and although groundwater would be fully addressed under SWA, it was too early in the process to provide NMED the requested details.

The other water quality data in the table are from three surface impoundment locations. The surface impoundment sampling locations include the Lower Stormwater Sump "GH-Sump" and the Lower Stormwater Pond "GH-Lower Pond" which make up the Groundhog Mine seepage collection system located up gradient of the headwall. The third surface impoundment sample site is the former Upper Stormwater Pond "GH-Upper Pond" which was removed during the supplemental site remediation in 2011 as the containment was no longer needed to alleviate subsurface flow through the adjacent stockpile material supporting the old pipeline corridor. Sampling of this site ceased upon its removal. This pond was located north of the haul road that divides the Groundhog Mine site. Chino will continue monitoring groundwater and surface water semi-annually for the following suite of analytes: cadmium, calcium, cobalt, copper, fluoride, iron, lead, magnesium, manganese, nickel, lead, zinc, pH, sulfate, and total dissolved solids. This analyte list was requested in a letter dated May 3, 2005 from the NMED.

If you require additional information regarding this submittal please contact Mr. Ned Hall at (520) 393-2292.

Sincerely,

for
Sherry Burt-Kested, Manager
Environmental Services Department

SBK:pp
Attachments
20141028-001

c. Matthew Schultz, NMED (4 copies)
Joseph Fox, NMED (via email)
Chris Eustice, Mining & Minerals Division, NMEMNRD (via email)
Petra Sanchez, Environmental Protection Agency (via email)
William Katz, Chino (via email)
Lynn Lande, Chino (via email)
Ned Hall, FCX (via email)

Freeport-McMoRan Chino Mines Company
Groundhog Mine IRA Annual Report
October 31, 2014

Site Number	Sample ID	Sample Date	Comments	Ca, Diss (mg/L)	Cd, Diss (mg/l)	Co, Diss (mg/l)	Cu, Diss (mg/l)	F, Tot_ (mg/l)	Fe, Diss (mg/l)	Mg, Diss (mg/L)	Mn, Diss (mg/l)	Ni, Diss (mg/l)	Pb, Diss (mg/l)	Zn, Diss (mg/l)	pH, Field (su)	SO4, Tot_ (mg/l)	TDS (mg/l)	Cond, Fld (micromho)	Water Temp (Cent)	Well Collar Level (ft msl)	Well Depth (ft)	Depth to Water (ft)
WQCC Water Quality Standard					0.01	0.05	1	1.6	1		0.2	0.2	0.05	10	6- 9	600	1000					
GH-2004-2D	235809	10/28/2004		NA	0.0044	<0.006	0.0049	<1	<0.02	NA	0.0591	<0.01	<0.005	0.743	6.63	**1780**	**2580**	2292	17.3	6009.7	157.6	62
GH-2004-2D	245863	5/17/2005		NA	0.0027	<0.006	<0.01	<0.5	0.089	NA	**0.374**	<0.01	<0.005	0.654	6.76	**1640**	**2440**	2339	17.4	6003.74	147.6	44.5
GH-2004-2D	270674	10/25/2005		NA	0.0074	<0.006	<0.01	1.03	<0.06	NA	**0.213**	<0.01	0.009	1.65	6.62	**1620**	**2530**	2354	17.4	6003.74	147.6	46.3
GH-2004-2D	276910	3/14/2006		NA	0.0087	<0.006	<0.01	0.2	<0.06	NA	0.129	<0.01	0.009	0.851	6.63	**1600**	**2770**	2334	17.2	6003.74	147.6	47.43
GH-2004-2D	283019	8/4/2006		NA	**0.0119**	<0.006	<0.01	<0.2	<0.06	NA	0.123	<0.01	0.0108	1	6.58	**1590**	**2620**	2384	17.6	6003.74	147.6	50.3
GH-2004-2D	299167	2/6/2007		NA	0.0095	<0.006	<0.01	<0.2	<0.06	NA	0.108	<0.01	0.0091	0.903	6.53	**1660**	**2630**	2372	17.3	6003.74	147.6	43.03
GH-2004-2D	305946	7/23/2007		NA	**0.011**	<0.006	<0.01	<0.5	<0.06	NA	0.0899	<0.01	0.011	0.935	6.72	**1640**	**2700**	2432	18.1	6003.74	147.6	43.45
GH-2004-2D	316507	3/25/2008		NA	**0.0105**	<0.006	<0.01	<0.2	<0.06	NA	0.0555	<0.01	0.0086	0.82	6.79	**1760**	**2700**	2304	17	6003.74	147.6	44.7
GH-2004-2D	320089	10/28/2008		NA	0.0094	<0.006	<0.01	<0.5	<0.06	NA	0.112	<0.01	0.011	0.866	6.63	**1990**	**2700**	2351	17.2	6003.74	147.6	41.42
GH-2004-2D	321236	03/23/2009		NA	0.0072	<0.006	0.015	0.107	<0.06	NA	**0.254**	<0.01	<0.0075	0.904	6.82	**1570**	**2690**	2348	17.2	6003.74	147.6	44.8
GH-2004-2D	322688	09/30/2009		494	**0.0101**	<0.006	0.016	<0.5	<0.06	121	0.139	<0.01	<0.0075	0.873	6.43	**1560**	**2730**	2405	17.8	6003.74	147.6	48.08
GH-2004-2D	323312	03/11/2010		491	**0.0116**	<0.0061	0.013	<0.2	<0.061	118	0.0689	<0.01	0.008	0.838	6.77	**1710**	**2680**	2382	16.9	6003.74	147.6	48.22
GH-2004-2D	324880	09/20/2010		515	**0.0117**	<0.006	<0.01	<0.5	<0.06	125	0.0606	<0.01	0.0108	0.775	6.81	**1660**	**2760**	2422	18.7	6003.74	147.6	44.74
GH-2004-2D	326361	03/02/2011		509	**0.0122**	<0.006	<0.01	<0.5	<0.06	118	0.0703	<0.01	0.0134	0.855	6.73	**1620**	**2540**	2367	17.5	6003.74	147.6	47.99
GH-2004-2D	327872	09/02/2011		489	0.0098	<0.006	0.01	<0.1	<0.06	113	0.0474	<0.01	<0.0075	0.782	6.75	**1640**	**2660**	2416	18.9	6003.74	147.6	50.32
GH-2004-2D	329325	03/22/2012		527	**0.0118**	<0.006	<0.01	<0.5	<0.06	122	0.0626	<0.01	0.0096	0.804	6.63	**1,750**	**2,710**	2,272	17.9	6003.74	147.6	45.34
GH-2004-2D	330950	09/06/2012		525	**0.0119**	<0.006	<0.01	<0.5	<0.06	123	0.0484	<0.01	0.009	0.852	6.72	**1,800**	**2,640**	2,467	19.3	6003.74	147.6	49.13
GH-2004-2D	332598	03/11/2013		540	**0.0136**	<0.006	0.011	<0.5	<0.06	130	0.0496	<0.01	0.0144	0.912	6.69	**1,780**	**2,720**	2,389	18	6003.74	147.6	52.56
GH-2004-2D	334321	09/18/2013		541	**0.0143**	<0.006	<0.01	1.01	<0.06	127	0.0635	<0.01	0.012	0.912	6.69	**1,780**	**2,720**	2,428	17.9	6003.74	147.6	50.28
GH-2004-2D	335938	03/06/2014		512	**0.0156**	<0.006	<0.01	0.96	<0.06	122	0.0932	<0.01	0.0091	0.883	6.63	**1,720**	**2,570**	2,361	17.9	6003.74	147.6	47
GH-2004-2D	337693	09/09/2014		521	**0.0148**	<0.006	<0.01	<0.5	<0.06	124	0.064	<0.01	<0.0075	0.843	6.75	**1,750**	**2,680**	2,404	18.3	6003.74	147.6	50.24
GH-2004-2S	236057	10/28/2004		NA	**0.0153**	<0.006	0.007	0.31	<0.02	NA	**0.703**	<0.01	<0.005	2.15	7.07	**1460**	**2120**	2019	17	6009.7	**	53.25
GH-2004-2S	245864	5/17/2005		NA	0.0029	<0.006	0.014	<0.5	<0.06	NA	0.0826	<0.01	<0.005	0.371	7.39	**1360**	**2080**	2046	17.4	6003.74	83	46.73
GH-2004-2S	270675	10/25/2005		NA	0.0026	<0.006	<0.01	1.02	<0.06	NA	0.0321	<0.01	<0.0075	0.421	6.99	**1390**	**2160**	2152	17.3	6003.74	83	40.16
GH-2004-2S	276911	3/14/2006		NA	0.0027	<0.006	<0.01	0.73	<0.06	NA	0.0216	<0.01	<0.008	0.291	7.26	**1410**	**2240**	2204	17.1	6003.74	83	40.64
GH-2004-2S	283020	8/4/2006		NA	0.0027	<0.006	<0.01	<0.2	<0.06	NA	0.011	<0.01	<0.0075	0.359	7.27	**1390**	**2240**	2203	17.8	6003.74	83	43.84
GH-2004-2S	299168	2/6/2007		NA	0.0031	0.01	0.111	1.16	<0.06	NA	**0.564**	<0.01	<0.0075	0.557	6.53	**1410**	**2220**	2142	17.4	6003.74	83	37.08
GH-2004-2S	305947	7/23/2007		NA	<0.002	<0.006	<0.01	<0.5	<0.06	NA	<0.004	<0.01	<0.008	0.226	7.03	**1440**	**2300**	2279	17.7	6003.74	83	36.89
GH-2004-2S	316508	3/25/2008		NA	0.0052	<0.006	0.065	<0.5	0.092	NA	**0.389**	<0.01	<0.0075	1.36	7.23	**1970**	**3000**	2648	16.3	6003.74	83	37.75
GH-2004-2S	320090	10/28/2008		NA	0.0022	<0.006	0.011	<0.5	<0.06	NA	0.0547	<0.01	<0.0075	0.318	7.07	**1870**	**2900**	2650	17.8	6003.74	83	59.59
GH-2004-2S	321237	03/23/2009		NA	0.0068	<0.006	0.051	<0.1	<0.06	NA	**0.916**	<0.01	<0.0075	1.63	7.02	**1720**	**2810**	2554	16.9	6003.74	83	37.27
GH-2004-2S	322689	09/30/2009		468	**0.0286**	<0.006	0.072	0.995	<0.06	137	**3.42**	0.031	<0.0075	5.91	6.73	**1850**	**3170**	2845	17.3	6003.74	83	39.47
GH-2004-2S	323313	03/11/2010		539	**0.0906**	0.0114	0.768	1.48	<0.061	172	**12**	0.026	<0.0076	**21**	6.62	**2520**	**3620**	2639	15.7	6003.74	83	40.25
GH-2004-2S	324881	09/20/2010		619	**0.115**	<0.006	0.019	<1	<0.06	200	**6.43**	0.036	<0.0075	**21.5**	6.69	**2450**	**3820**	3318	18.2	6003.74	83	37.33
GH-2004-2S	326362	03/02/2011		563	**0.111**	<0.006	0.012	0.858	<0.06	181	**5.52**	0.036	<0.0075	**23**	6.6	**2220**	**3550**	3102	17.1	6003.74	83	42.2
GH-2004-2S	327873	09/02/2011		527	**0.0748**	<0.006	0.032	<0.5	<0.06	167	**1.13**	0.016	<0.0075	**18**	6.65	**2150**	**3380**	3023	18.8	6003.74	83	42.57
GH-2004-2S	329326	03/22/2012		599	**0.203**	<0.006	0.012	1.1	<0.06	197	**10.7**	0.036	0.0133	**42.2**	6.53	**2,490**	**3,610**	3,042	17.9	6003.74	83	37.75
GH-2004-2S	330951	09/06/2012		585	**0.171**	<0.006	<0.01	1.34	<0.06	197	**10**	0.03	<0.0075	**36.9**	6.65	**2,500**	**3,580**	3,111	18.6	6003.74	83	41.17
GH-2004-2S	332599	03/11/2013		567	**0.157**	<0.006	<0.01	**1.81**	<0.06	192	**4.52**	0.03	<0.0075	**36.9**	6.5	**2,330**	**3,360**	2,846	18.3	6003.74	83	45.27
GH-2004-2S	334322	09/18/2013		430	**0.133**	<0.006	0.015	1.43	<0.06	152	**4.03**	0.025	<0.0075	**31**	6.6	**2,010**	**2,980**	2,635	18.7	6003.74	83	41.56
GH-2004-2S	335939	03/06/2014		570	**0.296**	<0.006	<0.01	1.59	<0.06	208	**27.3**	0.056	<0.0075	**59.8**	6.58	**2,680**	**3,470**	3,095	18.3	6003.74	83	38.95
GH-2004-2S	337694	09/09/2014		556	**0.227**	<0.006	<0.01	**1.73**	<0.06	198	**13.4**	0.043	<0.0075	**45.2**	6.59	**2,340**	**3,350**	2,999	18.8	6003.74	83	42.1
Lower GH-Sump*	250151	4/14/2005		NA	**2.31**	**1.11**	**95.1**	**6.04**	0.28	NA	**333**	**0.846**	**1.24**	**844**	**3.92**	**5530**	**9220**	5550	17.7	surface	surface	surface
Lower GH-Sump*	267561	9/26/2005		NA	**0.749**	**0.307**	**20.2**	**1.32**	<0.3	NA	**95.3**	0.178	**0.289**	**224**	**4.05**	**2870**	**4450**	3643	23.6	surface	surface	surface
Lower GH-Sump*	283021	8/4/2006		NA	**0.35**	**0.147**	**9.11**	1.08	0.15	NA	**44**	0.086	**0.0815**	**92**	**5.27**	**1530**	**2390**	2298	22.6	surface	surface	surface
Lower GH-Sump*	305948	7/23/2007		NA	**0.299**	**0.15**	**7.19**	1.15	<0.06	NA	**52.8**	0.097	**0.078**	**76.8**	**5.64**	**1600**	**2600**	2314	22.8	surface	surface	surface
Lower GH-Sump*	316509	3/25/2008	Dry	NS	NS	NS	NS	NS	NS	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	surface	surface	surface
Lower GH-Sump*	320091	10/28/2008		NA	**0.0725**	<0.006	0.227	0.825	<0.06	NA	**6.43**	0.019	<0.0075	**18**	6.93	**1890**	**2400**	1970	15.8	surface	surface	surface
Lower GH-Sump*	321238	03/23/2009	Dry	NS	NS	NS	NS	NS	NS	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	surface	surface	surface
Lower GH-Sump	322691	09/30/2009		111	0.0028	<0.006	0.03	1.02	<0.06	18.1	0.124	<0.01	<0.0075	0.55	7.35	329	536	645	18	surface	surface	surface
GH-Sump[1]	323315	03/10/2010		279	**0.0149**	<0.0061	0.04	1.08	<0.061	44.5	**0.67**	<0.01	<0.0076	1.69	6.88	**837**	**1360**	1130	8.8	surface	surface	surface
GH-Sump[1]	324883	09/20/2010	Dry	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	surface	surface	surface
GH-Sump[1]	326364	03/02/2011	Dry	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	surface	surface	surface
GH-Sump[1]	327875	09/02/2011		126	0.0074	<0.006	0.049	0.87	<0.06	20.6	**1.02**	<0.01	<0.0075	1.07	6.65	378	626	838	24.5	surface	surface	surface
GH-Sump[1]	329328	03/22/2012	Dry	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	surface	surface	surface
GH-Sump[1]	330953	09/06/2012	Dry	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	surface	surface	surface
GH-Sump[1]	332601	03/11/2013	Dry	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	surface	surface	surface
GH-Sump[1]	334167	08/05/2013		119	0.0046	<0.006	0.027	0.98	<0.06	17.7	0.0281	<0.01	<0.0075	0.737	6.82	379	570	758	24.2	surface	surface	surface
GH-Sump[1]	334324	09/18/2013		155	0.0069	<0.006	0.031	1.06	<0.06	24.6	**0.203**	<0.01	<0.0075	0.907	6.83	409	699	837	20.6	surface	surface	surface
GH-Sump	335941	03/06/2014	Dry	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	surface	surface	surface
GH-Sump	337696	09/09/2014		162	0.0029	<0.006	0.019	1.04	<0.06	23.8	<0.004	<0.01	<0.0075	0.461	7.06	475	748	906	21.4	surface	surface	surface

