
Process Memorandum to File

Summary of Hydrologic, Hydrochemical, and Geochemical Data Received to Date

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Purpose of Process Memorandum

The purpose of this process memorandum is to provide a summary of the baseline hydrology, hydrogeology, hydrochemical, and geochemical data received from Resolution Copper Mining, LLC (Resolution Copper).

Baseline hydrology, hydrogeology, hydrochemical, and geochemical data received from Resolution Copper to date and summarized herein include:

1. March 25, 2016, submittal:
 - a. Various Interim groundwater monitoring and assessment reports
2. June 10, 2016, submittal:
 - a. Well construction reports
 - b. Long-term pump test reports
 - c. Quarterly well compliance submittals to Arizona Department of Environmental Quality (ADEQ) associated with an existing aquifer protection permit for the West Plant Site
 - d. Geochemical Characterization of Resolution Copper Tailings: 2014-2016 Update report
3. June 24, 2016, submittal:
 - a. SQL version of baseline groundwater and compliance well database
4. July 1, 2016, submittal:
 - a. Hydrochemistry database
 - b. ITSI Validation reports
5. July 15, 2015, submittal:
 - a. PowerPoint presentations
 - i. Review of Baseline Hydrogeologic Data
 - ii. Hydraulic Testing for Aquifer Parameters in the Region of Proposed Block Region of Proposed Block Cave Mining Operations
 - b. Collection of hydrographs and well construction diagrams
6. July 22, 2016, submittal:
 - a. Various baseline data and reference documents
7. August 19, 2016, submittal:
 - a. Various baseline data and reference documents
8. September 15, 2016, submittal:
 - a. Access version of database previously provided on June 24
 - b. Additional geochemistry data

Key Process Steps

To date, Resolution Copper has provided data in several different formats: PDF reports, Access (and SQL) database, Excel spreadsheet, and scanned copies of laboratory reports. All files have been reviewed, and following is a summary of the data that have been provided. This process memo describes the following sections:

1. Reports and presentations – A summary of all written reports and presentations received, including those cited as references in the General Plan of Operations (GPO)
2. Baseline groundwater database – A summary of the data included in the baseline groundwater database exported from the Resolution Copper Acquire program
3. Geochemical data – A summary of all reports and electronic data received that describe the geochemical characterization of tailings or waste rock, including static and kinetic testing and acid-base accounting
4. Hydrochemistry data – A summary of all electronic data received that describe baseline surface water or groundwater quality
5. Aquifer Protection Permit (APP) data – A summary of all monitoring data received associated with the APP on the West Plant Site

Reports and Presentations

On March 25, 2016, Resolution Copper provided interim groundwater monitoring reports and reference documents. On June 10, 2016, Resolution Copper provided 25 documents in PDF format that included reports on local and regional hydraulic parameters. The reports consisted of (1) well construction reports with short-term pump test information for local wells around the proposed mine area, and (2) long-term pump tests for wells around the proposed mine area to assess regional storage and anisotropy.

In addition, on July 15, 2016, Resolution Copper provided (1) a set of the collective hydrographs and well construction diagrams taken from the above mentioned reports, and (2) PDF copies of 2 PowerPoint presentations given by Resolution Copper that summarizes their baseline hydrogeologic data and hydraulic testing.

Table 1 below lists the reports and presentations provided by Resolution Copper to date, and where appropriate, the associate well and period of record presented in the report. Note that reference documents received from Resolution Copper that are not specific to the Resolution Copper project have not been listed in Table 1, but are available for review on the project SharePoint site.

Table 1. Report Summary

Report Title	File Name	Document Date	Associated Well	Period of Record
Technical Memorandum: Preliminary Results and Analysis of Data Obtained at Deep Hydrogeologic Test Wells DHRES-01 and DHRES-02, Resolution Copper Mining, Pinal County, Arizona	FINAL DHRES-01_DHRES-02_Feb2010.pdf	3-Feb-10	-DHRES-01 -DHRES-02 -Grouted piezometers -Shaft No. 9	Raw water level data for 12/10/2009 Water level graphs 6/1/2008 to 12/31/2009
Technical Memorandum: Results of Drilling, Construction, and Testing at Hydrologic Test Wells DHRES-03, DHRES-04, DHRES-05 and DHRES-05B, Resolution Copper Mining, Pinal County, Arizona	FINAL DHRES-03_DHRES-04_DHRES-05_Tech_Memo.pdf	17-Jun-11	-DHRES-03 -DHRES-04 -DHRES-05/DHRES-05B	Water quality 2/10/2009 to 12/21/2009
Technical Memorandum: Results Of Drilling, Construction, Equipping, and Testing at Hydrologic Test Well DHRES-06, Resolution Copper Mining, Pinal County, Arizona	FINAL DHRES-06_ws_LOGS.pdf	13-May-11	-DHRES-06	Water quality 3/8/2010 to 1/9/2011
Technical Memorandum: Results of Drilling, Construction, and Testing of Hydrologic Test Wells HRES-16, HRES-17, and HRES-18 Resolution Copper Mining, Pinal County, Arizona	FINAL HRES-16 HRES-17 and HRES-18 TechMemo.pdf	13-Jan-12	-HRES-16 -HRES-17 -HRES-18	Water quality sample for 7/4/2011 to 7/19/2011
Technical Memorandum: Results of Drilling and Construction of Hydrologic Test Well DHRES-08 Resolution Copper Mining, Pinal County, Arizona	20110617_MA_DHRES08_890.pdf	17-Jun-11	-DHRES-08	
Technical Memorandum: Results of Drilling, Construction, and Testing at Hydrologic Test Well DHRES-09, Resolution Copper Mining, Pinal County, Arizona	FINAL DHRES-09_TechMemo.pdf	8-Dec-11	-DHRES-9	Water quality sample for 7/21/2010 to 9/2/2011
Technical Memorandum: Results and Analysis of Long-term Pumping Test at Well HRES-07, Resolution Copper Mining Pinal County, Arizona	FINAL DHRES10_TechMemo.pdf	21-Apr-10	-HRES-07	Pump test 10/7/2009 to 12/6/2009

