

**An Assessment of the Economic Impacts of the Rosemont Copper Project
on the Economies of the Cochise/Pima/Santa Cruz Counties Study Area,
the State of Arizona, and the United States using the REMI Regional
Economic Forecasting Model**

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Executive Summary

This report summarizes the results of an economic impact analysis of the Rosemont Copper Project, an open-pit mining operation to be developed on a 15,000 acre site in Pima County about 30 miles southeast of Tucson. The analysis employed the REMI PI+ regional economic forecasting model to estimate the economic impacts of the Project for the Cochise/Pima County/Santa Cruz Counties study area, for the State of Arizona, and for the United States.

Cochise/Pima/Santa Cruz Counties

Construction Phase

- Construction of the Project will generate an average annual increase of \$293 million (all dollar-denominated figures refer to 2011\$) in economic activity in the study area (measured in terms of demand for goods and services from local suppliers) over a four-year engineering/construction period.
- The engineering/construction phase will provide a total of 10,632 person-years of employment for local workers.
- Wages and salaries and non-labor income (dividends, interest, rent, proprietors' income, and net profits) produced by the economic activity associated with the engineering/construction phase will provide an average of \$111 million per year in additional income to area residents.
- The engineering/construction phase will generate more than \$11 million per year in revenues for local governments in the study area.

- Over the entire engineering/construction period, impacts will total \$1.2 billion in additional demand for goods and services from suppliers in the study area, \$688 million in gross regional product, \$445 million in personal income, and \$45 million in local government revenues.

Production/Post-Production Phase

- Production activities will generate an average annual increase of \$1.2 billion per year in economic activity (measured in terms of incremental regional output) within the study area over a 21-year production period.
- The Rosemont Copper Project will employ an average of 443 workers - with peak employment of 494 - and will support an average of 3,335 other jobs - a total of approximately 3,778 additional jobs for area residents.
- Wages and salaries and non-labor income produced by the economic activity will provide an annual average of \$232 million in additional income to area residents.
- Production activities will generate an average of \$25.7 million per year in incremental revenues for local governments in the study area.
- Over the entire expected production/post-production period, the overall impacts will be \$26 billion in additional output, \$15.8 billion in gross regional product, \$5.2 billion in personal income, 83,549 person-years of employment and \$566 million in local government revenues.

The Rosemont Copper Project will have lasting positive effects on the economy of the study area. Permanent changes to the regional economy would occur as a result of the increased levels of economic activity associated with the development and operation of the Rosemont mine. These changes will result in residual economic impacts in the Cochise/Pima/Santa Cruz Counties area that will persist after the end of the Project. The forecast results indicate that the level of economic activity would be \$29 million per year higher, area residents' income \$69 million per year higher, employment more than 227 higher, and local government revenues \$8 million per year higher than if the Rosemont Copper Project had never existed.

The State of Arizona

Construction Phase

- Construction of the Project will generate an average annual increase of \$396 million in economic activity in the state (measured in terms of demand for goods and services from Arizona suppliers) over a four-year engineering/construction period.
- The engineering/construction phase will provide a total of 12,321 person-years of employment for Arizona workers.
- Wages and salaries and non-labor income resulting from the economic activity associated with the engineering/construction phase will provide an average of \$151 million in additional income to Arizona residents.
- The engineering/construction phase will generate \$15 million per year in revenues during the engineering/construction period for state government.
- Over the entire engineering/construction period, impacts will total \$1.6 billion in additional demand for goods and services from Arizona suppliers, \$933 million in gross regional product, \$602 million in personal income, and \$61 million in state government revenues.

Production/Post-Production Phase

- Production activities will generate an average annual increase of \$1.4 billion per year in economic activity (measured in terms of incremental regional output) in the state over a 21-year production period.
- The Rosemont Copper Project will support an average of 4,581 additional jobs for Arizona workers.
- Wages and salaries and non-labor income produced by the economic activity will provide an annual average of \$322 million in additional income for Arizona residents.
- Production activities will generate an average of \$46 million per year in incremental state government revenues.

- Over the entire expected production/post-production period, the overall impacts will be \$31.7 billion in additional output, \$19.2 billion in gross regional product, \$7.3 billion in personal income, 101,622 person-years of employment and \$994 million in state government revenues.
- The Rosemont Copper Project will have lasting positive effects on the Arizona economy. Permanent changes to the state's economy would occur as a result of the increased levels of economic activity associated with the development and operation of the Rosemont mine. These changes will result in residual economic impacts in the state after the end of the Project. The forecast results indicate that the level of economic activity would be \$78 million per year higher, state residents' income \$103 million per year higher, employment 455 higher, and state government revenues \$12 million per year higher than if the Rosemont Copper Project never existed.

The United States

Construction Phase

- Construction of the Project will generate an average annual increase of \$719 million in economic activity in the nation (measured in terms of demand for goods and services) over a four-year engineering/construction period.
- The engineering/construction phase will provide a total of 18,203 person-years of employment for U.S. workers.
- Wages and salaries and non-labor income associated with the engineering/construction phase will provide an average of \$208 million per year in additional income to U.S. residents.
- The engineering/construction phase will generate \$46 million per year in additional revenues during the engineering/construction period for the federal government.
- Over the entire engineering/construction period, the impacts will total \$2.9 billion in additional demand for goods and services, \$1.6 billion in gross domestic product, \$834 million in personal income, and \$185 million in federal government revenues.

Production/Post-Production Phase

- Production activities will generate an average annual increase of \$2.5 billion per year in economic activity in the nation (measured in terms of incremental output) over a 21-year production period.
- The Rosemont Copper Project will support an annual average of 9,043 additional jobs for U.S. residents.
- Wages and salaries and non-labor income produced by the economic activity will provide an annual average of \$552 million in additional income to U.S. residents.
- Production activities will generate an average of \$235 million per year in incremental revenues for the federal government.
- Over the entire expected production/post-production period, the overall impacts will be \$55.3 billion in additional output, \$31.2 billion in gross domestic product, \$12.1 billion in personal income, 196,813 person-years of employment and \$5.1 billion in federal government revenues.

