Comparison of economic impact results for the proposed Rosemont Copper Mine

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In response to public comments regarding the estimated economic impacts displayed in the Rosemont Copper Mine DEIS (which came from a study conducted by Applied Economics (AE)), the US Forest Service (FS) conducted their own economic impact analysis of the proposed mining project for comparison purposes. This briefing paper compares the results of the FS analysis to the AE results cited in the DEIS. It is hoped that this additional analysis will provide the public with an increased understanding of the impacts published in the DEIS.

Overview of Economic Impact Analysis

Economic impact analysis is used to describe the effects (or impacts) that Forest Service activities may have on economic conditions (jobs and income) in defined impact areas. The analytical problem is to estimate, reliably, the effect of changes of one or several activities on the overall economy of the impact area. Input-output analysis is the recommended Forest Service analytical method used to examine relationships within an economy, both between businesses and between businesses and final consumers. It captures all monetary market transactions for consumption in a given time period. The resulting mathematical representation allows one to examine the effect of a change in one or several economic activities on an entire economy, all else constant. The IMPLAN modeling system (MIG 2003) allows the user to build regional economic models of one or more counties for a particular year. IMPLAN translates changes in final demand for goods and services into resulting changes in economic effects, such as labor income and employment of the affected area's economy.

The economic impact effects are measured by estimating the direct jobs and labor income generated by the proposed action (in this case, the construction and operation of the Rosemont Copper Mine in Pima County, Arizona). The direct employment and labor income benefit employees and their families and, therefore, directly affect the local economy. Additional indirect and induced multiplier effects (ripple effects) are generated by the direct activities. Indirect effects are felt by the producers of materials used by the directly affected industries. Induced effects occur when employees of the directly and indirectly affected industries spend the wages they receive. Together the direct and multiplier effects comprise the total economic impacts to the local economy.

Results

As with any model, results are dependent upon the assumptions and data used by the analyst. Both the FS and the AE analysis used the same data provided by Rosemont Copper (construction expenditures; projected direct employment, payroll, and non-labor input costs (purchase of supplies, equipment maintenance, fuel, etc.)) for the pre-production and production periods. In addition, neither analysis made any changes to the underlying data or economic relationships within IMPLAN. However, the industry sectors used in the two analyses differed somewhat, especially for the analysis of non-labor input expenditures (the indirect impacts arising from supply purchases from local vendors), leading to different results. Since only broad categories of supply expenditures were provided by Rosemont Copper (such as diesel fuel, electricity, processing supplies, equipment repair, etc.), professional judgment was needed to assign these broad categories to specific sectors. For instance, local purchases of equipment could be assigned to retail stores (resulting in larger economic impacts) or to wholesalers (resulting in smaller economic impacts). Neither method is incorrect since exactly how these future expenditures will occur is yet unknown, but one method results in more conservative (smaller) estimates than the other.

This paper focuses mainly on the indirect impact results, as these are the results that differed most substantially between the two analyses. Comparisons of the other parts of the impact analysis are described here only briefly. Construction impacts were nearly the same, assuming that no plant equipment was purchased locally, totaling 2,376 direct and 4,148 total jobs in the AE analysis and 2,552 direct jobs and 4,060 total jobs in the FS analysis. The Applied Economics analysis assumed that no plant equipment would be purchased locally. However, a discussion with Rosemont indicated that the plant equipment, though not manufactured locally, would most likely be purchased through local distributors. If this assumption is correct, then purchase of the plant equipment through local wholesale equipment dealers would add an additional 520 direct jobs and 825 total jobs over the 3-4 year construction phase (or 130 direct and 206 total jobs on an annual basis over four years). The range of values produced in the two analyses for the construction phase of the project is shown in Table 1.