Report Title	File Name	Document Date	Associated Well	Period of Record
Technical Memorandum: Results of Drilling, Construction, and Testing at Hydrologic Test Wells DHRES-12 And DHRES-13, Resolution Copper Mining, Pinal County, Arizona	FINAL DHRES-12 & 13_Tech Memo.pdf	22-Dec-11	-DHRES-12 -DHRES-13	Water quality 2/12/2011 and 6/28/2011
Technical Memorandum: Results of Drilling and Construction of Hydrologic Test Well DHRES-14 Resolution Copper Mining, Pinal County, Arizona	FINAL DHRES14_TechMemo.pdf	18-Jan-12	-DHRES-14	
Technical Memorandum: Results of Drilling, Construction and Testing at Hydrologic Test Wells DHRES-11 and HRES-12, Resolution Copper Mining, Pinal County, Arizona	20111208_MA_DHRES 11_HRES 12_892.pdf	8-Dec-11	-DHRES-11 -HRES-12	
Appendix D: Borehole Geophysical Logs (IDS, SWE, BHI)	FINAL DHRES-15, -16, HRES-21_AppD.pdf		-HRES-21 -DHRES-15	
Technical Memorandum: Summary of Modifications to Wells HRES-02, HRES-05, and HRES-10	FINAL HRES_06_07_08_A06_CORRAL_MIDDLE_MJ1 1_2006-2010.pdf	14-Sep-12	-HRES-02 -HRES-05 -HRES-10	
Technical Memorandum: Hydrogeologic Characterization Well HRES-4: Results of Long-Term Aquifer Test, Resolution Copper Mining LLC, Pinal County, Arizona	FINAL HRES4_25DayAquiferTest_2006.pdf	23-May-08	-HRES-4	Water quality 3/3/2004 to 11/3/2006
Technical Memorandum: Results and Analysis of Long-term Pumping Test at Well HRES-07, Resolution Copper Mining Pinal County, Arizona	FINAL HRES07_LongTermPumpingTest_21April2010.pdf	21-Apr-10	-HRES-07	
Technical Memorandum: Summary of Modifications to Wells HRES-02, HRES-05, and HRES-10	FINAL HRES-09_DHRES-07_Rev.pdf	14-Sep-12	-HRES-02 -HRES-05 -HRES-10	
Technical Memorandum: RESULTS AND ANALYSIS OF 23-Day Aquifer Test at Well HRES-09, Resolution Copper Mining, Pinal County, Arizona	FINAL HRES09_LongTermPumpingTest.pdf	26-Jan-12	-HRES-09	

Report Title	File Name	Document Date	Associated Well	Period of Record
Technical Memorandum: Results of Drilling, Construction, Equipping, and Testing at Hydrologic Test Wells HRES-10 and HRES-11, Resolution Copper Mining, Pinal County, Arizona	FINAL HRES-10 and HRES-11 TechMemo.pdf	13-May-11	-HRES-10 -HRES-11	Water quality data 4/19/2010 to 9/24/2010
Technical Memorandum: Results of Drilling, Construction, and Testing at Hydrologic Test Well HRES-13, Resolution Copper Mining, Pinal County, Arizona	FINAL HRES-13_Tech_Memo.pdf	5-Jan-12	-HRES-13	Water quality 3/5/2011 and 6/3/2011
Technical Memorandum: Results of Drilling, Construction, and Testing at Hydrologic Test Wells HRES-14 and HRES-15 Resolution Copper Mining, Pinal County, Arizona	FINAL HRES-14 and HRES-15 TechMemo.pdf	5-Jan-12	-HRES-14 -HRES-15	Water quality 3/26/2011 to 7/15/2011
Technical Memorandum: Well HRES-20 – Results of 90-day Aquifer Test, Resolution Copper Mining, Pinal County, Arizona	FINAL HRES20_90day.pdf	15-Jan-14	-HRES-20	
Technical Memorandum: Results of Drilling and Construction at Hydrologic Test Wells PHRES-01, PHRES-02, PHRES-03, and PHRES-04, Resolution Copper Mining, Pinal County, Arizona	FINAL PHRES-hole_TechMemo.pdf	28-Feb-12	-PHRES-01 -PHRES-02 -PHRES-03 -PHRES-04	
Technical Memorandum: Results of Drilling, Construction, and Development of Groundwater Production Well RESPW-01, Resolution Copper Mining, Pinal County, Arizona	FINAL RESPW-01_installation_Tech_Memo.pdf	14-Sep-12	-RESPW-01	
Results of Drilling, Construction, and Testing at Hydrologic Test Wells HRES-01, HRES-02, HRES-03, HRES-04, and HRES-05	HRES-01 to HRES-05 well construction revised.pdf	9-Jun-16	-HRES-01 -HRES-02 -HRES-03 -HRES-04 -HRES-05	
Hydrologic Test Wells HRES-19, HRES-20, QV-5 Completion Report	RCC Well Completion Report_FINAL.pdf	Dec-12	-HRES-19 -HRES-20 -QV-5	