THE ROSEMONT COPPER PROJECT

1. Introduction

This report summarizes the results of an economic impact analysis of the Rosemont Copper Project, an open-pit mining operation to be developed on a 15,000 acre site in Pima County about 30 miles southeast of Tucson. The analysis employed the REMI PI+ regional economic forecasting model to estimate the economic impacts of the Project for the Cochise/Pima County/Santa Cruz Counties study area, for the State of Arizona, and for the United States.

The combined proven and probable sulfide mineral reserves total nearly 546 million tons grading 0.45 percent copper, 0.015 percent molybdenum, and 0.12 ounces/ton silver. Proven and probable oxide mineral reserves total about 70 million tons grading 0.17 percent copper. Contained metal in the sulfide mineral reserves (proven and probable) is estimated to be 4.9 billion pounds of copper, 161 million pounds of molybdenum, and 65 million ounces of silver. Contained metal in the proven and probable oxide mineral reserves is estimated to be 241 million pounds of copper. The mining operation is projected to produce more than 200 million pounds of copper per year. In addition to copper, it is also projected to produce an average of 4.7 million pounds of molybdenum and 2.7 million ounces of silver per year (M3 Engineering and Technology Corp.).

The total cost of developing the site for mining and construction of the processing facilities will be \$913 million (2011\$). When in operation, employment will average 443 per year, and total annual production costs will average \$346 million per year during the 21-year production period. The model assumes prices of \$3.50/lb. for copper, \$15.00/lb. for molybdenum, and \$30.00/ounce for silver.

1.1 Summary of the Results: Engineering/Construction Phase

The results of the economic impact analysis indicate that the engineering/construction phase will generate an average annual increase of \$293 million in economic activity in the three-county study area (measured in terms of demand for goods and services from local suppliers)

and will provide a total of 10,632 person-years of employment for local workers during a four-year engineering/construction period. The jobs and non-labor income (dividends, interest, rent, proprietors' income, and net profits) produced by the economic activity will also provide an average of \$111 million per year in additional income to area residents and \$11 million per year in incremental revenues to local governments in the study area. Over the entire engineering/construction period, impacts will total \$1.2 billion in additional demand for goods and services, \$688 million in gross regional product, \$445 million in personal income, and \$45 million in local government revenues.

For the State of Arizona, the economic impact analysis estimates that the engineering/construction phase will generate an average annual increase of \$396 million in economic activity in the state (measured in terms of demand for goods and services from Arizona suppliers) and will provide a total of 12,321 person-years of employment for Arizona workers during a four-year engineering/construction period. The jobs and non-labor income resulting from the economic activity will also provide an average of \$150 million per year in additional income to state residents and \$15 million per year in incremental state government revenues. Over the entire engineering/construction period, the impacts will total \$1.6 billion in additional demand for goods and services from Arizona suppliers, \$933 million in gross regional product, \$602 million in personal income, and \$61 million in state government revenues.

For the U.S. economy, the engineering/construction phase will generate an average annual increase of \$719 million in economic activity in the nation and will provide a total of 18,203 person-years of employment for U.S. workers during a four-year engineering/construction period. The jobs and non-labor income produced by the economic activity will also provide an average of \$208 million per year in additional income to U.S. residents and \$46 million per year in incremental revenues to the federal government. Over the entire engineering/construction period, impacts will total \$2.9 billion in additional demand for goods and services, \$1.6 billion in gross domestic product, \$834 million in personal income, and \$185 million in federal government revenues.

1.2 Summary of Results: Production/Post-Production Phase

The productive life of the Rosemont Copper Project is projected to be 20+ years. Based on the cost data provided by Rosemont Copper, the total costs associated with the production/post-production phase of the Project, including reclamation and costs related to closure of the mine will total \$8.4 billion.

For the three-county study area, production activities will generate an average annual increase of \$1.2 billion in economic activity (measured in terms of incremental regional output) and will support an average of 3,778 jobs for residents of the study area. The wages and salaries and non-labor income produced by the economic activity will provide an average of \$232 million per year in additional income to area residents and \$26 million per year in incremental revenues to local governments in the region. Over the entire expected life of the Project, the overall impacts will be \$26 billion in additional output, \$15.8 billion in gross regional product, \$5.2 billion in personal income, 83,549 person-years of employment and \$566 million in local government revenues.

For the State of Arizona, production activities will generate an average annual increase of \$1.4 billion in economic activity and will support an average of 4,581 jobs for Arizona workers. The wages and salaries and non-labor income produced by the economic activity will provide an average of \$322 million per year in additional income for state residents and \$46 million per year in incremental state government revenues. Over the entire expected life of the Project, the overall impacts will be \$31.7 billion in additional output, \$19.2 billion in gross regional product, \$7.3 billion in personal income, 101,622 person-years of employment and \$994 million in state government revenues.

For the nation, production activities will generate an average annual increase of \$2.5 billion in economic activity and will support an average of 9,043 jobs for U.S. residents. The wages and salaries and non-labor income produced by the economic activity will provide an average of \$552 million per year in additional income to U.S. residents and \$235 million per year in incremental federal government revenues. Over the entire expected life of the Project, overall impacts will be \$55.3 billion in additional output, \$31.2 billion in gross domestic product, \$12.1

billion in personal income, 196,813 person-years of employment and \$5.1 billion in federal government revenues.

1.3 Comparison of Results with the Previous Analysis

All three parts of the economic impact analysis were prepared using the latest version of the REMI regional economic forecasting model. The Seidman Institute previously conducted a similar analysis of the economic impact of the Rosemont Copper Project (Seidman Institute 2010). The earlier analysis employed a different version of the REMI model.

As a consequence of using the new version of the REMI model, the results for the three-county study area are not consistent with the previous estimates reported. The estimated impacts are all substantially higher than the numbers reported in the previous study. These higher results are explained by higher production costs and employment numbers provided by Rosemont Copper in early 2012, higher copper prices (\$3.50/lb in 2012 compared to \$1.75/lb in 2010) which affect output and gross regional product, as well as using a different version of the REMI model.

