AFFIDAVIT OF DAVID M. CHAMBERS, Ph.D., P. Geop.

1. I make this affidavit based on personal knowledge.

2. I have been retained in this matter to provide expert testimony related to the

Background, Experience, and Expertise

3. I am a professional geophysicist and the president of the Center for Science in Public Participation (CSP2), 224 North Church Avenue, Bozeman, Montana, 59715. CSP2 is a non-profit corporation formed to provide technical assistance on mining and water quality issues to public interest organizations and tribal governments throughout the United States and Canada.

4. I hold a Mineral Engineering-Physics degree from the Colorado School of Mines (1969), and both a Master’s degree in Geophysics (1976) and a Ph.D. in Environmental Planning (1985) from the University of California at Berkeley.

5. I am a Registered Professional Geophysicist (GP #972) in the State of California. I received my certification in 1991.

6. I have over 35 years of experience in the field of mineral exploration and development, including 15 years of technical and management experience relating to mining and mineral exploration, and for the past 20 years I have advised public interest organizations and tribal governments on the environmental effects of mining projects both nationally and internationally.

7. Through my education, research, and work experience I have developed an expertise in assessing the environmental impacts of mining operations with a focus on metal mines and their impacts to surface and groundwater quality.

8. I have provided technical assistance to various entities on proposed, operating, and abandoned mines in 17 states, four Canadian provinces, Kyrgyzstan, and Northern Ireland. This assistance has included review of underground and open pit mine design, seismic stability for tailings dams, waste rock facilities design, water quality monitoring, water treatment facility design, reclamation planning, and financial assurance for mine closure.

9. A copy of my current résumé is attached hereto as Appendix A, which includes a list of my publications and a statement of my previous testimony as an expert witness at trial or by deposition in the last four years.

10. In formulating my opinions and conclusions in this matter, I have reviewed:


10.3. Memorandum, K Arnold to D Krizek, Rosemont Copper, APP Closure Costs and Post-Closure Period, August 30, 2011;

10.5. February 2009 Aquifer Protection Permit Application Vol 1, 13.0 Demonstration of Financial Capability; and,


Post-Closure Responsibilities and Associated Financial Assurance Cost Revision

11. In order to ensure that the funds are available in the event of a bankruptcy, the Financial Assurance associated with the Aquifer Protection Permit (APP) should include costs for the activities necessary to close the mine to protect groundwater, as proposed in the Reclamation Strategy or the Reclamation and Closure Plan.

12. A mine bankruptcy could occur at any time, and it should be assumed by the holders of a financial surety that bankruptcy would occur at the worst possible time in terms of providing financial resources to implement the planned reclamation and closure actions necessary to protect groundwater.

13. A number of the costs that would be associated with planned closure of mine facilities have been included in “operational costs,” and are not covered in the APP financial surety, even though completion of the closure items are critical to protecting groundwater. However, because there appears to be no agreement between regulatory agencies for a jointly-held financial surety, it is possible that ADEQ may not be able to access the funds from another agency, or to access the funds in a timely manner, that are necessary to carry out ADEQ’s obligations to protect groundwater.

13.1. Placement of Waste Rock Surface on top of Phase 2 Dry Stack for Closure:

13.1.1. The costs of the placement of Waste Rock Surface on top of Phase 2 Dry Stack is not included in the closure costs, but in the operational mining costs. The costs of the “placement of between three (3) to five (5) feet of waste rock on the top of the Phase 2 dry stack” should be included in the Closure Cost Estimate for the APP, not in the operational mining costs.

13.1.2. After considering the reclamation cost information presented in “Closure Cost Breakdown for APP-Regulated Facilities,” Letter, Katherine Arnold, Rosemont Copper, to Richard Mendolia, Arizona Department of Environmental Quality (ADEQ), October 31, 2011, Attachments 5 and 6, I estimate that the closure cost estimate for the placement of waste rock surface on top of Phase 2 Dry Stack is approximately $21.3 million.

13.2. Placement of Waste Rock required for the Last Buttress Lift for Closure

13.2.1. The costs for the placement of waste rock required for the Last Buttress Lift for closure are not included in the closure cost estimate, but in the operational mining costs. The costs of the material required for the Last Buttress Lift should be included in the Closure Cost Estimate for the APP, not in the operational mining costs.