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Site Number	Sample ID	Sample Date	Comments	Ca, Diss (mg/L)	Cd, Diss (mg/l)	Co, Diss (mg/l)	Cu, Diss (mg/l)	F, Tot_ (mg/l)	Fe, Diss (mg/l)	Mg, Diss (mg/L)	Mn, Diss (mg/l)	Ni, Diss (mg/l)	Pb, Diss (mg/l)	Zn, Diss (mg/l)	pH, Field (su)	SO4, Tot_ (mg/l)	TDS (mg/l)	Cond, Fld (micromho)	Water Temp (Cent)	Well Collar Level (ft msl)	Well Depth (ft)	Depth to Water (ft)
Lower GH-Sump Pond*		3/14/2006		NA	**0.701**	**0.284**	**20.2**	**5.34**	<0.06	NA	**116**	0.184	**0.16**	**232**	**4.88**	**3160**	**5100**	3293	13.1	surface	surface	surface
Lower GH-Sump Pond*	299169	2/6/2007		NA	**0.273**	**0.117**	**6.41**	**2.22**	<0.06	NA	**45**	0.073	**0.053**	**72.6**	**4.8**	**1870**	**2900**	2047	10.5	surface	surface	surface
GH-Lower Pond[2]	322690	09/30/2009		85.3	<0.002	<0.006	0.017	0.991	<0.06	15.3	0.0159	<0.01	<0.0075	0.0108	7.72	254	438	524	17.1	surface	surface	surface
GH-Lower Pond[2]	323314	03/10/2010		261	0.0048	<0.0061	0.016	1.21	<0.061	49.7	**0.225**	<0.01	<0.0076	0.496	7.49	**849**	**1360**	1140	9.5	surface	surface	surface
GH-Lower Pond[2]	324882	09/20/2010		151	<0.002	<0.006	0.013	0.847	<0.06	25.9	0.183	<0.01	<0.0075	0.0204	8.58	430	740	874	23.5	surface	surface	surface
GH-Lower Pond	326363	03/02/2011	Dry	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	surface	surface	surface
GH-Lower Pond	327874	09/02/2011		130	<0.002	<0.006	0.018	0.86	<0.06	20.7	0.119	<0.01	<0.0075	<0.01	7.94	415	656	821	23.8	surface	surface	surface
GH-Lower Pond	329327	03/22/2012	Dry	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	surface	surface	surface
GH-Lower Pond	330952	09/06/2012	Dry	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	surface	surface	surface
GH-Lower Pond	332600	03/11/2013	Dry	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	surface	surface	surface
GH-Lower Pond[2]	GH-Lower Pond	07/22/2013		62.3	0.0059	<0.006	0.061	0.52	<0.06	10.9	**1.12**	<0.01	<0.0075	1.02	6.75	210	350	442	21.6	surface	surface	surface
GH-Lower Pond[2]	334166	08/05/2013		98.1	0.0061	<0.006	0.039	0.7	<0.06	16	**1.71**	<0.01	<0.0075	0.447	7.52	330	494	682	26.5	surface	surface	surface
GH-Lower Pond[2]	334323	09/18/2013		123	**0.018**	0.0061	0.131	0.62	<0.06	24.1	**2.84**	<0.01	0.0077	3.53	7.09	411	634	745	21.2	surface	surface	surface
GH-Lower Pond	335940	03/06/2014		333	0.0055	<0.006	0.051	1.52	<0.06	59.6	0.0924	<0.01	<0.0075	0.554	8.03	**1,090**	**1,650**	1,574	16.5	surface	surface	surface
GH-Lower Pond	337695	09/09/2014		127	0.0055	<0.006	0.045	0.95	<0.06	19.5	**0.812**	<0.01	<0.0075	0.35	7.79	406	607	772	22.7	surface	surface	surface
GH-Upper Pond	322692	09/30/2009	Pumped dry, mud puddle is all that remained. No water.	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	surface	surface	surface
GH-Upper Pond	323316	03/10/2010		306	**0.155**	**0.124**	**1.77**	0.636	<0.061	86.5	**38.9**	0.065	**0.296**	**33.1**	**5.24**	**1370**	**2090**	1712	13.9	surface	surface	surface
GH-Upper Pond	324884	09/20/2010	Pumped dry, mud puddle is all that remained. No water.	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	surface	surface	surface
GH-Upper Pond	326365	03/02/2011	Reclaimed	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	surface	surface	surface

***Water in sump at this time was from the construction phase of the stockpile removal.**
****Well depth on record is incorrect.**
NS - Not sampled, sump and/or sump pond are dry.
NA - Not analysed.
[1] "GH-Sump" is the same monitoring site and location as "Lower GH-Sump" (the site was renamed)
[2] "GH-Lower Pond" is the same monitoring site and location as "Lower GH-Sump" (the site was renamed)

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Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Chino Routine
Work Order: **W4C0134**
Reported: 20-Mar-14 11:21

ANALYTICAL REPORT FOR SAMPLES

Sample ID		Laboratory ID	Matrix	Date Sampled	Sampled By	Date Received
335938	GH-2004-2D	W4C0134-01	Water	06-Mar-14 11:40	NL	11-Mar-2014
335939	GH-2004-2S	W4C0134-02	Water	06-Mar-14 12:18	NL	11-Mar-2014
335940	GH-LOWER POND	W4C0134-03	Water	06-Mar-14 12:40	NL	11-Mar-2014

Solid samples are analyzed on an as-received, wet-weight basis, unless otherwise requested.
Sample preparation is defined by the client as per their Data Quality Objectives.
This report supercedes any previous reports for this Work Order. The complete report includes pages for each sample, a full QC report, and a notes section.
The results presented in this report relate only to the samples, and meet all requirements of the NELAC Standards unless otherwise noted.