Regional Economic Models Inc., the builder of the REMI model, has been in business for nearly 30 years and has a policy of continually updating their economic impact models based on the latest available data and advances in economic analysis and econometric methods. The model used for this analysis incorporates many changes to the previous version – including changes to both individual equations and to its overall structure. The parameters in the model have been re-estimated using a modified and updated dataset that included data through 2009. In addition, the economic forecasts incorporated into the new model were updated to reflect more recent views on future economic trends. The sum of these changes has resulted in somewhat different results compared with the previous analysis. The fact that the numbers are different should be interpreted in that context rather than in terms of which numbers are “right.” The results of the current analysis should be taken as reasonable estimates of the economic impact of the Rosemont Copper Project produced by a state-of-the-art regional forecasting model based on the current state of the local, state, and national economies.

2. Economic/Financial Overview

The following discussion is based upon economic and financial information provided by Rosemont Copper. All dollar-denominated figures in this report are stated in terms of 2011\$.

The total cost of construction is estimated to be \$913 million. The cost figures for the construction and development of the site for mining are summarized in Table 1. Expenditures for goods and services, payrolls, and tax payments associated with the engineering/construction phase will total \$913 million over a four-year period.

The productive life of the Rosemont Copper Project is projected to be 20+ years. Table 2 lists the total and yearly expenditures. The total costs associated with the production/post-production phase of the Project, including reclamation and costs related to closure of the mine will total \$8.4 billion-- or approximately \$346 million per year over the 21-year production period. These figures include spending associated with the mining operations, processing of the ore, maintenance/replacement of facilities and equipment, reclamation, administration, taxes, and other outlays, but do not include accounting cost components such as salvage value and depreciation.

Table 1: Rosemont Copper Project - Construction Costs
(Millions of 2011\$)

Cost Category	
CONSTRUCTION	512.2
ENVIRONMENTAL COMPLIANCE ACTIVITIES FOR CONSTRUCTION	31.2
SALARIES AND BENEFITS	9.5
DETAILED AND SUPPORT ENGINEERING	59.8
PLANT EQUIPMENT	299.7
LAB EQUIPMENT	0.8
TOTAL EPCM PLANT CONSTRUCTION	913.1

Column may not add to totals due to rounding.

Source: Rosemont Copper Project, 2012

Table 2: Rosemont Copper Project - Total Expenditures by Year
(Millions 2011\$)

	Engineering/Construction Phase	Production/Post-Production Phase
Total	913.1	8,445.3
Annual Average* Year	228.3	346.0
Engineering/Construction Phase		
PP3	109.9	117.3
PP2	106.5	214.3
PP1	538.4	818.4
Production Phase		
1	158.3	377.0
2		408.4
3		389.6
4		355.5
5		383.2
6		372.0
7		375.9
8		352.8
9		368.3
10		361.0
11		383.8
12		364.5
13		336.8
14		343.2
15		346.3
16		333.1
17		311.1
18		296.3
19		301.8
20		280.9
21		224.7
Post-Production Phase		
22		17.5
23		6.1
24		5.7

*Annual average value for the Production/Post-Production Phase refers to years 1 - 21 when full production activity will occur.
Production costs do not include federal and state income tax as well as accounting cost components such as salvage value.

Columns may not add to totals due to rounding.

Source: Rosemont Copper Project, 2012.

3. Economic Impacts

Economic impacts are measured as changes in economic activity attributable to an event or policy change. Economists distinguish between direct impacts and total impacts. The direct impacts are changes in the economy that are the direct result of the event or policy change. In this study, the event being analyzed is the Rosemont Copper Project and the direct impacts of the construction and operation of the Project will be the purchases of goods and services from suppliers, the wages and salaries paid to mine employees, and the taxes and other payments to governments. The total impacts of the Project will be the final changes in the area economy after all of the indirect effects caused by the direct impacts have worked their way through the economy. Conventionally, the total impacts are measured by the additional economic activity that occurs as a result of the event or policy change – in terms of economic measures such as output, income, employment, etc.

The estimates of the direct impacts and of the total impacts have been produced by very different methods. The direct impacts have been calculated from data provided by Rosemont Copper in combination with other data from secondary sources. The total economic impacts of the Rosemont Copper Project were estimated using three different versions of the REMI PI+ regional economic forecasting model. These computer models were developed by Regional Economic Models Inc. for use by a consortium of Arizona state agencies, including Arizona State University. The estimates of the direct impacts were used as inputs to the process, and the REMI models generated detailed estimates of the total economic impacts. The methodology and data used to develop the estimates of the direct impacts and the operation of the REMI PI+ model are described in the Technical Appendix.

The economic impacts for the Cochise/Pima/Santa Cruz Counties study area were estimated using a county-level version of the Arizona-specific REMI PI+ model. The economic impacts of the Project for the State of Arizona were estimated using a state-level version of the model, and the impacts for the U.S. economy were estimated using a national version of the REMI PI+ model.

3.1 Direct Impacts

3.1.1 Engineering/Construction Phase

Total spending associated with the engineering/construction phase will be \$913 million. However, much of the equipment and specialized services to be purchased is not produced within the three-county study area or the State of Arizona. The total expenditures for goods and services from local suppliers in Cochise/Pima/Santa Cruz Counties (including the local share of the value of equipment ordered through local suppliers but produced elsewhere) are estimated at \$576 million. Annual spending levels over the four-year engineering/construction period in the three-county study area are shown in Table 3. Most of these expenditures would be focused in the construction, mining support, and business services sectors.

At the statewide level, total purchases of goods and services from Arizona suppliers would be substantially higher at \$646 million. Annual expenditures in Arizona for the four-year engineering/construction period are listed in Table 4. Again, most of these expenditures would occur in the construction, mining support, and business services sectors.

3.1.2 Production/Post-Production Phase

Total direct spending associated with the production/post-production phase (including reclamation and mine closure activities) will be approximately \$8.4 billion over a 27-year period. These expenditures will produce the following direct economic impacts within the Cochise/Pima/Santa Cruz Counties study area: \$2.3 billion in purchases of goods and services from local suppliers (shown as non-labor expenditures); an average of 443 jobs and \$606 million in wages and salaries paid to area workers; and \$156 million in revenues to local area governments. The annual figures for each of these measures are shown in Table 3.