Report Title	File Name	Document Date	Associated Well	Period of Record
Geochemical Characterization of Resolution Tailings Update: 2014 - 2016	RCM_TailingsGeochem_BaselineReport_Update_08June2016.pdf	8-Jun-16		2014–2016
Hydrograph Set for Current Hydrogeologic Monitoring Network	2016 RCM Hydrograph Set_13July2016.pdf	11-Jul-16		Collection of hydrographs and well construction diagrams from above reports
Review of Baseline Hydrogeologic Data	M&A_RCM_USFS_Jul2016_HydroBaseline_TK Rev1.pdf	13-Jul-16		Resolution Copper presentation of hydrology baseline
Hydraulic Testing for Aquifer Parameters in the Region of Proposed Block-Cave Mining Operations	RCM_USFS AquiferTests_DW_13jul2016_rev0.pdf	13-Jul-16		Resolution Copper presentation of aquifer tests
Interim Results of Groundwater Monitoring, Upper Queen Creek and Devils Canyon Watersheds, Resolution Copper Mining LLC, Pinal County, Arizona	20100217_Montgomery_GroundwaterMonitoring_QueenDevilWatersheds.pdf	February 2010	19 wells, boreholes, shafts	2004–2009
Groundwater Assessment Update: West Plant Site, Superior, Arizona: Technical Memorandum prepared for Resolution Copper Company	20130328_Golder_GroundwaterAssessUpdate_West_41.pdf	March 2013		
Technical Memorandum, Phase I Hydrogeologic Field Investigations, Near West Tailings Site, Pinal County, Arizona	20130501_Montgomery_Phase1_HydrogeologicFieldInvestigations_West_38	2013 MAY		2/11/2013 to 3/5/2013
Technical Memorandum, Phase II Hydrogeologic Field Investigations, Near West Tailings Site, Pinal County, Arizona	20130510_Montgomery_Phase2_HydrogeologicFieldInvestigations_West_39	2013 MAY		2/22/2013 to 3/3/2013
Results of Queen Creek Corridor Survey, Superior Basin, Pinal County Arizona.	20130219_Montgomery_ResultsQueenCorridorSurvey_44	2013 FEB		1984 to 2012

Report Title	File Name	Document Date	Associated Well	Period of Record
Results of Hydrochemical Characterization of Groundwater, Upper Queen Creek/Devils Canyon Study area, Resolution Copper Mining LLC, Pinal County, Arizona	20120315_Montgomery_ResultsHydrochemGroundwater_QueenDevilStudyArea_43	2012 MAR		6/8/1993 to 12/7/2011
Technical Memorandum Groundwater Assessment Update: West Plant Site, Superior, Arizona Prepared for Resolution Copper Mining LLC	20130328_Golder_GroundwaterAssessUpdate_West_41	2013 MAR	•Groundwater assessment to support APP	01/1994 to 01/2014
Well Installation Report for New Point of Compliance and Alert Wells, West Plant Site, Superior, Arizona, November 21, 2007, Report ref. 073-92522	20071121_Golder_Well Installation Rpt_740.pdf	2007	<ul style="list-style-type: none"> •500 Yard POC Well •Indian Ponds POC Well •Settling Ponds 1&2 Alert Well •Smelter Pond POC Well •Tailings Pond 5 POC Well 	5/22/2007 to 5/22/2007
Report on Groundwater Model of West Plant Site, Superior Arizona	20130328_Golder_GroundwaterAssessUpdate_West_41	2008 MAR	•Groundwater assessment to support APP	01/1994 to 01/2014
Hydrogeologic Data Submittal, Tailings Prefeasibility Study, Whitford, Silver King, and Happy Camp Sites	Montgomery_2012_756	2012 OCT		01/01/1925 to 3/22/2012
Results of Phase II Hydrogeologic Investigations in Support of Tailings Prefeasibility Study, Far West Site	20120731_Montgomery_2012_Results Phase II_758.pdf	2012 JUL	<ul style="list-style-type: none"> • FW3-R • FW4-R • FW7-R • FW15-R • FW9-S • FW2-S • FW3-S • FW4-S • FW5-S • FW7-S • FW8-S • FW10-S • FW12-S • FW13-S • FW14-S 	3/6/2012 to 6/5/2012

Report Title	File Name	Document Date	Associated Well	Period of Record
Interim Results of Groundwater Monitoring, Upper Queen Creek and Devils Canyon Watersheds, Resolution Copper Mining LLC, Pinal County, Arizona	20100217_Montgomery_GroundwaterMonitoring_QueenDevilWatersheds_42	2010 FEB	<ul style="list-style-type: none"> • Corral Well • Middle Well • Hackberry Windmill • HRES-01 • HRES-02 • HRES-03 • HRES-04 • HRES-05 • HRES-06 • HRES-07 • HRES-08 • Oak Flat Well • A-06 • MJ-11 • RES-03 • DHRES-01 • DHRES-02 • Shaft No. • Shaft No. 3 	1970 to 12/6/2009
Results of Hydrochemical Characterization of Groundwater, Upper Queen Creek/Devils Canyon Study Area, Resolution Copper Mining LLC, Pinal County, Arizona. Report prepared for Resolution Copper Mining	20120315_Montgomery_ResultsHydrochemicalGroundwater_QueenDevilStudyArea_43	2012 MAR		6/8/1993 to 12/7/2011
Technical Memorandum, Phase I Hydrogeologic Field Investigations, Near West Tailings Site, Pinal County, Arizona	20130501_Montgomery_Phase1_HydrogeologicFieldInvestigations_West_38	2013 MAY		