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Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Chino Routine
Work Order: **W4C0134**
Reported: 20-Mar-14 11:21

Client Sample ID: **335938 : GH-2004-2D**
SVL Sample ID: **W4C0134-01 (Water)**

Sampled: 06-Mar-14 11:40
Received: 11-Mar-14
Sampled By: NL

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Dissolved)										
EPA 200.7	**Cadmium**	0.0156	mg/L	0.0020	0.0007		W411115	AS	03/19/14 14:51	
EPA 200.7	**Calcium**	512	mg/L	0.040	0.015		W411115	AS	03/19/14 14:51	
EPA 200.7	Cobalt	< 0.0060	mg/L	0.0060	0.0007		W411115	AS	03/19/14 14:51	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.006		W411115	AS	03/19/14 14:51	
EPA 200.7	Iron	< 0.060	mg/L	0.060	0.023		W411115	AS	03/19/14 14:51	
EPA 200.7	**Lead**	0.0091	mg/L	0.0075	0.0027		W411115	AS	03/19/14 14:51	
EPA 200.7	**Magnesium**	122	mg/L	0.200	0.039		W411115	AS	03/19/14 14:51	
EPA 200.7	**Manganese**	0.0932	mg/L	0.0040	0.0013		W411115	AS	03/19/14 14:51	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.003		W411115	AS	03/19/14 14:51	
EPA 200.7	**Zinc**	0.883	mg/L	0.0100	0.0023		W411115	AS	03/19/14 14:51	
Classical Chemistry Parameters										
SM 2540 C	**Total Diss. Solids**	2570	mg/L	40			W411106	JDM	03/12/14 15:45	D1
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	0.96	mg/L	0.50	0.14	5	W412090	AEW	03/18/14 15:44	D1
EPA 300.0	**Sulfate as SO4**	1720	mg/L	15.0	2.75	50	W412090	AEW	03/18/14 15:55	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

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Project Name: Chino Routine
Work Order: **W4C0134**
Reported: 20-Mar-14 11:21

Client Sample ID: **335939 : GH-2004-2S**
SVL Sample ID: **W4C0134-02 (Water)**

Sampled: 06-Mar-14 12:18
Received: 11-Mar-14
Sampled By: NL

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Dissolved)										
EPA 200.7	**Cadmium**	0.296	mg/L	0.0020	0.0007		W411115	AS	03/19/14 14:55	
EPA 200.7	**Calcium**	570	mg/L	0.040	0.015		W411115	AS	03/19/14 14:55	
EPA 200.7	Cobalt	< 0.0060	mg/L	0.0060	0.0007		W411115	AS	03/19/14 14:55	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.006		W411115	AS	03/19/14 14:55	
EPA 200.7	Iron	< 0.060	mg/L	0.060	0.023		W411115	AS	03/19/14 14:55	
EPA 200.7	Lead	< 0.0075	mg/L	0.0075	0.0027		W411115	AS	03/19/14 14:55	
EPA 200.7	**Magnesium**	208	mg/L	0.200	0.039		W411115	AS	03/19/14 14:55	
EPA 200.7	**Manganese**	27.3	mg/L	0.0040	0.0013		W411115	AS	03/19/14 14:55	
EPA 200.7	**Nickel**	0.056	mg/L	0.010	0.003		W411115	AS	03/19/14 14:55	
EPA 200.7	**Zinc**	59.8	mg/L	0.100	0.0230	10	W411115	AS	03/19/14 15:45	D2
Classical Chemistry Parameters										
SM 2540 C	**Total Diss. Solids**	3470	mg/L	40			W411106	JDM	03/12/14 15:45	D1
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	1.59	mg/L	0.50	0.14	5	W412090	AEW	03/18/14 16:07	D1
EPA 300.0	**Sulfate as SO4**	2680	mg/L	30.0	5.50	100	W412090	AEW	03/19/14 14:19	D2

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Project Name: Chino Routine
Work Order: **W4C0134**
Reported: 20-Mar-14 11:21

Client Sample ID: **335940 : GH-LOWER POND**
SVL Sample ID: **W4C0134-03 (Water)**

Sampled: 06-Mar-14 12:40
Received: 11-Mar-14
Sampled By: NL

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Dissolved)										
EPA 200.7	**Cadmium**	0.0055	mg/L	0.0020	0.0007		W411115	AS	03/19/14 15:04	
EPA 200.7	**Calcium**	333	mg/L	0.040	0.015		W411115	AS	03/19/14 15:04	
EPA 200.7	Cobalt	< 0.0060	mg/L	0.0060	0.0007		W411115	AS	03/19/14 15:04	
EPA 200.7	**Copper**	0.051	mg/L	0.010	0.006		W411115	AS	03/19/14 15:04	
EPA 200.7	Iron	< 0.060	mg/L	0.060	0.023		W411115	AS	03/19/14 15:04	
EPA 200.7	Lead	< 0.0075	mg/L	0.0075	0.0027		W411115	AS	03/19/14 15:04	
EPA 200.7	**Magnesium**	59.6	mg/L	0.200	0.039		W411115	AS	03/19/14 15:04	
EPA 200.7	**Manganese**	0.0924	mg/L	0.0040	0.0013		W411115	AS	03/19/14 15:04	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.003		W411115	AS	03/19/14 15:04	
EPA 200.7	**Zinc**	0.554	mg/L	0.0100	0.0023		W411115	AS	03/19/14 15:04	
Classical Chemistry Parameters										
SM 2540 C	**Total Diss. Solids**	1650	mg/L	10			W411106	JDM	03/12/14 15:45	
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	1.52	mg/L	0.50	0.14	5	W412090	AEW	03/18/14 16:30	D1
EPA 300.0	**Sulfate as SO4**	1090	mg/L	15.0	2.75	50	W412090	AEW	03/18/14 16:41	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

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Project Name: Chino Routine
Work Order: **W4C0134**
Reported: 20-Mar-14 11:21

Quality Control - BLANK Data

Method	Analyte	Units	Result	MDL	MRL	Batch ID	Analyzed	Notes
Metals (Dissolved)								
EPA 200.7	Cadmium	mg/L	<0.0020	0.0007	0.0020	W411115	19-Mar-14	
EPA 200.7	Calcium	mg/L	<0.040	0.015	0.040	W411115	19-Mar-14	
EPA 200.7	Cobalt	mg/L	<0.0060	0.0007	0.0060	W411115	19-Mar-14	
EPA 200.7	Copper	mg/L	<0.010	0.006	0.010	W411115	19-Mar-14	
EPA 200.7	Iron	mg/L	<0.060	0.023	0.060	W411115	19-Mar-14	
EPA 200.7	Lead	mg/L	<0.0075	0.0027	0.0075	W411115	19-Mar-14	
EPA 200.7	Magnesium	mg/L	<0.200	0.039	0.200	W411115	19-Mar-14	
EPA 200.7	Manganese	mg/L	<0.0040	0.0013	0.0040	W411115	19-Mar-14	
EPA 200.7	Nickel	mg/L	<0.010	0.003	0.010	W411115	19-Mar-14	
EPA 200.7	Zinc	mg/L	<0.0100	0.0023	0.0100	W411115	19-Mar-14	
Classical Chemistry Parameters								
SM 2540 C	Total Diss. Solids	mg/L	<10		10	W411106	12-Mar-14	
Anions by Ion Chromatography								
EPA 300.0	Fluoride	mg/L	<0.10	0.03	0.10	W412090	18-Mar-14	
EPA 300.0	Sulfate as SO4	mg/L	<0.30	0.06	0.30	W412090	18-Mar-14	

Quality Control - LABORATORY CONTROL SAMPLE Data

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Dissolved)									
EPA 200.7	Cadmium	mg/L	1.03	1.00	103	85 - 115	W411115	19-Mar-14	
EPA 200.7	Calcium	mg/L	19.8	20.0	99.0	85 - 115	W411115	19-Mar-14	
EPA 200.7	Cobalt	mg/L	1.01	1.00	101	85 - 115	W411115	19-Mar-14	
EPA 200.7	Copper	mg/L	1.04	1.00	104	85 - 115	W411115	19-Mar-14	
EPA 200.7	Iron	mg/L	9.82	10.0	98.2	85 - 115	W411115	19-Mar-14	
EPA 200.7	Lead	mg/L	0.998	1.00	99.8	85 - 115	W411115	19-Mar-14	
EPA 200.7	Magnesium	mg/L	20.1	20.0	101	85 - 115	W411115	19-Mar-14	
EPA 200.7	Manganese	mg/L	1.01	1.00	101	85 - 115	W411115	19-Mar-14	
EPA 200.7	Nickel	mg/L	0.999	1.00	99.9	85 - 115	W411115	19-Mar-14	
EPA 200.7	Zinc	mg/L	1.01	1.00	101	85 - 115	W411115	19-Mar-14	
Anions by Ion Chromatography									
EPA 300.0	Fluoride	mg/L	1.93	2.00	96.7	90 - 110	W412090	18-Mar-14	
EPA 300.0	Sulfate as SO4	mg/L	9.95	10.0	99.5	90 - 110	W412090	18-Mar-14	

Quality Control - DUPLICATE Data

Method	Analyte	Units	Duplicate Result	Sample Result	RPD	RPD Limit	Batch ID	Analyzed	Notes
Classical Chemistry Parameters									
SM 2540 C	Total Diss. Solids	mg/L	623	617	1.0	10	W411106	12-Mar-14	

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Project Name: Chino Routine
Work Order: **W4C0134**
Reported: 20-Mar-14 11:21

Quality Control - MATRIX SPIKE Data

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Dissolved)										
EPA 200.7	Cadmium	mg/L	1.03	<0.0020	1.00	103	70 - 130	W411115	19-Mar-14	
EPA 200.7	Cadmium	mg/L	1.01	<0.0020	1.00	101	70 - 130	W411115	19-Mar-14	
EPA 200.7	Calcium	mg/L	208	190	20.0	94.4	70 - 130	W411115	19-Mar-14	M3
EPA 200.7	Calcium	mg/L	75.0	55.1	20.0	99.5	70 - 130	W411115	19-Mar-14	
EPA 200.7	Cobalt	mg/L	0.990	<0.0060	1.00	99.0	70 - 130	W411115	19-Mar-14	
EPA 200.7	Cobalt	mg/L	0.977	<0.0060	1.00	97.7	70 - 130	W411115	19-Mar-14	
EPA 200.7	Copper	mg/L	1.03	<0.010	1.00	103	70 - 130	W411115	19-Mar-14	
EPA 200.7	Copper	mg/L	1.01	0.012	1.00	99.7	70 - 130	W411115	19-Mar-14	
EPA 200.7	Iron	mg/L	9.98	<0.060	10.0	99.8	70 - 130	W411115	19-Mar-14	
EPA 200.7	Iron	mg/L	9.82	<0.060	10.0	98.2	70 - 130	W411115	19-Mar-14	
EPA 200.7	Lead	mg/L	0.978	<0.0075	1.00	97.8	70 - 130	W411115	19-Mar-14	
EPA 200.7	Lead	mg/L	0.971	<0.0075	1.00	97.1	70 - 130	W411115	19-Mar-14	
EPA 200.7	Magnesium	mg/L	28.6	8.42	20.0	101	70 - 130	W411115	19-Mar-14	
EPA 200.7	Magnesium	mg/L	36.4	16.6	20.0	98.7	70 - 130	W411115	19-Mar-14	
EPA 200.7	Manganese	mg/L	1.01	0.0064	1.00	100	70 - 130	W411115	19-Mar-14	
EPA 200.7	Manganese	mg/L	1.05	0.0519	1.00	99.6	70 - 130	W411115	19-Mar-14	
EPA 200.7	Nickel	mg/L	0.974	<0.010	1.00	97.4	70 - 130	W411115	19-Mar-14	
EPA 200.7	Nickel	mg/L	0.964	<0.010	1.00	96.4	70 - 130	W411115	19-Mar-14	
EPA 200.7	Zinc	mg/L	1.05	0.0520	1.00	100	70 - 130	W411115	19-Mar-14	
EPA 200.7	Zinc	mg/L	1.00	0.0104	1.00	99.0	70 - 130	W411115	19-Mar-14	
Anions by Ion Chromatography										
EPA 300.0	Fluoride	mg/L	2.71	0.79	2.00	96.2	90 - 110	W412090	18-Mar-14	
EPA 300.0	Fluoride	mg/L	2.08	0.23	2.00	92.4	90 - 110	W412090	18-Mar-14	
EPA 300.0	Sulfate as SO4	mg/L	74.1	64.2	10.0	98.9	90 - 110	W412090	18-Mar-14	D2,M3
EPA 300.0	Sulfate as SO4	mg/L	108	98.5	10.0	94.1	90 - 110	W412090	18-Mar-14	D2,M3