The direct economic impacts of the production/post-production phase for the State of Arizona will produce substantially larger amounts of purchases of goods and services from Arizona suppliers – \$4.0 billion – and \$671 million in state government revenues. The annual figures for the direct impacts for the State of Arizona are shown in Table 4.

Table 3: Rosemont Copper Project - Direct Impacts by Year
Cochise/Pima/Santa Cruz Counties Study Area
(Millions 2011\$)

	Engineering/ Construction Expenditures	Total Production/Post-Production Expenditures		Wages & Salaries	Local Government Revenues	Employment
			Non-Labor Expenditures			
Total	575.9	3,103.3	2,342.0	605.6	155.7	9,963
Annual Average* Year	144.0	127.9	94.0	27.4	6.5	443
Engineering/Construction Phase						
PP3	69.3	7.4	7.4			
PP2	67.2	102.9	83.6	6.8	12.61	152
PP1	339.6	279.4	254.5	18.4	6.47	428
Production Phase						
1	99.8	148.7	118.2	28.2	2.39	476
2		157.3	121.1	29.2	7.05	471
3		142.4	105.7	29.7	7.05	483
4		125.2	88.8	29.4	7.05	477
5		148.4	111.4	30.0	7.05	490
6		148.3	111.1	30.2	7.05	494
7		140.3	103.5	29.7	7.05	483
8		122.2	86.3	28.8	7.05	468
9		138.3	102.6	28.6	7.05	463
10		141.0	105.8	28.1	7.05	459
11		162.2	126.4	28.7	7.05	472
12		156.7	120.1	29.5	7.05	490
13		141.2	105.0	29.2	7.05	482
14		135.1	99.2	28.9	7.05	475
15		131.9	96.4	28.5	7.05	467
16		120.1	85.9	27.2	7.05	444
17		103.3	71.7	24.6	7.05	396
18		85.2	56.5	21.7	7.05	333
19		90.1	61.6	21.5	7.05	329
20		78.8	50.0	21.7	7.05	333
21		69.3	47.8	21.4	0.05	327
Post-Production Phase						
22		16.6	13.7	2.8	0.05	35
23		5.7	4.1	1.5	0.05	18
24		5.2	3.7	1.5	0.05	18

*Annual average values for the production phase refer to years 1 - 21 when full production activities will occur. Numbers may not add to totals due to rounding.

Source: Computed from information from the REMI PI+ regional economic forecasting model.

Table 4: Rosemont Copper Project - Direct Impacts by Year
State of Arizona
(Millions 2011\$)

	Engineering/ Construction Expenditures	Total Production/Post-Production Expenditures		Wages & Salaries	State Government Revenues	Employment
			Non-Labor Expenditures			
Total	646.3	5,284.4	4,007.4	605.6	671.4	9,963
Annual Average* Year	161.6	232.2	173.3	27.4	31.5	443
Engineering/Construction Phase						
PP3	77.8	7.4	7.4			
PP2	75.4	90.7	83.6	6.8	0.4	152
PP1	381.2	280.9	255.6	18.4	6.9	428
Production Phase						
1	111.9	170.8	140.1	28.2	2.5	476
2		246.0	207.7	29.2	9.1	471
3		256.3	192.3	29.7	34.2	483
4		226.9	174.7	29.4	22.8	477
5		249.8	197.5	30.0	22.3	490
6		241.4	196.7	30.2	14.5	494
7		253.9	189.7	29.7	34.5	483
8		239.0	171.9	28.8	38.3	468
9		255.0	186.5	28.6	39.9	463
10		256.2	187.1	28.1	41.0	459
11		277.3	207.7	28.7	40.8	472
12		264.5	200.3	29.5	34.6	490
13		240.7	184.6	29.2	26.9	482
14		243.3	179.3	28.9	35.1	475
15		244.8	176.9	28.5	39.4	467
16		232.9	166.2	27.2	39.5	444
17		214.3	151.8	24.6	38.0	396
18		200.9	136.8	21.7	42.4	333
19		205.8	141.8	21.5	42.5	329
20		188.3	129.8	21.7	36.9	333
21		167.4	120.0	21.4	26.0	327
Post-Production Phase						
22		16.5	13.7	2.8	0.0	35
23		8.3	4.1	1.5	2.7	18
24		5.2	3.7	1.5	0.0	18

*Annual average values for the production phase refer to years 1 - 21 when full production activities will occur. Numbers may not add to totals due to rounding.

Source: Computed from information from the REMI PI+ regional economic forecasting model.

3.2 Total Impacts

This section summarizes the results from the REMI model. The total impacts of the Project are measured in terms of:

- Output - The dollar value of all goods and services produced in the region.
- Gross Regional Product - The dollar value of all goods and services produced for final demand in the region. It excludes the value of intermediate goods and services purchased as inputs to final production.
- Personal Income - The total income received by residents of the region from all sources.
- Total Employment - the number of full- and part-time jobs by place of work.
- Government Revenues - taxes and other payments received by the region's government(s).

3.2.1 Engineering/Construction Phase

3.2.1.A Cochise/Pima/Santa Cruz Counties

The development of the Rosemont Copper Project site over a four-year engineering/construction period will produce substantial benefits for the Cochise/Pima/Santa Cruz Counties study area. It will generate an average annual increase of \$293 million in economic activity in the area (measured in terms of demand for goods and services from local suppliers) and will provide a total of 10,632 person-years of employment for local workers. The wages and salaries and non-labor income (dividends, interest, rent, proprietors' income and net profits) produced by the economic activity will provide an average of \$111 million per year in additional income to area residents and \$11 million per year in incremental revenues to local governments in the region. Over the entire engineering/construction period, these impacts are equivalent to \$1.2 billion in additional demand for goods and services from local suppliers, \$688 million in gross regional product, \$445 million in personal income, and \$45 million in local government revenues (Table 5).