Report Title	File Name	Document Date	Associated Well	Period of Record
Summary of Hydraulic Conductivity Estimates from Testing of Hydrologic Characterization Wells, 2004-2012	20140912_Montgomery_Summary of Hydraulic Conductivity_759.pdf	2014 SEP	<ul style="list-style-type: none"> • HRES-01 • HRES-02 • HRES-03 • HRES-04 • HRES-05 • HRES-06 • HRES-07 • HRES-09 • HRES-10 • HRES-11 • HRES-12 • Oak Flat Well • A-06 • MJ-11 • DHRES-04 • DHRES-05 • DHRES-07 • DHRES-04 • DHRES-05 • DHRES-07 • DHRES-13 	2004–2012
RESULTS OF DRILLING, CONSTRUCTION, AND TESTING AT HYDROLOGIC TEST WELLS HRES-21, DHRES-15, AND DHRES-16	20160512_MA_HRES 21_DHRES 15 16_893	2016 MAY	HRES-21, DHRES-15 and DHRES-16	5/26/2014 to 9/26/2014
Resolution Copper Company Surface Water Baseline Report, October 2002 through February 2006, Volume I of II	20060630_Golder_BaselineReport_SurfaceWater02_06_Vol1_40.pdf	2006 JUN	N/A	12/16/2002 to 9/7/2005
Surface Water Baseline Report, Devils Canyon, Mineral Creek and Queen Creek Watersheds, Resolution Copper Mining LLC, Pinal County Arizona	20130516_Montgomery_BaselineReportSurfaceWater_45.pdf	2013 MAY	N/A	5/13/2003 to 8/13/2013
Resolution Copper Company Surface Water Baseline Report, October 2002 through February 2006 Volume I of II - Text Tables, Figures	20060630_Golder_BaselineReport_SurfaceWater02_06_Vol1_40.pdf	2006 JUN	N/A	12/16/2002 to 9/7/2005
Results of Queen Creek Corridor Survey, Superior Basin, Pinal County Arizona	20130219_Montgomery_ResultsQueenCorridorSurvey_44.pdf	2013	N/A	01/1892 to 2012

Report Title	File Name	Document Date	Associated Well	Period of Record
Surface Water Baseline Report, Devils Canyon, Mineral Creek and Queen Creek Watersheds, Resolution Copper Mining LLC, Pinal County Arizona	20130516_Montgomery_BaselineReportSurfaceWater_45.pdf	2013 MAY	N/A	5/13/2003 to 8/13/2013
Hydrochemistry Addendum Groundwater and Surface Water Upper Queen Creek/Devils Canyon Study Area	20160811_Montgomery_Hydrochemistry Addendum Queen Creek Devils Canyon_1002.pdf	2016 AUG	N/A	3/15/2004 to 7/16/2014
Resolution Copper Geochemical Characterization Data Summary Report	20140923_RCM_MWH_Appendix G. Geochemical Data Summary Report_2013_revised.pdf	2013 AUG	N/A	8/2008 to 05/2010
Geochemical Characterization of Resolution Copper Tailings	20140923_RCM_Duke HydroChem_Appendix H. Geochemical Characterization of RCM Tailings.pdf	2014 AUG	N/A	2002 to 2010
Technical Memorandum - Geochemical Characterization of Development Rock for Proposed Shaft No. 10, Resolution Project :ADEQ Tier 1 Results and Inertness Analysis	20070126_GeochemicalCharacterizationProposedShaft10_34.pdf	2007 JAN REV 2013 NOV	N/A	5/1973 to 1/5/2007
Technical Memorandum - Geochemical Characterization of Development Rock for Proposed Shaft No. 10, Resolution Project: ADEQ Tier 1 Results and Inertness Analysis	20070126_GeochemicalCharacterizationProposedShaft10_34.pdf	2007	N/A	5/1973 to 1/5/2007
Site Characterization Report for the West Plant Site, Superior Arizona December 2011	20111200_Golder_Site Characterization West Plant Site_867.pdf	2011 DEC	N/A	2/17/1998 to 5/1/2008
Geochemical Characterization Of Resolution Tailings Update: 2014 - 2016	20160608_Duke_TailingsGeochem_BaselineReport_Update_887.pdf	2016 JUN	N/A	1/2013 to 5/2016

Report Title	File Name	Document Date	Associated Well	Period of Record
Final Report Describing Flotation Testing on Master Composite No. 1 (RES 2C-2, 3-1 and 3A-1) from the Resolution Project, Report to Rio Tinto Technical Services, Project No. P-2694E, November 11, 2002	Dawson Metallurgical Lab_2002_950.pdf	2002 NOV	N/A	5/30/2002 to 9/11/2002
Geochemical Characterization of Cleaner and Scavenger Tailings – Resolution Copper Project, Technical Memorandum to Resolution Copper Mining, Project No. 073-92548, December 11, 2007	Golder_2007_952.pdf	2007 DEC	N/A	12/1/2007
Resolution Project Tailings Characterization: Static Geochemistry, Letter Report to Resolution Copper Mining, December 6, 2007	Klohn Crippen Berger_2007_957.pdf	2007 DEC	N/A	9/14/2007 to 11/1/2007
Kinetic Testing Results of Cleaner and Scavenger Tailings – Resolution Copper Project, Technical Memorandum to Resolution Copper Mining, Project No. 073-92548, July 14, 2008	Golder_2008_953.pdf	2008 JUL	N/A	2/8/2008 to 12/2/2008
Kinetic Testing Results of Scavenger Tailings – Resolution Copper Project, Technical Memorandum to Resolution Copper Mining, Project No. 073-92548-01.001, January 12, 2009	Golder_2009_954.pdf	2009 JAN	N/A	2/8/2008 to 12/2/2008
Field Testing Program, Resolution Copper Project – 2012-2013 Geochemical Annual Evaluation and Final Assessment, Report to Resolution Copper Mining, Project No. 073-92548-01.005, April 2013	Golder_2013_956.pdf	2013 APR	N/A	5/2009 to 1/2013
Final Resolution Copper Tailings Geochemical Characterization Data Summary Report, Report to Resolution Copper Mining, March 2014	MWH_2014_960.pdf	2014 MAR	N/A	2/11/2010 to 2/11/2014

Report Title	File Name	Document Date	Associated Well	Period of Record
Environmental and Geotechnical Characterization of Resolution Pilot Plant Tailings, Report to Resolution Copper Mining, Project 12074-002 – Final Report Revision 1, March 27, 2014	SGS Mineral Services_2014_961.pdf	2014 MAR	N/A	6/5/2009 to 5/30/2013
Pilot Plant Test Work, Resolution Copper Project, Rio Tinto. Report KM4420, December 19, 2014	ALS_2014_1004.pdf	2014	N/A	10/17/2014 to 11/26/2014

The wells discussed throughout the various reports listed in Table 1 typically have been registered through the Arizona Department of Water Resources (ADWR) and received a corresponding ADWR 55-registry number. Registered well information is available through ADWR’s on-line well database at <https://gisweb.azwater.gov/waterresourcedata/WellRegistry.aspx>. Table 2 provides a cross reference of the Resolution Copper well numbers/names and the ADWR registration number.