13.2.2. After considering the reclamation cost information presented in “Closure Cost Breakdown for APP-Regulated Facilities,” Letter, Katherine Arnold, Rosemont Copper, to Richard

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1 "In Tetra Tech (2007), and in Section 13.0 of the 2009 APP application, the placement of between three (3) to five (5) feet of waste rock on the top of the Phase 2 dry stack was attributed to mining costs while the placement of one (1) foot of growth medium was allocated to reclamation costs." (APP Closure Costs and Post-Closure Period, Memorandum, K Arnold to D Krizek, Rosemont Copper, 30Aug11, p. 4)

2 "... the material required for the last buttress lift, plus the Phase 2 cover, is about 70 million tons. This entire 70 million tons of waste rock material could potentially require rehandling." (emphasis added) (APP Closure Costs and Post-Closure Period, Memorandum, K Arnold to D Krizek, Rosemont Copper, 30Aug11, p. 5)
Mendolia, Arizona Department of Environmental Quality (ADEQ), October 31, 2011, Attachments 5 and 6, I estimate that the closure cost estimate for the placement of the material required for the Last Buttress Lift is approximately $28.4 million.

13.3. Placement of Waste Rock required for the Spent Heap Leach Pile for Closure

13.3.1. The cost of placement of waste rock required for the spent heap leach pad is not included in the closure costs, but in the operational mining costs.\(^3\) The costs of the reclamation for the spent heap leach pile, a minimum 20-foot thick cover of waste rock, should be included in the Closure Cost Estimate for the APP, not in the operational mining costs.

13.3.2. After considering the reclamation cost information presented in “Closure Cost Breakdown for APP-Regulated Facilities,” Letter, Katherine Arnold, Rosemont Copper, to Richard Mendolia, Arizona Department of Environmental Quality (ADEQ), October 31, 2011, Attachments 5 and 6, I estimate that the closure cost estimate for the placement of a minimum 20-foot thick cover of waste rock on the spent heap leach pile is approximately $24.2 million.

13.4. The Closure Cost Estimate presented in Table 13.04 (revised) (October 20, 2011) does not include costs for Long Term Maintenance of the waste rock and tailings facilities.\(^4\)

13.4.1. Very few mines require no long term maintenance after closure – that is to say there are few “walk away” mines. This is especially if there are engineered waste facilities, both tailings and waste rock, at a mine – which would be the situation at Rosemont. Most commonly the slopes of these facilities will, over time, exhibit some erosion. Lack of routine maintenance to manage and repair these surface erosional features can lead to large-scale failure and the release of the waste material.

13.4.2. Long term maintenance costs include inspections by qualified personnel, and incidental repair of closed facilities (rilling of waste rock and tailings covers, site road maintenance, mobilization of equipment, etc.). Long Term Maintenance costs are not included in the Closure Cost Estimate for the APP.\(^5\)

13.4.3. Based on my personal experience long term maintenance costs could typically be $30,000 to $150,000 per year, but a more accurate estimate would require more information than is presently available in the Rosemont Reclamation and Closure Plan.

13.5. The Closure Cost Estimate presented in Table 13.04 (revised) (October 20, 2011) does not include costs for Long Term Pumping and Treatment of Groundwater.\(^6\)

\(^3\) "... reclamation plans for the spent heap leach pile include a minimum 20-foot thick cover of waste rock. Costs for this cover are part of the mining costs." (APP Closure Costs and Post-Closure Period, Memorandum, K Arnold to D Krizek, Rosemont Copper, 30Aug11, p. 6)


13.5.1. If it is determined that the waste rock pile could leak contamination to groundwater in the long term, a contingency cost for Long Term Pumping and Treatment of Groundwater should be included in the Closure Cost Estimate for the APP.

13.5.2. The pumping and treatment costs are dependent on the volume of water to be pumped and treated. Typical water treatment costs vary from $100,000 to $1 million per year.

14. A number of “indirect costs” have not been included, or are not adequately assessed, in the Financial Surety. These omissions, or under-estimations, could adversely impact groundwater protection.