Table 5: Rosemont Copper Project - Engineering/Construction Phase - Total Impacts by Year
Cochise/Pima/Santa Cruz Counties Study Area
(Millions 2011\$)

	Output	Gross Regional Product	Personal Income	Employment	Local Government Revenues
Total*	1,173.1	688.2	444.7	10,632	45.4
Annual Average	293.3	172.1	111.2	2,658	11.4
Year					
Engineering/Construction Phase					
PP3	126.8	73.95	45.1	1,144	4.5
PP2	152.8	89.23	56.3	1,387	5.6
PP1	698.7	409.97	255.0	6,326	27.4
Production Phase					
1	194.8	115.05	88.3	1,774	7.9

Output is the dollar value of all goods and services produced in the region, including intermediate goods as well as value added.

Gross regional product is the dollar value of all goods and services produced for final demands.

It excludes intermediate goods and services.

Personal income is the total income received by residents from all sources.

* Total figure for employment is measured in terms of person-years of employment.

Columns may not add due to rounding.

Source: Results from the REMI PI+ regional economic forecasting model.

3.2.1.B The State of Arizona

The development of the Rosemont Copper Project site will produce even larger benefits for the State of Arizona. It will generate an average annual increase of \$396 million in economic activity in the state (measured in terms of demand for goods and services from Arizona suppliers) and will provide a total of 12,321 person-years of employment for Arizona workers. The wages and salaries and non-labor income produced by the economic activity will provide an average of \$150 million per year in additional income to state residents and \$15 million per year in incremental state government revenues. Over the entire engineering/construction period, these impacts are equivalent to \$1.6 billion in additional demand for goods and services from Arizona suppliers, \$933 million in gross regional product, \$602 million in personal income, and \$61 million in state government revenues (Table 6).

3.2.1.C The United States

The development of the Rosemont Copper Project site will also produce substantial benefits to the national economy. It will generate an average annual increase of \$718 million in economic activity (measured in terms of demand for goods and services from U.S. suppliers) and will provide a total of 18,203 person-years of employment for U.S. workers. The wages and salaries and non-labor income produced by the economic activity will provide an average of \$208 million per year in additional income to U.S. residents and \$46 million per year in incremental revenues to the federal government. Over the entire engineering/construction period, these impacts are equivalent to \$2.9 billion in additional demand for goods and services, \$1.6 billion in gross domestic product, \$834 million in personal income, and \$185 million in federal government revenues (Table 7).

Table 6: Rosemont Copper Project - Engineering/Construction Phase - Total Impacts by Year
State of Arizona
(Millions 2011\$)

	Output	Gross Regional Product	Personal Income	Employment	State Government Revenues
Total*	1,585.0	932.9	601.9	12,321	60.7
Annual Average	396.2	233.2	150.5	3,080	15.2
Year					
Engineering/Construction Phase					
PP3	168.8	98.7	61.3	1,324	5.4
PP2	206.5	121.0	76.9	1,611	7.0
PP1	937.4	551.5	346.7	7,323	37.0
Production Phase					
1	272.3	161.7	116.9	2,063	11.3

Output is the dollar value of all goods and services produced in the region, including intermediate goods as well as value added.

Gross regional product is the dollar value of all goods and services produced for final demands.

It excludes intermediate goods and services.

Personal income is the total income received by residents from all sources.

* Total figure for employment is measured in terms of person-years of employment.

Columns may not add due to rounding.

Source: Results from the REMI PI+ regional economic forecasting model.

Table 7: Rosemont Copper Project - Engineering/Construction Phase - Total Impacts by Year
United States of America
(Millions 2011\$)

	Output	Gross Domestic Product	Personal Income	Employment	Local Government Revenues
Total*	2,874.0	1,560.3	833.6	18,203	185.1
Annual Average	718.5	390.1	208.4	4,551	46.3
Year					
Engineering/Construction Phase					
PP3	328.1	174.0	97.2	2,094	21.4
PP2	370.0	199.3	102.6	2,344	23.0
PP1	1,720.0	941.5	485.8	11,000	108.7
Production Phase					
1	455.9	245.6	148.0	2,766	32.0

Output is the dollar value of all goods and services produced in the region, including intermediate goods as well as value added.

Gross regional product is the dollar value of all goods and services produced for final demands excluding intermediate goods and services. Personal income is total income received by residents from all sources.

* Total figure for employment is measured in terms of person-years of employment. Columns may not add due to rounding.

Source: Results from the REMI PI+ regional economic forecasting model.

3.2.2 Production/Post-Production Phase

The economic benefits associated with the operation of the Rosemont Mine will be much larger in scale than those generated by its construction for all three levels of geography.

3.2.2.A Cochise/Pima/Santa Cruz Counties

Production activities will generate an average annual increase of \$1.2 billion in economic activity (measured in terms of incremental regional output) within the three-county study area and will provide an average of 3,778 jobs for area residents. The wages and salaries and non-labor income produced by the economic activity will provide an average of \$232 million per year in additional income to area residents and \$26 million per year in incremental revenues to local governments in the study area. (All measured over the 21-year production period.) Over the entire production/post-production period, these impacts are equivalent to \$26 billion in additional output, \$15.8 billion in gross regional product, \$5.2 billion in personal income, 83,549 person-years of employment and \$566 million in local government revenues (Table 8).

3.2.2.B The State of Arizona

Production activities will generate an average annual increase of \$1.4 billion in economic activity (measured in terms of incremental output) within the State of Arizona and will provide an average of 4,581 jobs for state residents. The wages and salaries and non-labor income produced by the economic activity will provide an average of \$322 million per year in additional income to state residents and \$46 million per year in incremental state government revenues. (All measured over the 21-year production period.) Over the entire production/post-production period, these impacts are equivalent to \$31.7 billion in additional output, \$19.2 billion in gross regional product, \$7.3 billion in personal income, 101,622 person-years of employment, and \$994 million in state government revenues (Table 9).