Quality Control - MATRIX SPIKE DUPLICATE Data

Method	Analyte	Units	MSD Result	Spike Result	Spike Level	%R	RPD	RPD Limit	Batch ID	Analyzed	Notes
Metals (Dissolved)											
EPA 200.7	Cadmium	mg/L	1.04	1.03	1.00	104	0.7	20	W411115	19-Mar-14	
EPA 200.7	Calcium	mg/L	208	208	20.0	94.0	0.0	20	W411115	19-Mar-14	M3
EPA 200.7	Cobalt	mg/L	0.995	0.990	1.00	99.5	0.5	20	W411115	19-Mar-14	
EPA 200.7	Copper	mg/L	1.04	1.03	1.00	104	1.1	20	W411115	19-Mar-14	
EPA 200.7	Iron	mg/L	9.79	9.98	10.0	97.9	1.9	20	W411115	19-Mar-14	
EPA 200.7	Lead	mg/L	0.985	0.978	1.00	98.5	0.7	20	W411115	19-Mar-14	
EPA 200.7	Magnesium	mg/L	28.5	28.6	20.0	101	0.4	20	W411115	19-Mar-14	
EPA 200.7	Manganese	mg/L	1.02	1.01	1.00	101	0.9	20	W411115	19-Mar-14	
EPA 200.7	Nickel	mg/L	0.980	0.974	1.00	98.0	0.6	20	W411115	19-Mar-14	
EPA 200.7	Zinc	mg/L	1.06	1.05	1.00	101	0.6	20	W411115	19-Mar-14	
Anions by Ion Chromatography											
EPA 300.0	Fluoride	mg/L	2.07	2.08	2.00	92.0	0.4	20	W412090	18-Mar-14	
EPA 300.0	Sulfate as SO4	mg/L	108	108	10.0	90.5	0.3	20	W412090	18-Mar-14	D2,M3

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Project Name: Chino Routine
Work Order: **W4C0134**
Reported: 20-Mar-14 11:21

Notes and Definitions

D1	Sample required dilution due to matrix.
D2	Sample required dilution due to high concentration of target analyte.
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to spike level. The LCS was acceptable.
LCS	Laboratory Control Sample (Blank Spike)
RPD	Relative Percent Difference
UDL	A result is less than the detection limit
R > 4S	% recovery not applicable, sample concentration more than four times greater than spike level
<RL	A result is less than the reporting limit
MRL	Method Reporting Limit
MDL	Method Detection Limit
N/A	Not Applicable

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Freeport McMoRan - Chino Mines
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Project Name: Chino Routine
Work Order: **W4I0204**
Reported: 19-Sep-14 09:29

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Sampled By	Date Received	Notes
337693 / GH-2004-2D	W4I0204-01	Water	09-Sep-14 10:33	NL	10-Sep-2014	
337694 / GH-2004-2S	W4I0204-02	Water	09-Sep-14 09:56	NL	10-Sep-2014	
337695 / GH-LOWER POND	W4I0204-03	Water	09-Sep-14 11:00	NL	10-Sep-2014	
337696 / GH-SUMP	W4I0204-04	Water	09-Sep-14 09:15	NL	10-Sep-2014	

Solid samples are analyzed on an as-received, wet-weight basis, unless otherwise requested.
Sample preparation is defined by the client as per their Data Quality Objectives.
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The results presented in this report relate only to the samples, and meet all requirements of the NELAC Standards unless otherwise noted.

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Project Name: Chino Routine
Work Order: **W4I0204**
Reported: 19-Sep-14 09:29

Client Sample ID: **337693 : GH-2004-2D**
SVL Sample ID: **W4I0204-01 (Water)**

Sampled: 09-Sep-14 10:33
Received: 10-Sep-14
Sampled By: NL

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Dissolved)										
EPA 200.7	**Cadmium**	0.0148	mg/L	0.0020	0.0007		W437241	AS	09/16/14 17:25	
EPA 200.7	**Calcium**	521	mg/L	0.040	0.029		W437241	AS	09/16/14 17:25	
EPA 200.7	Cobalt	< 0.0060	mg/L	0.0060	0.0007		W437241	AS	09/16/14 17:25	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.003		W437241	AS	09/16/14 17:25	
EPA 200.7	Iron	< 0.060	mg/L	0.060	0.023		W437241	AS	09/16/14 17:25	
EPA 200.7	Lead	< 0.0075	mg/L	0.0075	0.0038		W437241	AS	09/16/14 17:25	
EPA 200.7	**Magnesium**	124	mg/L	0.200	0.090		W437241	AS	09/16/14 17:25	
EPA 200.7	**Manganese**	0.0640	mg/L	0.0040	0.0013		W437241	AS	09/16/14 17:25	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.002		W437241	AS	09/16/14 17:25	
EPA 200.7	**Zinc**	0.843	mg/L	0.0100	0.0032		W437241	AS	09/16/14 17:25	
Classical Chemistry Parameters										
SM 2540 C	**Total Diss. Solids**	2680	mg/L	40			W437268	AGF	09/11/14 13:00	D1
Anions by Ion Chromatography										
EPA 300.0	Fluoride	< 0.50	mg/L	0.50	0.14	5	W438198	AEW	09/17/14 17:37	D1
EPA 300.0	**Sulfate as SO4**	1750	mg/L	15.0	2.75	50	W438198	AEW	09/17/14 17:48	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

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Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Chino Routine
Work Order: **W4I0204**
Reported: 19-Sep-14 09:29

Client Sample ID: **337694 : GH-2004-2S**
SVL Sample ID: **W4I0204-02 (Water)**

Sampled: 09-Sep-14 09:56
Received: 10-Sep-14
Sampled By: NL

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Dissolved)										
EPA 200.7	**Cadmium**	0.227	mg/L	0.0020	0.0007		W437241	AS	09/16/14 17:28	
EPA 200.7	**Calcium**	556	mg/L	0.040	0.029		W437241	AS	09/16/14 17:28	
EPA 200.7	Cobalt	< 0.0060	mg/L	0.0060	0.0007		W437241	AS	09/16/14 17:28	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.003		W437241	AS	09/16/14 17:28	
EPA 200.7	Iron	< 0.060	mg/L	0.060	0.023		W437241	AS	09/16/14 17:28	
EPA 200.7	Lead	< 0.0075	mg/L	0.0075	0.0038		W437241	AS	09/16/14 17:28	
EPA 200.7	**Magnesium**	198	mg/L	0.200	0.090		W437241	AS	09/16/14 17:28	
EPA 200.7	**Manganese**	13.4	mg/L	0.0040	0.0013		W437241	AS	09/16/14 17:28	
EPA 200.7	**Nickel**	0.043	mg/L	0.010	0.002		W437241	AS	09/16/14 17:28	
EPA 200.7	**Zinc**	45.2	mg/L	0.100	0.0320	10	W437241	AS	09/16/14 18:26	D2
Classical Chemistry Parameters										
SM 2540 C	**Total Diss. Solids**	3350	mg/L	40			W437268	AGF	09/11/14 13:00	D1
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	1.73	mg/L	0.50	0.14	5	W438198	AEW	09/17/14 18:20	D1
EPA 300.0	**Sulfate as SO4**	2340	mg/L	15.0	2.75	50	W438198	AEW	09/17/14 18:31	D2

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Project Name: Chino Routine
Work Order: **W4I0204**
Reported: 19-Sep-14 09:29

Client Sample ID: **337695 : GH-LOWER POND**
SVL Sample ID: **W4I0204-03 (Water)**

Sampled: 09-Sep-14 11:00
Received: 10-Sep-14
Sampled By: NL

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Dissolved)										
EPA 200.7	**Cadmium**	0.0055	mg/L	0.0020	0.0007		W437241	AS	09/16/14 17:38	
EPA 200.7	**Calcium**	127	mg/L	0.040	0.029		W437241	AS	09/16/14 17:38	
EPA 200.7	Cobalt	< 0.0060	mg/L	0.0060	0.0007		W437241	AS	09/16/14 17:38	
EPA 200.7	**Copper**	0.045	mg/L	0.010	0.003		W437241	AS	09/16/14 17:38	
EPA 200.7	Iron	< 0.060	mg/L	0.060	0.023		W437241	AS	09/16/14 17:38	
EPA 200.7	Lead	< 0.0075	mg/L	0.0075	0.0038		W437241	AS	09/16/14 17:38	
EPA 200.7	**Magnesium**	19.5	mg/L	0.200	0.090		W437241	AS	09/16/14 17:38	
EPA 200.7	**Manganese**	0.812	mg/L	0.0040	0.0013		W437241	AS	09/16/14 17:38	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.002		W437241	AS	09/16/14 17:38	
EPA 200.7	**Zinc**	0.350	mg/L	0.0100	0.0032		W437241	AS	09/16/14 17:38	
Classical Chemistry Parameters										
SM 2540 C	**Total Diss. Solids**	607	mg/L	10			W437268	AGF	09/11/14 13:00	
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	0.95	mg/L	0.10	0.03		W438198	AEW	09/17/14 18:42	
EPA 300.0	**Sulfate as SO4**	406	mg/L	3.00	0.55	10	W438198	AEW	09/17/14 18:53	D2

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Project Name: Chino Routine
Work Order: **W4I0204**
Reported: 19-Sep-14 09:29

Client Sample ID: **337696 : GH-SUMP**
SVL Sample ID: **W4I0204-04 (Water)**

Sampled: 09-Sep-14 09:15
Received: 10-Sep-14
Sampled By: NL

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Dissolved)										
EPA 200.7	**Cadmium**	0.0029	mg/L	0.0020	0.0007		W437241	AS	09/16/14 17:41	
EPA 200.7	**Calcium**	162	mg/L	0.040	0.029		W437241	AS	09/16/14 17:41	
EPA 200.7	Cobalt	< 0.0060	mg/L	0.0060	0.0007		W437241	AS	09/16/14 17:41	
EPA 200.7	**Copper**	0.019	mg/L	0.010	0.003		W437241	AS	09/16/14 17:41	
EPA 200.7	Iron	< 0.060	mg/L	0.060	0.023		W437241	AS	09/16/14 17:41	
EPA 200.7	Lead	< 0.0075	mg/L	0.0075	0.0038		W437241	AS	09/16/14 17:41	
EPA 200.7	**Magnesium**	23.8	mg/L	0.200	0.090		W437241	AS	09/16/14 17:41	
EPA 200.7	Manganese	< 0.0040	mg/L	0.0040	0.0013		W437241	AS	09/16/14 17:41	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.002		W437241	AS	09/16/14 17:41	
EPA 200.7	**Zinc**	0.461	mg/L	0.0100	0.0032		W437241	AS	09/16/14 17:41	
Classical Chemistry Parameters										
SM 2540 C	**Total Diss. Solids**	748	mg/L	10			W437268	AGF	09/11/14 13:00	
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	1.04	mg/L	0.10	0.03		W438198	AEW	09/17/14 19:04	
EPA 300.0	**Sulfate as SO4**	475	mg/L	3.00	0.55	10	W438198	AEW	09/17/14 19:15	D2