Table 1. Economic impacts associated with the construction phrase (lower bound = Applied Economics results; upper bound = FS results assuming plant equipment is purchased through local distributors)

	Jobs		Labor Income	
	Direct	Total	Direct	Total
Construction Phase (upper bound assumes plant equipment would be purchased through local distributors)	2,376 – 3,072 over a three to four year period (approximately 594-768 jobs annually if spread over four years)	4,148 – 4,885 over a three to four year period (approximately 1,037 – 1,221 jobs annually if spread over four years)	$124 million - $165 million over a three to four year period	$194 million - $238 million over a three to four year period

For the production phase, the same estimate of direct jobs (an average of 434 jobs annually per Rosemont data) was used. For purpose of this comparison, this average does not include the preproduction phase. The FS analysis resulted in a greater number of induced jobs (an average of 246 jobs annually) associated with employee spending (both the spending of Rosemont employees and employees of suppliers), compared to the AE estimate of 160 jobs annually. These differences arose from the definition of income that was used in the two analyses (whether or not employee benefits were included). The FS analysis included employee benefits, per the definition of labor income used by the FS, and AE did not include the benefits, therefore resulting in fewer induced jobs.

Indirect Impact Comparison

Table 2 provides information on the industry sectors that the FS and AE used in conducting their analyses of indirect impacts. Also included are the response coefficients (jobs and labor income per $1 million of expenditures) for the different sectors used. These response coefficients allow the reader to quickly assess how differences in economic impacts can result from the use of different sectors in the analysis. For instance, according to Rosemont, nearly half of their local supply expenditures will be for mining parts and for local processing equipment and supplies. Since the two analyses use different sectors for these expenditures, and since the impact per $1 million of spending is six times greater for the sectors used by Applied Economics, this has a large effect on the results of the analysis. Since the “correct” sectors for all of these expenditures are unknown without much more detailed information than was provided, these results should be interpreted as providing a range of possible impacts, rather than an absolute number. Therefore, Table 3 is provided to show the range of job and labor income estimates produced by the two analyses.

Table 2. IMPLAN Sectors used in Rosemont Copper Mine economic impact analyses and response coefficients (economic impacts per $1 million of expenditures) for local supply and equipment expenditures

	Applied Economics Analysis					Forest Service Analysis				
Type of Expenditure	IMPLAN Sector Used	Jobs per Million$		Labor Income per Millions$		IMPLAN Sector Used	Jobs per Million$		Labor Income per Millions$	
		Direct	Total	Direct	Total		Direct	Total	Direct	Total
Electricity	Sector 31 Electric power generation, transmission, and distribution	1.9	3.4	$209,857	$264,816	Sector 31 Electric power generation, transmission, and distribution	1.9	3.4	$209,857	$264,816
Diesel fuel	Sector 326 Gasoline Stations	1.5	2.1	$53,268	$73,586	115 Petroleum Refineries	0.1	0.4	$19,705	$33,994
Equipment repair and maintenance	417 Commercial and industrial machinery and equipment repair and maintenance	7.2	10	$321,009	$423,821	417 Commercial and industrial machinery and equipment repair and maintenance	7.2	10	$321,009	$423,821
Mine blasting	141 Other Chemical Product and Preparation Manufacturing	1.4	3.7	$289,128	$393,657	30 Support services for other mining	2.1	5.4	$139,215	$287,174
Mining parts	417 Commercial and industrial machinery and equipment repair and maintenance	7.2	10	$321,009	$423,821	319 Wholesale equipment	1.2	1.9	$70,035	$97,143
Processing (Equipment and Supplies)	417 Commercial and industrial machinery and equipment repair and maintenance	7.2	10	$321,009	$423,821	319 Wholesale equipment	1.2	1.9	$70,035	$97,143
Lab and Office Supplies	319 Wholesale equipment	1.2	1.9	$70,035	$97,143	330 Retail stores miscellaneous	9.1	10.8	$225,648	$286,425

Table 3. Economic impacts associated with production (not including the 1 ½ years of pre-production)

	Jobs	Labor Income
Direct	434 (average annual)	$23 million - $29 million annually[1]
Indirect[2]	265 - 1,094	$17 - $51 million
Induced[3]	166 - 247	$6 million - $9 million
Total[4]	946 - 1,694	$55 million - $81 million

[1] Differences in direct labor income estimates based upon whether employee benefits are included or not.
[2] Lower bound= FS Results; Upper bound = Applied Economics results
[3] Lower bound =Applied Economics results; Upper bound = FS results
[4] The range shown in the total row does not reflect the sum of the above numbers but rather the total impacts calculated by each study.