Table 8: Rosemont Copper Project - Production/Post-Production Phase - Total Impacts by Year
Cochise/Pima/Santa Cruz Counties Study Area
(Millions 2011\$)

	Output	Gross Regional Product	Personal Income	Employment	Local Government Revenues
Total	26,015.1	15,815.7	5,246.2	83,549	566.1
Annual Average*	1,182.4	721.8	232.3	3,778	25.7
Year					
Engineering/Construction Phase					
PP3	10.9	6.7	2.0	58	0.4
PP2	151.3	92.9	41.5	1,021	5.8
PP1	391.7	240.6	89.6	2,314	15.0
Production Phase					
1	322.0	192.3	101.7	2,300	9.8
2	596.6	378.2	165.1	3,523	23.9
3	1,465.3	940.4	203.5	4,164	27.3
4	1,366.4	848.3	196.6	3,771	25.2
5	1,244.4	764.6	217.9	4,023	26.5
6	1,236.0	742.6	217.0	3,863	25.5
7	1,192.6	724.7	242.8	4,273	27.9
8	1,271.9	772.6	237.8	4,048	27.3
9	1,291.4	787.3	249.8	4,204	28.4
10	1,316.5	803.0	254.7	4,204	28.4
11	1,359.1	826.8	270.0	4,427	29.7
12	1,343.6	799.3	259.9	4,147	28.4
13	1,204.9	704.6	246.8	3,810	26.5
14	1,114.9	665.0	258.0	3,958	27.4
15	1,239.4	746.0	266.1	4,042	28.2
16	1,282.5	774.2	262.7	3,889	27.8
17	1,247.9	759.3	253.2	3,623	26.9
18	1,206.0	757.7	252.6	3,527	27.0
19	1,254.1	789.7	260.1	3,591	27.5
20	1,221.8	754.0	248.1	3,295	26.0
21	1,053.9	627.8	215.0	2,654	14.7
Post-Production Phase					
22	590.5	286.6	91.0	443	2.6
23	29.3	21.1	77.3	258	1.4
24	10.1	9.4	65.6	119	0.7

Output is the dollar value of all goods and services produced in the region, including intermediate goods as well as value added. Gross regional product is the dollar value of all goods and services produced for final demands. It excludes intermediate goods and services. Personal income is the total income received by residents from all sources. Columns may not add due to rounding.

*Annual average values refer to years 1 - 21 when full production activity will occur.

Source: Results from the REMI PI+ regional economic forecasting model.

Table 9: Rosemont Copper Project - Production/Post-Production Phase - Total Impacts by Year

State of Arizona (Millions 2011\$)					
	Output	Gross Regional Product	Personal Income	Employment	State Government Revenues
Total	31,688.0	19,183.7	7,260.6	101,622	993.8
Annual Average*	1,436.8	871.7	321.6	4,581	46.1
Year					
Engineering/Construction Phase					
PP3	14.7	9.1	3.0	69	0.4
PP2	199.1	121.8	55.5	1,176	5.3
PP1	524.2	320.3	125.1	2,666	13.8
Production Phase					
1	511.6	302.5	165.5	2,990	9.2
2	829.6	514.3	244.3	4,380	22.1
3	1,708.7	1,082.8	286.6	4,997	49.3
4	1,603.5	987.4	279.8	4,602	36.4
5	1,499.0	914.4	307.8	4,893	37.3
6	1,489.6	892.2	307.3	4,735	28.8
7	1,451.3	877.4	334.1	5,111	50.3
8	1,524.4	921.8	327.0	4,853	53.4
9	1,551.9	941.3	340.8	5,014	55.9
10	1,576.2	956.4	345.5	4,998	57.1
11	1,635.1	990.0	365.5	5,263	58.0
12	1,623.5	964.6	357.9	5,003	50.9
13	1,477.5	865.7	343.0	4,662	41.8
14	1,391.0	828.2	354.9	4,802	50.6
15	1,520.0	912.2	364.6	4,889	55.4
16	1,558.1	937.6	360.4	4,718	55.0
17	1,508.6	914.7	346.5	4,406	52.7
18	1,448.7	903.3	338.9	4,237	57.0
19	1,499.3	937.0	347.0	4,298	57.5
20	1,464.7	899.9	336.0	4,009	50.7
21	1,278.5	762.9	299.2	3,339	38.2
Post-Production Phase					
22	661.5	332.1	126.1	717	2.0
23	82.4	55.3	106.3	478	3.9
24	55.3	38.6	92.0	320	0.6

Output is the dollar value of all goods and services produced in the region, including intermediate goods as well as value added. Gross regional product is the dollar value of all goods and services produced for final demands. It excludes intermediate goods and services. Personal income is the total income received by residents from all sources. Columns may not add due to rounding.

*Annual average values refer to years 1 - 21 when full production activity will occur.

Source: Results from the REMI PI+ regional economic forecasting model.

3.2.2.C The United States

Production activities will generate an average annual increase of \$2.5 billion in economic activity for the nation and will provide an average of 9,043 jobs for U.S. residents. The wages and salaries and non-labor income produced by the economic activity will provide an average of \$552 million per year in additional income to U.S. residents and \$235 million per year in incremental revenues for the federal government. (All measured over the 21-year production period.) Over the entire production/post-production period, these impacts are equivalent to \$55.3 billion in additional output, \$31.2 billion in gross domestic product, \$12.1 billion in personal income, 196,813 person-years of employment, and \$5.1 billion in federal government revenues (Table 10).

4. Concluding Observations

4.1 Population Changes

Unlike most other regional economic impact models, REMI is a dynamic model that produces integrated multiyear forecasts and accounts for dynamic feedbacks among its economic and demographic variables. As such, it provides forecasts of the demographic impacts of the development and operation of the Rosemont mine in addition to forecasts of economic variables.

The results of the analysis indicate that net migration into the Cochise/Pima/Santa Cruz Counties study area will increase by more than 400 per year in the early years of operation and then lessen, with an annual average net migration figure of about 160 over the entire 21-year production period. This increase in net migration would mean that the population of the study area would be approximately 2,200 larger after five years and more than 3,000 larger by the end of the production period compared with a situation in which the Rosemont Copper Project was not developed.