Table 2. Resolution Copper Well Name/Number and Corresponding ADWR Registry Number

Resolution Copper Well Name	ADWR Registration Number (55-)
Corral Well	609685
Middle Well	214967
Hackberry Windmill	615244
HRES-01	201852
HRES-02	201850
HRES-03	201851
HRES-04	201849
HRES-05	201848
HRES-06	214967
HRES-07	907947
HRES-08	907946
HRES-09	911875
HRES-10	911941
HRES-11	912021
HRES-12	912917
HRES-14	912993
HRES-15	913292
HRES-16	913342

Resolution Copper Well Name	ADWR Registration Number (55-)
HRES-17	913427
HRES-18	913308
HRES-19	914789
HRES-20	914790
Oak Flat Well	526592
A-06	615241
MJ-11	615246
RES-03	N/A
DHRES-01	217406
DHRES-02	217407
Shaft No. 9	N/A
Shaft No. 3	N/A
DHRES-03	910437
DHRES-04	218676
DHRES-05	218677
DHRES-07	911954
DHRES-08	912102
DHRES-09	912289
DHRES-11	912601
DHRES-12 (abandoned)	912725
DHRES-13	912770
DHRES-14	913073
PHRES-01	913050
PHRES-02	913051
PHRES-03	913052
PHRES-04	913053
RESPW-01	912941
QV-5	221850
FW3-R	914079
FW4-R	914258
FW7-R	914080
FW15-R	914044
FW9-S	914088
FW2-S	914091
FW3-S	914092
FW4-S	914093
FW5-S	914087
FW7-S	914094
FW8-S	914095

Resolution Copper Well Name	ADWR Registration Number (55-)
FW10-S	914089
FW12-S	Not Registered
FW13-S	914096
FW14-S	914090
500 Yard POC Well	907035
Indian Ponds POC Well	907037
Settling Ponds 1&2 Alert Well	213994
Smelter Pond POC Well	906299
Tailings Pond 5 POC Well	910698

Baseline Groundwater Database

On June 24, Resolution Copper provided a SQL database containing baseline geochemistry for groundwater and compliance wells that had been exported from AcQuire, a proprietary geoscientific information management program. The same data were later exported into Access Database format by Resolution Copper and provided again on September 15, 2016.

- Construction details (depth, diameter, casing size/type, perforation information, annular materials, packers, modifications);
- Location (X, Y, and Z in AZ State Plane, NAD 83);
- Measuring points for calculating groundwater elevations;
- Data as downloaded from transducers;
- Digit readouts from nested piezometers;
- Lithology of drill holes.

The database contains information on 73 drillhole locations with individual identification numbers (HOLEID). Table 3 below is a summary of the Access Database tables and related information contained therein.

Table 3. Baseline Data Tables Provided as Access Database

Table Name	Data in Table	Start Date	End Date	Description of Table
Collar	<ul style="list-style-type: none"> • depth • hole type (hydro, enviro, tailings) • coordinates 			Locational and depth information for 73 drillhole locations

Table Name	Data in Table	Start Date	End Date	Description of Table
Construction	<ul style="list-style-type: none"> • depth (to and from) • type (annual, borehole, casing, etc.), phase, • annular type and comment, • hole diameter • casing diameter • perforated zone 			Well construction details for 68 completed wells
DH Baro	<ul style="list-style-type: none"> • pressure (PSI) • read date/time (for select HOLEIDs) • construction phase 	11/18/2008	12/31/2015	Barometric pressure measurements for 7 well locations
DHRES-01 complete	<ul style="list-style-type: none"> • read date/time • calculated hydraulic head • depth to water • temperature 	6/1/2008	12/31/2015	Transducer pressure, hydraulic head, or water level measurements
DHRES-02 complete	<ul style="list-style-type: none"> • read date/time • calculated hydraulic head • depth to water • temperature 	7/20/2008	12/31/2015	Transducer pressure, hydraulic head, or water level measurements
DHRES-03 complete	<ul style="list-style-type: none"> • read date/time • calculated hydraulic head • depth to water • temperature 	2/15/2009	12/31/2015	Transducer pressure, hydraulic head, or water level measurements
DHRES-04 complete	<ul style="list-style-type: none"> • read date/time • calculated hydraulic head • depth to water • temperature 	3/13/2009	12/31/2015	Transducer pressure, hydraulic head, or water level measurements
DHRES-05 complete	<ul style="list-style-type: none"> • read date/time • calculated hydraulic head • depth to water 	9/23/2010	12/31/2015	Transducer pressure, hydraulic head, or water level measurements
DHRES-06 complete	<ul style="list-style-type: none"> • read date/time • calculated hydraulic head • depth to water • temperature 	3/3/2010	4/17/2015	Transducer pressure, hydraulic head, or water level measurements
DHRES-07 complete	<ul style="list-style-type: none"> • read date/time • calculated hydraulic head • depth to water • temperature • precipitation 	6/5/2010	12/31/2015	Transducer pressure, hydraulic head, or water level measurements
DHRES-08 complete	<ul style="list-style-type: none"> • read date/time • calculated hydraulic head • depth to water • temperature 	7/4/2010	12/31/2015	Transducer pressure, hydraulic head, or water level measurements