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Freeport McMoRan - Chino Mines
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Bayard, NM 88023

Project Name: Chino Routine
Work Order: **W4I0204**
Reported: 19-Sep-14 09:29

Quality Control - BLANK Data

Method	Analyte	Units	Result	MDL	MRL	Batch ID	Analyzed	Notes
Metals (Dissolved)								
EPA 200.7	Cadmium	mg/L	<0.0020	0.0007	0.0020	W437241	16-Sep-14	
EPA 200.7	Calcium	mg/L	<0.040	0.029	0.040	W437241	16-Sep-14	
EPA 200.7	Cobalt	mg/L	<0.0060	0.0007	0.0060	W437241	16-Sep-14	
EPA 200.7	Copper	mg/L	<0.010	0.003	0.010	W437241	16-Sep-14	
EPA 200.7	Iron	mg/L	<0.060	0.023	0.060	W437241	16-Sep-14	
EPA 200.7	Lead	mg/L	<0.0075	0.0038	0.0075	W437241	16-Sep-14	
EPA 200.7	Magnesium	mg/L	<0.200	0.090	0.200	W437241	16-Sep-14	
EPA 200.7	Manganese	mg/L	<0.0040	0.0013	0.0040	W437241	16-Sep-14	
EPA 200.7	Nickel	mg/L	<0.010	0.002	0.010	W437241	16-Sep-14	
EPA 200.7	Zinc	mg/L	<0.0100	0.0032	0.0100	W437241	16-Sep-14	
Classical Chemistry Parameters								
SM 2540 C	Total Diss. Solids	mg/L	<10		10	W437268	11-Sep-14	
Anions by Ion Chromatography								
EPA 300.0	Fluoride	mg/L	<0.10	0.03	0.10	W438198	17-Sep-14	
EPA 300.0	Sulfate as SO4	mg/L	<0.30	0.06	0.30	W438198	17-Sep-14	

Quality Control - LABORATORY CONTROL SAMPLE Data

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Dissolved)									
EPA 200.7	Cadmium	mg/L	0.991	1.00	99.1	85 - 115	W437241	16-Sep-14	
EPA 200.7	Calcium	mg/L	20.0	20.0	100	85 - 115	W437241	16-Sep-14	
EPA 200.7	Cobalt	mg/L	0.998	1.00	99.8	85 - 115	W437241	16-Sep-14	
EPA 200.7	Copper	mg/L	1.02	1.00	102	85 - 115	W437241	16-Sep-14	
EPA 200.7	Iron	mg/L	10.4	10.0	104	85 - 115	W437241	16-Sep-14	
EPA 200.7	Lead	mg/L	0.996	1.00	99.6	85 - 115	W437241	16-Sep-14	
EPA 200.7	Magnesium	mg/L	20.2	20.0	101	85 - 115	W437241	16-Sep-14	
EPA 200.7	Manganese	mg/L	0.990	1.00	99.0	85 - 115	W437241	16-Sep-14	
EPA 200.7	Nickel	mg/L	1.00	1.00	100	85 - 115	W437241	16-Sep-14	
EPA 200.7	Zinc	mg/L	0.959	1.00	95.9	85 - 115	W437241	16-Sep-14	
Anions by Ion Chromatography									
EPA 300.0	Fluoride	mg/L	1.94	2.00	97.2	90 - 110	W438198	17-Sep-14	
EPA 300.0	Sulfate as SO4	mg/L	9.89	10.0	98.9	90 - 110	W438198	17-Sep-14	

Quality Control - DUPLICATE Data

Method	Analyte	Units	Duplicate Result	Sample Result	RPD	RPD Limit	Batch ID	Analyzed	Notes
Classical Chemistry Parameters									
SM 2540 C	Total Diss. Solids	mg/L	559	554	0.9	10	W437268	11-Sep-14	

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Project Name: Chino Routine
Work Order: **W4I0204**
Reported: 19-Sep-14 09:29

Quality Control - MATRIX SPIKE Data

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Dissolved)										
EPA 200.7	Cadmium	mg/L	1.05	<0.0020	1.00	105	70 - 130	W437241	16-Sep-14	
EPA 200.7	Cadmium	mg/L	1.06	<0.0020	1.00	106	70 - 130	W437241	16-Sep-14	
EPA 200.7	Calcium	mg/L	107	87.3	20.0	99.6	70 - 130	W437241	16-Sep-14	M3
EPA 200.7	Calcium	mg/L	265	246	20.0	95.8	70 - 130	W437241	16-Sep-14	M3
EPA 200.7	Cobalt	mg/L	1.01	<0.0060	1.00	101	70 - 130	W437241	16-Sep-14	
EPA 200.7	Cobalt	mg/L	0.997	<0.0060	1.00	99.7	70 - 130	W437241	16-Sep-14	
EPA 200.7	Copper	mg/L	1.07	0.020	1.00	105	70 - 130	W437241	16-Sep-14	
EPA 200.7	Copper	mg/L	1.05	<0.010	1.00	105	70 - 130	W437241	16-Sep-14	
EPA 200.7	Iron	mg/L	10.3	<0.060	10.0	103	70 - 130	W437241	16-Sep-14	
EPA 200.7	Iron	mg/L	10.5	<0.060	10.0	104	70 - 130	W437241	16-Sep-14	
EPA 200.7	Lead	mg/L	1.02	<0.0075	1.00	102	70 - 130	W437241	16-Sep-14	
EPA 200.7	Lead	mg/L	1.00	<0.0075	1.00	100	70 - 130	W437241	16-Sep-14	
EPA 200.7	Magnesium	mg/L	47.0	26.7	20.0	102	70 - 130	W437241	16-Sep-14	
EPA 200.7	Magnesium	mg/L	98.4	78.1	20.0	101	70 - 130	W437241	16-Sep-14	
EPA 200.7	Manganese	mg/L	1.40	0.403	1.00	99.7	70 - 130	W437241	16-Sep-14	
EPA 200.7	Manganese	mg/L	1.15	0.155	1.00	99.6	70 - 130	W437241	16-Sep-14	
EPA 200.7	Nickel	mg/L	1.02	<0.010	1.00	102	70 - 130	W437241	16-Sep-14	
EPA 200.7	Nickel	mg/L	1.01	<0.010	1.00	101	70 - 130	W437241	16-Sep-14	
EPA 200.7	Zinc	mg/L	1.05	0.0555	1.00	99.4	70 - 130	W437241	16-Sep-14	
EPA 200.7	Zinc	mg/L	1.00	<0.0100	1.00	99.3	70 - 130	W437241	16-Sep-14	
Anions by Ion Chromatography										
EPA 300.0	Fluoride	mg/L	2.78	0.79	2.00	99.6	90 - 110	W438198	17-Sep-14	
EPA 300.0	Fluoride	mg/L	2.58	0.20	2.00	119	90 - 110	W438198	18-Sep-14	M1
EPA 300.0	Sulfate as SO4	mg/L	567	571	10.0	R > 4S	90 - 110	W438198	17-Sep-14	D2,M3
EPA 300.0	Sulfate as SO4	mg/L	144	134	10.0	102	90 - 110	W438198	18-Sep-14	D2,M3

Quality Control - MATRIX SPIKE DUPLICATE Data

Method	Analyte	Units	MSD Result	Spike Result	Spike Level	%R	RPD	RPD Limit	Batch ID	Analyzed	Notes
Metals (Dissolved)											
EPA 200.7	Cadmium	mg/L	1.03	1.05	1.00	103	1.6	20	W437241	16-Sep-14	
EPA 200.7	Calcium	mg/L	107	107	20.0	99.4	0.0	20	W437241	16-Sep-14	M3
EPA 200.7	Cobalt	mg/L	0.997	1.01	1.00	99.7	1.3	20	W437241	16-Sep-14	
EPA 200.7	Copper	mg/L	1.05	1.07	1.00	103	1.6	20	W437241	16-Sep-14	
EPA 200.7	Iron	mg/L	10.2	10.3	10.0	102	0.5	20	W437241	16-Sep-14	
EPA 200.7	Lead	mg/L	0.997	1.02	1.00	99.7	2.0	20	W437241	16-Sep-14	
EPA 200.7	Magnesium	mg/L	47.0	47.0	20.0	102	0.1	20	W437241	16-Sep-14	
EPA 200.7	Manganese	mg/L	1.38	1.40	1.00	97.8	1.4	20	W437241	16-Sep-14	
EPA 200.7	Nickel	mg/L	1.01	1.02	1.00	100	1.7	20	W437241	16-Sep-14	
EPA 200.7	Zinc	mg/L	1.04	1.05	1.00	98.3	1.1	20	W437241	16-Sep-14	
Anions by Ion Chromatography											
EPA 300.0	Fluoride	mg/L	2.80	2.78	2.00	101	0.8	20	W438198	17-Sep-14	
EPA 300.0	Sulfate as SO4	mg/L	556	567	10.0	R > 4S	1.9	20	W438198	17-Sep-14	D2,M3

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Project Name: Chino Routine
Work Order: **W4I0204**
Reported: 19-Sep-14 09:29

Notes and Definitions

D1	Sample required dilution due to matrix.
D2	Sample required dilution due to high concentration of target analyte.
M1	Matrix spike recovery was high, but the LCS recovery was acceptable.
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to spike level. The LCS was acceptable.
LCS	Laboratory Control Sample (Blank Spike)
RPD	Relative Percent Difference
UDL	A result is less than the detection limit
R > 4S	% recovery not applicable, sample concentration more than four times greater than spike level
<RL	A result is less than the reporting limit
MRL	Method Reporting Limit
MDL	Method Detection Limit
N/A	Not Applicable

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Chino Mines Co. Reclamation/Erosion Monitoring Form

☐ Monthly
☒ Quarterly
☐ 1" Rain Event

Reclamation Unit: Osceola	Weather Conditions: Partly Cloudy \ cold
Inspector: Steven Garcia	
Time/Date: 1:20 pm 12-10-13	
Vegetation Conditions: Sparse dry grasses & weeds visible	Fences/Livestock: none
Ditches/Water Control: none noted	Significant Erosion (Attach Description): none visible
Monitoring Stations: N/A	
Other Observations:	

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Chino Mines Co. Reclamation/Erosion Monitoring Form

[ ] Monthly
[X] Quarterly
[ ] 1" Rain Event

Reclamation Unit: Bell Inspector: Steven Garcia Time/Date: 1:35 12/10/13	Weather Conditions: Partly Cloudy/Cold
Vegetation Conditions: Dry grasses & weeds visible	Fences/Livestock: None
Ditches/Water Control: None noted.	Significant Erosion (Attach Description): None visible
Monitoring Stations: N/A	
Other Observations:	

FREEPORT-McMoRan COPPER & GOLD INC.