Table 10: Rosemont Copper Project - Production/Post-Production Phase - Total Impacts by Year
United States of America
(Millions 2011\$)

	Output	Gross Domestic Product	Personal Income	Employment	Federal Government Revenues
Total	55,309.1	31,245.7	12,120.6	196,813	5,070.4
Annual Average*	2,520.1	1,429.3	552.3	9,043	235.3
Year					
Engineering/Construction Phase					
PP3	41.8	20.9	10.77	188	2.4
PP2	431.7	240.1	106.03	2,266	24.7
PP1	1,303.8	710.2	296.52	6,328	70.0
Production Phase					
1	1,129.8	606.7	312.97	5,875	69.5
2	1,802.9	1,008.6	486.97	8,984	118.0
3	3,019.0	1,764.4	647.89	11,656	264.1
4	2,637.0	1,522.3	539.64	9,563	196.6
5	2,560.8	1,461.6	555.74	9,813	200.3
6	2,387.3	1,346.8	476.33	8,547	153.2
7	2,632.7	1,490.6	589.57	10,531	257.0
8	2,743.3	1,552.6	592.64	10,328	271.6
9	2,831.9	1,607.2	628.54	10,734	285.8
10	2,840.7	1,611.2	623.69	10,469	289.0
11	2,945.2	1,667.3	656.93	10,797	295.3
12	2,801.2	1,570.9	614.64	9,703	261.4
13	2,481.5	1,375.8	522.53	8,359	212.8
14	2,517.7	1,404.7	567.06	9,031	255.7
15	2,716.2	1,527.0	589.69	9,453	276.8
16	2,718.0	1,533.4	577.44	9,016	273.7
17	2,590.9	1,470.2	562.91	8,266	263.5
18	2,538.0	1,466.7	578.77	8,109	283.5
19	2,591.2	1,505.6	587.03	8,109	285.2
20	2,430.4	1,392.4	503.54	7,172	246.3
21	2,005.5	1,129.8	384.48	5,391	182.7
Post-Production Phase					
22	571.1	258.8	10.34	-672	2.1
23	44.0	13.2	49.65	-500	21.5
24	-4.4	-13.2	48.28	-703	7.9

Output is the dollar value of all goods and services produced in the region, including intermediate goods as well as value added. Gross regional product is the dollar value of all goods and services produced for final demands. It excludes intermediate goods and services. Personal income is the total income received by residents from all sources. Columns may not add due to rounding.

*Annual average values refer to years 1 - 21 when full production activity will occur.

Source: Results from the REMI PI+ regional economic forecasting model.

Similarly, the results of the state-level analysis indicate that net migration into Arizona will increase by more than 680 per year in the early years of operation and then lessen, with an annual average net migration figure of about 250 over the entire 21-year production period. This increase in net migration would mean that the state's population would be approximately 3,650 larger after five years and 5,200 larger by the end of the production period compared with a situation in which the Rosemont Copper Project had not been developed.

4.2 Residual Impacts

Results from the REMI forecasts of economic activity for the years after the closure of the mine show that the Rosemont Copper Project would have lasting effects on the economy of the three-county study area over and above the impacts during its 27-year "active" period. Permanent changes to the business community, to the labor market, to local governments, and to many other aspects of the local economy would occur as a result of the development and operations of the Rosemont mine. These changes will result in residual economic impacts in the Cochise/Pima/Santa Cruz Counties area. The forecast results indicate that the level of economic activity would be \$29 million per year higher, area residents' income \$69 million per year higher, employment more than 227 higher, and local government revenues \$8 million per year higher than if the Rosemont Copper Project had never existed. Annual figures for each of these measures for the ten years after closure are listed in Table 11.

The REMI state-level forecast for years after the closure of the mine show that the Rosemont Copper Project would also have similar lasting effects on the Arizona economy. Permanent changes to the business community, to the labor market, to the state government, and to many other aspects of the Arizona economy would occur as a result of economic activity induced by the development and operation of the Rosemont mine, and these changes would result in residual economic impacts within Arizona. The state-level forecast results indicate that the level of economic activity would be \$78 million per year higher, the state residents' income \$103 million per year greater, employment 455 higher, and state government revenues \$12 million per year higher than if the Rosemont Copper Project had never existed. Annual figures for each of these measures for the ten years after the end of operations are provided in Table 12. Results from the REMI national forecast do not show similar lasting effects for the overall U.S. economy.

Table 11: Rosemont Copper Project - Residual Impacts by Year
Cochise/Pima/Santa Cruz Counties Study Area
(Millions 2011\$)

	Output	Gross Regional Product	Personal Income	Employment	Local Government Revenues
Total*	291.4	212.9	693.7	2,266	82.3
Annual Average	29.1	21.3	69.4	227	8.2
Year					
Post-Closure					
25	10.1	9.4	65.6	119	11.1
26	4.9	6.0	60.2	81	9.9
27	9.2	8.6	59.9	107	9.1
28	16.1	12.9	61.6	149	8.4
29	24.1	18.0	64.5	199	8.0
30	32.1	23.1	68.2	246	7.6
31	39.6	27.9	72.2	290	7.3
32	46.2	32.1	76.4	328	7.1
33	52.0	35.8	80.5	360	7.0
34	56.9	39.0	84.7	386	6.8

Output is the dollar value of all goods and services produced in the region, including intermediate goods as well as value added. Gross regional product is the dollar value of all goods and services produced for final demands. It excludes intermediate goods and services. Personal income is the total income received by residents from all sources.

*Total figures refer to the sum of years 25-34. Residual impacts would continue after year 34.

Columns may not add due to rounding.

Source: Results from the REMI PI+ regional economic forecasting model.

Table 12: Rosemont Copper Project - Residual Impacts by Year
State of Arizona
(Millions 2011\$)

	Output	Gross Regional Product	Personal Income	Employment	State Government Revenues
Total*	777.1	530.1	1,029.6	4,554	120.8
Annual Average	77.7	53.0	103.0	455	12.1
Year					
Post-Production Phase					
25	34.8	26.3	82.5	222	14.9
26	40.2	29.5	83.4	258	13.8
27	50.4	35.8	87.3	317	13.0
28	62.8	43.4	92.4	385	12.3
29	74.9	51.1	98.3	449	11.8
30	86.3	58.2	105.2	507	11.5
31	96.3	64.8	111.4	556	11.2
32	104.5	69.8	117.5	594	11.0
33	110.9	73.8	123.0	622	10.7
34	116.0	77.4	128.6	644	10.6

Output is the dollar value of all goods and services produced in the region, including intermediate goods as well and value added (compensation and profit). Gross regional product is the dollar value of all goods and services produced for final demands. It excludes intermediate goods and services. Personal income is the total income received by residents from all sources.