Table Name	Data in Table	Start Date	End Date	Description of Table
DHRES-09 complete	<ul style="list-style-type: none"> • read date/time • calculated hydraulic head • calculated water level • depth to water • rain gauge • temperature 	2/24/2011	12/31/2015	Transducer pressure, hydraulic head, or water level measurements
DHRES-11 complete	<ul style="list-style-type: none"> • read date/time • calculated hydraulic head • depth to water • temperature 	11/22/2011	12/31/2015	Transducer pressure, hydraulic head, or water level measurements
DHRES-13 complete	<ul style="list-style-type: none"> • read date/time • calculated hydraulic head • calculated water level • depth to water • temperature 	1/17/2011	12/31/2015	Transducer pressure, hydraulic head, or water level measurements
DHRES-14 complete	<ul style="list-style-type: none"> • read date/time • calculated hydraulic head • calculated water level • depth to water • temperature 	4/30/2011	12/31/2015	Transducer pressure, hydraulic head, or water level measurements
DHRES-15 complete	<ul style="list-style-type: none"> • read date/time • calculated hydraulic head • depth to water • temperature 	6/23/2014	12/31/2015	Transducer pressure, hydraulic head, or water level measurements
DHRES-16 complete	<ul style="list-style-type: none"> • read date/time • calculated hydraulic head 	9/24/2014	12/31/2015	Transducer pressure, hydraulic head, or water level measurements
Hydro Lithology	<ul style="list-style-type: none"> • geology from/to formation • lithology 			Lithologic information for 65 drillhole locations
Level Troll	<ul style="list-style-type: none"> • temperature • Depth to water • date/time 	10/31/2003	12/31/2015	Transducer measurements for 35 well locations
Measuring Point	<ul style="list-style-type: none"> • reference date • measurement • reference point • elevation • monitoring name (sounder, etc.) 			Measuring point reference data for 61 drillholes or wells
RES-003 Water Level	<ul style="list-style-type: none"> • read date/time • monitoring name (sounder, etc.) • battery • measured water 	11/18/2002	7/11/2013	Transducer pressure, hydraulic head, or water level measurements

Table Name	Data in Table	Start Date	End Date	Description of Table
WL Hydrograph	<ul style="list-style-type: none"> • read time • monitoring name (sounder, etc.) • depth to water • calculated water level 	4/10/1998	9/9/2015	Water levels for 62 well locations

Geochemical Data

Resolution Copper has provided numerous documents reporting on the geochemical program. Table 4 below lists those reports named in Table 1 above that contain geochemistry data, along with a general description of what each contains.

Table 4. Summary of Geochemistry Reports

Report Title	Document Date	General Description
<i>Resolution Copper Geochemical Characterization Data Summary Report</i>	2013 AUG	<ul style="list-style-type: none"> • RES-001C (ABA, SPLP, NAG, WRA, XRF, HCT, SCT) • RES-002A (ABA, SPLP, NAG, WRA, XRF, HCT, SCT) • RES-005I (ABA, SPLP, NAG, WRA, XRF, HCT, SCT) • RES-005J (ABA, SPLP, NAG, WRA, XRF, HCT) • RES-006D (ABA, SPLP, NAG, WRA, XRF, HCT, SCT) • RES-008 (HCT, SCT) • RES-009 (ABA, SPLP, NAG, WRA, XRF, HCT, SCT) • RES-009D (ABA, SPLP, NAG, WRA, XRF) • RES-009E (ABA, SPLP, NAG, WRA, XRF, HCT, SCT)

Report Title	Document Date	General Description
<i>Geochemical Characterization of Resolution Copper Tailings</i>	2014 AUG	<ul style="list-style-type: none"> • RES-005H (ABA) • RES-005I (ABA) • RES-005K (ABA) • MC1 (ABA, NAG) • MC2 (ABA, NAG) • MC3 (ABA, NAG) • RES-006D (ABA) • RES-007 (ABA) • RES-007A (ABA) • RES-007C (ABA) • RES-009A (ABA) • RES-009D (ABA) • RES-009F (ABA) • RES-014 (ABA) • RES-015B (ABA) • RES-016A (ABA) • RES-017F (ABA) • RES-017G (ABA) • RES-017N (ABA) • RES-023B (ABA) • RES-025A (ABA) • RES-027 (ABA)
<i>Technical Memorandum - Geochemical Characterization of Development Rock for Proposed Shaft No. 10, Resolution Project: ADEQ Tier 1 Results and Inertness Analysis</i>	2007 JAN REV 2013 NOV	<ul style="list-style-type: none"> • Shaft 10 samples: evaluated geology, stratigraphy, and mineralogy of the samples (ABA, SPLP)
<i>Technical Memorandum - Geochemical Characterization of Development Rock for Proposed Shaft No. 10, Resolution Project: ADEQ Tier 1 Results and Inertness Analysis</i>	2007	<ul style="list-style-type: none"> • Shaft 10 samples: evaluated geology, stratigraphy, and mineralogy of the samples (ABA, SPLP)
<i>Site Characterization Report for the West Plant Site, Superior Arizona December 2011</i>	2011 DEC	<ul style="list-style-type: none"> • Monthly and Annual Climatic Data (all sites) • Soil sample testing for Arsenic and Copper (all sites) • Soil tested for additional constituents, gray layer soil, underlying layer, total metals, SPLP (IA) • XRF, Laboratory Metals, and SPLP (EMF, NMF) • GPL Calculations (EMF, NMF) • Surface Water Analysis (SKW) • Electron Microprobe Analysis (all sites) • Inorganic Metals Analysis (all sites)