Chino Mines Co. Reclamation/Erosion Monitoring Form

☐ Monthly
☒ Quarterly
☐ 1" Rain Event

Reclamation Unit: Star	Weather Conditions: Partly Cloudy/cold.
Inspector: Steven Garcia	
Time/Date: 1:45 12-10-13	
Vegetation Conditions: Thick dry grass & weeds visible on slope.	Fences/Livestock: none
Ditches/Water Control: No visible concerns.	Significant Erosion (Attach Description): none visible.
Monitoring Stations: N/A	
Other Observations:	

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Chino Mines Co. Reclamation/Erosion Monitoring Form

☐ Monthly
☒ Quarterly
☐ 1" Rain Event

Reclamation Unit: Tenderfoot Inspector: Steven Garcia Time/Date: 2:00 PM 12-10-13	Weather Conditions: Partly Cloudy/cold
Vegetation Conditions: Dry grass: weeds, live trees visible.	Fences/Livestock: None
Ditches/Water Control: No visible concerns.	Significant Erosion (Attach Description): None visible.
Monitoring Stations: N/A	
Other Observations:	

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Chino Mines Co. Reclamation/Erosion Monitoring Form

☐ Monthly
☒ Quarterly
☐ 1" Rain Event

Reclamation Unit: Groundhog Inspector: Steven Garcia Time/Date: 2:25 12-10-13	Weather Conditions: Partly Cloudy/cold.
Vegetation Conditions: Dry grass; weeds visible	Fences/Livestock: none
Ditches/Water Control: No visible concerns.	Significant Erosion (Attach Description): none visible
Monitoring Stations: ~~Pipeline inspection rd.~~ N/A	
Other Observations: Pipeline insp. road is rutted, deep. ~~so~~ sediment washed into upper sump (Eastend)	

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Chino Mines Co. Reclamation/Erosion Monitoring Form

[ ] Monthly
[X] Quarterly
[ ] 1" Rain Event

Reclamation Unit: Groundhog	Weather Conditions: Partly Cloudy
Inspector: Steven Garcia	
Time/Date: 2:45 12-10-13	
Vegetation Conditions: Dry grass & weeds	Fences/Livestock: none
Ditches/Water Control: No visible Concerns.	Significant Erosion (Attach Description): none.
Monitoring Stations: none.	
Other Observations: Pipeline insp. rd. is rutted, needs work. some erosion visible into upper sump Area.	

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Chino Mines Co. Reclamation/Erosion Monitoring Form

☐ Monthly
☒ Quarterly
☐ 1" Rain Event

Reclamation Unit: Groundhog	Weather Conditions: Clear warm & windy
Inspector: Steve Garcia	
Time/Date: 2:40 PM 3-17-2014	
Vegetation Conditions: Abundant dry grass is visible throughout.	Fences/Livestock: none
Ditches/Water Control: Berm on P. Pline insl. road has A washout. for water to drain.	Significant Erosion (Attach Description): none. Some minor rills visible.
Monitoring Stations: none	
Other Observations: none.	

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Chino Mines Co. Reclamation/Erosion Monitoring Form

☐ Monthly
☒ Quarterly
☐ 1" Rain Event

Reclamation Unit: Tender Foot	Weather Conditions: Clear warm; windy
Inspector: Steve Garcia	
Time/Date: 3:00pm 3-17-2014	
Vegetation Conditions: Abundant dry grass visible along with live juniper trees; various shrubs.	Fences/Livestock: None
Ditches/Water Control: No visible Concerns.	Significant Erosion (Attach Description): none visible
Monitoring Stations: None	
Other Observations: None	

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Chino Mines Co. Reclamation/Erosion Monitoring Form

- [ ] Monthly
- [x] Quarterly
- [ ] 1" Rain Event

Reclamation Unit: Star Inspector: Steve Garcia Time/Date: 3:12 PM. 3-17-2014	Weather Conditions: Clear warm & windy
Vegetation Conditions: Abundant dry grass visible along with various shrubs & a few trees	Fences/Livestock: none
Ditches/Water Control: No visible concerns.	Significant Erosion (Attach Description): none visible
Monitoring Stations: none	
Other Observations: none	

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Chino Mines Co. Reclamation/Erosion Monitoring Form

☐ Monthly
☒ Quarterly
☐ 1" Rain Event

Reclamation Unit: Bell	Weather Conditions: Clear warm & windy
Inspector: Steve Garcia	
Time/Date: 4:10 pm 3-17-2014	
Vegetation Conditions: Some dry vegitation visible Along with live oak scrub & Juniper trees.	Fences/Livestock: None
Ditches/Water Control: None	Significant Erosion (Attach Description): None visible
Monitoring Stations: None	
Other Observations: None.	

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Chino Mines Co. Reclamation/Erosion Monitoring Form

☐ Monthly
☒ Quarterly
☐ 1" Rain Event

Reclamation Unit: Oceola	Weather Conditions: Clear Warm & Windy
Inspector: Steve Garcia	
Time/Date: 4:15 PM 3-17-2014	
Vegetation Conditions: Some dry vegitation visible	Fences/Livestock:
Ditches/Water Control: None	Significant Erosion (Attach Description): None visible
Monitoring Stations: None	
Other Observations:	

FREEPORT-McMoRan COPPER & GOLD INC.

Chino Mines Co. Reclamation/Erosion Monitoring Form

☐ Monthly
☒ Quarterly
☐ 1" Rain Event

Reclamation Unit: Ground HOS Inspector: Steven M. Garcia Time/Date: 6-19-2014 2:30 pm	Weather Conditions: Partly Cloudy
Vegetation Conditions: Abundant dry grass visible some new growth visible.	Fences/Livestock: None
Ditches/Water Control: No visible concerns.	Significant Erosion (Attach Description): non visible
Monitoring Stations: None	
Other Observations:	

FREEPORT-McMoRan COPPER & GOLD INC.

Chino Mines Co. Reclamation/Erosion Monitoring Form

☐ Monthly
☒ Quarterly
☐ 1" Rain Event

Reclamation Unit: Tender Foot	Weather Conditions: Partly Cloudy
Inspector: Steven M. Garcia	
Time/Date: 2:50 P.M. 6-19-2014	
Vegetation Conditions: Abundant dry grasses. Live juniper & pinon trees various shrubs visible. Some new growth also visible.	Fences/Livestock: None
Ditches/Water Control: No visible Concerns.	Significant Erosion (Attach Description): None visible.
Monitoring Stations: None	
Other Observations: None.	

FREEPORT-McMoRan COPPER & GOLD INC.

Chino Mines Co. Reclamation/Erosion Monitoring Form

☐ Monthly
☑ Quarterly
☐ 1" Rain Event

Reclamation Unit: Star	Weather Conditions: Partly Cloudy
Inspector: Steven M. Garcia	
Time/Date: 3:00 PM 6-19-2014	
Vegetation Conditions: Abundant dry grass visible along with various shrubs & trees. Some new growth visible	Fences/Livestock: none
Ditches/Water Control: No visible concerns.	Significant Erosion (Attach Description): none visible
Monitoring Stations: None	
Other Observations: none.	

FREEPORT-McMoRan COPPER & GOLD INC.

Chino Mines Co. Reclamation/Erosion Monitoring Form

☐ Monthly
☒ Quarterly
☐ 1" Rain Event

Reclamation Unit: Oceola	Weather Conditions: Partly Cloudy / Dry
Inspector: Steven M. Garcia	
Time/Date: 3:12 pm 6/19/2014	
Vegetation Conditions: Dry ~~dead~~ grasses visible. Some new growth. live shrubs also visible.	Fences/Livestock: None
Ditches/Water Control: ~~No ditch~~ None visible.	Significant Erosion (Attach Description): None Noted.
Monitoring Stations: None.	
Other Observations: None.	

FREEPORT-McMoRan COPPER & GOLD INC.

Chino Mines Co. Reclamation/Erosion Monitoring Form

☐ Monthly
☒ Quarterly
☐ 1" Rain Event

Reclamation Unit: Bell	Weather Conditions: Partly Cloudy ; dry
Inspector: Steven M. Garcia	
Time/Date: 3:24 6-19-2014	
Vegetation Conditions: Sparse dry grass. live scrub Oak. Some new growth visible	Fences/Livestock: none
Ditches/Water Control: none	Significant Erosion (Attach Description): none visible.
Monitoring Stations: none	
Other Observations: none	

FREEPORT-McMoRan COPPER & GOLD INC.

Chino Mines Co. Reclamation/Erosion Monitoring Form

- [ ] Monthly
- [x] Quarterly
- [ ] 1" Rain Event

Reclamation Unit: 1-Under Foot

Inspector: Pam Pinson

Time/Date: 9-30-14 - 8:30 ~~pm~~ am

Weather Conditions: Warm & Sunny

Vegetation Conditions: Excellent - See annual Veg Report

Fences/Livestock: N A

Ditches/Water Control: Good Shape

Significant Erosion (Attach Description): Only in borrow area above remediated site. See annual veg report. Rilling - need to stabilize by December 2014

Monitoring Stations: N A

Other Observations: See photos in annual veg report.

FREEPORT-McMoRan COPPER & GOLD INC.

Chino Mines Co. Reclamation/Erosion Monitoring Form

☐ Monthly
☑ Quarterly
☐ 1" Rain Event

Reclamation Unit: Osceola Inspector: Pam Pinson Time/Date: 9-30-14 9am	Weather Conditions: Sunny & warm
Vegetation Conditions: Slight improvement from last year. See annual Veg report	Fences/Livestock: NA
Ditches/Water Control: No issue w/ monitor well/ road or pipelines.	Significant Erosion (Attach Description): Nothing noted.
Monitoring Stations: NA	
Other Observations: See photos in annual veg report.	

FREEPORT-McMoRan COPPER & GOLD INC.

Chino Mines Co. Reclamation/Erosion Monitoring Form

☐ Monthly
☑ Quarterly
☐ 1" Rain Event

Reclamation Unit: C.B. Bell

Inspector: Dan Pinson

Time/Date: 9-30-14 9:20 am

Weather Conditions: warm & sunny

Vegetation Conditions: Slight improvement from last year. See annual Veg report.

Fences/Livestock: NA

Ditches/Water Control: Drainage still had water impounded due to recent rains. Tends to seep out quickly.

Significant Erosion (Attach Description): OK, nothing noted.

Monitoring Stations: NA

Other Observations: See photos in annual veg. report.

FREEPORT-McMoRan COPPER & GOLD INC.

Chino Mines Co. Reclamation/Erosion Monitoring Form

[ ] Monthly
[x] Quarterly
[ ] 1" Rain Event

Reclamation Unit: Groundhog Mine Site	Weather Conditions: Sunny & warm
Inspector: Pam Pinson	
Time/Date: 9-30-14 10:00 am	
Vegetation Conditions: Excellent. See annual veg report. Big improvement on pipeline corridor	Fences/Livestock: NA unless you count Elk & deer sign...
Ditches/Water Control: Stable. Last year's debris flow revegetated and road berm reset.	Significant Erosion (Attach Description): Minor rilling in upper Ghog on north facing slope just above drainage. BMP work by December to stabilize before next rain events
Monitoring Stations: NA	
Other Observations: See photos in annual veg. report.	

TECHNICAL MEMORANDUM

Date:	October 31, 2014	**Project No.:**	141-1160
To:	Pam Pinson	**Company:**	Freeport-McMoRan Chino Mines Company
From:	Emily Clark, CPSS and Doug Romig, CPSS	**Email:**	eclark@golder.com
cc:	Ned Hall, Freeport-McMoRan Inc.		

RE: 2014 VEGETATION INSPECTION OF THE GROUNDHOG MINE AND SMALL HISTORIC STOCKPILE INTERIM REMEDIAL ACTION SITES

1.0 INTRODUCTION

Freeport-McMoRan Chino Mines Company (Chino) completed remediation of several small waste rock stockpiles in the headwaters of Whitewater Creek in 2004, and the Groundhog Mine site in 2008. The remedial actions fulfilled the mitigation requirements under Interim Remedial Actions (IRAs) pursuant to the Chino Administrative Order on Consent (AOC) between Chino and the New Mexico Environment Department (NMED). Pursuant to the commitments presented in the IRA Work Plan, Chino performs qualitative vegetation and erosion monitoring of the remediated areas. Golder Associates, Inc. (Golder) was retained by Chino to perform the annual monitoring of these sites.