*Total figures refer to the sum of years 25-34. Residual impacts would continue after year 34.

Columns may not add due to rounding.

Source: Results from the REMI PI+ regional economic forecasting model.

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TECHNICAL APPENDIX

A1. Economic Impact Analysis Using the REMI Model

This study used the REMI PI+ regional forecasting model to produce numeric estimates of the economic impacts associated with the construction, operation, and closure of the Rosemont mine. The general method for estimating impacts using the REMI model involves 4 steps:

1. Preparation of a baseline or control forecast for the study area – this baseline scenario provides a forecast of the future path of the study area’s economy based on a combination of the extrapolation of current economic conditions and an exogenous forecast of relevant economic variables without any changes in public policy or other external factors.
2. Development of a policy scenario – this policy scenario describes the direct effects that the event(s) – in this case the construction, operation, and closure of the Rosemont mine would have on the study area’s economy.
3. Preparation of a forecast simulation of the area economy based on the policy scenario – this alternative forecast provides a forecast of the future path of the area economy incorporating the effects of the changes specified in the policy scenario.
4. Comparison of the baseline and policy scenario forecasts – the differences between the future values of each variable in the forecasts provide numeric estimates of the nature and magnitudes of the economic impacts of Rosemont Copper Project on the study area.

A2. The REMI Model

REMI is an economic-demographic forecasting and simulation model developed by Regional Economic Models Inc. REMI is designed to forecast the impact of public policies and external events on an economy and its population. The REMI model is recognized by the business and academic community as the leading regional forecast/simulation tool available. A complete explanation of the model and discussion of the empirical estimation of the parameters/equations are given in *Regional Economic Modeling: A Systematic Approach to*

Economic Forecasting and Policy Analysis (Treyz), Introduction to PI+: The Next Generation of Policy Insight (REMI), and PI+ version 1.3 (REMI).

The REMI models used for this analysis were all versions of Policy Insight Model PI+ Version 1.3.5 leased from Regional Economic Models Inc. by a consortium of State agencies, including Arizona State University, for economic forecasting and policy analysis.

A3. Updating of the Baseline or Control Forecast

The PI+ v 1.3 models were delivered with national and local datasets containing data through 2009 and also with national and local baseline forecasts prepared by Regional Economic Models Inc. The REMI model incorporates procedures for updating the datasets and the baseline forecasts with more recent data. The research team performed these procedures to prepare updated baseline forecasts for this study. In practice, the methodology requires first updating the national baseline forecast since forecast values of national economic variables are important inputs to the state-level and county-level forecasts.

The national forecast was updated by using 2010 data from the U.S. Bureau of Economic Analysis and forecast data for the 2011-2019 period from the latest available Global Insight national forecast (September 2011). The baseline forecast of the Arizona model was updated based on 2010 employment data from the Arizona Department of Administration.

A4. Definition of the Local Study Area

REMI is a county-based model, so that the study area must be defined in terms of one or more Arizona counties. The site on which the Rosemont Copper Project is being developed is located in Pima County southeast of the Tucson urbanized area, near the border with Santa Cruz County, and also in relatively close proximity to Cochise County. The approved bounds of analysis for the environment impact assessment have been defined by the U.S. Forest Service to include three counties – Cochise, Pima, and Santa Cruz Counties. Based on this definition, the combined three-county region was specified as the study area for the county-level REMI economic impact analysis.

A5. Definition of the Study Period

REMI is a dynamic model that produces integrated multiyear forecasts. The analysis of the economic impacts of the Rosemont Copper Project has employed this feature of the model. The feasibility study provides annual information relating to both capital and operating costs for the projected lifetime of the Project. The timeline for the Project in the study includes three pre-production years (designated years PP3 through PP1 in this report), a production period of 21 years (designated years 1 through 21), and a post-production period of three years (years 22 through 24). The first year of the post-production period (Year 22) includes some production activity during the first part of the year. The economic impact analysis of the construction phase provides estimates of the impacts over the four-year engineering/construction period specified in the feasibility study (year PP3 to year 1). The analysis of the production/post-production phase encompasses a 27-year period (years PP3 through year 24).

The REMI model requires specification of calendar year time periods for its forecast process. Based on a timeline on the Rosemont Copper Project website, the study period starting date (PP3) was assumed to be 2011.

A6. Calculation of the Direct Impacts

All of the estimates of the direct impacts of the Rosemont Copper Project were based on the economic and financial information supplied by Rosemont Copper.

The REMI model requires input data in very specific formats. In particular, the data must conform to the 70 economic sectors in the model. Data provided by Rosemont Copper was by broad categories, and in some cases the economic data were not sufficiently detailed to be used directly as inputs for the REMI model. Detailed data from REMI's direct requirements table were used to convert the information into a form usable by the model. The direct requirements coefficients for each industry specify the dollar amount of inputs from each supplying industry needed to produce a dollar of industry output.

A7. Government Revenues

Estimates of revenues received by each of the three levels of government from Rosemont Copper operations were based on tax information provided directly by Rosemont Copper. The share of state transactions privilege tax, severance tax, and income tax collections distributed to the area local governments was calculated from data in the Arizona Department of Revenue *FY2011 Annual Report*.

Estimates of revenues received by area local governments and the state government as a result of the incremental economic activity induced by Rosemont Copper operations and/or construction activities were based on ratios of collections per dollar of gross regional product calculated from data obtained from the U.S. Census Bureau's *State and Local Government Finances database*. Estimates of revenues received by the federal government as a result of the incremental economic activity induced by Rosemont Copper operations and/or construction activities were based on ratios of collections per dollar of gross domestic product calculated from data obtained from the U.S. Census Bureau's *2011 Statistical Abstract*.