Report Title	Document Date	General Description
<i>Geochemical Characterization of Resolution Tailings Update: 2014-2016</i>	2016 JUN	<ul style="list-style-type: none"> • RES-027C (ABA, NAG, Lithology, alteration type, pyrite grade, XRD) • RES-029A (ABA, NAG, Lithology, alteration type, pyrite grade, XRD) • RES-029B (ABA, NAG, Lithology, alteration type, pyrite grade, TCLP, XRD) • RES-031 (ABA, NAG, Lithology, alteration type, pyrite grade, XRD, QEMSCAN, XRF, EA)
<i>Final Report Describing Flotation Testing on Master Composite No. 1 (RES 2C-2, 3-1 and 3A-1) from the Resolution Project, Report to Rio Tinto Technical Services, Project No. P-2694E, November 11, 2002</i>	2002 NOV	<ul style="list-style-type: none"> • RES-2C-2 (Cleaner Test, CU, MO analysis) • RES-3-1 (Cleaner Test, CU, MO analysis) • RES-3A-1 (Cleaner Test, CU, MO analysis) • MC-1 (Head Assay and Black Calculated Assays, ABA, RSFRST, PGT, RSKTS, pH, RCTS, CROT, PRTP, 33, CMBCT, MST, NACCT)
<i>Geochemical Characterization of Cleaner and Scavenger Tailings – Resolution Copper Project, Technical Memorandum to Resolution Copper Mining, Project No. 073-92548, December 11, 2007</i>	2007 DEC	<ul style="list-style-type: none"> • 7/7A (ABA, XRD, NAG, XRF, SPLP, CADW, CANL) • 7C (ABA, XRD, NAG, XRF, SPLP, CADW, CANL)
<i>Resolution Project Tailings Characterization: Static Geochemistry, Letter Report to Resolution Copper Mining, December 6, 2007</i>	2007 DEC	<ul style="list-style-type: none"> • CL-1 (ABA, SFE, ICP-OES, MS, CVAA, XRD) • SC-1 (ABA, SFE, ICP-OES, MS, CVAA, XRD) • CL-2 (ABA, SFE, ICP-OES, MS, CVAA, XRD) • CL-1-Super (SFE) • SC-1-Super (SFE)
<i>Kinetic Testing Results of Cleaner and Scavenger Tailings – Resolution Copper Project, Technical Memorandum to Resolution Copper Mining, Project No. 073-92548, July 14, 2008</i>	2008 JUL	<ul style="list-style-type: none"> • HC 1-C (ABA, NAG) • HC 2-C (ABA, NAG) • HC 3-C (ABA, NAG) • HC 1-S (ABA, NAG) • HC 2-S (ABA, NAG) • HC 3-S (ABA, NAG)
<i>Kinetic Testing Results of Scavenger Tailings – Resolution Copper Project, Technical Memorandum to Resolution Copper Mining, Project No. 073-92548-01.001, January 12, 2009</i>	2009 JAN	<ul style="list-style-type: none"> • HC 1-S • HC 2-S • HC 3-S

Report Title	Document Date	General Description
<i>Field Testing Program, Resolution Copper Project – 2012-2013 Geochemical Annual Evaluation and Final Assessment, Report to Resolution Copper Mining, Project No. 073-92548-01.005, April 2013</i>	2013 APR	<ul style="list-style-type: none"> • Barrel 1 (SGS, HCT) • Barrel 2 (FTS) (SGS, HCT) • Barrel 3 (SGS, HCT) • Barrel 4 (SGS, HCT) • Barrel 5 (FTS) (SGS, HCT) • Barrel 6 (SGS, HCT) • Barrel 7 (SGS, HCT) • Barrel 8 (SGS, HCT) • Barrel 9 (FTS) (SGS, HCT) • Barrel 10 (SGS, HCT) • Barrel 11 (FTS) (SGS, HCT)
<i>Final Resolution Copper Tailings Geochemical Characterization Data Summary Report, Report to Resolution Copper Mining, March 2014</i>	2014 MAR	<ul style="list-style-type: none"> • MC1- (ABA, WRA, NAG, HCT, SPLP) • MC2-(ABA, WRA, NAG, HCT, SPLP) • MC3-(ABA, WRA, NAG, HCT, SPLP)
<i>Environmental and Geotechnical Characterization of Resolution Pilot Plant Tailings, Report to Resolution Copper Mining, Project 12074-002 – Final Report Revision 1, March 27, 2014</i>	2014 MAR	<ul style="list-style-type: none"> • Rougher TIs (XRD, ICP, MS, STL, DSA, ABA, NAG, MC, SG, PSD, AL, SDT) • 1st CI Scav TIs (XRD, ICP, MS, STL, DSA, ABA, NAG, MC, SG, PSD, AL, HC, S) • Whole TIs (XRD, ICP, MS, STL, DSA, ABA, NAG, MC, SG, PSD) • Cyclone U/F - Untreated (XRD, ICP, MS, STL, DSA, ABA, NAG, MC, SG, PSD, SP, CDCST) • Cyclone U/F - Desulphidized (DSA, ABA, NAG, HC)
<i>Pilot Plant Test Work, Resolution Copper Project, Rio Tinto. Report KM4420, December 19, 2014</i>	2014	<ul style="list-style-type: none"> • RES-005L Lab Composite Test • RES-009G Lab Composite Test • RES-013F Lab Composite Test • RES-017M Lab Composite Test • RES-025B Lab Composite Test • RES-025 E Lab Composite Test • RES-027C Lab Composite Test • RES-028B Lab Composite Test • RES-028D Lab Composite Test • RES-029A Lab Composite Test • RES-029B Lab Composite Test • RES-031 Lab Composite Test • RES-031B Lab Composite Test

Notes:

ABA = Acid Base Accounting

SPLP = synthetic Precipitation Leaching procedures

NAG = Net Acid Generation

XRF = X-ray fluorescence

HCT = Humidity Cell Testing
 SCT = Saturated Column Testing
 XRD = Semi-quantitative X-ray diffraction
 TCLP = Toxicity Characteristic Leaching Procedure
 QEMSCAN = Quantitative Evaluation of Minerals by Scanning Electron Microscopy
 PGT = Primary Grid Test
 RSKTS = Rougher/Scavenger Kinetic Test Series
 RCTS = Regrind Cleaner Test Series
 CROT = Cleaner Reagent Optimization Test
 PRTP = Pyrite Removal from Tailings Product
 CMBCT = Cu-MO Bulk Cleaner Test
 MSTI = Moly Separation Test
 CADW = Chemical Analysis of Decant Water
 CANL = Comprehensive Analysis of NAG Leachates
 SFE = Shake Flask Extraction
 FTP = field Testing Program
 STL = Short Term Leach
 DSA = Decant Solutions Analysis
 MC = Moisture Content

Additionally, Resolution Copper has provided lab reports and an excel spreadsheet of corresponding data for the geochemical characterization performed October 9, 2007. No spreadsheets or databases have been received for the remainder of the geochemical information. Data include analysis for the “Cleaner’ and ‘Scavenger” for:

- minerology
- acid base accounting
- net acid generation
- synthetic precipitation leaching.