The project site is approximately 1-½ miles northeast of Bayard, New Mexico. The Groundhog Mine site is located on the flanks of San Jose Mountain in a small canyon upgradient of Whitewater Creek along the Lake One haul road. Collectively known as the Small Historic Stockpiles; Osceolla, CG Bell, and Tenderfoot B sites reside along the banks and steep hillsides immediately above Whitewater Creek. The Star Rock Stockpile, located across the Whitewater Creek drainage from the Tenderfoot B, was also included in the annual inspection, although it is not specifically included in an IRA under the AOC due to the stockpile consisting of unreactive and unmineralized limestone and granodiorite. Figure 1 illustrates the general locations of these sites. Remediation at four of these five sites included the removal of potentially-reactive stockpile materials and affected soils, closure of mine openings, site regrading, cover placement, and revegetation of the reclamation, removal and borrow areas. This work was performed as part of the IRAs to reduce mass loading of metals and acidity to groundwater and surface water.

This technical memorandum documents the annual vegetation inspection for the Groundhog Mine and Small Historic Stockpile remediated sites for 2014. The inspection of remediated areas is the sixth since 2009 for the majority of the sites and exceeds Chino's commitment discussed in the IRA Work Plan to annually monitor vegetation and erosion for four years. However, because the Groundhog pipeline corridor was first inspected in the fall of 2011, Chino elected to continue the annual inspection of these sites until all remediated areas had been monitored for at least four years. The 2014 inspection is the fourth since 2011 for the Groundhog pipeline corridor. The sites were inspected to assess the general condition of the soil cover, estimate vegetation cover, and document the plant species that occur. The

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reclaimed areas were inspected on September 30, 2014 by Ms. Emily Clark (Golder), Ms. Pam Pinson (Chino) and Mr. Matthew Schultz (NMED).

2.0 MONITORING RESULTS

The vegetation on the IRA and cover borrow sites was inspected on foot to evaluate the progress of plant establishment and determine if the vegetated cover is viable, self-sustaining and capable of supporting the post-mining land use of wildlife habitat. The general condition of the soil cover and estimated vegetation canopy cover were assessed. A summary of the general conditions at each site is provided below. Photo documentation of the site conditions are provided in the photo log attached to this document. Precipitation measured at the Reservoir 3A Met Station for the past 4 years is listed in Table 1 and the list of plant species identified over the past six inspections of the Groundhog Mine and Small Historic Stockpile sites are presented in Table 2.

2.1 Precipitation

Precipitation measured at the Reservoir 3A gauge between January and September 2014 totaled 12.6 inches (Table 1). This is equivalent to the long-term regional average for the same time period at Fort Bayard, New Mexico of about 12.6 (Western Regional Climate Center, wrcc@dri.edu). The majority of the year-to-date precipitation measured at Res 3A, 11.3 inches, fell during the summer monsoon period (July to September). The monthly precipitation totals recorded during this period were also near normal, with exception of September which totaled 5.5 inches. This is nearly 2.5 inches above the Ft. Bayard regional monthly average. Record precipitation was recorded throughout Southern New Mexico in September.

2.2 Tenderfoot B

The Tenderfoot B site was hand seeded in 2004 by Chino staff and currently supports a diverse and robust plant community (Photos 1 and 2). Average canopy cover was estimated at 85 to 90 percent. Shrubs are abundant (150 stems/acre) and at comparable densities to the adjacent native areas. Furthermore, numerous native forbs have become established. Since regular inspections began five years ago, a total of 42 species have been identified in the revegetated plant community (Table 2). The majority of these species were not in the seed mix, designated for reclamation use, and have been recruited from the native plant community adjacent to the site.

No new erosion features in the remediated site were identified during the inspection. In 2012, rilling induced by runon from the upper access road was identified at the site. The midslope rills appear to be in a stable condition; however, some minor rills near the road were observed. Some rills from recent rains were noted in the borrow area uphill of Tenderfoot B.

2.3 CG Bell

The CG Bell site was also hand seeded in 2004 and vegetation establishment is discontinuous across the site in part due to shallow cover materials over naturally mineralized bedrock (Photos 3 and 4). There were observable increases in grass cover on the west side of the pond (Photo 3). Average canopy cover was estimated at 30 percent across the entire site and 13 species have been identified in the revegetated plant community (Table 2). The site has been successful at recruiting native shrub species from adjacent undisturbed areas. Shrub density remains at 150 stems/acre which is considered adequate at this stage of the reclamation. The site has also recruited numerous forb species and grass cover is expected to continue to improve.

2.4 Osceolla

The Osceolla site extends from Whitewater Creek along the railroad tracks to an access road to the north (Figure 1). Establishment of vegetation at the Osceolla site is inconsistent across the site; however, the areas were vegetation is established are showing increased diversity and canopy cover. Vegetation is established along the railroad tracks and in the east and west portions of the site (Photos 5 through 8). Estimated canopy cover in these areas was 55 percent, though vegetative cover in the central portion of the site continues to develop slowly over the naturally mineralized bedrock. This section is also appears to be a slightly steeper slope than the surrounding slope and has a concave shape which may function to drain stormwater. A total to 35 species have been identified in the revegetated plant community (Table 2). The majority of these species were recruited from adjacent undisturbed areas. Shrub density is relatively low, estimated at 75 stems/acre. Annual grasses and forbs were observed in the previously disturbed areas along the railroad corridor at the base of the slope at the Osceolla.

2.5 Star Rock Stockpile

This stockpile was characterized in the late 1990's along with the three Small Historic Stockpiles and lab analysis determined that this site did not exceed New Mexico groundwater standards unlike the other three historical sites. The Star Rock Stockpile was covered with local borrow materials in 1997. The area was not seeded and native plants have colonized the site. The plant community is in very good condition with an estimated average canopy cover of 80 percent and an estimated shrub density of 400 stems/acre (Photos 9 and 10). A total of 18 species have been identified in the revegetated plant community (Table 2).

2.6 Groundhog Mine

After removal of waste rock and cover placement, the Groundhog Mine site was hydroseeded by Freeport-McMoRan Reclamation Services in 2008. During December 2010 and the first quarter of 2011, Chino removed additional waste rock, excavated to the bedrock contact, under the pipeline corridor along the Lake One haul road. Clean cover materials were placed over the waste rock removal areas in the pipeline corridor and then hydroseeded and mulched in the spring of 2011.

Vegetation in the areas seeded in 2008 is well established and supports robust and diverse plant community. Across the remediated area, average canopy cover increased this year to an estimated 85 percent (Photos M through P). Photos 11 through 14 provide a progression of vegetation performance from 2011 through 2014. Numerous well-established seedlings were observed in the 2011 seeded area and the area is becoming less distinct compared to areas revegetated in 2008 (Photo 14 and 15).

Minor rilling was observed on the upper IRA Groundhog area in the north section of the 2008 seeded area (Photo 16) and along the toe of the pipeline corridor in the south 2011 seeded area (Photo 18).

The Groundhog IRA site has excellent diversity. A total to 70 species have been identified in the remediated area in the past five years (Table 2). Average shrub density has increased and was estimated around 150 stems/acre. The lower Groundhog areas tend to have higher shrub density than the upper Groundhog area (Photos 19 and 20).

Plant cover and density in the San Jose Mountain borrow area at the Groundhog Mine site is considered appropriate for this stage in its reclamation (Photos 21 and 22). Several areas of localized rill erosion in the borrow area were identified in 2013. Many of these rill areas appeared to initiate in undisturbed areas upgradient of the borrow site and represent the formation of a natural incipient drainage pattern along the lower slopes. Chino implemented stormwater conveyance channels to mitigate the rill erosion on the borrow area slopes and take advantage of the natural emergent drainage patterns (Photo 22).

3.0 SUMMARY AND RECOMMENDATIONS

In general, revegetation efforts at the Groundhog Mine and Small Historic Stockpile IRA sites are considered successful including the 2011 seeded pipeline corridor which is in its fourth year of annual monitoring. The majority of the IRA areas now support robust and diverse plant communities and soil surfaces are stable. The above normal precipitation measured in 2014 and 2013 has resulted in two productive growing seasons. The vegetation at the remediated sites has responded to the increase in moisture and show increases in canopy cover, diversity and standing biomass compared to previous years. Small areas within the CG Bell and Osceolla sites currently have low percentage seedling establishment and are slowly recruiting plant species from adjacent areas based on the last 6 years of annual observations. The Star Rock Stockpile demonstrates that these types of sites are capable of recruiting volunteer vegetation over the long term.

The majority of the sites have well-established vegetation as has been determined in six years of inspections, and Chino has met the four-year annual vegetation monitoring requirement for all IRA sites. However, since re-seeding of the pipeline corridor area along the haul road at the Groundhog site was not completed until 2011, and the completion report was not approved until fourth quarter 2011, Golder recommends that Chino wait until the fifth year of vegetation growth and development on the pipeline corridor to complete quantitative monitoring as part of a comprehensive vegetation success evaluation. For efficiency, the quantitative monitoring will be performed in 2015 for all the remediated sites to demonstrate that the vegetation has achieved the success targets consistent with the Vegetation Success Standards of Appendix C in the New Mexico Energy, Minerals and Natural Resources Department,

Mining and Minerals Division revision 01-1 to Permit GR009RE. The CG Bell and Osceolla may not be part of the formal vegetation monitoring due in part to their small size and the potential for redisturbance as they are within operational areas of the mine.

Sincerely,

GOLDER ASSOCIATES INC.

Emily Clark, CPSS
Project Soil Scientist

Doug Romig, CPSS
Senior Soil Scientist

Attachments: Tables
Figure
Photo Log

TABLES

Table 1: Measured Precipitation at the Reservoir 3A Met Station (January through September)

Year	Precipitation (inches)
	Reservoir 3A
2011	7.2
2012	6.9
2013	16.4
2014	12.6

Table 2: Plant Species Identified on Reclaimed Areas from 2009 through 2014 at the Groundhog Mine and Whitewater Creek Small Historic Stockpile Sites

Scientific Name	Common Name	Tenderfoot B	CG Bell	Osceolla	Star Rock Stkpl	Groundhog
Grasses						
Aristida purpurea	Purple threeawn	X			X	
Aristida schiedeana	Single-awn threeawn	X	X	X	X	X
Bothriochloa barbinodis	Cane bluestem			X	X	X
Bothriochloa ischaemum	Yellow bluestem					X
Bouteloua barbata	Six-weeks grama		X	X		
Bouteloua curtipendula[1]	Sideoats grama	X		X	X	X
Bouteloua gracilis[1]	Blue grama	X	X	X		X
Bouteloua hirusta	Hairy grama	X			X	X
Cyperus fendleriannus	Fendlers's flatsedge	X		X		X
Elymus canadensis	Canadian wild rye	X				
Elymus elymoides[1]	Bottlebrush squirreltail					X
Elymus lanceolatus[1]	Thickspike wheatgrass					X
Eragrostis curvula[1]	Weeping lovegrass	X				X
Eragrostis intermedia	Plains lovegrass					X
Eragrostis spp.	Lovegrass	X				X
Hilaria belangeri	Curly mesquite					X
Leptochloa dubia[1]	Green sprangletop	X		X		X
Panicum obtusum	Vine mesquite	X				X
Pascopyrum smithii	Western wheatgrass					X
Pleuraphis jamesii	Galleta					X
Chloris virgata	Feather fingergrass					X
Eragrostis mexicana	Mexican Lovegrass					X
Muhlenbergia metcalfei	Purple muhly					X
Schizachyrium scoparium	Little bluestem				X	
Setaria macrostachya	Plains bristlegrass	X		X		X
Sporobolus cryptandrus[1]	Sand dropseed	X		X	X	X
Forbs						
Artemisia carruthii	Sagewort	X		X		X
Astragalus mollissimus	Woolly locoweed					X
Astragalus nuttallii	Nuttall's milkvetch	X				X
Bahia dissecta	Bahia	X		X	X	X

