

Memorandum

To: File
CC:
From: DeAnne Rietz, SWCA
Date: August 28, 2012
Re: Method for estimating flow in Davidson Canyon

The purpose of this memo is to document the method used to estimate post-mine flow in Davidson Canyon at the confluence with Cienega Creek for each of the action alternatives in the Rosemont Copper EIS.

Zeller's 2011 Technical Memo¹ reported model results for both pre- and post-mine flow (for proposed alternative only) to various locations along Davidson Canyon, including the USGS gage at US 83 and at the confluence with Cienega Creek. This technical memo was the basis for estimating Davidson Canyon flows for the remainder action alternatives.

Zeller's reported flows for the proposed alternative shows a 38.2% reduction of average-annual runoff to the USGS gage at US 83 (pre-mine = 1407 ac-ft and post-mine = 869 ac-ft) and a 9.7% reduction in flow at the Davidson Canyon/Cienega Creek confluence (pre-mine = 514 ac-ft and post-mine = 464 ac-ft). The 9.7% reduction at the confluence = 25.4% of the 38.2% reduction at the USGS gage. This ratio of reduced flow in the upper reach of Davidson Canyon to reduced flow at the confluence (25.4%) was then used to estimate post-mine flow for the remainder action alternatives. Results are presented in the table below. Formulas for calculation are shown in brackets.

¹ Zeller, M.E. 2011. Predicted Regulatory (100-yr) Hydrology and Average-Annual Runoff Downstream of the Rosemont Copper Project. July 11.

	MPO	Phased Tailings	Barrel	Barrel Trail	Scholefield-McCleary
(a) pre mine runoff at US 83*	1407	1407	1404	1407	1407
(b) post mine runoff at US 83*	869	784	1162	816	1086
(c) reduction at US 83 [(a-b)/a]	38.24%	44.28%	17.24%	42.00%	22.81%
(d) pre mine runoff at Cienega/Davidson confluence**	514				
(e) post mine runoff at Cienega/Davidson confluence**	464				
(f) reduction at Cienega/Davidson confluence [(d-e)/d]	9.73%				
(g) ratio of reduction in flow at US 83 gage to reduction in flow at Cienega/Davidson confluence [f/c]	25.44%				
(h) reduction at Cienega Davidson confluence based on reduction ratio [g * c]	9.73%	11.26%	4.38%	10.69%	5.80%

* From Krizek 2010a, 2010b, 2010c, 2010d; Chee 2010

** From Zeller 2011

REFERENCES

- Chee, R. 2010. *Expanded Barrel Only Alternative Stormwater Assessment*. Document No. 0/10-320878-5.3. Prepared for Rosemont Copper Company. Tucson, Arizona: Tetra Tech. September 15.
- Krizek, D.R. 2010a. *Technical Memorandum: Barrel and McCleary Alternative Stormwater Assessment*. Document No. 058/10-320871-5.3. Prepared for Rosemont Copper Company. Tucson, Arizona: Tetra Tech. March 5.
- Krizek, D.R. 2010b. *Technical Memorandum: Barrel Only Stormwater Assessment*. Document No. 059/10-320871-5.3. Prepared for Rosemont Copper Company. Tucson, Arizona: Tetra Tech. March 5.
- Krizek, D.R. 2010c. *Technical Memorandum: Mine Plan of Operations Stormwater Assessment*. Document No. 062/10-320871-5.3. Prepared for Rosemont Copper Company. Tucson, Arizona: Tetra Tech. March 5.
- Krizek, D.R. 2010d. *Technical Memorandum: Scholefield Tailings and McCleary Waste Alternative Stormwater Assessment*. Document No. 060/10-320871-5.3. Prepared for Rosemont Copper Company. Tucson, Arizona: Tetra Tech. March 5.
- Zeller, M.E. 2011. *Predicted Regulatory (100-yr) Hydrology and Average-Annual Runoff Downstream of the Rosemont Copper Project*. Tucson, Arizona: Tetra Tech. July 11.