15. I have participated in several studies on reclamation costing and the calculation of financial sureties. The most commonly underestimated portion of these estimates is that of calculating the indirect cost, i.e. the costs to third parties (government and contractors) in performing the reclamation work should the mining operator not be able to do so because of financial insolvency.

16. The Center for Science in Public Participation (CSP2) has developed recommendations for computing these indirect costs, and in the table below the CSP2 recommendations are compared to indirect cost recommendations of the other published source for calculating these direct costs, the US Forest Service (USFS).

<table>
<thead>
<tr>
<th>INDIRECT COST GUIDELINES</th>
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<table>
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<tr>
<th>CSP2* Recommended Percentage of contract costs</th>
<th>USFS** Recommended Percentage of contract costs</th>
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</thead>
<tbody>
<tr>
<td>Contingency 10%</td>
<td>Contingencies: 6% 20%</td>
</tr>
<tr>
<td>Mobilization / Demobilization 10%</td>
<td>Mobilization and Demobilization 0% 10%</td>
</tr>
<tr>
<td>Engineering Redesign 3%</td>
<td>Engineering Redesign 2% 10%</td>
</tr>
<tr>
<td>Engineering, Procurement &amp; Construction Management 5%</td>
<td>--</td>
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<tr>
<td>Contractor Overhead 15%</td>
<td>Contractor’s Costs: 3% 3%</td>
</tr>
<tr>
<td>Contractor Profit 10%</td>
<td>- Performance &amp; Payment Bonds: 0% 5%</td>
</tr>
<tr>
<td>Agency Administration 10%</td>
<td>- Estimated Sales Tax:</td>
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<tr>
<td>Inflation 3%/yr</td>
<td>- Profit &amp; Overhead:</td>
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<tr>
<td>TOTAL 66%</td>
<td><strong>==</strong></td>
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References:
17. Several standard indirect costs do not appear to have been included in the cost calculation.

17.1.1. The Reclamation and Closure Plan includes indirect costs for:
17.1.1.1. Insurance (1% of total direct costs);
17.1.1.2. Workers Compensation (10% of total labor);
17.1.1.3. Contract Administration (15% of total direct costs);
17.1.1.4. Bond (1% of total direct costs);
17.1.1.5. Profit (10% of total direct costs).\(^7\)

17.1.2. These represent Indirect Costs of approximately 22% of total project costs (note that the workers compensation is only a percentage of labor costs, not total costs).\(^8\)\(^9\) As can be seen when comparing these categories with the table, the percentage of contract costs are below those recommended by CSP2 and the USFS.

17.1.3. The Reclamation and Closure Plan indirect costs do not include:
17.1.3.1. Contingency (CSP2 – 10%, USFS 16%-40%)  
17.1.3.2. Mobilization/Demobilization (CSP2 – 10%, USFS 0%-10%)  
17.1.3.3. Engineering Redesign/Procurement/Management (CSP2 – 8%, USFS 2%-10%)  
17.1.3.4. Contractor Overhead/Costs (CSP2 – 15%, USFS 18%-38%)  
17.1.3.5. Inflation (CSP2 – 3%, USFS 2%-10%)

17.1.4. In addition, since this table was published (2004), I now recommend a “holding cost” based on 2 years of site operating costs also be added. This is based on a number of mine bankruptcies where agencies have not been able to begin mine closure for an extended period of time after the bankruptcy due to pending legal actions, contract preparation and bidding, limited site access due to weather, and other factors.

17.1.5. These additional factors would increase the Indirect Costs from the approximately 22% recommended in the “Reclamation and Closure Plan” to at least 38% (USFS) – 66% (CSP2) of the direct costs, plus holding costs.

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\(^7\) Reclamation and Closure Plan, Rosemont Copper, Tetra Tech Project No. 320614-400, July 2007, 13.0 Reclamation and Closure Costs, 13.1.2 Indirect Cost Determination


\(^9\) Reclamation and Closure Plan, Rosemont Copper, Tetra Tech Project No. 320614-400, July 2007, 13.0 Reclamation and Closure Costs, Table 13-4: Reclamation Cost Summary per Activity Area.
Executed this 2nd day of August, 2012.

David M. Chambers

Dylan S. Clarkson
Notary Public
State of Montana
Residing at Bozeman, Montana
My Commission Expires January 23, 2015

1/23/2015