Table 2: Plant Species Identified on Reclaimed Areas from 2009 through 2014 at the Groundhog Mine and Whitewater Creek Small Historic Stockpile Sites (con't)

Scientific Name	Common Name	Tenderfoot B	CG Bell	Osceolla	Star Rock Stkpl	Groundhog
Forbs						
Chaenactis stevioides	False yarrow	X	X	X	X	X
Cirsium spp.	Thistle	X				
Cleome serrulata	Beeplant				X	
Conyza canadensis	Horseweed					X
Dalea candida	White prairie clover					X
Dalea leporina	Foxtail dalea	X				X
Datura quercifolia	Oak-leaved thornapple			X		X
Eriogonum wrightii	Bastardsage	X			X	X
Euphorbia dentata	Toothed poinsettia					X
Evolvulus sericeus	Silver dwarf morning-glory					X
Gallardia pinnatifida	Red dome blanketflower					X
Gaura spp.	Beeblossom	X				X
Grindelia squarosa	Curly-cup gumweed					X
Heliomeris longifolia	Long-leaf goldeneye					
Heterotheca villosa	Hairy goldenaster		X			X
Hoffmannseggia glauca	Hog potato			X		X
Ipomoea cristulata	Scarlet morning glory			X		X
Ipomoea purpurea	Wild morning glory			X		X
Ipomopsis multiflora	Many-flowered ipomopsis					X
Linum lewisii[1]	Blue flax					X
Lotus wrightii	Wright's deervetch	X	X		X	
Machaeranthera gracilis	Slender goldenweed			X		X
Malva neglecta	Common mallow					X
Mechaeranthera canescens	Purple aster	X			X	X
Melapodium leucanthum	Blackfoot	X				X
Melilotus officinalis	Yellow sweetclover					X
Mentzelia multiflora	Blazing star			X		
Mirabilis linearis	Narrowleaf four-o'clock					X
Monardella odoratissima	Horsemint	X				X
Pectis angustifolia	Lemonweed	X			X	X
Penstemon spp. [1]	Penstemon	X			X	
Phaseolus angustissimus	Slimleaf limabean	X			X	
Physalis virginiana	Virginia groundcherry					X
Proboscidea parviflora	Devil's claw					X
Pseudognaphalium canescens	Gray everlasting	X				
Ratibida columnifera	Cone flower					X
Rhynchosia senna	Rosary bean			X		
Salsola tragus	Russian thistle					X

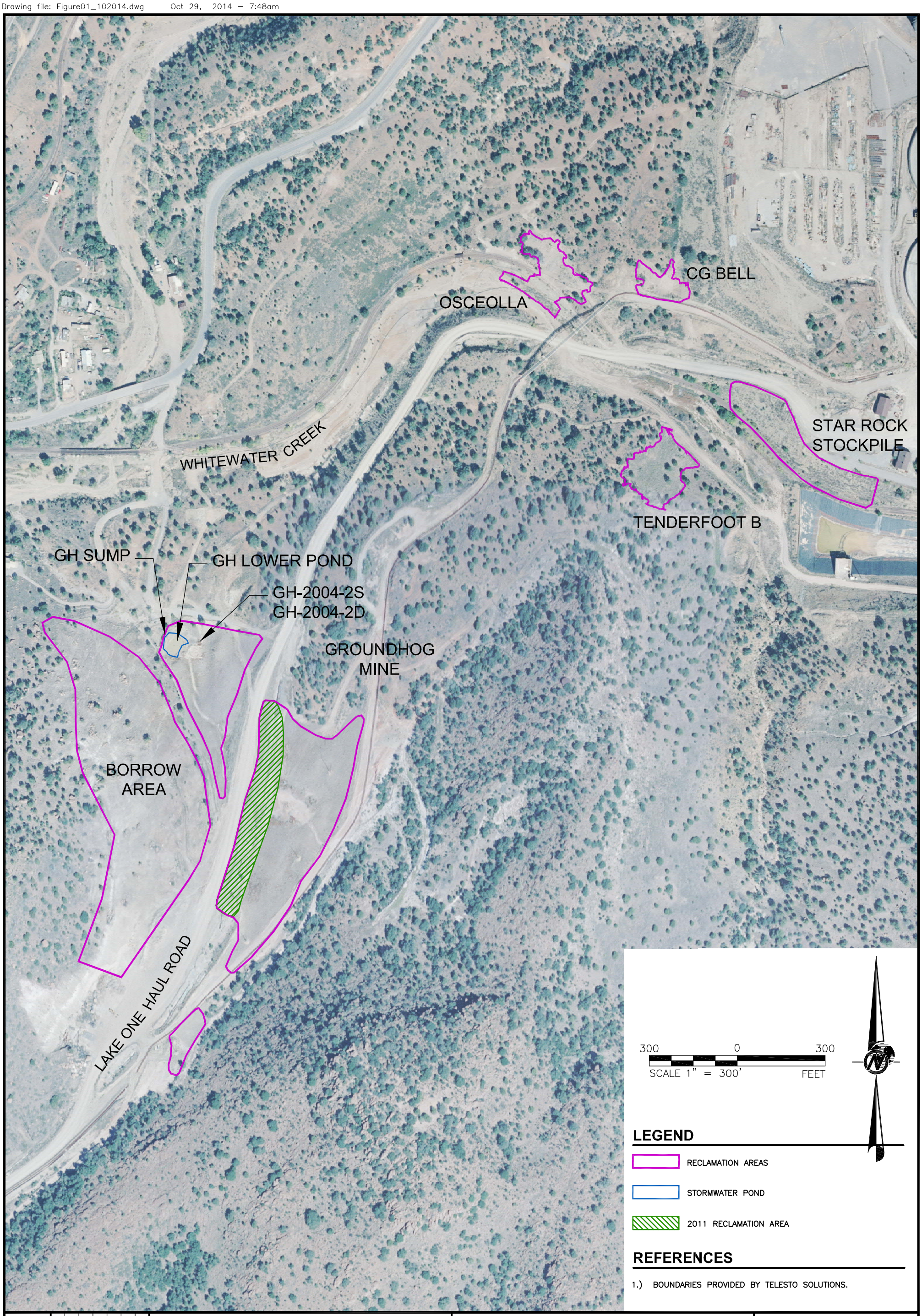
Table 2: Plant Species Identified on Reclaimed Areas from 2009 through 2014 at the Groundhog Mine and Whitewater Creek Small Historic Stockpile Sites (con't)

Scientific Name	Common Name	Tenderfoot B	CG Bell	Osceolla	Star Rock Stkpl	Groundhog
Forbs						
Salvia subincisa	Sawtooth sage					X
Tradescantia pinetorum	Pine spiderwort					X
Schoenocrambie linearfolia	Slimleaf purple mustard					X
Solanum elaeagnifolium	Silverleaf nightshade	X	X	X		X
Sphearalcea coccinea	Scarlet globemallow	X		X		
Sphearalcea fendleri[1]	Fendler's globemallow	X		X		X
Verbascum thapsus	Common mullen	X	X		X	X
Shrubs and Trees						
Acacia angustissima	Prairie acacia					X
Ailanthus altissima	Tree of heaven				X	
Atriplex canescens[1]	Four-wing saltbush	X		X		X
Brickellia californica	California brickellbush	X	X	X	X	X
Brickellia grandiflora	Tasselflower brickellbush	X	X	X		
Cylindropuntia imbricata	Tree cholla	X				X
Eramerica nauseosus	Rubber rabbitbush		X	X	X	
Fallugia paradoxa	Apache plume					X
Gutierrezia sarothrae	Broom snakeweed	X			X	X
Krascheninnikovia lanata	winterfat	X				
Mimosa biuncifera	Mimosa	X				X
Opuntia engelmannii	Pickly pear	X				
Pinus edulis	Pinyon pine		X	X		
Quercus emoryi	Emory oak			X		
Senecio flaccidus	Douglas' ragwort	X	X	X	X	
Ulmus pumila	Siberian elm				X	
Yucca baccata	Banana yucca			X		X

Note: 1 - Species in the reclamation seed mix

FIGURE

Drawing file: Figure01_102014.dwg Oct 29, 2014 – 7:48am



LEGEND

- RECLAMATION AREAS
- STORMWATER POND
- 2011 RECLAMATION AREA

REFERENCES

1.) BOUNDARIES PROVIDED BY TELESTO SOLUTIONS.

FIGURE 1

PROJECT No.	141-1160	
FILE No.	Figure01.dwg	
REV. 0	SCALE AS SHOWN	
DESIGN	DR	10/28/10
CADD	CM	10/20/14
CHECK	EC	10/20/14
REVIEW	DR	10/20/14

TITLE

ANNUAL MONITORING OF INTERIM REMEDIAL ACTION SITES LOCATION MAP

PROJECT

FREEPORT-McMoRan COPPER & GOLD
CHINO MINES COMPANY

GROUNDHOG MINE AND SMALL HISTORIC STOCKPILES IRA'S
GRANT COUNTY, NEW MEXICO

Golder Associates
Albuquerque, NM

PHOTO LOG

Project Title: Groundhog Mine Site and Small Historic Stockpile IRA

PHOTO 1
Tenderfoot B site looking south in 2014

PHOTO 2
General condition of Tenderfoot B site in 2014

PHOTO 3
West side of CG Bell site in 2014

PHOTO 4
Overview of eastern slope of the CG Bell site in 2014

PHOTO 5
View of Osceolla from the lower road looking north 2014

PHOTO 6
Osceolla site looking east in 2014

PHOTO 7
Hog potato plant growing in the central portion of Osceolla

PHOTO 8
Increased diversity on portions of Osceolla

PHOTO 9
Star Rock Stockpile vegetation condition 2014

PHOTO 10
Star Rock Stockpile vegetation condition 2014

PHOTO 11
Groundhog Mine Site: Pipeline corridor reseeded area following waste rock removal along the Lake One haul road in 2011

PHOTO 12
Overview of the pipeline corridor reseeded area at the same location as Photo M in 2012

PHOTO 13
Overview of the pipeline corridor reseeded area at the same location as Photo M in 2013

PHOTO 14
Overview of the pipeline corridor reseeded area in 2014

PHOTO 15
Overview of original Upper Groundhog IRA area vegetation condition

PHOTO 16
Minor rilling observed on Upper Groundhog IRA 2014

PHOTO 17
2014 Overview of Upper Groundhog area and Pipeline Corridor.

PHOTO 18
Condition of Upper Groundhog pipeline corridor remediated area looking south in 2014

PHOTO 19
Overview of Lower Groundhog 2014

PHOTO 20
Shrubs at Lower Groundhog 2014

PHOTO 21
Overview of borrow area reclamation in 2014

PHOTO 22
New water channel controls added in 2014 to San Jose Mountain borrow area above the Groundhog lower sump stormwater pond.