On September 15, 2016, Resolution Copper also provided scans of 43 “Barrel lab reports” for wet chemistry and metals analysis. These Barrel lab reports were results from a larger-scale barrel testing in which eleven 55-gallon barrels of different tailing types (cleaner, scavenger, and whole tailings and untreated and desulfidized cyclone sands) were exposed to ambient or accelerated weathering as described in Appendix H (Section 4.6) of the GPO. These data were not among those provided in Excel spreadsheet format. Table 5 gives a list of the Barrel lab reports received.

Table 5. Barrel Lab Reports Not in the Database

Well ID	Sample Date From	Sample Date to
Barrel #1	2/15/2010	3/17/2010
Barrel #2	5/14/2009	12/14/2010
Barrel #3	2/15/2010	
Barrel #4	2/15/2010	
Barrel #5	8/17/2009	12/14/2010
Barrel #6	4/14/2010	

Well ID	Sample Date From	Sample Date to
Barrel #7	2/15/2010	
Barrel #8	2/15/2010	
Barrel #9	8/17/2009	12/14/2010
Barrel #10	2/15/2010	
Barrel #11	8/17/2009	12/14/2010
Barrel #12	5/14/2009	11/15/2010
Barrel #13	9/15/2009	9/9/2010
Barrel #17	12/14/2010	
Barrel #22	9/9/2010	
Barrel #55	1/14/2010	
Barrel #111	7/13/2010	

Hydrochemistry data

The July 1, 2016, submittal package included an Excel file of data for groundwater and compliance wells (HRES-series and DHRES-series) titled “ResolutionsHydrochemistryDatabase28June2016.xls”. The file includes measured and calculated data collected by Rosemont Copper Company, Montgomery and Associates, Golder, and others. Spreadsheets in the Excel workbook include an output file from EnviroData, as well as main data storage tables for sites, stations, samples, and analysis.

A summary of data contained in the Resolution Copper Excel database is provided in Table 6 below.

Table 6. Summary of Hydrochemistry Data*

Sample Type	Sample Count	Sample Data Range	General Locations
Surface Water	352	May 16, 2003, to Dec 16, 2015	Queen Creek, Mineral Creek, and Devil’s Canyon watersheds
Groundwater	216	Jun 3, 2003, to Dec 29, 2015**	Queen Creek, Mineral Creek, Devil’s Canyon, and East Salt River Valley basins watersheds
Springs	251	May 15, 2003, to Dec 16, 2015	Queen Creek, Mineral Creek, and Devil’s Canyon watersheds
Process water	36	Apr 22, 2009, to Dec 7, 2011	N/A

*Source: ResolutionsHydrochemistryDatabase28June2016.xls

**plus one sample taken on Jun 17, 1986

Note: N/A = Not applicable

Quality Assurance/Quality Control

Also included in this submittal were actual copies of lab reports and documentation of quality assurance/quality control (QA/QC) and data validation measures performed both in-house and by third party reviewers.

The lab reports (from TestAmerica, SVL, Beta, etc.) include the reported sample results, chain of custody, as well as reporting of all of the laboratory QA/QC results (like duplicates, blanks, splits, etc.). Evidence of in-house validation of lab reports was attached to some of the lab report files.

In addition, there are documents from Innovative Technical Solutions, Inc. (ITSI). ITSI has conducted a comprehensive third-party review of select sampling, independent of the laboratory. ITSI's review encompasses the laboratory reports field forms, interpretation of the QA/QC results, and assigning any data qualifiers, if needed. According to an accompanying README file, in some cases ITSI qualifiers and corrections were applied to the data in the database.

Table 7 provides a summary of the lab reports and validation provided.

Table 7. Lab Reports and QA/QC Documentation

Sampling Year	Number of Lab Reports Provided	In-house Validation Provided	Third-party Validation by ITSI
2003	33	3	1
2004	60	-	1
2005	29	-	1
2006	6	-	-
2007	10	-	-
2008	34	-	2
2009	70	2	14
2010	73	-	1
2011	161	1	-
2012	80	2	2
2013	19	4	-
2014	23	13	-
2015	19	6	-
2016	14	4	-

Aquifer Protection Permit Compliance

On June 10, 2106, Resolution Copper provided copies of their APP compliance submittals made to the ADEQ. These submittals were for West Plant Site APP #P-101703. Files provided include PDFs of the quarterly Self-monitoring Reporting Forms (SMRFs) and the occasional associated documents such as Excel spreadsheets, maps, water level data, or communications on exceedance.

Table 8 is a summary of the APP data received.

Table 8. APP Compliance Documentation

Year	Q 1	Q2	Q2	Q2	Exceedance Documentation	Contour Maps/Water Level
2008	✓	✓	✓	✓	-	✓
2009		✓	✓	✓	-	✓
2010	✓	✓	✓	✓	Q4	✓
2011	✓	✓	✓	✓	-	✓
2012	✓	✓	✓	✓	Q1, Q2, Q3	✓
2013	✓	✓	✓	✓	-	-
2014	✓	✓	✓	✓	Q3	-
2015	✓	✓	✓	✓	Q3	-
2016	✓				-	-